

Echo Lake Questions and Answers, 2015 CSLAP

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

A1. Water quality conditions in Echo Lake were close to normal in 2015; water clarity was lower than normal, but so were algae levels, and no blue green algae blooms were reported.

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

A2. Chloride sampling results were typical of lakes with only minor impacts associated with road salt runoff. The spring shoreline algae bloom was comprised of multiple forms of algae, not blue green algae. .

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

A3. Echo Lake had lower water clarity, but lower algae and nutrient levels, than most lakes in Central New York. Consistent with lower overall algae levels, no shoreline blooms were reported in the lake in 2015.

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






















A4. Water clarity has decreased since the late 1990s, consistent with a weak increase in phosphorus over this period (there may have been a slight drop in algae levels as well). Aquatic plant coverage is variable from year to year.

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

A5. Echo Lake appears to be susceptible to algae blooms in some years, for reasons not yet known. This suggests that nutrient levels should be reduced to reduce overall susceptibility to 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 should be continued to maintain water quality 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				
Potable Water				Not applicable
Swimming				Algae blooms
Recreation				Algae blooms
Aquatic Life				No impacts
Aesthetics				Algae blooms
Habitat				No impacts
Fish Consumption				
	PWL	Average Year	2015	Primary issue

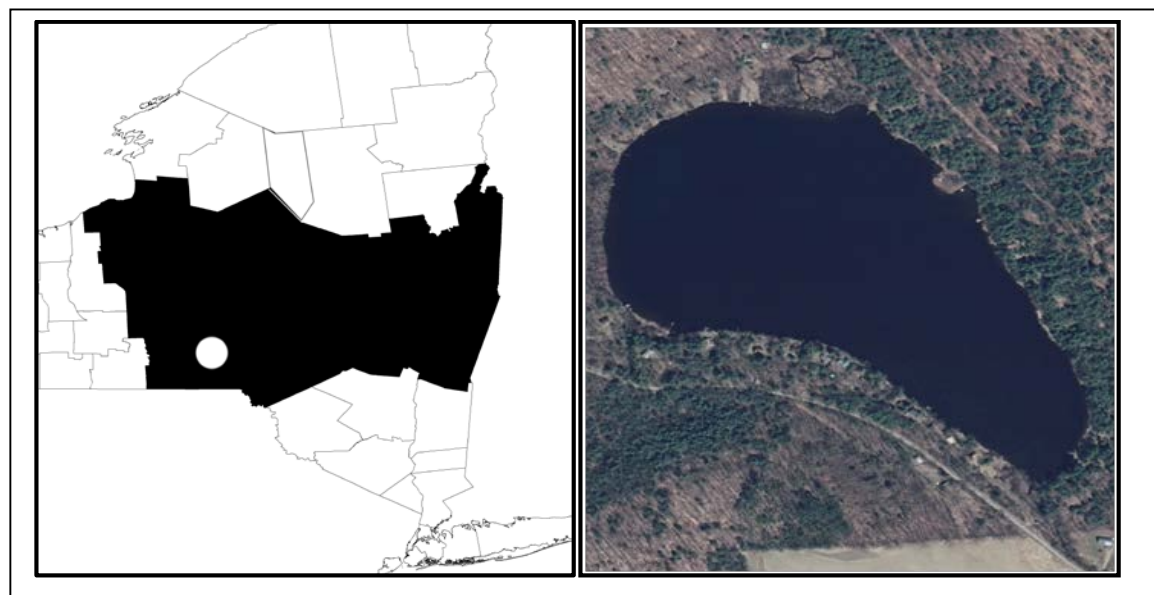


CSLAP 2015 Lake Water Quality Summary: Echo Lake

General Lake Information

Location	Town of Smithville
County	Chenango
Basin	Susquehanna River
Size	25.9 hectares (63.9 acres)
Lake Origins	Natural
Watershed Area	272.5 hectares (673.1 acres)
Retention Time	1.0 years
Mean Depth	4.8 meters
Sounding Depth	9.2 meters
Public Access?	no
Major Tributaries	no named tribs
Lake Tributary To...	unnamed outlet to unnamed tribs to Genegantslet Creek to Chenango River to Susquehanna River
WQ Classification	C (non-contact recreation = boating, angling)
Lake Outlet Latitude	42.382
Lake Outlet Longitude	-75.848
Sampling Years	1991-1995, 2002-2010, 2012-2015
2015 Samplers	Fred Getz and Marcia Matiss
Main Contact	Fred Getz

Lake Map



Background

Echo Lake is a 64 acre, class C lake found in the Town of Smithville in Chenango County, in the central / Leatherstocking region of New York State. It was first sampled as part of CSLAP in 1991.

It is one of eight CSLAP lakes among the more than 150 lakes 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

Echo Lake is a Class C lake; this means that the best intended use for the lake is for non-contact recreation—fishing and boating, aquatic life and aesthetics, although the lake may also support contact recreation—swimming and bathing. The lake is used by lake residents and invited guests for non-power boating and swimming; the lake does not have public access.

It is not known by the report authors if Echo Lake has been stocked by lake residents or municipal officials.

General statewide fishing regulations are applicable in Echo Lake. In addition, the open season on trout runs from April 1st through October 15th, with no size limit and a daily take limit of five fish, with no more than two fish greater than 12 inches in length and five brook trout under eight inches in length.

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

Historical Water Quality Data

CSLAP sampling was conducted on Echo Lake from 1991 to 1995, 2002 to 2010, and 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 Echo Lake can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77879.html>.

Echo Lake was not sampled by the NYSDEC as part of any of its statewide water quality monitoring programs (prior to CSLAP). It is not known if the lake has been sampled by the regional fisheries staff as part of any fisheries management activities on the lake.

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

Lake Association and Management History

Echo Lake is served by the Echo Lake Association. The bylaws of the lake association dictate that the lake is private, no gas powered motors are allowed, dock and float are limited, and there are limits to wastewater discharge (via septic).

The lake association maintains a web site at <http://www.echolakeassociation.org/>

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 –Echo Lake” section in Appendix C.

Evaluation of Eutrophication Indicators

Algae (chlorophyll *a*) and water clarity were both slightly lower than normal in 2015, while nutrient levels were close to normal. This suggests that each of these indicators varies slightly from year to years. There has been a slight decrease in water clarity over the last 15 years, coincident with a slight increase in phosphorus readings over this period. However, none of these changes have been statistically significant.

Phosphorus readings typically increase slightly during the summer, although these readings (and algae levels) decreased slightly during the summer of 2015.

