Plymouth Reservoir Questions and Answers, 2015 CSLAP

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

A1. Water clarity was lower due to higher nutrient and algae levels. This has been part of a longer trend. However, the lake does not appear to be any more susceptible to blue green algae blooms.

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

A2. Chloride sampling results were typical of lakes with few (if any) impacts from road salt runoff, and no such impacts have been reported or measured. The phosphorus sampling results might be higher than expected due to a bottle contamination issue, although higher readings are consistent with higher algae levels and lower clarity.

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

A3. Plymouth Reservoir had lower water clarity, and higher nutrient levels and algae levels, than other nearby lakes. Aquatic plant coverage was slightly lower than in nearby lakes; the latter may be in response to the grass carp stocking.

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

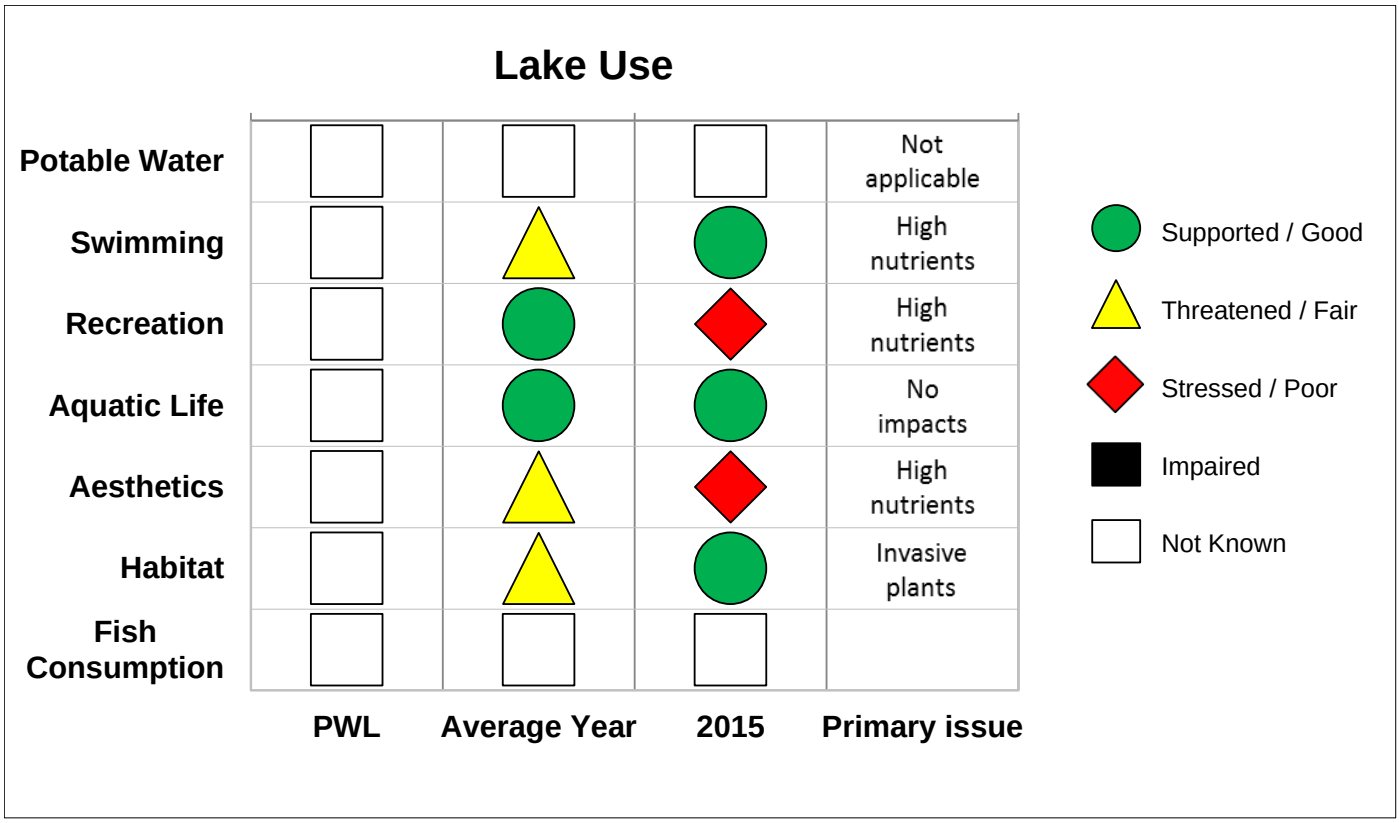
A4. Aquatic plant coverage has been lower than usual in the last decade, due to the grass carp stocking. This has resulted in slightly more favorable recreational assessments over the same period. It is not known if this contributed to a reduction in water clarity and occasionally high algae levels.

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

A5. Although algae levels are at times elevated and water clarity can be depressed, shoreline algae blooms have not been reported. However, the phosphorus levels measured in 2014 and 2015 are typical of some lakes with shoreline blooms, so lake residents are advised to be on the lookout for (and should report) any shoreline algae blooms. .

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

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

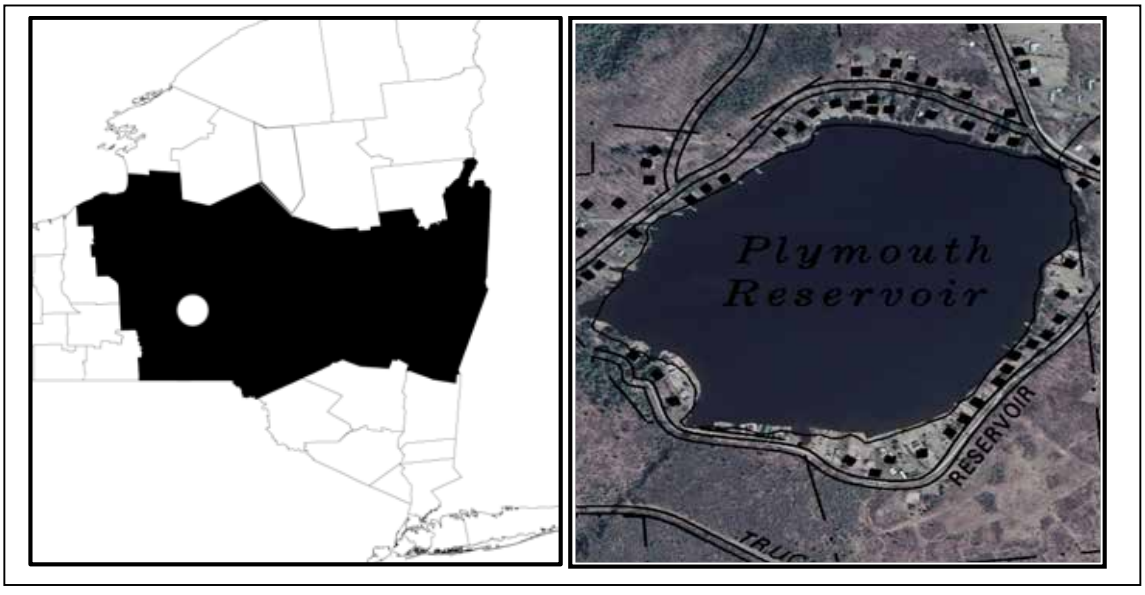


CSLAP 2015 Lake Water Quality Summary: Plymouth Reservoir

General Lake Information

Location	Town of Plymouth
County	Chenango
Basin	Susquehanna River
Size	31.1 hectares (76.8 acres)
Lake Origins	Augmented by 20ft by 150ft rockfill dam (1827)
Watershed Area	434 hectares (1,072 acres)
Retention Time	0.2 years
Mean Depth	1.3 meters
Sounding Depth	3.1 meters
Public Access?	no
Major Tributaries	no named tribs
Lake Tributary To…	Reservoir Creek to Canasawacta Creek to Chenango River to Susquehanna River
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	42.590
Lake Outlet Longitude	-75.647
Sampling Years	1991-2010, 2012-2015
2015 Samplers	Rena Doing and Paul Simack
Main Contact	Rena Doing

Lake Map



Background

Plymouth Reservoir is a 77 acre, class B lake found in the Town of Plymouth in Chenango County, in the Southern Tier region of New York State. The lake was first sampled as part of CSLAP in 1991.

It is one of eight CSLAP lakes among the more than 150 lakes and ponds found in Chenango County, and one of 25 CSLAP lakes among the nearly 900 lakes and ponds in the Susquehanna River drainage basin.

Lake Uses

Plymouth Reservoir 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, aquatic life, and aesthetics. The lake is used by lake residents for swimming, low power boating and other recreation via shoreline properties; the public does not have access to the lake.

Plymouth Reservoir has not been stocked through any state fisheries stocking programs. The lake association conducts some stocking.

General statewide fishing regulations are applicable in Plymouth Reservoir. In addition, open season on trout is April 1st through October 15th, with no minimum size. There is a daily limit of five trout, with no more than two longer than 12 inches and no more than five brook trout under eight inches.

Historical Water Quality Data

CSLAP sampling was conducted on Plymouth Reservoir from 1991 to 2010 and in 2012 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 Plymouth Reservoir can also be found on the NYSDEC web page at http://www.dec.ny.gov/lands/77879.html.

The lake was sampled as part of the state Lake Biomonitoring pilot project (as part of the state Lake Classification and Inventory study, or LCI) conducted by the NYSDEC in 2008. Most of these readings are comparable between the programs—water clarity readings were slightly higher in the LCI (but similar to those at other times of the year), but so were chlorophyll *a* readings, and phosphorus levels were slightly lower. Each of the other water quality indicators was comparable in both monitoring programs. The depth profiles show fully oxygenated conditions to the lake bottom. Chloride readings are very low and suggest little impact from any road deicing operations. The biological samples collected as part of this program will continue to be analyzed, and the preliminary results are discussed in the statewide report.

Plymouth Reservoir was not sampled through any of the major NYS monitoring programs prior to the initiation of CSLAP in 1991. It is not known if monitoring was conducted by other agencies in support of fisheries management activities or other lake management concerns at the lake.

Neither the Plymouth Reservoir inlets nor Reservoir Creek (the outlet) has been monitored through the NYSDEC Rotating Intensive Basins (RIBS) program or the state stream macroinvertebrate monitoring program.

Lake Association and Management History

Plymouth Reservoir is served by the Plymouth Reservoir Lot Owners Association. The lake association is involved in a variety of lake management activities, including:

- Manages maintenance and upkeep of dam and sluiceways
- Oversees stocking and water management program
- Conducts annual meeting and social events

It is not known if the Plymouth Reservoir Lot Owners Association maintains a website.

Summary of 2015 CSLAP Sampling Results

Evaluation of 2015 Annual Results Relative to 1991-2014

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 – Plymouth Reservoir" section in Appendix C.

Evaluation of Eutrophication Indicators

Water clarity readings were slightly lower than usual in 2015, as part of a longer-term trend since the late 1990s. This is consistent with higher than normal phosphorus readings and (slightly) higher algae levels. The higher phosphorus readings were also part of an increase since the late 1990s, although algae levels have been variable from year to year. The unusually high phosphorus readings in 2015 may also represent a bottle contamination issue seen in some other CSLAP lakes.

Phosphorus readings decrease slightly from June through September, and decrease substantially in October during the typical sampling season. This resulted in an increase in water clarity over the same period, although the drop in algae levels was only apparent in the fall. This was also apparent in 2015, although these seasonal changes were small.

The lake can usually be characterized as *mesoeutrophic*, or moderately productive, based on total phosphorus (consistent with *eutrophic* lakes), chlorophyll *a*, and water clarity readings (the latter indicative of *mesotrophic* lakes). However, these indicators were typical of *eutrophic* lakes in 2014 and 2015. The trophic state indices (TSI) evaluation suggests that each of these trophic indicators is "internally consistent"—each of these indicators is in the expected range given the readings of the other 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 higher algae levels were apparent in 2014 and 2015. However, the lake is not used for drinking water. Plymouth Reservoir is not thermally stratified, at least on a consistent basis, so deepwater samples have not been collected in the lake (and deepwater intakes to avoid surface algae-enriched waters are not possible). Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Each of the limnological indicators (nitrogen, pH, conductivity, color, and calcium) was close to normal in 2014, and none of these indicators has exhibited any clear long-term trends (although nitrogen to phosphorus ratios may have dropped slightly). It is likely that the small changes in each of the limnological indicators have been within the normal range of variability in the lake.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 5 to 12 mg/l. These values fall within the range of "minor" road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l and below the range of values found in most NYS lakes. These readings suggest a low likelihood of biological impacts from road salt. Additional data will help to determine if these represent normal readings for the lake.