The lake can be characterized as *mesotrophic*, or moderately productive, based on water clarity, chlorophyll *a*, and total phosphorus readings (all typical of *mesotrophic* lakes), although each of these indicators were more typical of *mesoligotrophic* lakes in 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. Water clarity readings are slightly lower than expected given the nutrient and algae levels in the lake. 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, and the lake is not classified for use for drinking water. Deepwater phosphorus and ammonia readings are similar to those measured at the lake surface, although deep ammonia readings were higher than normal in 2014 and 2015. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Limnological Indicators

Most of the limnological indicators (NO_x, ammonia, total nitrogen, pH and conductivity) were slightly higher than normal in 2015, but none of these indicators has exhibited any significant long-term changes. The nitrogen readings have exhibited small increases over the last decade, although nitrogen to phosphorus ratios have dropped over the same period. However, it is likely that the small changes in each of these indicators have been within the normal range of variability in the lake.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 5 to 6 mg/l. These values fall within the “minor” road salt runoff levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l and lower than the range of values found in most NYS lakes. 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 samples analyzed by SUNY ESF in the last several years indicated both low overall algae levels and low levels of blue green algae in the open water. These mid lake water samples showed a mix of algae samples, particularly green algae and diatoms. Shoreline blooms were reported from May thru July in 2013, and in early May of 2015, but not later in the summer, and not at all in 2014. These 2014 blooms were comprised primarily of blue green algae, and were dominated by *Anabaena* and *Microcystis* (two toxin-producing blue green algae) early and *Woronichina* later (the latter is not usually associated with toxin production). The 2015 shoreline bloom was comprised of a mix of (non-blue green) algae species, and toxin production was very low in all samples.

Macrophyte surveys have been conducted through CSLAP in Echo Lake. At least 28 aquatic plant species have been found, including at least one protected plant species (*Eleocharis robbinsii*, Robbins spikerush). The modified floristic quality index (FQI) for the lake indicates that the quality of the aquatic plant community is “excellent.”

Only an incomplete inventory of the fish community is available for Echo Lake—it is likely that the lake supports a coolwater fishery.

Zooplankton and macroinvertebrates have not been evaluated through CSLAP in Echo Lake.

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

Evaluation of Lake Perception

Water quality, aquatic plant, and recreational assessments were less favorable than normal in 2014 and 2015. Aquatic plant coverage was more extensive than normal in each of the last four years, resulting in less favorable recreational assessments, although the coverage of aquatic plants decreased from the early 1990s to the early 2010s. None of the other assessments (water quality or recreation) has exhibited a long term trend. Recreational assessments usually improve slightly during the summer, degrading slightly in the fall; this usually mirrors seasonal changes in water quality assessments. These seasonal patterns were not apparent in any of the last four years; it is not known if this reflects changing lake conditions or shifts in volunteers’ perceptions of the lake. Plant coverage was slightly greater than normal in 2015. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

Evaluation of Local Climate Change

Air temperature readings in the summer index period have increased in recent years, which may have resulted in an increase in water temperatures over the same period, although deepwater temperatures have decreased slightly over this period.

Evaluation of Algal Toxins

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Fluoroprobe readings have been well below the levels indicating susceptibility for harmful algal blooms (HABs), indicating low levels of blue green algae. Although highly elevated blue green algae levels in the shoreline blooms were recorded in early summer of 2013, an analysis of algae samples indicated microcystin and anatoxin readings in the open water and in the blue green algae blooms along the shoreline to be below levels needed to support safe swimming. The 2015 shoreline bloom was comprised of green algae and diatoms. However, lake residents and pets are still advised to avoid direct exposure to these blooms.

Lake Condition Summary

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.65	3.34	5.45	1.83	Mesotrophic	Lower Than Normal	No Change
	Chlorophyll <i>a</i>	0.05	4.22	21.40	7.39	Mesotrophic	Higher than Normal	No Change
	Total Phosphorus	0.002	0.011	0.031	0.018	Mesotrophic	Higher than Normal	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.00	0.07	0.50	0.12	Close to Surface NH ₄ Readings	Higher than Normal	Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.004	0.027	0.088	0.027	Close to Surface TP Readings	Within Normal Range	Not known
	Nitrate + Nitrite	0.00	0.02	0.25	0.02	Low NO _x	Higher than Normal	No Change
	Ammonia	0.00	0.03	0.26	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.01	0.36	1.09	0.37	Low Total Nitrogen	Within Normal Range	No Change
	pH	5.55	7.35	8.19	7.51	Circumneutral	Within Normal Range	No Change
	Specific Conductance	21	46	68	56	Softwater	Higher than Normal	No Change
	True Color	2	22	61	21	Intermediate Color	Within Normal Range	No Change
	Calcium	2.4	5.4	7.6	5.8	Not Susceptible to Zebra Mussels	Within Normal Range	No Change
Lake Perception	WQ Assessment	1	1.6	3	2.0	Not Quite Crystal Clear	Less Favorable than Normal	No Change
	Aquatic Plant Coverage	1	2.5	4	3.0	Subsurface Plant Growth	Less Favorable than Normal	No Change
	Recreational Assessment	1	1.5	5	1.9	Could Not Be Nicer	Less Favorable than Normal	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-high blue green algae in bloom	Not known	Not known
	Macrophytes					Excellent quality of aquatic plant community	Not known	Not known
	Zooplankton					Not measured through CSLAP	Not known	Not known
	Macroinvertebrates					Not yet evaluated	Not known	Not known
	Fish					Warmwater fisheries	Not known	Not known
	Invasive Species					None observed	Not known	Not known
Local Climate Change	Air Temperature	9	22.6	34	24.3		Within Normal Range	Increasing Slightly
	Water Temperature	9	21.5	28	23.1		Within Normal Range	No Change

Category	Indicator	Min	Annual Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	3	8	2	No readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	1	3	8	5	No readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	0	2	0	No readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	0.4	0.2	0.4	<0.30	Mostly undetectable open water MC-LR	Not known	Not known
	Open Water Anatoxin a	<DL	<DL	<DL	<DL	Open water Anatoxin-a consistently not detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a	3	826	3140	3	Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0	807	3140	0	Most readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<0.60	0.4	0.7	<0.60	Mostly undetectable shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	<DL	<DL	Shoreline bloom Anatoxin-a consistently not detectable	Not known	Not known

Evaluation of Lake Condition Impacts to Lake Uses

Echo Lake is cited on the 2009 Susquehanna River drainage basin Priority Waterbody List (PWL) as having “no use impairments”. The PWL listing for Echo Lake is listed in Appendix B.

Potable Water (Drinking Water)

The CSLAP dataset at Echo Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not used for this purpose. The low algae levels in the open water and relatively low deepwater ammonia readings do not point to any impacts to “unofficial” potable water use of the lake, although any water intakes within blue green algae blooms along the shoreline may be compromised.

Public Bathing

The CSLAP dataset at Echo Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, suggests that public bathing, if supported at a public bathing beach, would be fully supported most years, although shoreline blue green algae blooms in 2013 may have *stressed* this use in the areas where blooms were reported. 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 Echo Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, suggest that recreation should be fully supported in most years, although this use may also be *stressed* by periodic (early summer) shoreline blue green algae blooms.

Aquatic Life

The CSLAP dataset on Echo Lake, including water chemistry data, physical measurements, and volunteer samplers’ perception data, suggest that aquatic life should be fully supported, although additional data are needed to evaluate the food and habitat conditions for aquatic organisms in the lake.

Aesthetics and Habitat

The CSLAP dataset on Echo Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *stressed* at times by shoreline blue green algae blooms, although this was not apparent in 2014 or 2015. Habitat should be favorable.

Fish Consumption

There are no fish consumption advisories posted for Echo Lake.

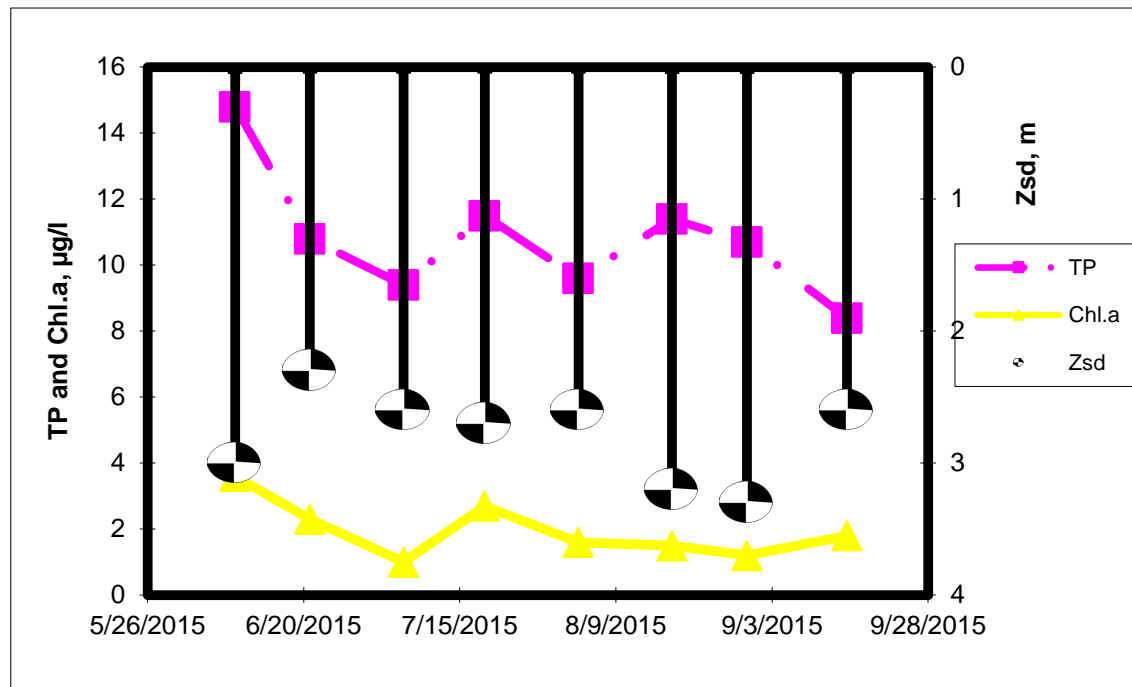
Additional Comments and Recommendations

The lake association should continue to evaluate aquatic plant communities within the lake and conduct shoreline assessments to determine if any exotic plant species or harmful algae blooms are found in the lake. The decrease in water clarity in recent years may be indicative of additional inputs of materials into the lake; these should be evaluated by the lake association. Lake residents and their pets are advised to avoid contact with shoreline blooms or discolored water.

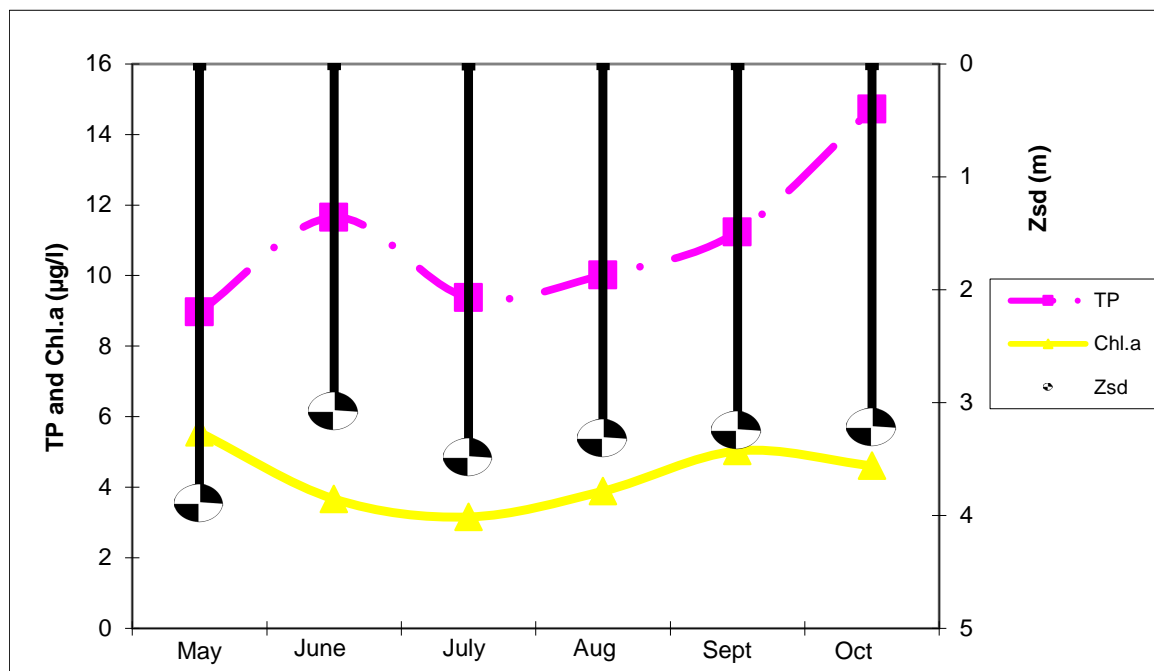
Aquatic Plant IDs-2015

None submitted for identification in 2015.