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

Evaluation of Biological Condition

The fluoroprobe screening data analyzed by SUNY ESF in the last few years found both low algae levels and a low percentage of blue green algae, and no shoreline blooms have been reported or sampled. The open water samples contained a mix of algae species.

Macrophyte surveys conducted through CSLAP showed a moderately high number of aquatic plants, and at least one exotic plant species (*Myriophyllum spicatum*, Eurasian watermilfoil) has been found in the lake. The modified floristic quality index (FQI) data indicate "fair" aquatic plant diversity, although it is not known if the aquatic plant population has changed significantly since the grass carp stocking. The composition of the fish community in the lake has not been reported, although it is known that largemouth bass are found in the lake.

Plymouth Reservoir was among 12 New York state lakes sampled as part of the lake biomonitoring study in 2008. These results are discussed in the statewide CSLAP report, and found a high number of macroinvertebrate taxa, a high number of macroinvertebrate taxa (COTE, *Coleoptera*, *Odonate*, *Tricoptera*, and *Ephemeroptera*) associated with good water quality, a relatively high Hilsenhoff biotic index (HBI), suggesting tolerant macroinvertebrate species and a high diversity of organisms.

Zooplankton surveys have not been conducted through CSLAP at Plymouth Reservoir.

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

Evaluation of Lake Perception

Aquatic plant coverage has decreased over the last twenty years, perhaps a continuing response to the grass carp stocking. This may have contributed to more favorable recreational assessments over this period, despite lower water clarity and higher algae levels in recent years. The lower weed growth and more favorable recreational assessments were part of a long-term trend. 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 close to normal in 2015, despite slightly lower air temperatures. Water temperatures have increased slightly over the last two decades, although this increase may not be statistically significant. It is not known if this is an indication of the lack of local climate change or if these changes cannot be well evaluated through CSLAP.

Evaluation of Algal Toxins

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Fluoroprobe readings indicate open water levels below the criteria for harmful algal blooms (HABs). An analysis of algae samples indicated microcystin levels below the levels needed to support safe swimming, and no shoreline blooms have been reported. However, lake residents and pets should continue to avoid exposure to any shoreline blooms or heavily discolored water.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	0.95	2.01	3.40	1.45	Mesotrophic	Lower Than Normal	Decreasing Slightly
	Chlorophyll *a*	0.82	7.20	58.10	9.18	Mesotrophic	Within Normal Range	No Change
	Total Phosphorus	0.001	0.020	0.059	0.033	Eutrophic	Higher than Normal	No Change
Potable Water Indicators	Hypolimnetic Ammonia							Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus							Not known
	Nitrate + Nitrite	0.00	0.02	0.51	0.01	Low NOx	Within Normal Range	No Change
	Ammonia	0.00	0.03	0.27	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.07	0.45	0.78	0.49	Low Total Nitrogen	Within Normal Range	No Change
	pH	5.59	7.52	8.98	7.64	Alkaline	Within Normal Range	No Change
	Specific Conductance	21	46	71	49	Softwater	Within Normal Range	No Change
	True Color	11	31	88	31	Intermediate Color	Within Normal Range	No Change
	Calcium	2.9	6.2	8.7	5.8	Not Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	2.2	4	2.1	Not Quite Crystal Clear	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.2	4	2.1	Subsurface Plant Growth	Within Normal Range	Slightly Improving
	Recreational Assessment	1	2.2	4	2.1	Excellent	Within Normal Range	Slightly Improving
Biological Condition	Phytoplankton					Open water-low blue green algae biomass	Not known	Not known
	Macrophytes					Fair quality of aquatic plant community	Not known	Not known
	Zooplankton					Not evaluated through CSLAP	Not known	Not known
	Macroinvertebrates					High diversity of tolerant organisms	Not known	Not known
	Fish					Little information available for report	Not known	Not known
	Invasive Species					Eurasian watermilfoil	Not known	Not known

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Local Climate Change	Air Temperature	7	21.4	31	20.1		Within Normal Range	No Change
	Water Temperature	11	20.9	27	21.6		Within Normal Range	No Change
Harmful Algal Blooms	Open Water Phycocyanin	1	24	230	9	Most readings indicate low risk of BGA	Not known	Not known
	Open Water FP Chl.a	2	5	10	5	No readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	1	3	0	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	<DL	0.9	<DL	Low to undetectable open water microcystins	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a					No shoreline blooms sampled for FP	Not known	Not known
	Shoreline FP BG Chl.a					No shoreline blooms sampled for FP	Not known	Not known
	Shoreline Microcystis					No shoreline bloom MC-LR data	Not known	Not known
	Shoreline Anatoxin a					No shoreline bloom anatoxin data	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Plymouth Reservoir is listed on the 2009 Susquehanna River drainage basin Priority Waterbody List (PWL), with public bathing and recreation listed as *stressed*. The PWL listing for Plymouth Reservoir is listed in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Plymouth Reservoir, 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.

Public Bathing

The CSLAP dataset at Plymouth Reservoir, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if supported at a public swimming beach, should be supported, although this use at times may be *threatened* by excessive nutrients and low water clarity. 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 Plymouth Reservoir, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *stressed* by excessive nutrients (particularly given the higher readings in 2015), and may be *threatened* by the presence of an exotic plant species (Eurasian watermilfoil). These impacts have been substantially reduced in response to the grass carp stocking (and were not apparent in the last several years).

Aquatic Life

The CSLAP dataset on Plymouth Reservoir, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life should be fully

supported, although this use may be *threatened* by the presence of Eurasian watermilfoil. Additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Plymouth Reservoir, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *poor* due to elevated nutrients and their associated connection to elevated algae levels and poor clarity. This use may also be *threatened* by excessive weeds. Habitat may be *fair* due to invasive weeds (Eurasian watermilfoil).

Fish Consumption

There are no fish consumption advisories posted for Plymouth Reservoir.

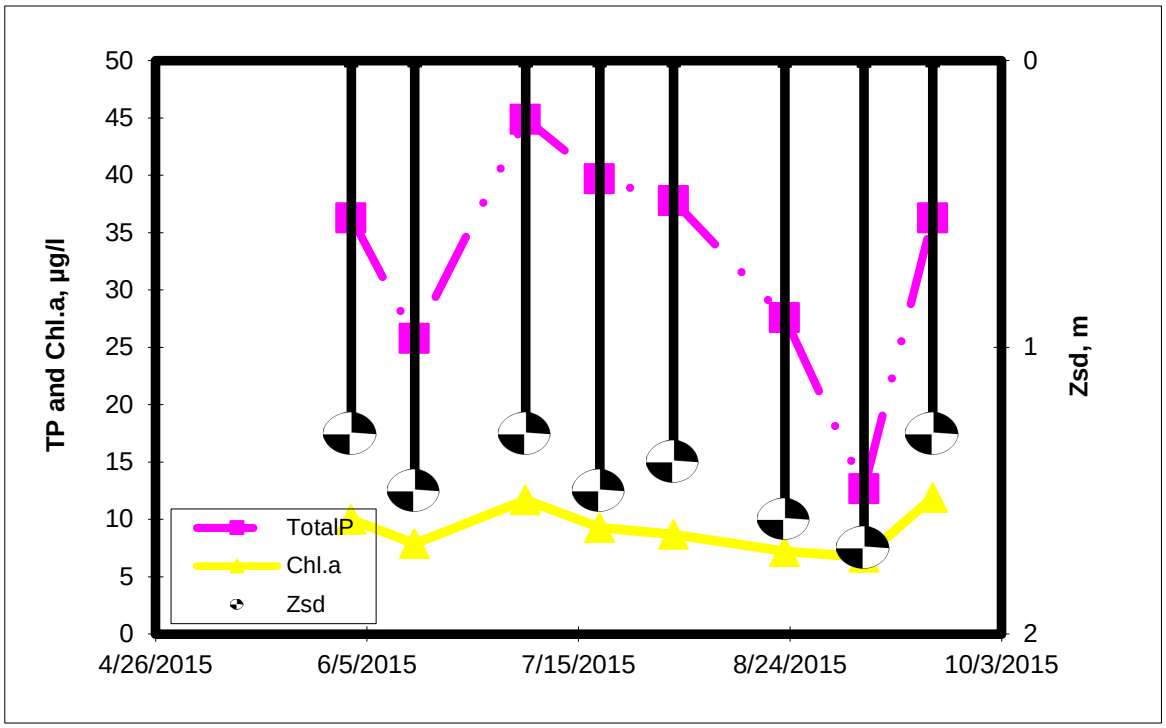
Additional Comments and Recommendations

The continued evaluation of the 2008 lake biomonitoring survey results and the floristic quality index will help to determine if aquatic life in the lake has been compromised by excessive nutrients or other stressors. Lake residents should continue to report and avoid exposure to any surface scums or heavily discolored water.

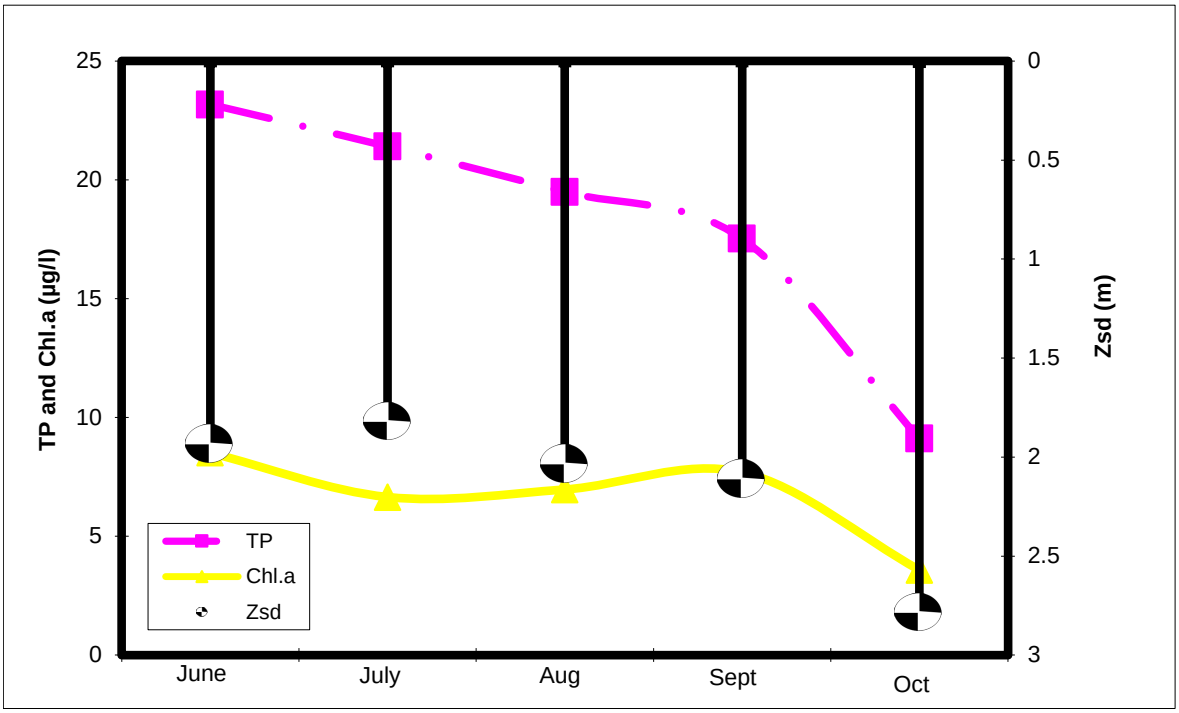
Aquatic Plant IDs-2015

None submitted for identification in 2015.