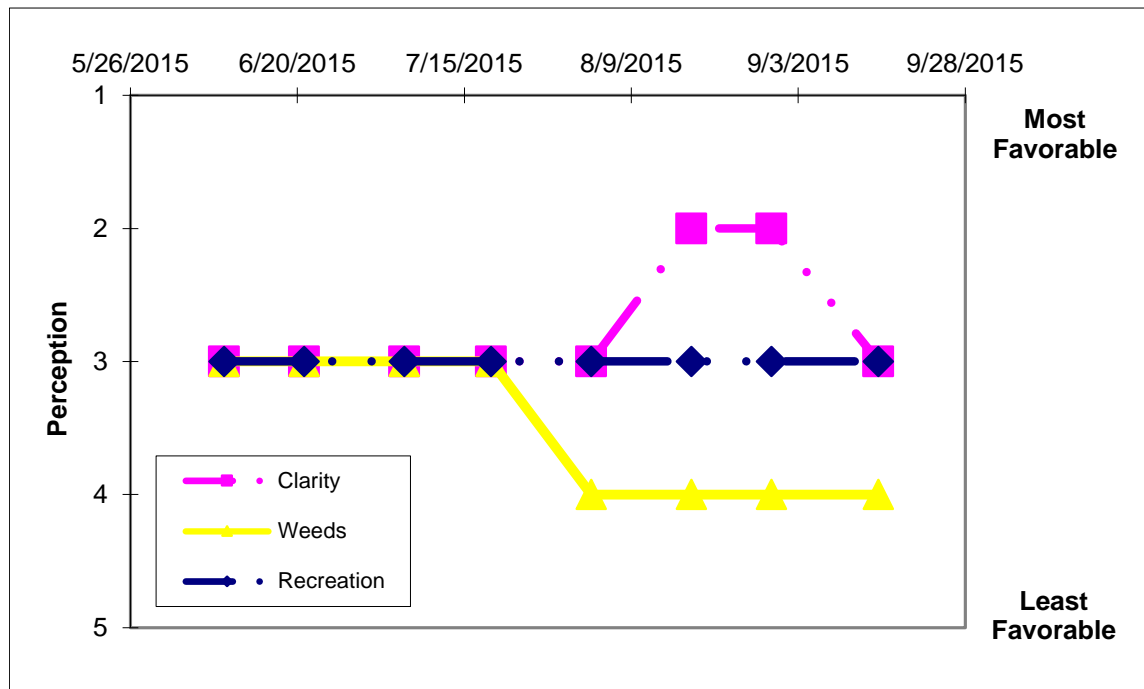
Time Series: Trophic Indicators, 2015



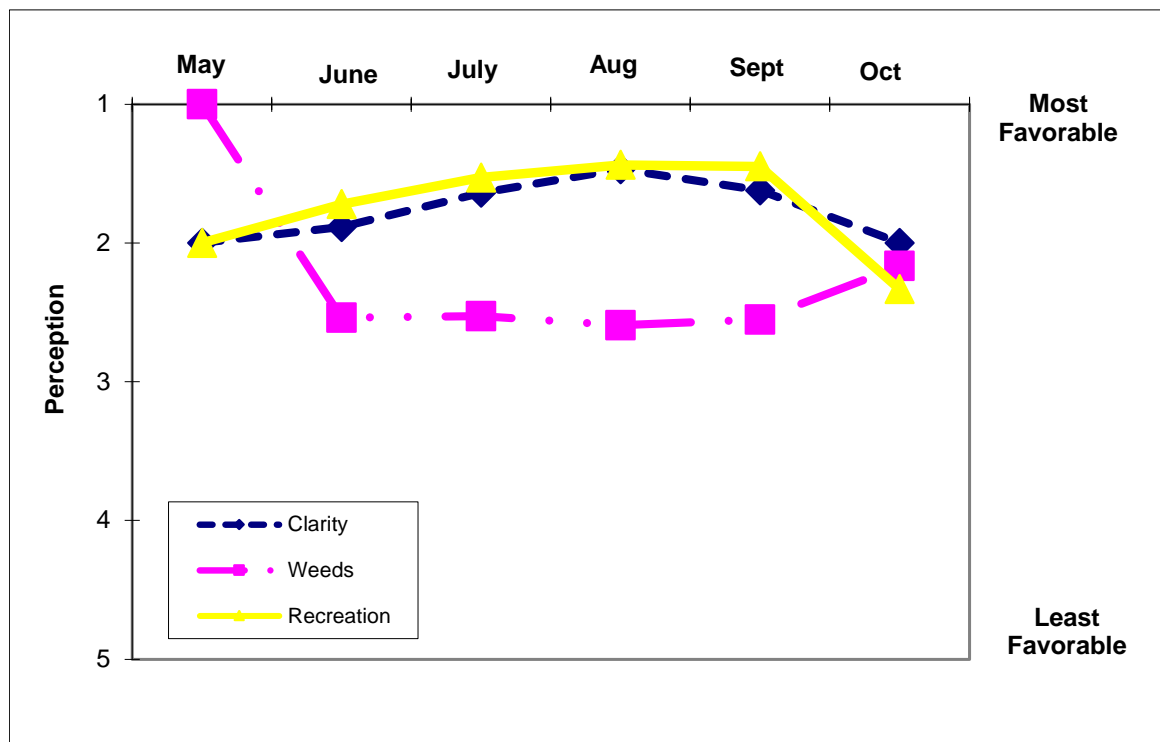
Time Series: Trophic Indicators, Typical Year (1991-2015)