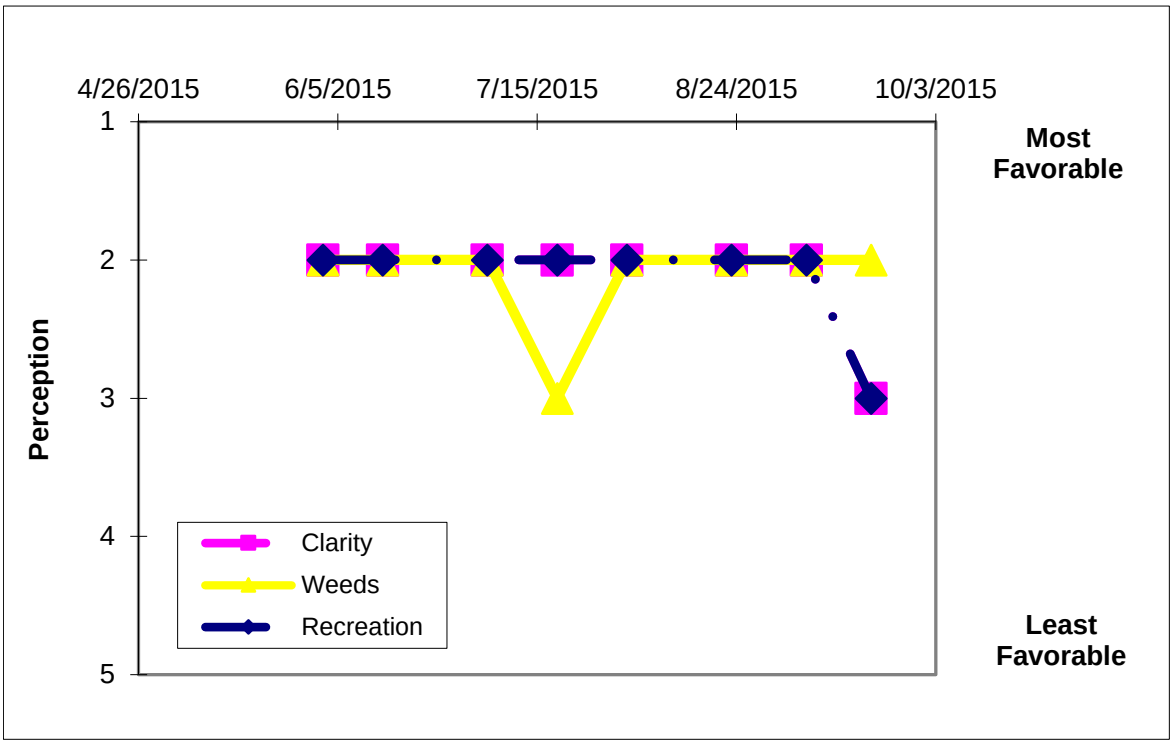
Time Series: Trophic Indicators, 2015



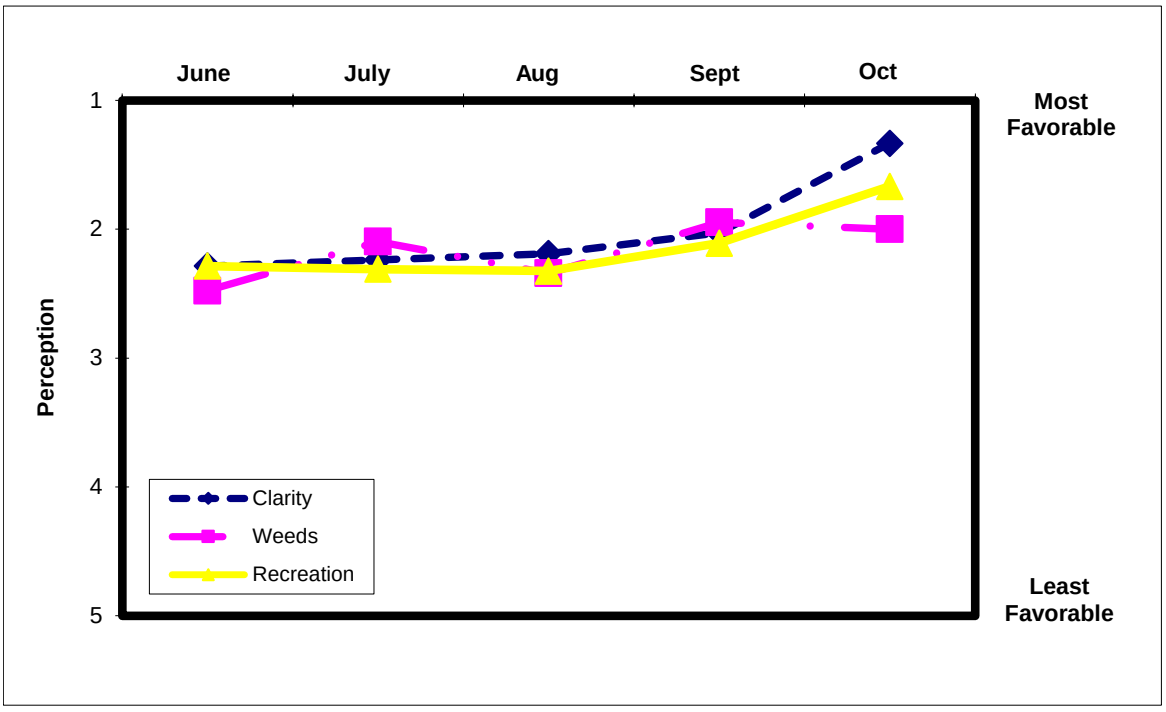
Time Series: Trophic Indicators, Typical Year (1991-2015)



Time Series: Lake Perception Indicators, 2015



Time Series: Lake Perception Indicators, Typical Year (1991-2015)



Appendix A- CSLAP Water Quality Sampling Results for Plymouth Reservoir

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH3	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
90	Plymouth R	6/28/1991	2.8	1.75	1.5	0.020	0.01				29	5.59	55		6.47	
90	Plymouth R	7/14/1991	2.6	1.98	1.5	0.024	0.01				24	7.24	46		2.98	
90	Plymouth R	7/28/1991	2.5	2.50	1.5	0.017	0.01				20	7.47	21		3.78	
90	Plymouth R	8/11/1991	2.9	2.70	1.5	0.028	0.01				20	7.66	46		4.39	
90	Plymouth R	8/25/1991	2.6	2.35	1.5	0.019	0.01				19	7.24	45		9.21	
90	Plymouth R	9/8/1991	2.9	2.55	1.5	0.020	0.01				15	7.70	46		2.20	
90	Plymouth R	9/22/1991	2.9	2.90	1.5	0.013	0.01				22	7.62	45		3.05	
90	Plymouth R	10/6/1991	2.5	2.50	1.5		0.01				11				2.29	
90	Plymouth R	6/14/1992	3.0	2.50	1.5	0.017	0.01				29	7.54	47		4.03	
90	Plymouth R	6/28/1992	3.0	2.35	1.5	0.020	0.01				30	6.84	47		4.62	
90	Plymouth R	7/12/1992	3.1	2.30	1.5	0.016	0.01				28	7.58	47		2.12	
90	Plymouth R	7/28/1992	3.0	2.75	1.5	0.020					26	7.20	47		9.72	
90	Plymouth R	8/9/1992	3.0	2.70	1.5	0.014	0.01				35	7.45	45		3.00	
90	Plymouth R	8/23/1992	3.0	2.45	1.5	0.012					35	7.52	42		3.82	
90	Plymouth R	9/5/1992	2.9	2.50	1.5	0.017					29	7.62	45		3.55	
90	Plymouth R	9/25/1992	2.9	2.90	1.5	0.012					29	7.44	44		5.95	
90	Plymouth R	6/13/1993	2.6	2.60	1.5	0.018					18	6.87	40		7.90	
90	Plymouth R	6/27/1993	2.9	2.00	1.5	0.017	0.01				26	7.63	38		5.70	
90	Plymouth R	7/11/1993	2.9	2.35	1.5	0.016					27	7.74	39		5.63	
90	Plymouth R	7/24/1993	3.0	2.18	1.5	0.018	0.01				27	7.48	40		5.85	
90	Plymouth R	8/8/1993	3.0	2.50	1.5	0.017					19	7.67	40		7.95	
90	Plymouth R	8/22/1993	2.9	2.55	1.5	0.012					23	6.90	41		4.23	
90	Plymouth R	9/6/1993	2.9	2.75	1.5	0.012					19	7.45	42		2.27	
90	Plymouth R	9/19/1993	2.9	2.65	1.5	0.012	0.01				16	7.43	42		2.55	
90	Plymouth R	6/12/1994	2.8	2.00	1.5	0.029	0.01				32	7.36	25		16.60	
90	Plymouth R	6/28/1994	3.0	1.50	1.5	0.023					43	7.32	42		14.70	
90	Plymouth R	7/14/1994	3.2	1.35	1.5	0.022	0.01				43	7.42	42		6.30	
90	Plymouth R	7/26/1994	2.7	1.55	1.5	0.022					37	7.58	44		14.40	
90	Plymouth R	8/7/1994	2.8	1.80	1.5	0.018					33	7.54	43		5.04	
90	Plymouth R	8/26/1994	2.8	1.80	1.5	0.026	0.01				45	7.45	42		17.80	
90	Plymouth R	9/6/1994	2.8	1.50	1.4	0.019					40	7.43	43		13.90	
90	Plymouth R	9/25/1994	2.9	2.25	1.5	0.020					28	7.62	39		14.50	
90	Plymouth R	6/25/1995	2.8	2.51	1.5	0.013					20	7.24	48		1.72	
90	Plymouth R	7/2/1995	2.8	2.00	1.5	0.019	0.01				25	7.98	48		7.72	
90	Plymouth R	7/16/1995	3.0	2.00	1.5	0.020	0.01					7.55	47		5.22	
90	Plymouth R	7/30/1995	2.6	1.90	1.5	0.015	0.01				20	7.47	47		3.54	
90	Plymouth R	8/13/1995	2.5	2.50	1.5	0.017	0.01				20	7.41	46		2.00	
90	Plymouth R	8/26/1995	2.8	2.80	1.5	0.010	0.01				20	7.68	47		2.90	
90	Plymouth R	9/10/1995	2.5	2.50	1.5	0.013	0.01				15	7.36	46		2.96	
90	Plymouth R	9/25/1995	2.3	2.30	1.5	0.009	0.01				15	7.36	46		7.17	
90	Plymouth R	7/1/1996	3.0	2.20	1.5	0.019					30	7.28	43		8.10	
90	Plymouth R	8/5/1996	3.1	2.40	1.5	0.017					30	7.70	45		5.30	
90	Plymouth R	9/1/1996	2.8	2.60	1.5	0.010					35	7.46	47		7.46	
90	Plymouth R	10/1/1996	2.8	2.80	2.8	0.010					22	7.42	45		5.31	
90	Plymouth R	6/29/1997	3.0	3.00	1.5	0.015					25	7.57	42		3.84	
90	Plymouth R	7/27/1997	3.0	2.50	1.5	0.018					25	7.77	43		3.85	
90	Plymouth R	8/24/1997	2.9	2.90	1.5	0.011					17	7.57	45		5.94	
90	Plymouth R	9/22/1997		2.90	1.5	0.012					15	7.61	45		3.76	
90	Plymouth R	7/21/1998		2.00	2.5	0.018	0.01				37	7.31	46		7.99	
90	Plymouth R	8/23/1998	3.0	2.30	1.5	0.018					28	7.40	47		4.54	
90	Plymouth R	9/14/1998	3.0	3.00	1.5	0.016	0.01				18	7.49	48		3.52	
90	Plymouth R	10/4/1998	2.9	2.90	1.5	0.008					20	7.43	48		6.21	
90	Plymouth R	7/13/1999	3.0	1.50	1.5	0.015	0.01				24	8.14	49		12.10	
90	Plymouth R	8/10/1999	3.3	1.63	1.5	0.017	0.01				17	7.45	53		6.15	
90	Plymouth R	8/29/1999	2.9	2.00		0.017	0.01				20	7.85	54		16.60	
90	Plymouth R	9/19/1999	3.0	2.50	1.5	0.019	0.14				18	7.91	54		7.10	
90	Plymouth R	8/6/2000	3.0	1.50	1.5	0.025	0.01				34	6.79	51		23.60	
90	Plymouth R	8/20/2000	3.0	1.50	1.5	0.026	0.01				34	6.96	51		14.40	
90	Plymouth R	9/5/2000	3.3	1.80	1.5	0.018	0.01				30	7.62	52		18.60	
90	Plymouth R	9/27/2000	3.0	3.00	1.5	0.026	0.01				30	7.82	50		20.10	
90	Plymouth R	7/8/2001	3.0	2.50	1.5	0.022	0.01				45	7.40	41		16.80	
90	Plymouth R	7/23/2001	3.0	2.50	1.5		0.01				37	8.12	43		4.54	
90	Plymouth R	8/14/2001		2.55	1.5	0.018	0.01				32	6.79	47		5.45	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH3	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
90	Plymouth R	9/16/2001	3.0	3.00	1.5	0.014	0.01				23	6.96	47		7.8	
90	Plymouth R	9/23/2001	3.0	3.00	1.5	0.009					18	7.32	48		3.38	
90	Plymouth R	10/6/2001	3.0	3.00	1.5	0.011	0.01				22	7.05	44		3.04	
90	Plymouth R	10/13/2001	3.0	3.00	1.5	0.009					22	7.55	44		2.88	
90	Plymouth R	10/21/2001	3.0	3.00	1.5	0.012					27	7.60	47		2.72	
90	Plymouth R	6/23/2002	2.8	2.00	1.5	0.023	0.02	0.01	0.55	51.91	69	7.39	45		5.42	
90	Plymouth R	7/14/2002	3.0	1.50	1.5	0.003	0.02	0.04	0.49	348.17	65	7.18	71		4.27	
90	Plymouth R	8/4/2002	3.0	2.50	1.5		0.00	0.01	0.48		22	8.42	50		3.66	
90	Plymouth R	8/12/2002	3.0	2.35	1.5	0.015	0.01	0.01	0.48	71.61	25	8.02	51		3.60	
90	Plymouth R	8/25/2002	2.8	2.30	1.5	0.016	0.05	0.10	0.59	78.48	45	7.51	53	6.5	3.03	
90	Plymouth R	9/3/2002	2.6	2.60	1.5	0.001	0.00	0.01	0.47	716.21					2.98	
90	Plymouth R	9/22/2002	2.8	2.50	1.5	0.013	0.00	0.01	0.43	73.63	29	7.76	50		6.22	
90	Plymouth R	9/29/2002	3.0	3.00	1.5	0.011	0.00	0.05	0.63	126.93	13	7.41	49		3.49	
90	Plymouth R	7/13/2003	3.0	1.25	1.5	0.047	0.00	0.27	0.25	11.81	88	7.4	48	7.0	15.2	
90	Plymouth R	7/20/2003	3.3	1.50	1.5	0.023	0.00	0.02	0.39	37.48	39	7.4	49		7.4	
90	Plymouth R	7/29/2003	3.0	1.50	1.5	0.031	0.01	0.00	0.26	19.06	59	7.2	46		13.1	
90	Plymouth R	8/12/2003	3.2	1.50	1.5	0.025	0.00	0.01	0.35	31.19	43	7.6	46		16.2	
90	Plymouth R	8/19/2003	3.0	1.50	1.5	0.022	0.00	0.02	0.40	40.21	44	7.1	47	7.4	6.3	
90	Plymouth R	8/24/2003	3.0	1.30	1.5	0.027	0.00	0.00	0.46	37.61	84	7.2	50		8.3	
90	Plymouth R	9/7/2003	3.3	1.75	1.5	0.021	0.01	0.03			35	7.4	49		4.4	
90	Plymouth R	9/21/2003	3.0	1.50	1.5	0.027	0.01	0.02	0.31	25.73	27	7.2	49		7.4	
90	Plymouth R	7/5/2004	2.8	1.50	1.5	0.023	0.01	0.01	0.38	37.16	33	5.68	48		4.8	
90	Plymouth R	7/18/2004	3.5	1.25	1.5	0.037	0.01	0.01	0.36	21.44	53	6.51	33		4.7	
90	Plymouth R	7/25/2004	3.0	1.00	1.5	0.041	0.01	0.01	0.21	11.35	46	7.95	48		3.0	
90	Plymouth R	8/1/2004	3.3	1.25	1.5	0.037	0.01	0.01	0.35	20.62	65	7.55	44		14.3	
90	Plymouth R	8/8/2004	3.0	1.30	1.5	0.022	0.02	0.04	0.77	78.14	71	7.28	38	7.5	11.2	
90	Plymouth R	9/6/2004	3.3	1.25	1.5	0.028	0.06	0.01	0.40	32.19		7.83	32		2.2	
90	Plymouth R	9/12/2004	3.3	1.25	1.5	0.026	0.01	0.03	0.45	37.53	55	7.65	43		8.0	
90	Plymouth R	9/26/2004	3.2	1.50	1.5	0.022	0.02	0.03	0.48	47.55	35	7.27	35		2.1	
90	Plymouth R	6/5/2005	3.3	2.00	1.5	0.044	0.12	0.01	0.21	10.75	24	7.20	45	2.9	5.1	
90	Plymouth R	6/26/2005	3.2	1.60	1.5	0.014	0.02	0.06	0.07	10.62	37	7.51	36		3.4	
90	Plymouth R	7/4/2005	3.0	1.50	1.5	0.016	0.01	0.01	0.26	36.57	20	7.52	46		6.8	
90	Plymouth R	7/17/2005	3.8	2.63	1.5	0.026	0.04	0.03	0.31	26.36	26	8.10	44		10.2	
90	Plymouth R	7/31/2005	3.3	1.50	1.5	0.025	0.04	0.02	0.18	15.81	28	7.90	40	5.7	9.3	
90	Plymouth R	8/15/2005	3.0	1.50	1.5	0.029	0.09	0.01	0.35	26.58	22	7.86	49		10.8	
90	Plymouth R	8/28/2005	3.0	2.00	1.5	0.019	0.02	0.01	0.35	40.14	18	7.53	48		4.8	
90	Plymouth R	9/11/2005	3.0	1.50	1.5		0.01	0.01	0.18		16	7.74	42		3.8	
90	Plymouth R	6/25/2006	3.8	1.80	1.5	0.017	0.03	0.01	0.63	80.58	22	7.45	37	6.2	6.35	
90	Plymouth R	7/9/2006	2.7	1.30	1.5	0.023	0.00	0.01	0.56	53.14	81	7.26	37		1.15	
90	Plymouth R	7/24/2006	3.1	1.40	1.5	0.017	0.01	0.02	0.52	65.22	50	7.05	37		3.89	
90	Plymouth R	8/6/2006	2.8	1.28	1.5	0.016	0.02	0.01	0.65	90.89	58	7.90	39		2.49	
90	Plymouth R	8/13/2006	2.7	1.85	1.5	0.015	0.01	0.03	0.61	88.66	41	7.49	38	6.1	1.84	
90	Plymouth R	8/28/2006	2.9	2.05	1.5	0.014	0.01	0.05	0.73	114.88	48	7.44	50		4.78	
90	Plymouth R	9/11/2006	2.7	1.70	1.5	0.013	0.02	0.01	0.66	109.93	44	7.31	45		0.82	
90	Plymouth R	9/24/2006	2.5	1.70	1.5	0.016	0.01	0.01	0.59	79.11	26	7.74	38		2.43	
90	Plymouth R	7/5/2007	2.9	2.70	1.5	0.016	0.00	0.02	0.38	52.03	22	8.62	33	6.0	3.36	
90	Plymouth R	7/15/2007	2.8	2.40	1.5	0.020	0.01	0.02	0.44	50.06	19	8.06	57		2.76	
90	Plymouth R	7/28/2007	2.7	2.70	1.5	0.016	0.01	0.01	0.58	82.41	15	8.86	44		1.03	
90	Plymouth R	8/12/2007	3.4	3.40	1.5	0.016	0.01	0.01	0.53	72.38	14	8.70	37		1.37	
90	Plymouth R	8/19/2007	3.1	3.10	1.5	0.013	0.00	0.01	0.43	71.15	15	8.11	33	6.3	1.18	
90	Plymouth R	9/3/2007	2.7	2.70	1.5	0.012	0.00	0.02	0.55	103.39	14	8.98	48		1.04	
90	Plymouth R	9/18/2007	2.8	2.83	1.5	0.013	0.00	0.01	0.55	96.25	13	7.84	47		1.67	
90	Plymouth R	9/30/2007	2.9	2.90	1.5	0.012	0.01	0.01	0.57	102.17	12	7.86	32		1.21	
90	Plymouth R	6/8/2008	2.7	2.70	1.5	0.017	0.08	0.05	0.35	44.59	17	8.24	52	6.2	2.63	
90	Plymouth R	6/22/2008	2.8	2.10	1.5	0.015	0.01	0.01	0.18	26.67	30	7.19	36		5.15	
90	Plymouth R	7/6/2008	3.1	2.00	1.5	0.016	0.12	0.02	0.41	54.58	35	8.44	45		4.29	
90	Plymouth R	7/22/2008	2.9	2.00	1.5	0.020	0.03	0.27	0.39	44.54	15	8.02	50		3.80	
90	Plymouth R	8/3/2008	2.9	1.68	1.5	0.021	0.51	0.03	0.46	48.67	20	7.98	38	6.2	6.59	
90	Plymouth R	8/23/2008	2.9	2.35	1.5	0.015	0.01	0.00	0.32	48.44	19	8.17	41		3.12	
90	Plymouth R	9/1/2008	3.0	2.10	1.5	0.015	0.01	0.01	0.34	50.74	17	6.73	50		3.69	
90	Plymouth R	9/14/2008	2.6	2.40	1.5	0.017	0.01	0.04	0.51	65.00	19	7.81	49		6.33	
90	Plymouth R	06/14/2009	2.8	1.75	1.5	0.021	0.00	0.21	0.32	33.94	30	6.64	38	5.5	10.44	
90	Plymouth R	06/29/2009	2.9	1.85	1.5	0.019	0.04	0.02	0.32	36.89	23	6.70	38		10.77	
90	Plymouth R	07/14/2009	2.7	1.80	1.5	0.017	0.02	0.02	0.33	41.85	44	7.64	34		3.22	
90	Plymouth R	07/26/2009	3.0	1.70	1.5	0.015	0.01	0.02	0.30	42.42	32	7.90	30		3.33	
90	Plymouth R	08/09/2009	3.2	2.10	1.5	0.017	0.01	0.02	0.30	37.95	38	7.19	35	5.5	4.70	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH3	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
90	Plymouth R	08/30/2009	3.0	2.55	1.5	0.012	0.07	0.03	0.41	74.73	52	6.96	41		2.70	
90	Plymouth R	09/13/2009	2.9	1.80	1.5	0.013	0.01	0.01	0.34	56.90	44	7.84	32		4.30	
90	Plymouth R	10/04/2009	3.0	2.30	1.5	0.014	0.02	0.02	0.35	56.28	48	7.35	34		2.62	
90	Plymouth R	6/23/2010	2.9	1.90	1.5	0.015	0.11	0.06	0.34	48.49	27	7.05	46	5.9	2.10	
90	Plymouth R	7/6/2010	2.9	2.25	1.5	0.016	0.01	0.03	0.40	54.59	20	8.49	51		4.30	
90	Plymouth R	7/20/2010	2.8	2.60	1.5	0.012	0.02	0.02	0.37	68.59	26	7.56	50		3.70	
90	Plymouth R	8/3/2010	2.8	2.10	1.5	0.015	0.01	0.03	0.16	22.43	27	7.60	65		3.90	
90	Plymouth R	8/17/2010	2.5	1.45	1.5	0.023	0.01	0.01	0.31	29.82	24	7.86	50	8.7	8.90	
90	Plymouth R	9/14/2010	2.7	1.00	1.5	0.030	0.01	0.03	0.56	41.15	22	7.01	65		26.30	
90	Plymouth R	9/21/2010	2.8	1.20	1.5	0.030	0.48	0.03	0.72	53.40	67	7.45	69		16.60	
90	Plymouth R	9/29/2010	2.4	1.10	1.5	0.030	0.01	0.02	0.77	56.05	19	7.44	69		10.60	
90	Plymouth R	6/23/2012	3.2	1.95	1.5	0.020	0.01	0.04	0.39	44.22	41	7.91	45	5.4		
90	Plymouth R	7/8/2012	2.7	1.35	1.5	0.018	0.01	0.02	0.39	48.88	59	6.85	48		4.60	
90	Plymouth R	7/16/2012	2.9	1.60	1.5	0.016	0.01	0.02	0.42	58.25	30	7.87	51		4.80	
90	Plymouth R	7/24/2012	4.2	1.65	1.5	0.030	0.01	0.02	0.62	45.02	31	8.38	61		5.20	
90	Plymouth R	7/31/2012	2.9	2.30	1.5	0.019	0.01	0.02	0.47	53.79	26	7.47	54	7.9	4.40	
90	Plymouth R	8/14/2012	2.9	1.40	1.5	0.030	0.01	0.02	0.55	40.52	31	7.17	50		9.60	
90	Plymouth R	8/21/2012	2.8	2.60	1.5	0.022	0.01	0.02	0.78	76.41	32	7.09	57		6.30	
90	Plymouth R	9/3/2012	2.9	1.83	1.5	0.026	0.01	0.03	0.64	54.91	27	7.89	52		8.50	
90	Plymouth R	6/4/2013	2.3	1.95	1.5	0.018	0.02	0.01	0.44	52.70	22	7.38	46	7.1	4.00	
90	Plymouth R	6/23/2013	3.2	1.55	1.5	0.029			0.44	33.66	41	6.92	47		4.90	
90	Plymouth R	7/7/2013	2.8	1.38	1.5	0.020	0.01	0.02	0.33	36.34	76	7.65	45		4.80	
90	Plymouth R	7/22/2013	3.1	1.00	1.5	0.027			0.42	33.92	50	7.77	56		10.70	
90	Plymouth R	8/5/2013	2.8	1.35	1.5	0.028	0.01	0.02	0.37	29.52	45	8.50	63		14.70	
90	Plymouth R	8/20/2013	2.9	1.50	1.5	0.022			0.56	55.77	35	7.72	49		5.00	
90	Plymouth R	9/9/2013	2.8	1.30	1.5	0.021	0.01	0.02	0.56	60.39	42	8.16	55		6.10	
90	Plymouth R	9/29/2013	2.8	1.63	1.5	0.024			0.60	55.37	35	7.22	51		14.00	
90	Plymouth R	6/8/2014	2.9	1.10	1.5	0.034	0.01	0.02	0.49	31.96	27	7.01	47	5.9	11.00	
90	Plymouth R	6/22/2014	2.8	1.10	1.5	0.059			0.59	22.00	27	7.13	46		58.10	
90	Plymouth R	7/6/2014	2.8	1.06	1.5	0.030	0.01	0.04	0.51	37.45	29	7.60	49		14.30	
90	Plymouth R	7/13/2014	2.8	1.10	1.5	0.042			0.53	27.97	33	6.77	47		10.70	
90	Plymouth R	7/27/2014	2.9	0.95	1.5	0.031	0.01	0.03	0.35	24.94	28	7.44	45	6.1	11.30	
90	Plymouth R	8/24/2014	3.0	1.33	1.5	0.029			0.55	40.78	28	7.52	48		3.00	
90	Plymouth R	9/1/2014	2.8	1.12	1.5	0.032	0.01	0.01	0.41	27.89	33	6.81	45		18.00	
90	Plymouth R	9/14/2014	2.9	1.20	1.5	0.035			0.69	43.31	37	7.45	46		35.80	
90	Plymouth R	6/2/2015	2.9	1.30	1.5	0.036	0.01	0.02	0.38	10.41	27	7.38	44	5.2	10.00	
90	Plymouth R	6/14/2015	2.8	1.50	1.5	0.026			0.37	14.50	20	7.94	45		7.90	
90	Plymouth R	7/5/2015	2.8	1.30	1.5	0.045	0.00	0.03	0.54	12.00	33	7.54	45		11.70	5.0
90	Plymouth R	7/19/2015	2.8	1.50	1.5	0.040			0.47	11.76	41	7.00	47		9.30	
90	Plymouth R	8/2/2015	2.7	1.40	1.5	0.038	0.01	0.05	0.47	12.38	38	7.47	50	6.4	8.70	
90	Plymouth R	8/23/2015	2.6	1.60	1.5	0.028			0.52	18.66	29	7.88	51		7.20	
90	Plymouth R	9/7/2015	2.9	1.70	1.5	0.013	0.00	0.04	0.54	42.13	29	7.88	50		6.70	11.5
90	Plymouth R	9/20/2015	2.7	1.30	1.5	0.036			0.61	16.91	30	7.99	58		11.90	