Time Series: Lake Perception Indicators, 2015



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



Appendix A- CSLAP Water Quality Sampling Results for Echo Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
81	Echo L	6/30/1991	10.0	4.85	1.5	0.008	0.01				21	7.60	45		3.11	
81	Echo L	7/14/1991	10.5	5.10	1.5	0.009	0.01				26	7.38	47		4.29	
81	Echo L	7/28/1991	10.0	4.13	1.5	0.008	0.01				20	7.33	46		6.14	
81	Echo L	8/11/1991	10.0	2.88	1.5	0.009	0.01				18	7.50	46		21.40	
81	Echo L	8/25/1991	10.2	3.05	1.5	0.011	0.01				18	7.55	36		2.44	
81	Echo L	9/8/1991	10.5	4.90	1.5	0.009	0.01				15	7.36	48		9.02	
81	Echo L	9/14/1991	10.3	3.50	1.5	0.010	0.01				17	7.50	44		2.82	
81	Echo L	9/29/1991	10.2	2.40	1.5	0.026	0.01				18	7.60	47		7.25	
81	Echo L	6/7/1992	9.2	2.05	1.5	0.014	0.01				24	7.55	47		0.58	
81	Echo L	6/21/1992	10.5	2.50	1.5	0.013					29	7.14	47		9.69	
81	Echo L	7/5/1992	10.3	1.90	1.5	0.021	0.01				21	7.57	47		8.42	
81	Echo L	7/19/1992	10.2	2.05	1.5	0.016					25	7.61	47		7.91	
81	Echo L	8/2/1992	9.2	2.65	1.5	0.011	0.01				25	7.55	48		3.82	
81	Echo L	8/16/1992	10.5	2.50	1.5	0.013					24	7.62	47		3.71	
81	Echo L	8/30/1992	10.5	2.75	1.5	0.011	0.01				25	7.59	48		3.20	
81	Echo L	9/12/1992	10.5	4.13	1.5	0.011					27	7.49	46		6.29	
81	Echo L	6/20/1993	11.3	3.13	1.5	0.011	0.01				17	7.43	43		2.20	
81	Echo L	6/26/1993	10.3	2.88	1.5	0.012	0.01				18	7.69	42		2.96	
81	Echo L	7/10/1993	10.3	3.13	1.5	0.006	0.01				22	7.01	42		1.92	
81	Echo L	7/24/1993	10.0	3.25	1.5	0.009					18	7.61	41		7.48	
81	Echo L	8/7/1993	10.0	2.75	1.5	0.009	0.01				18	7.54	43		6.08	
81	Echo L	8/21/1993	10.0	3.50	1.5	0.008					20	7.09	42		8.58	
81	Echo L	9/5/1993	10.0	3.75	1.5	0.008	0.01				18	7.72	43		2.79	
81	Echo L	9/18/1993	10.0	4.00	1.5	0.008					20	7.24	44		6.12	
81	Echo L	6/11/1994	9.3	3.50	1.5	0.012	0.01				17	7.21	43		3.88	
81	Echo L	6/22/1994	10.1	3.00	1.5	0.008					22	7.15	42			
81	Echo L	7/2/1994	10.0	2.65	1.5	0.010	0.01				23	7.30	42		6.64	
81	Echo L	7/16/1994	10.0	3.25	1.5	0.006	0.01				27	7.45	42		5.62	
81	Echo L	7/30/1994	10.0	3.83	1.5	0.010	0.01				18	7.44	42		3.29	
81	Echo L	8/13/1994	9.8	3.58	1.5	0.010					28	7.29	43		5.53	
81	Echo L	8/27/1994	10.0	3.75	1.5	0.008	0.01				25	7.33	43		3.19	
81	Echo L	9/11/1994	10.0	3.40	1.5	0.009	0.01				24	7.42	44			
81	Echo L	6/24/1995	10.0	3.25	1.5	0.009	0.01				15	7.34	48		1.80	
81	Echo L	7/8/1995	9.3	4.75	1.5	0.007	0.01					7.04	49		1.68	
81	Echo L	7/22/1995	10.1	4.40	1.5	0.009	0.01				15	7.46	48		3.19	
81	Echo L	8/5/1995	9.8	4.95	1.5	0.010					15	7.10	48		2.35	
81	Echo L	8/19/1995	9.0	4.63	1.5	0.007					10	7.06	49		2.79	
81	Echo L	9/2/1995	10.0	3.65	1.5	0.009					20	7.24	49		5.13	
81	Echo L	9/16/1995	9.9	3.46	1.5	0.009					10	7.05	50		3.94	
81	Echo L	9/30/1995	9.9	3.60	1.5	0.011	0.01				15	7.13	50		4.27	
81	Echo L	06/23/02	10.3	3.05	1.5	0.009	0.02	0.03	0.40	95.16	35	7.38	47		1.11	
81	Echo L	07/07/02	9.1	3.70	1.5	0.007	0.02	0.08	0.37	112.98	18	7.57	48		1.72	
81	Echo L	07/21/02	9.2	4.10	1.5	0.003	0.00	0.03	0.39	265.24	23	7.45	48		0.42	
81	Echo L	08/04/02	9.0	4.35	1.5	0.006	0.02	0.04	0.46	175.82	29	7.34	49		1.75	
81	Echo L	08/18/02	9.0	4.55	1.5	0.012	0.00	0.01	0.48	85.22	19	7.38	49		3.37	
81	Echo L	09/02/02	9.2	4.10	1.5	0.007	0.00	0.01	0.38	111.41	17	7.45	50		8.41	
81	Echo L	09/23/02	9.0	3.35	1.5	0.011	0.01	0.03	0.34	68.52	27	7.26	51		4.49	
81	Echo L	10/06/02	9.3	2.55	1.5	0.019	0.00	0.07	0.49	56.87	31	6.72	54		7.72	
81	Echo L	10/19/02			1.5	0.013	0.00	0.01	0.43	73.75						
81	Echo L	5/26/2003	9.6	3.30	1.5	0.011	0.01	0.03	0.38	76.42	19	7.06	50	5.5	8.64	
81	Echo L	6/8/2003	9.5	3.90	1.5		0.02	0.03	0.23		16	7.18	52		1.61	
81	Echo L	6/22/2003	9.6	2.90	1.5	0.009	0.02	0.00	0.23	53.32	20	7.26	47		1.83	
81	Echo L	7/6/2003	9.6	3.25	1.5	0.008	0.01	0.01	0.34	92.89	17	7.25	50		1.78	
81	Echo L	7/20/2003	9.4	4.20	1.5	0.006	0.00	0.03	0.41	157.25	22	7.28	51	5.4	2.30	
81	Echo L	8/3/2003	9.7	3.30	1.5	0.006	0.00	0.02	0.17	61.64	26	6.71	50		3.80	
81	Echo L	8/17/2003	9.6	3.60	1.5	0.005	0.01	0.02	0.33	134.32	27	6.95	49		4.52	
81	Echo L	9/7/2003	9.7	3.20	1.5	0.007	0.00	0.26	0.42	124.89	32	7.06	51		0.31	
81	Echo L	6/20/2004	9.6	2.80	1.5	0.017	0.01	0.01	0.20	25.28	21	5.55	53		8.32	
81	Echo L	7/5/2004	8.4	2.50	1.5	0.008	0.01	0.01	0.35	94.15	17	6.10	57		4.20	
81	Echo L	7/18/2004	9.4	2.50	1.5	0.004	0.02	0.01	0.44	214.70	24	6.49			3.80	
81	Echo L	8/1/2004	9.4	2.70	1.5	0.013	0.01	0.01	0.29	50.94	22	7.26	49		3.90	
81	Echo L	8/15/2004	9.1	2.00	1.5	0.013	0.01	0.02	0.80	133.29	2	7.76		6.8	9.50	
81	Echo L	8/29/2004	9.1	2.00	1.5	0.016	0.03	0.20	0.98	138.56	28	7.00	40		1.20	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
81	Echo L	9/12/2004	8.8	2.50	1.5	0.018	0.01	0.03	0.54	64.24	53	7.23	48		2.70	
81	Echo L	9/26/2004	8.9	2.40	1.5	0.012	0.01	0.01	0.01	0.95	33	8.16	31		4.63	
81	Echo L	6/20/2005	9.3	4.30	1.5	0.002	0.03	0.04	0.29	294.18	14	6.80	45	5.1	1.19	
81	Echo L	7/5/2005	9.3	4.45	1.5		0.01	0.01	0.11		21	7.67	44		1.48	
81	Echo L	7/31/2005	9.4	3.70	1.5	0.005	0.01	0.01	0.25	115.22	22	8.00	44		1.09	
81	Echo L	8/15/2005	9.1	2.70	1.5	0.010	0.05	0.01	0.21	45.55	10	7.90	42		6.28	
81	Echo L	9/5/2005	9.5	2.45	1.5	0.015	0.01	0.01	0.17	25.07	14	7.39	41	5.5	6.03	
81	Echo L	9/11/2005	9.0	2.55	1.5	0.013	0.01	0.01	0.16	27.93	11	7.59	46		6.18	
81	Echo L	9/18/2005	9.7	3.10	1.5	0.009	0.01	0.01	0.15	38.55	13	8.03	49		5.65	
81	Echo L	9/25/2005	8.9	2.85	1.5	0.009	0.01	0.01	0.07	17.04	9	6.69	49		9.30	
81	Echo L	5/29/2006	8.3	4.50	1.5	0.007	0.25	0.03	0.39	121.96	18		46	3.9	2.46	
81	Echo L	6/21/2006	9.5	3.38	1.5	0.009	0.02	0.02	0.48	120.79	22	7.40	26		3.95	
81	Echo L	7/9/2006	9.0	2.08	1.5	0.011	0.01	0.03	0.48	101.24	61	6.79	32		2.41	
81	Echo L	7/30/2006	8.0	1.90	1.5	0.011	0.01	0.03	1.09	213.99	59	7.59	34		11.01	
81	Echo L	8/18/2006	8.8	3.35	1.5	0.009	0.00	0.02	0.72	179.15	30	7.81	37	5.2	2.87	
81	Echo L	8/31/2006	8.9	2.95	1.5	0.009			0.61	149.99	38	6.79	38		2.92	
81	Echo L	9/18/2006	8.8	3.10	1.5	0.006			0.41	157.09	36	8.15	31		2.60	
81	Echo L	10/8/2006	8.9	3.60	1.5	0.016	0.01	0.02	0.57	78.64	35	7.20	51		2.76	
81	Echo L	6/28/2007	8.9	3.20		0.010	0.01	0.01	0.30	69.5	13	7.2	36	2.4		
81	Echo L	7/8/2007	9.1	3.50	1.5	0.008	0.03	0.02	0.64	178.2	21	8.2	60		1.81	
81	Echo L	7/30/2007	8.8	4.00	1.5	0.009	0.02	0.02	0.53	135.5	11	7.9	52		1.65	
81	Echo L	8/12/2007	9.2	3.90	1.5	0.010	0.00	0.01	0.31	70.0	14	6.6	21		2.88	
81	Echo L	8/25/2007	8.7	4.15	1.5	0.010	0.02	0.02	0.57	131.8	18	7.3	52	5.5	2.64	
81	Echo L	9/8/2007	8.9	4.55	1.5	0.013	0.00	0.02	0.62	108.2	12	7.2	41		2.03	
81	Echo L	9/23/2007	9.0	4.40	1.5	0.009	0.00	0.01	0.49	121.3	13	6.8	52		2.54	
81	Echo L	10/14/2007	8.9	3.90	1.5	0.010	0.02	0.06	0.64	136.9	17	7.2	48		3.64	
81	Echo L	6/8/2008	9.2	4.15		0.010	0.01	0.02	0.23	50.22	16	7.57	58	6.4	4.62	
81	Echo L	7/2/2008	8.9	5.45	1.5	0.006	0.03	0.03	0.25	98.98	20	6.69	41		1.01	
81	Echo L	7/14/2008	9.2	4.95	1.5	0.009	0.02	0.03	0.24	58.00	15	7.79	47		1.43	
81	Echo L	7/29/2008	9.1	5.10	1.5	0.013	0.05	0.08	0.14	24.55	13	6.99	47		2.40	
81	Echo L	8/9/2008	8.9	4.90	1.5	0.008	0.01	0.01	0.19	54.52	18	7.28	34	5.6	2.99	
81	Echo L	8/24/2008	9.2	4.85	1.5	0.008	0.03	0.04	0.31	89.59	8	7.01	45		2.40	
81	Echo L	9/8/2008	9.1	4.05	1.5	0.010	0.01	0.01	0.29	64.06	13	7.77	36		4.06	
81	Echo L	10/5/2008	8.9	3.15	1.5	0.012	0.03	0.01	0.26	48.55	21	8.17	49		5.52	
81	Echo L	06/28/2009	9.3	3.60	1.5	0.011	0.00	0.01	0.10	20.80	18	6.36	47	5.7	4.63	
81	Echo L	07/20/2009	8.8	4.85	1.5	0.009	0.05	0.03	0.29	73.93	20	6.61	36		2.40	
81	Echo L	07/28/2009	8.6	5.00	1.5	0.008	0.01	0.01	0.26	68.65	23	8.09	39		2.43	
81	Echo L	08/11/2009	9.5	3.95	1.5	0.007	0.01	0.02	0.22	70.78	22	7.49	31		3.00	
81	Echo L	08/23/2009	9.2	4.43	1.5	0.006	0.02	0.02	0.27	91.44	39	7.12	41	7.6	2.20	
81	Echo L	09/07/2009	9.5	3.25	1.5	0.008	0.01	0.03	0.17	47.71	43	7.07	31		2.80	
81	Echo L	09/20/2009	9.1	3.00	1.5	0.008	0.01	0.01	0.14	38.43	35	7.29	36		2.80	
81	Echo L	10/18/2009	9.5	2.55	1.5	0.014	0.02	0.03	0.35	57.26	40	7.19	27		4.90	
81	Echo L	6/15/2010	9.1	3.35	1.5	0.012	0.04	0.02	0.28	52.61	20	7.91	50	5.6	0.90	
81	Echo L	6/27/2010	9.3	3.28	1.5	0.009	0.05	0.03			27	7.35	39		4.70	
81	Echo L	7/12/2010	9.7	4.05	1.5	0.009	0.01	0.02	0.24	62.38	18	7.49	52		0.60	
81	Echo L	7/25/2010	9.6	3.75	1.5	0.009	0.01	0.02	0.24	61.14	17	6.82	37		2.30	
81	Echo L	8/9/2010	9.5	3.85	1.5	0.008	0.02	0.04	0.33	89.36	22	7.47	48	3.7	2.60	
81	Echo L	8/29/2010	9.2	3.45	1.5	0.012	0.03	0.01	0.33	61.53	19	7.38	49		4.60	
81	Echo L	9/6/2010	9.8	3.55	1.5	0.014	0.05	0.02	0.39	60.94	27	7.77	58		8.10	
81	Echo L	9/19/2010	8.4	3.00	1.5	0.010	0.05	0.02	0.45	102.21	25	7.02			5.40	
81	Echo L	6/11/2012	8.9	3.05	1.5	0.010	0.01	0.01	0.25	55.78		7.73	55	5.0	1.40	
81	Echo L	7/10/2012	7.5	4.00	1.5	0.012	0.01	0.01	0.28	53.67	19	7.80	50		1.70	
81	Echo L	7/22/2012	8.7	3.65	1.5	0.009	0.01	0.03	0.23	56.96	17	7.64	35		0.90	
81	Echo L	8/6/2012	9.7	3.70	1.5	0.010	0.01	0.01	0.27	59.49	18	8.14	51		1.60	
81	Echo L	8/19/2012	9.4	3.10	1.5	0.011	0.01	0.01	0.49	98.09	18	7.91	41	6.1	1.50	
81	Echo L	9/3/2012	9.5	3.45	1.5	0.012	0.01	0.02	0.25	47.98	16	7.78	41		3.00	
81	Echo L	9/11/2012	8.8	3.90	1.5	0.014	0.01	0.03	0.27	44.00	13	7.16	47		2.60	
81	Echo L	10/28/2012	9.0	3.60	1.5	0.019	0.01	0.02	0.41	46.74	23	7.37	27		3.10	
81	Echo L	5/21/2013			Bloom											
81	Echo L	6/3/2013			Bloom											
81	Echo L	6/16/2013	8.9	2.65	1.5	0.012	0.02	0.02	0.31	58.85		7.30	47		1.50	
81	Echo L	6/17/2013			Bloom											
81	Echo L	6/30/2013	9.1	3.38	1.5	0.009			0.32	76.18	25	7.67	52		0.05	
81	Echo L	7/14/2013			bloom											
81	Echo L	7/14/2013	7.4	2.20	1.5	0.010	0.01	0.01	0.29	63.39	28	7.57	49		2.80	
81	Echo L	7/28/2013	9.6	2.25	1.5	0.012			0.38	72.34	23	7.75	50			