LNum	PName	Date	Type	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
90	Plymouth R	6/28/1991	epi	31	25															
90	Plymouth R	7/14/1991	epi	25	25															
90	Plymouth R	7/28/1991	epi	27	25															
90	Plymouth R	8/11/1991	epi	17	20															
90	Plymouth R	8/25/1991	epi	17	21															
90	Plymouth R	9/8/1991	epi	21	21															
90	Plymouth R	9/22/1991	epi	12	14															
90	Plymouth R	10/6/1991	epi	20	17															
90	Plymouth R	6/14/1992	epi	25	18															
90	Plymouth R	6/28/1992	epi	23	19															
90	Plymouth R	7/12/1992	epi	23	22															
90	Plymouth R	7/28/1992	epi	22	19															
90	Plymouth R	8/9/1992	epi	21	20															
90	Plymouth R	8/23/1992	epi	20	19															
90	Plymouth R	9/5/1992	epi	20	20															
90	Plymouth R	9/25/1992	epi	20	15															
90	Plymouth R	6/13/1993	epi	22	20															
90	Plymouth R	6/27/1993	epi	23	21	2	4	3	2											

LNum	PName	Date	Type	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
90	Plymouth R	7/11/1993	epi	27	26															
90	Plymouth R	7/24/1993	epi	27	23															
90	Plymouth R	8/8/1993	epi	20	21															
90	Plymouth R	8/22/1993	epi	21	21															
90	Plymouth R	9/6/1993	epi	25	23															
90	Plymouth R	9/19/1993	epi	14	16															
90	Plymouth R	6/12/1994	epi	23	20	2	3	4	1											
90	Plymouth R	6/28/1994	epi	22	21	3	3	4	12											
90	Plymouth R	7/14/1994	epi	20	25	3	3	4	12											
90	Plymouth R	7/26/1994	epi	19	25	2	3	3	12											
90	Plymouth R	8/7/1994	epi	24	24	2	3	4	12											
90	Plymouth R	8/26/1994	epi	23	11	2	3	3	12											
90	Plymouth R	9/6/1994	epi	17	19	2	3	3												
90	Plymouth R	9/25/1994	epi	19	18	2	3	3												
90	Plymouth R	6/25/1995	epi	26	25	2	3	2												
90	Plymouth R	7/2/1995	epi	18	24	2	2	3												
90	Plymouth R	7/16/1995	epi	29	18	2	2	2												
90	Plymouth R	7/30/1995	epi	25	20	2	2	2												
90	Plymouth R	8/13/1995	epi	25	23	1	2	2												
90	Plymouth R	8/26/1995	epi	28	22	1	2	2												
90	Plymouth R	9/10/1995	epi	12	17	1	2	2												
90	Plymouth R	9/25/1995	epi	13	12															
90	Plymouth R	7/1/1996	epi	24	24	2	2	2												
90	Plymouth R	8/5/1996	epi	25	22	2	3	2												
90	Plymouth R	9/1/1996	epi	11	13	1	3	2												
90	Plymouth R	10/1/1996	epi	18	15	1	3	2												
90	Plymouth R	6/29/1997	epi	28	24	2	3	3												
90	Plymouth R	7/27/1997	epi	27	25	2	4	4	2											
90	Plymouth R	8/24/1997	epi	19	18	1	3	3	25											
90	Plymouth R	9/22/1997	epi	14	14	1	3	3	2											
90	Plymouth R	7/21/1998	epi	22	22															
90	Plymouth R	8/23/1998	epi	25	20	2	4	4	2											
90	Plymouth R	9/14/1998	epi	20	20	1	3	4	2											
90	Plymouth R	10/4/1998	epi	11	13	1	2	2												
90	Plymouth R	7/13/1999	epi	23	22	3	3	4	126											
90	Plymouth R	8/10/1999	epi	20	15	4	4	4	12											
90	Plymouth R	8/29/1999	epi	18	22															
90	Plymouth R	9/19/1999	epi	18	15	3	3	2												
90	Plymouth R	8/6/2000	epi	13	20	3	2	3	1											
90	Plymouth R	8/20/2000	epi	13	18	2	2	2	5											
90	Plymouth R	9/5/2000	epi	14	20	2	2	2	15											
90	Plymouth R	9/27/2000	epi	16	14	1	1	1												
90	Plymouth R	7/8/2001	epi	23	21	3	3	4	5											
90	Plymouth R	7/23/2001	epi	30	12	3	4	4												
90	Plymouth R	8/14/2001	epi	12	18															
90	Plymouth R	9/16/2001	epi	19	17	1	3	2												
90	Plymouth R	9/23/2001	epi	18	16															
90	Plymouth R	10/6/2001	epi	19	15															
90	Plymouth R	10/13/2001	epi	20	14															
90	Plymouth R	10/21/2001	epi	15	14															
90	Plymouth R	6/23/2002	epi	27	26	4	4	4	124											
90	Plymouth R	7/14/2002	epi	28	26	3	3	3	123											
90	Plymouth R	8/4/2002	epi	29	27	3	4	4	234											
90	Plymouth R	8/12/2002	epi	27	24	3	4	4	2											
90	Plymouth R	8/25/2002	epi	21	22	2	3	3												
90	Plymouth R	9/3/2002	epi	25	22	3	4	4	2											
90	Plymouth R	9/22/2002	epi	17	19	3	3	3	25											
90	Plymouth R	9/29/2002	epi	16	17	1	2	2	2											
90	Plymouth R	7/13/2003	epi	24	22	3	3	3	13											
90	Plymouth R	7/20/2003	epi	19	23	3	2	2	1											
90	Plymouth R	7/29/2003	epi	27	23	3	2	2	8											

LNum	PName	Date	Type	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HABform	ShoreHAB
90	Plymouth R	8/12/2003	epi	24	25	3	3	2	1											
90	Plymouth R	8/19/2003	epi	25	25	3	3	2												
90	Plymouth R	8/24/2003	epi	18	23	3	3	2												
90	Plymouth R	9/7/2003	epi	20	21	3	3	2												
90	Plymouth R	9/21/2003	epi	15	19	3	2	2												
90	Plymouth R	7/5/2004	epi	24		3	3	3	18											
90	Plymouth R	7/18/2004	epi	19	21	3	1	2	1											
90	Plymouth R	7/25/2004	epi	20	22	3	2	3	18											
90	Plymouth R	8/1/2004	epi	23	22	3	2	3	1											
90	Plymouth R	8/8/2004	epi	20	23	3	3	2	1											
90	Plymouth R	9/6/2004	epi	21	21	3	2	2	1											
90	Plymouth R	9/12/2004	epi	23	21	3	1	2	1											
90	Plymouth R	9/26/2004	epi	18	19	2	1	2	0											
90	Plymouth R	6/5/2005	epi	25	22	3	3	2	0											
90	Plymouth R	6/26/2005	epi	30	24	2	1	2	0											
90	Plymouth R	7/4/2005	epi	27	24	2	1	2	0											
90	Plymouth R	7/17/2005	epi	27	26	2	2	2	0											
90	Plymouth R	7/31/2005	epi	31	26	2	1	2	0											
90	Plymouth R	8/15/2005	epi	26	25	3	3	2	8											
90	Plymouth R	8/28/2005	epi	24	22	2	3	2	0											
90	Plymouth R	9/11/2005	epi	22	21	3	3	2	1											
90	Plymouth R	6/25/2006	epi	23	23	2	3	2	0											
90	Plymouth R	7/9/2006	epi	24	24	2	1	2	0											
90	Plymouth R	7/24/2006	epi	22	24	2	1	2	0											
90	Plymouth R	8/6/2006	epi	24	26	2	1	2	0											
90	Plymouth R	8/13/2006	epi	25	24	2	1	2	0											
90	Plymouth R	8/28/2006	epi	19	19	2	1	1	0											
90	Plymouth R	9/11/2006	epi	14	18	1	1	1	0											
90	Plymouth R	9/24/2006	epi	18	16	2	1	1	0											
90	Plymouth R	7/5/2007	epi	21	22	1	2	2	0											
90	Plymouth R	7/15/2007	epi	23	23	1	2	1	8											
90	Plymouth R	7/28/2007	epi	23	24	1	1	1	0											
90	Plymouth R	8/12/2007	epi	30	25	1	1	1	0											
90	Plymouth R	8/19/2007	epi	23	22	1	1	1	0											
90	Plymouth R	9/3/2007	epi	25	22			1	0											
90	Plymouth R	9/18/2007	epi	21	18	1	1	1	0											
90	Plymouth R	9/30/2007	epi	16	18	1	1	1	0											
90	Plymouth R	6/8/2008	epi	25	24	2	3	2	8											
90	Plymouth R	6/22/2008	epi	23	21	2	3	2	8											
90	Plymouth R	7/6/2008	epi	29	23	2	1	1	0											
90	Plymouth R	7/22/2008	epi	25	25	3	1	2	0											
90	Plymouth R	8/3/2008	epi	18	22	2	1	2	0											
90	Plymouth R	8/23/2008	epi	20	23		2		0											
90	Plymouth R	9/1/2008	epi	24	22	2	2	2	0											
90	Plymouth R	9/14/2008	epi	27	20	2	2	2	0											
90	Plymouth R	06/14/2009	epi	21	21	2	2	2	0											
90	Plymouth R	06/29/2009	epi	27	21	3	2	2	0											
90	Plymouth R	07/14/2009	epi	19	20	2	1	2	0											
90	Plymouth R	07/26/2009	epi	23	22	2	2	2	0											
90	Plymouth R	08/09/2009	epi	20	22	2	2	2	0					0.01						
90	Plymouth R	08/30/2009	epi	22	21	2	2	2	0											
90	Plymouth R	09/13/2009	epi	18	18	2	1	2	0			38.03		0.01						
90	Plymouth R	10/04/2009	epi	17	12	2	1	1	0			213.34								
90	Plymouth R	6/23/2010	epi	26	24	2	2	2	0											
90	Plymouth R	7/6/2010	epi	27	25	2	3	2	0											
90	Plymouth R	7/20/2010	epi	26	25	1	2	2	0											
90	Plymouth R	8/3/2010	epi	24	24	2	3	2	0			27.00		0.00						
90	Plymouth R	8/17/2010	epi	23	23	2	2	2	0											
90	Plymouth R	9/14/2010	epi	13	16	3	1	2	1			230.00		0.01						
90	Plymouth R	9/21/2010	epi	17	16	3	1	2	0											
90	Plymouth R	9/29/2010	epi	15		2	1	2	1			95.00		0.00						

LNum	PName	Date	Type	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
90	Plymouth R	6/23/2012	epi	23	24	2	3	2	0	0	0	3.40	0.90	<0.30	<0.410		1.98	0.98		
90	Plymouth R	7/8/2012	epi	22	25	3	2	2	0	0	0	2.40	0.90	<0.30	<0.423		2.47	0.66	FG	
90	Plymouth R	7/16/2012	epi	25	26	2	3	2	0	0	0	9.60	1.20	<0.30	<0.328		3.20	0.70		
90	Plymouth R	7/24/2012	epi	21	25	2	1	2	0	0	0	2.80	1.00	<0.30	<0.292		3.22	0.94		
90	Plymouth R	7/31/2012	epi	22	25	2	1	2	0	0	0	6.70	1.00	<0.30	<0.292		2.65	0.67		
90	Plymouth R	8/14/2012	epi	22	23	2	1	2	0	0	0	10.40	2.00	0.39	<0.552		4.39	1.18		
90	Plymouth R	8/21/2012	epi	23	22	2	2	2	0	0	0	7.70	1.40	0.40	<0.552		3.08	1.32		
90	Plymouth R	9/3/2012	epi	19	22	2	2	2	0	0	0	12.20	1.20	0.33	<0.725		4.90	2.41		
90	Plymouth R	6/4/2013	epi	18	22	2	1	1	0	0	0	7.60	2.70	<0.30	<0.630		3.00	0.60	I	
90	Plymouth R	6/23/2013	epi	25	24	2	2	2	1	0	0	5.50	3.10	<0.30	<0.610		2.90	0.00		I
90	Plymouth R	7/7/2013	epi	28	27	2	2	2	0	0		7.40	6.30	<0.30	<0.510		6.70	0.90		ef
90	Plymouth R	7/22/2013	epi	25	25	3	3	2	1	0	0	17.20	7.40	<0.30	<0.910		7.80	1.50		I
90	Plymouth R	8/5/2013	epi	19	21	2	2	2	1	0	0	7.40	5.60	<0.30	<0.390		6.10	0.60		I
90	Plymouth R	8/20/2013	epi	26	22	2	2	2	0	0	0	8.20	4.20	<0.30	<0.510		3.60	0.40		I
90	Plymouth R	9/9/2013	epi	19	18	2	3	3	0	0	0	12.40	3.60	0.87	<19.130		4.00	1.20		I
90	Plymouth R	9/29/2013	epi	18	16	3	2	2	0	0	0	7.50	9.60	<0.30	<19.130		5.00	0.40	I	
90	Plymouth R	6/8/2014	epi	24	23	3	1	2	1	0	0	1.10	3.70	<1.83	<0.17	<0.001	3.83	1.19	i	i
90	Plymouth R	6/22/2014	epi	19	22	2	2	1	0	0	0	9.90	2.00	<0.58	<0.44	<0.002	9.91	0.54	i	i
90	Plymouth R	7/6/2014	epi	23	24	2	2	2	0	0	0	6.50	1.10	<0.62	<0.03	<0.002	4.75	0.97	i	i
90	Plymouth R	7/13/2014	epi	21	23	2	2	2	0	0	0	9.00	0.70	<0.40	<0.21	<0.003	3.79	1.43	i	i
90	Plymouth R	7/27/2014	epi	19	22	2	2	2	0	0	0	9.20	1.00	<0.63	<0.03	<0.001	5.87	0.55	i	i
90	Plymouth R	8/24/2014	epi	23	21	3	2	2	0	0	0	5.70	1.40	<0.26	<0.10	<0.002	6.71	0.98	i	i
90	Plymouth R	9/1/2014	epi	20	20	3	1	2	0	0	0	12.20	1.00	<0.25	<0.14	<0.002	7.81	1.32	i	i
90	Plymouth R	9/14/2014	epi	7	15	2	1	2	0	0	0	11.50	1.20	<0.24	<0.03	<0.001	9.44	2.57	i	
90	Plymouth R	6/2/2015	epi	14	18	2	2	2	5	0	5	17.50	1.30	<0.56	<0.119	<0.706	6.74	0.91	I	I
90	Plymouth R	6/14/2015	epi	24	23	2	2	2	1	0	0	11.20	1.50	<0.55	<0.027	<0.318	4.01	0.19	I	I
90	Plymouth R	7/5/2015	epi	24	22	2	2	2	0	0	0	6.20	1.50	<0.88	<0.010	<32.57	5.59	0.00	I	I
90	Plymouth R	7/19/2015	epi	27	24	2	3	2	0	0	0	12.30	1.50	<0.30	<0.009	<0.049	5.04	1.20	I	I
90	Plymouth R	8/2/2015	epi	20	24	2	2	2	8	0	0	4.09	1.48	<0.19	<0.004	<0.015	5.26	0.16	I	I
90	Plymouth R	8/23/2015	epi	21	21	2	2	2	1	0	0	6.20	0.70	<0.28	<0.008	<0.021	3.79	0.00	I	I
90	Plymouth R	9/7/2015	epi	21	23	2	2	2	0	0	0			<0.37	<0.004	<0.012	3.72	0.21	I	I
90	Plymouth R	9/20/2015	epi	10	18	3	2	3	12	0	0	4.20	1.40	<0.30	<0.007	<0.035	6.70	0.90	I	I

Legend Information

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

Appendix B: Priority Waterbody Listing for Plymouth Reservoir

Plymouth Reservoir (0602-0014) MinorImpacts

Waterbody Location Information

Revised: 07/07/2009

Water Index No: SR- 44-54- 8-P107
Hydro Unit Code: 02050102/030 **Str Class:** B
Waterbody Type: Lake (Mesotrophic)
Waterbody Size: 79.0 Acres
Seg Description: entire reservoir

Drain Basin: Susquehanna River
Chenango River
Reg/County: 7/Chenango Co. (9)
Quad Map: EAST PHARSALIA (K-18-4)

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
Public Bathing	Stressed	Possible
Recreation	Stressed	Suspected

Type of Pollutant(s)
Known: ALGAL/WEED GROWTH (aquatic vegetation)
Suspected: Nutrients (phosphorus)
Possible: - - -

Source(s) of Pollutant(s)
Known: - - -
Suspected: HABITAT MODIFICATION
Possible: On-Site/Septic Syst

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 3 (Cause Identified, Source Unknown)
Lead Agency/Office: ext/WQCC **Resolution Potential:** Medium
TMDL/303d Status: n/a

Further Details

Overview
Recreational uses (swimming, fishing, boating) in Plymouth Reservoir are thought to experience minor impacts due to algal and aquatic weed growth in the lake. The lake is very shallow, so weed growth could be somewhat natural; but might be exacerbated by excess nutrient input. Grass carp have been introduced into the lake in an effort to control the weeds.

Water Quality Sampling
Plymouth Reservoir has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1991 and continuing through 2006. An Interpretive Summary report of the findings of this sampling was published in 2007. These data indicate that the lake continues to be best characterized as mesotrophic, or moderately productive. Lake productivity as reflected in phosphorus and algal measurements was lower than expected in 2006. Phosphorus levels in the lake are typically below the state guidance values indicating impacted/stressed recreational uses. Corresponding transparency measurements regularly exceed the recommended minimum for swimming beaches. Measurements of pH typically fall within the state water quality range of 6.5 to 8.5. The lake water is moderately to highly colored, and color does limit water transparency when algae levels are reduced. (DEC/DOW, BWAM/CSLAP,

March 2007)

Recreational Assessment

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This assessment indicates recreational suitability of the lake to be generally favorable, and more so in 2006. The recreational suitability of the lake is described most frequently as "excellent" for most uses. The lake itself is most often described as "not quite crystal clear" or having "definite algal greenness," an assessment that is consistent measured water quality characteristics. More recent assessments have noted that aquatic plants do not grow to the lake surface after June. Aquatic plants are dominated by a mix of native and non-native (Eurasian milfoil) species. Weed growth in the lake has been quite variable in recent years, perhaps related to the introduction of grass carp. (DEC/DOW, BWAM/CSLAP, March 2007)

Lake Uses

This lake waterbody is designated class B, suitable for use as a public bathing beach, for general recreation and aquatic life support, but not for drinking 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.

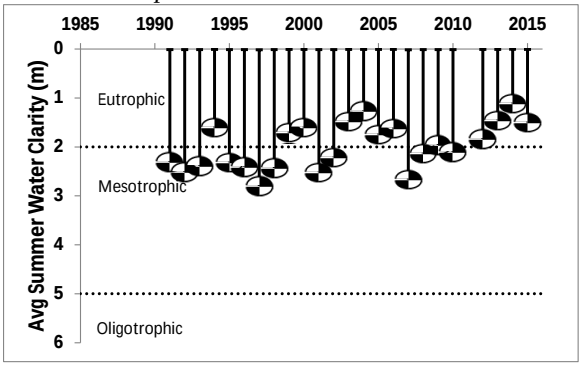
Segment Description

This segment includes the total area of the entire lake.

Appendix C- Long Term Trends: Plymouth Reservoir

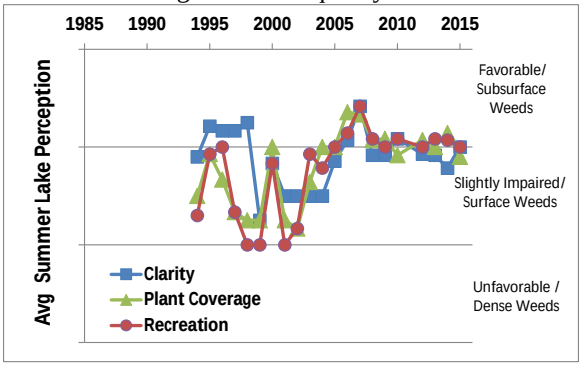
Long Term Trends: Water Clarity

- Long-term decrease in water clarity
- Most readings typical of *mesotrophic* to *eutrophic* lakes



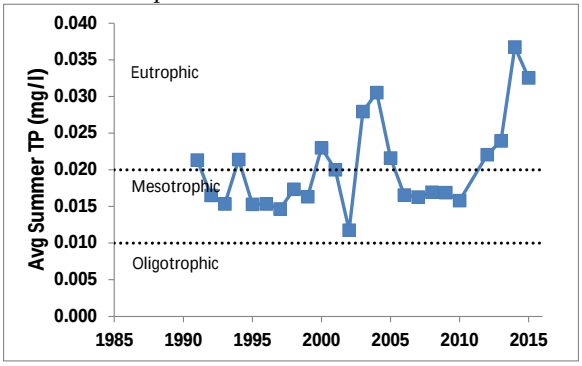
Long Term Trends: Lake Perception

- Improved perception since early 2000s
- Recreational perception only weakly linked to changes in water quality or weeds