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
81	Echo L	8/11/2013	9.1	2.30	1.5	0.009	0.01	0.03	0.41	99.23	35	6.82	40		0.70	
81	Echo L	8/25/2013	8.9	2.70	1.5	0.009			0.42	104.19	33	7.21	61		3.40	
81	Echo L	9/15/2013	9.3	1.75	1.5	0.016	0.01	0.03	0.49	69.70	36	7.11	48		8.20	
81	Echo L	9/29/2013	9.1	1.75	1.5	0.020			0.37	40.32	29	7.36	52		17.40	
81	Echo L	5/10/2014			bloom											
81	Echo L	6/1/2014	8.0	1.95	1.5	0.031	0.03	0.03	0.37	25.85	25	7.45	54	5.8	15.40	
81	Echo L	6/15/2014	9.5	1.75	1.5	0.014			0.33	51.59	17	7.25	53		7.50	
81	Echo L	6/29/2014	9.0	2.15	1.5	0.016	0.01	0.02	0.34	46.46	24	7.66	55		2.50	
81	Echo L	7/14/2014	9.5	2.10	1.5	0.017			0.34	43.75	28	8.14	68		6.20	
81	Echo L	7/27/2014	9.2	1.75	1.5	0.014	0.03	0.04	0.34	52.68	17	6.97	57	5.8	6.40	
81	Echo L	8/10/2014	9.7	1.65	1.5	0.018			0.46	58.21	18	7.44	59		5.20	
81	Echo L	8/24/2014	9.7	1.65	1.5	0.019	0.04	0.02	0.46	53.15	14	7.69	52		11.20	
81	Echo L	9/6/2014	9.2	1.65	1.5	0.014			0.30	47.64	23	7.49	49		4.70	
81	Echo L	5/4/2015			bloom											
81	Echo L	6/9/2015	9.0	3.00	1.5	0.015	0.04	0.16	0.31	20.68	9	7.91	50	5.2	3.60	
81	Echo L	6/21/2015	9.3	2.30	1.5	0.011			0.30	27.41	16	8.23	68		2.30	
81	Echo L	7/6/2015	9.6	2.60	1.5	0.009	0.01	0.07	4.29	456.17	29	6.98	52		1.00	5.0
81	Echo L	7/19/2015	9.3	2.70	1.5	0.012			0.51	44.17	28	8.08	52		2.70	
81	Echo L	8/3/2015	9.7	2.60	1.5	0.010	0.04	0.04	0.52	53.75	29	7.15	53	5.0	1.60	
81	Echo L	8/18/2015	9.4	3.20	1.5	0.011			0.42	36.58	19	7.41	52		1.50	
81	Echo L	8/30/2015	9.5	3.30	1.5	0.011	0.02	0.04	0.33	30.75	27	7.56	49		1.20	5.0
81	Echo L	9/15/2015	9.3	2.60	1.5	0.008			0.28	32.74	19	7.28	50		1.80	
81	Echo L	6/26/1993	10.3		8.0	0.021										
81	Echo L	8/7/1993	10.0		8.5	0.043										
81	Echo L	8/21/1993	10.0		8.5	0.045										
81	Echo L	6/22/1994	10.1		8.0	0.028										
81	Echo L	7/16/1994	10.0		8.5	0.034										
81	Echo L	8/13/1994	9.8		9.0	0.054										
81	Echo L	9/11/1994	10.0		9.5	0.046										
81	Echo L	06/23/02	10.3	3.05	8.0	0.015	0.00	0.03	0.37	25.29						
81	Echo L	07/07/02	9.1	3.70	7.5	0.006	0.02	0.09	0.33	59.65						
81	Echo L	07/21/02	9.2	4.10	7.5	0.005	0.00	0.02	0.25	48.05						
81	Echo L	08/04/02	9.0	4.35	7.5	0.008	0.01	0.02	0.38	50.31						
81	Echo L	08/18/02	9.0	4.55	7.5	0.021	0.00	0.09	0.56	26.23						
81	Echo L	09/02/02	9.2	4.10	7.5	0.011	0.00	0.01	0.44	41.66						
81	Echo L	09/23/02	9.0	3.35	7.5	0.019	0.00	0.03	0.37	20.19						
81	Echo L	10/06/02	9.3	2.55	7.5	0.009	0.00	0.02	0.38	40.72	9	7.44	71		4.00	
81	Echo L	5/26/2003			8.0		0.01	0.04	0.27		19	7.06	50.2			
81	Echo L	6/22/2003			8.0	0.017	0.02	0.05	0.27	16.00						
81	Echo L	7/6/2003			8.0	0.035	0.01	0.01	0.25	7.17						
81	Echo L	7/20/2003			8.0	0.011	0.00	0.01	0.26	23.57						
81	Echo L	8/3/2003			8.2	0.059	0.00	0.10	0.16	2.73						
81	Echo L	8/17/2003			8.0	0.062	0.00	0.12	0.35	5.62						
81	Echo L	9/7/2003			8.0	0.007	0.00	0.50	0.44	59.53						
81	Echo L	6/20/2004	9.6		8.1	0.022										
81	Echo L	7/5/2004	8.4		7.0	0.007										
81	Echo L	7/18/2004	9.4		8.0	0.024										
81	Echo L	8/1/2004	9.4		8.0	0.034										
81	Echo L	8/15/2004	9.1		7.5	0.007										
81	Echo L	8/29/2004	9.1		7.0	0.017										
81	Echo L	9/12/2004	8.8		7.3	0.007										
81	Echo L	9/26/2004	8.9		7.5	0.011										
81	Echo L	6/20/2005			7.5	0.012										
81	Echo L	7/5/2005			7.5	0.008										
81	Echo L	7/31/2005			8.9	0.080										
81	Echo L	8/15/2005			7.5	0.041						7.89	118			
81	Echo L	9/5/2005			8.0	0.007										
81	Echo L	9/11/2005			7.5	0.020										
81	Echo L	9/18/2005			8.0	0.013										
81	Echo L	5/29/2006	8.3		6.5	0.017										
81	Echo L	6/21/2006	9.5		8.0	0.014										
81	Echo L	7/9/2006	9.0		7.5	0.031										
81	Echo L	7/30/2006	8.0		6.5	0.008										
81	Echo L	8/18/2006	8.8		7.3	0.025										
81	Echo L	8/31/2006	8.9		7.4	0.010										
81	Echo L	9/18/2006	8.8		7.3	0.026										