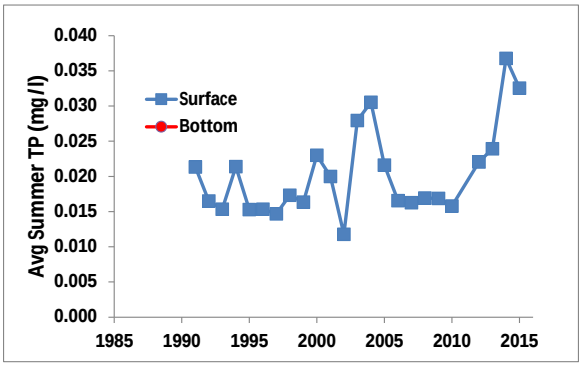
Long Term Trends: Phosphorus

- No trends apparent, though recent rise in TP
- Most readings typical of *mesotrophic* to *eutrophic* lakes



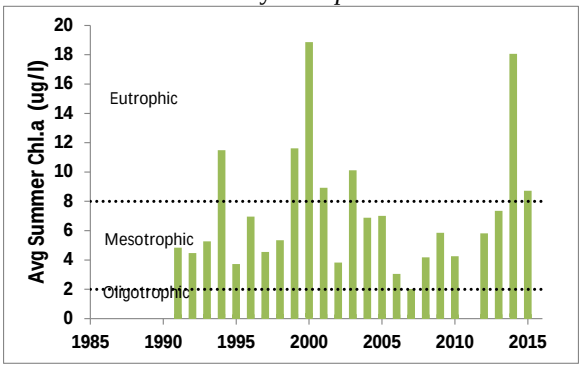
Long Term Trends: Bottom Phosphorus

- No deepwater TP readings
- Likely that surface and bottom TP readings are similar in shallow unstratified lakes



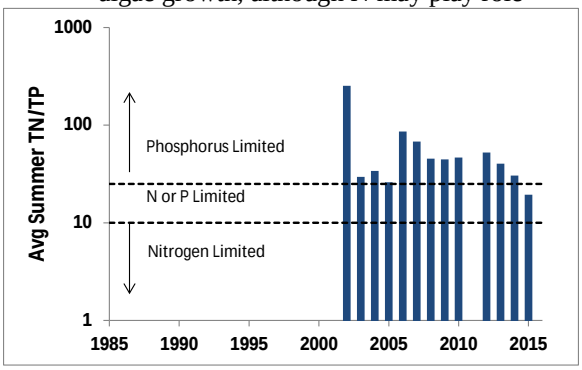
Long Term Trends: Chlorophyll a

- ↑ since ’06; consistent with recent ↓ clarity
- Most readings typical of *mesotrophic* lakes, but occasionally *eutrophic* conditions



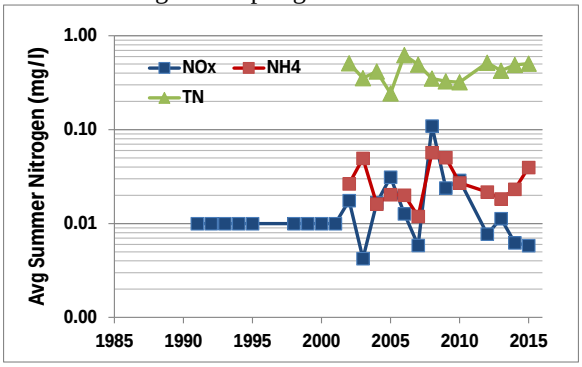
Long Term Trends: N:P Ratio

- No trends apparent; recent ↓
- Most readings indicate phosphorus limits algae growth, although N may play role



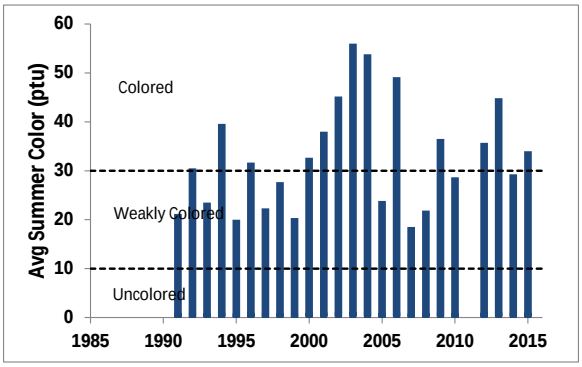
Long Term Trends: Nitrogen

- No trends apparent; recent ↓ NOx
- Low NOx, ammonia and total nitrogen during all sampling seasons



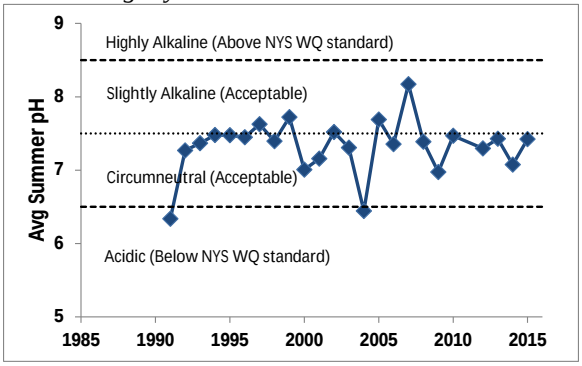
Long Term Trends: Color

- No trends apparent, though higher after 2002
- Most readings typical of *weakly* to *slightly colored* lakes



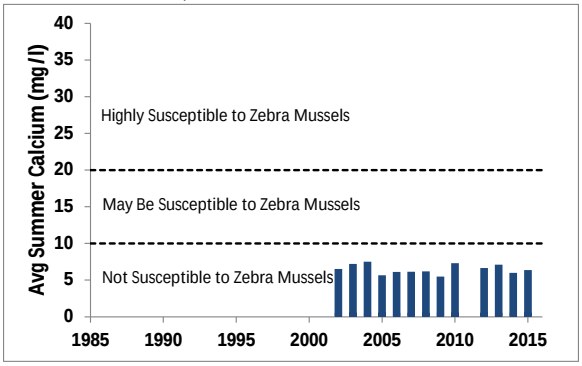
Long Term Trends: pH

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



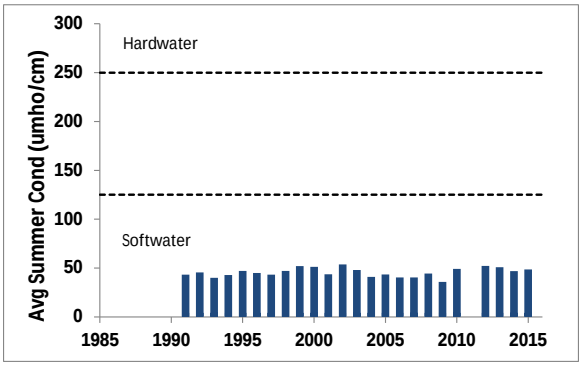
Long Term Trends: Calcium

- No trends apparent
- Data indicates low susceptibility to zebra mussels, which are not found in lake



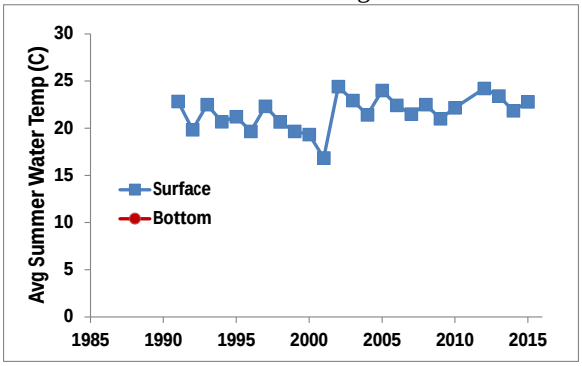
Long Term Trends: Conductivity

- No trends apparent; perhaps slight ↑
- Most readings typical of *softwater* lakes



Long Term Trends: Water Temperature

- Long term increase in water T
- "Deepwater" temperatures are usually similar to surface readings in shallow lakes



Appendix D:
Algae Testing Results from SUNY ESF Study

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

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

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

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

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

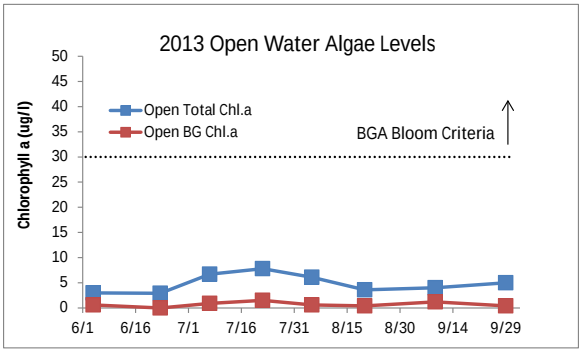


Figure D1:
2013 Open Water Total and BGA Chl.a

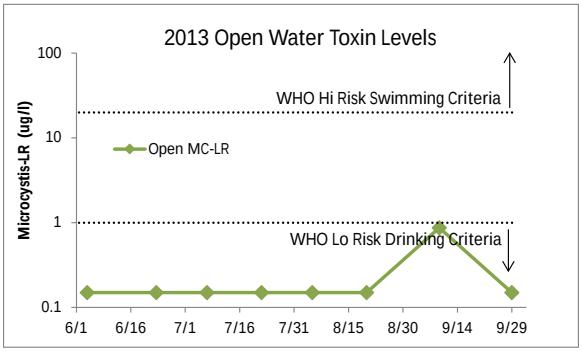


Figure D2:
2013 Open Water Microcystin-LR

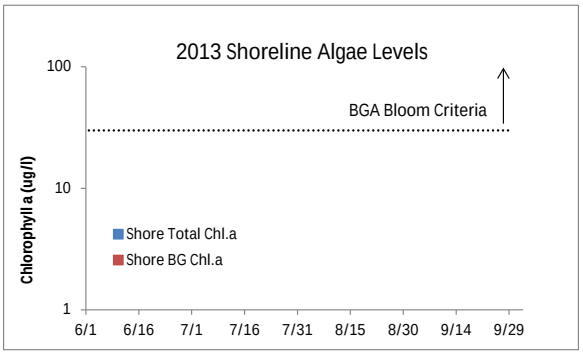


Figure D3:
2013 Shoreline Total and BGA Chl.a

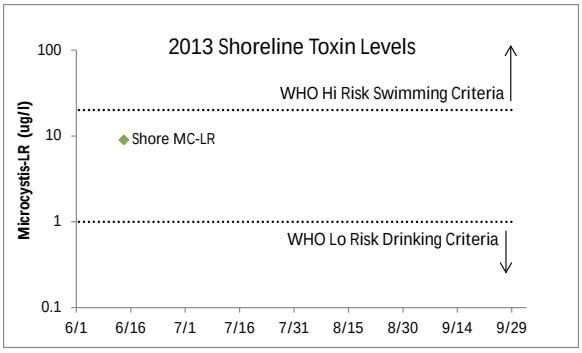


Figure D4:
2013 Shoreline Microcystin-LR

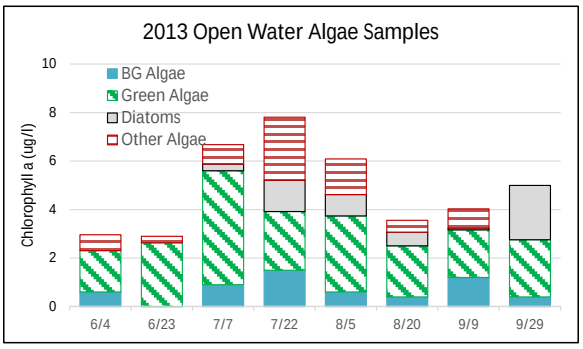


Figure D5:
2013 Open Water Algae Types

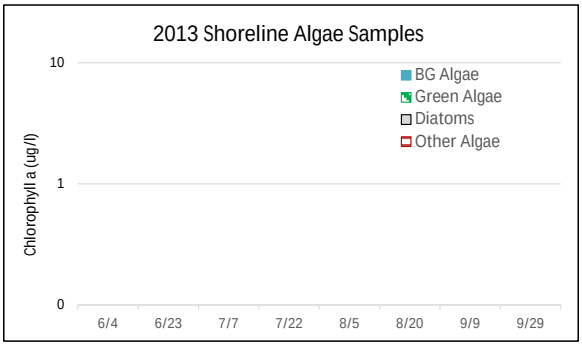


Figure D6:
2013 Shoreline Algae Types

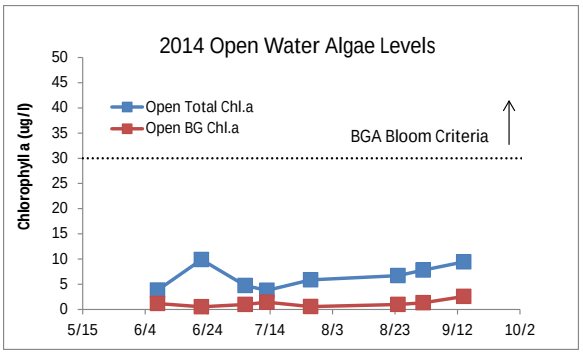


Figure D7:
2014 Open Water Total and BGA Chl.a

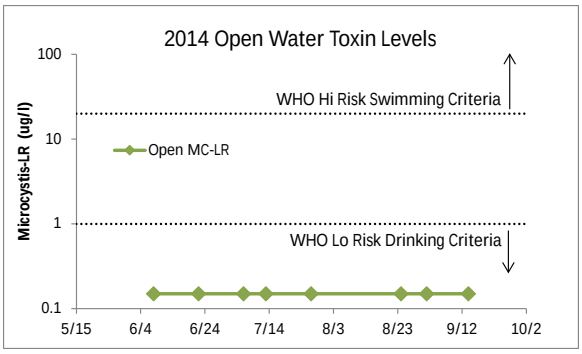


Figure D8:
2014 Open Water Microcystin-LR

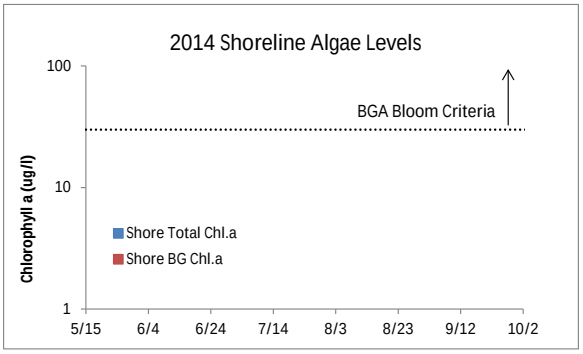


Figure D9:
2014 Shoreline Total and BGA Chl.a

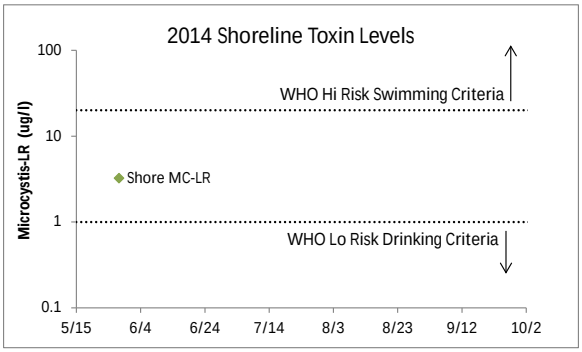


Figure D10:
2014 Shoreline Microcystin-LR

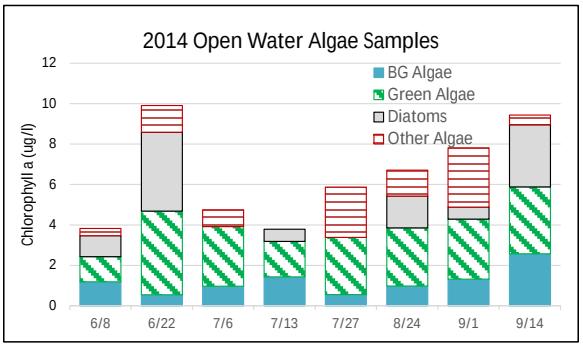


Figure D11:
2014 Open Water Algae Types

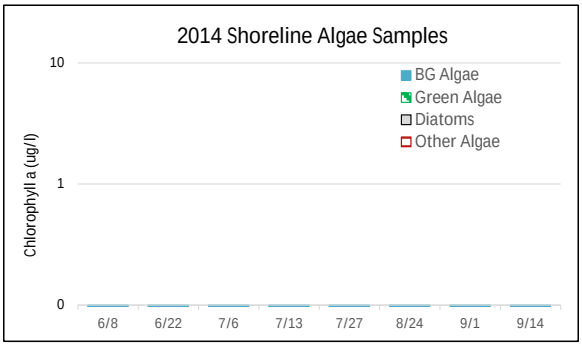


Figure D12:
2014 Shoreline Algae Types

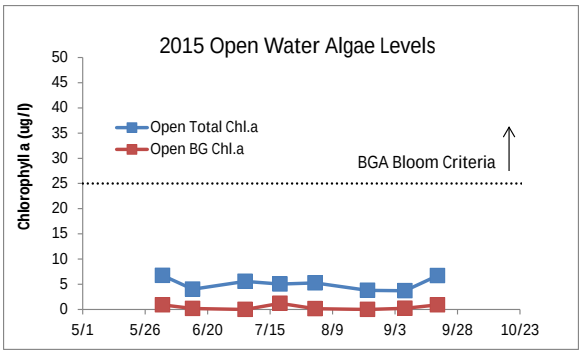


Figure D13:
2015 Open Water Total and BGA Chl.a

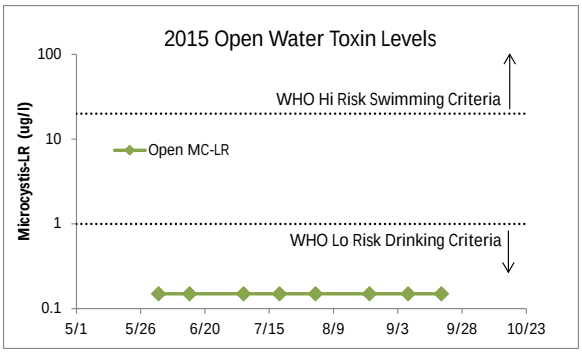


Figure D14:
2015 Open Water Microcystin-LR

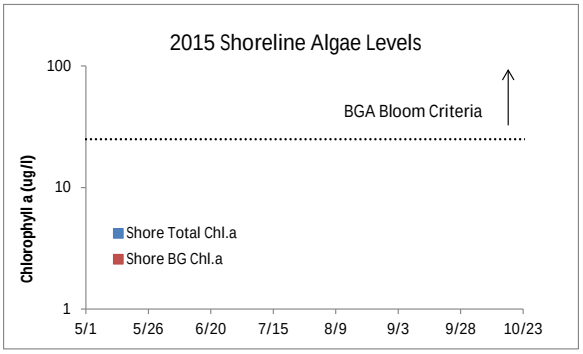


Figure D15:
2015 Shoreline Total and BGA Chl.a

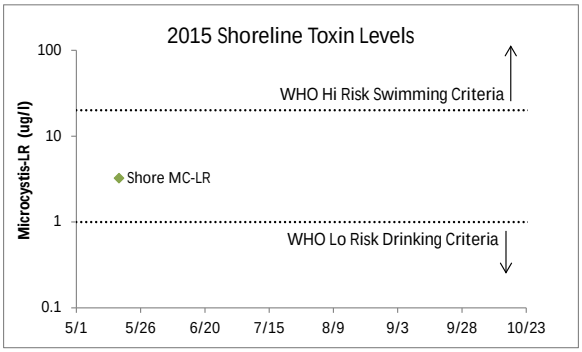


Figure D16:
2015 Shoreline Microcystin-LR

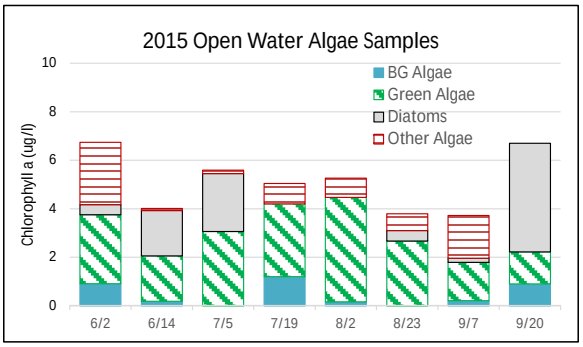


Figure D17:
2015 Open Water Algae Types

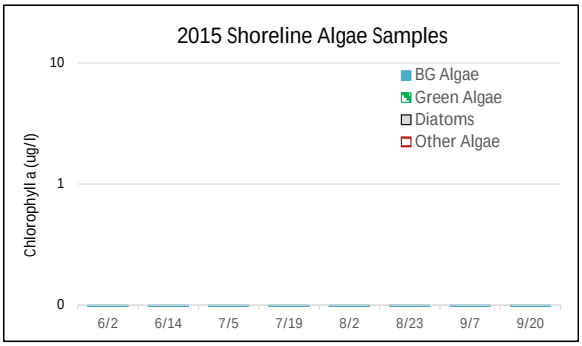


Figure D18:
2015 Shoreline Algae Types

Appendix E:
AIS Species in Chenango County

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

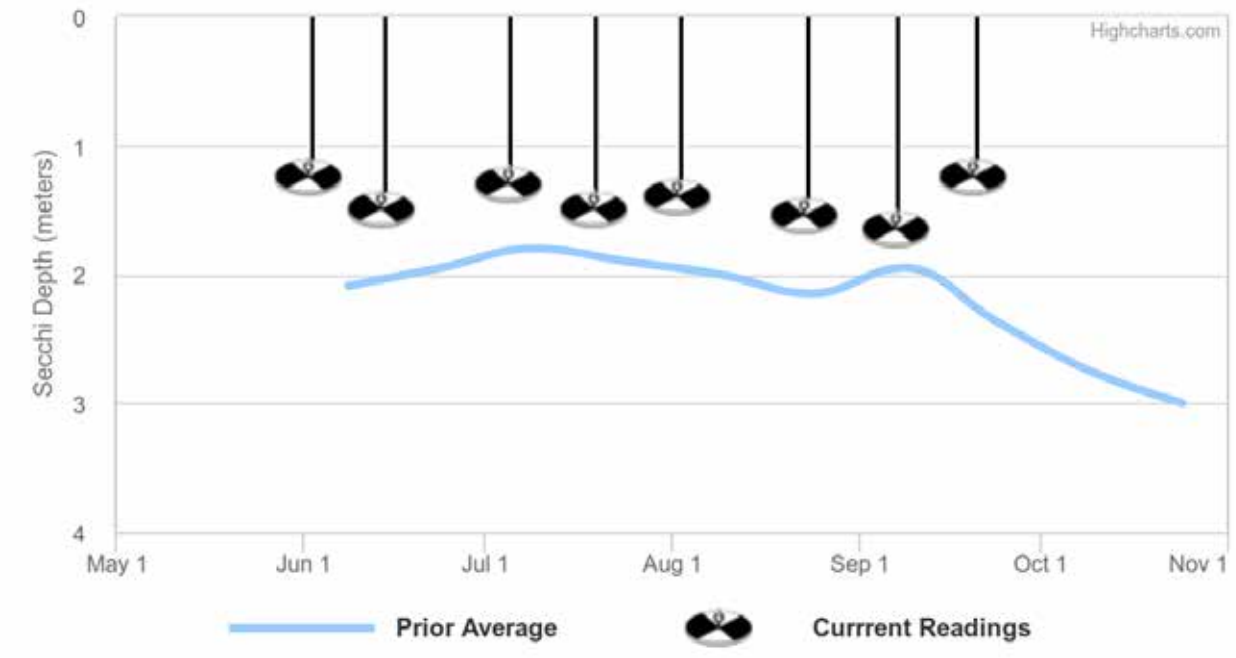
Aquatic Invasive Species - Chenango County			
Waterbody	**Kingdom**	**Common name**	**Scientific name**
Balsam Pond	Plant	Variable watermilfoil	*Myriophyllum heterophyllum*
Bowman Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Chenango Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Chenango River near Greene	Animal	Asian clam	*Corbicula fluminea*
Chenango River near Oxford	Animal	Asian clam	*Corbicula fluminea*
Guilford Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Hunt Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Jackson Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Long Pond	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Mill Brook Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Mud Creek e of Cortland	Animal	Asian clam	*Corbicula fluminea*
Otselic River near Pitcher	Animal	Asian clam	*Corbicula fluminea*
Plymouth Reservoir	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Warn Lake	Plant	Eurasian watermilfoil	*Myriophyllum spicatum*
Warn Lake	Plant	Curly leafed pondweed	*Potamogeton crispus*

Appendix F: Current Year vs. Prior Averages for Plymouth Reservoir

Current Year Water Temperatures vs. Prior Average

This year's shallow water sample temperatures are about the same as the average of readings collected from 1991 to 2014.

Current Year Secchi Readings vs. Prior Average



This year's session Secchi readings are tending to be lower than normal when compared to the average of readings collected from 1991 to 2014

Appendix G: Watershed and Land Use Map for Plymouth Reservoir

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.