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
81	Echo L	10/8/2006	8.9		7.4	0.029										
81	Echo L	6/28/2007	8.9		7.4	0.015										
81	Echo L	7/8/2007	9.1		7.6	0.015										
81	Echo L	7/30/2007	8.8		7.3	0.017										
81	Echo L	8/12/2007	9.2		7.7	0.027										
81	Echo L	8/25/2007	8.7		7.2	0.021										
81	Echo L	9/8/2007	8.9		7.4	0.013										
81	Echo L	9/23/2007	9.0		7.5	0.011										
81	Echo L	10/14/2007	8.9		7.4	0.027										
81	Echo L	6/8/2008	9.2		7.7	0.056										
81	Echo L	7/2/2008	8.9		7.4	0.049										
81	Echo L	7/14/2008	9.2		7.7	0.047										
81	Echo L	7/29/2008	9.1		7.6	0.075										
81	Echo L	8/9/2008	8.9		7.4	0.088										
81	Echo L	8/24/2008	9.2		7.7	0.058										
81	Echo L	9/8/2008	9.1		7.6	0.070										
81	Echo L	10/5/2008	8.9		7.4	0.023										
81	Echo L	06/28/2009	9.3		7.8	0.022		0.00								
81	Echo L	07/20/2009	8.8		7.3	0.021										
81	Echo L	07/28/2009	8.6		7.1	0.024		0.02								
81	Echo L	08/11/2009	9.5		8.0	0.022										
81	Echo L	08/23/2009	9.2		7.7	0.041		0.03								
81	Echo L	09/07/2009	9.5		8.0	0.088										
81	Echo L	09/20/2009	9.1		7.6	0.058		0.19								
81	Echo L	10/18/2009	9.5		8.0	0.012										
81	Echo L	6/15/2010	9.1		8.0	0.027		0.06								
81	Echo L	7/12/2010	9.7		8.5	0.030		0.02								
81	Echo L	8/9/2010	9.5		8.0	0.022		0.02								
81	Echo L	9/6/2010	9.8		8.3	0.039		0.08								
81	Echo L	6/11/2012			7.4	0.023		0.05								
81	Echo L	7/22/2012			7.2	0.009		0.03								
81	Echo L	8/19/2012			8.0	0.004		0.02								
81	Echo L	9/11/2012			7.3	0.020		0.04								
81	Echo L	6/16/2013			7.0	0.009										
81	Echo L	7/14/2013			6.0	0.029		0.01								
81	Echo L	8/11/2013			7.6	0.017		0.03								
81	Echo L	9/15/2013			7.8	0.038		0.20								
81	Echo L	6/1/2014			6.5	0.028		0.03								
81	Echo L	6/15/2014			8.0	0.009										
81	Echo L	6/29/2014			7.5	0.033		0.14								
81	Echo L	7/14/2014			8.0	0.033										
81	Echo L	7/27/2014			7.7	0.053		0.15								
81	Echo L	8/10/2014			8.2	0.018										
81	Echo L	8/24/2014			8.2	0.016		0.17								
81	Echo L	9/6/2014			7.7	0.027										
81	Echo L	6/9/2015			7.5	0.021		0.06								
81	Echo L	6/23/2015			7.8	0.017										
81	Echo L	7/6/2015			8.1	0.034		0.10								
81	Echo L	7/19/2015			7.8	0.043										
81	Echo L	8/3/2015			8.2	0.035		0.30								
81	Echo L	8/18/2015			7.9	0.017										
81	Echo L	8/30/2015			8.0	0.049		0.14								
81	Echo L	9/15/2015			7.8	0.051										

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QE	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB-form	Shore
81	Echo L	6/30/1991	epi	20	24															
81	Echo L	7/14/1991	epi	20	22															
81	Echo L	7/28/1991	epi	20	23															
81	Echo L	8/11/1991	epi	17	21															
81	Echo L	8/25/1991	epi	19	22															
81	Echo L	9/8/1991	epi	22	21															
81	Echo L	9/14/1991	epi	24	21															
81	Echo L	9/29/1991	epi	10	14															
81	Echo L	6/7/1992	epi	22	18	2	3	2	6											

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB form	Shore HAB
81	Echo L	6/21/1992	epi	12	19	2	3		5											
81	Echo L	7/5/1992	epi	17	19	2	3	2	5											
81	Echo L	7/19/1992	epi	22	22	2	3	2	126											
81	Echo L	8/2/1992	epi	20	20															
81	Echo L	8/16/1992	epi	15	19															
81	Echo L	8/30/1992	epi	18	20	2	3	2	0											
81	Echo L	9/12/1992	epi	9	17	1	3	1	5											
81	Echo L	6/20/1993	epi	18	22	2	3	2	5											
81	Echo L	6/26/1993	epi	22	24	2	3	2												
81	Echo L	7/10/1993	epi	26	25	1	4	1												
81	Echo L	7/24/1993	epi	23	21	1	3	1												
81	Echo L	8/7/1993	epi	14	22															
81	Echo L	8/21/1993	epi	18	22															
81	Echo L	9/5/1993	epi	17	23	2	3	2												
81	Echo L	9/18/1993	epi	15	18	2	3	1	5											
81	Echo L	6/11/1994	epi	19	20	2	3	2	6											
81	Echo L	6/22/1994	epi	26	24	2	3	2	6											
81	Echo L	7/2/1994	epi	23	22	2	3	2												
81	Echo L	7/16/1994	epi	20	24	2	3	2												
81	Echo L	7/30/1994	epi	23	25	2	3	2												
81	Echo L	8/13/1994	epi	21	22	2	3	2												
81	Echo L	8/27/1994	epi	20	21	1	3	2	2											
81	Echo L	9/11/1994	epi	15	17	2	3	2	0											
81	Echo L	6/24/1995	epi	18	23	2	3	2	5											
81	Echo L	7/8/1995	epi	16	24	2	3	2	5											
81	Echo L	7/22/1995	epi	23	23	2	3	2												
81	Echo L	8/5/1995	epi	21	25	2	2	2												
81	Echo L	8/19/1995	epi	22	24	2	2	2												
81	Echo L	9/2/1995	epi	14	20	2	2	2												
81	Echo L	9/16/1995	epi	15	18	2	2	2	6											
81	Echo L	9/30/1995	epi	13	15	2	2	2												
81	Echo L	06/23/02	epi	34	27	2	3	2	18											
81	Echo L	07/07/02	epi	26	25	1	3	1	8											
81	Echo L	07/21/02	epi	29	27	1	1	1												
81	Echo L	08/04/02	epi	32	28	1	3	1												
81	Echo L	08/18/02	epi	30	27	1	3	1												
81	Echo L	09/02/02	epi	26	23															
81	Echo L	09/23/02	epi	18	20	1	3	1	5											
81	Echo L	10/06/02	epi	20	19	3	3	1												
81	Echo L	10/19/02	epi	9	12	2	3	5	5											
81	Echo L	5/26/2003	epi	14	17	2	1	3	56											
81	Echo L	6/8/2003	epi	22	20	2	2	1	8											
81	Echo L	6/22/2003	epi	26	20	2	2	2	5											
81	Echo L	7/6/2003	epi	29	27	2	3	1												
81	Echo L	7/20/2003	epi	25	25	1	3	1												
81	Echo L	8/3/2003	epi	31	26	1	3	1												
81	Echo L	8/17/2003	epi	23	27	1	3	1												
81	Echo L	9/7/2003	epi	29	21	1	3	1												
81	Echo L	6/20/2004	epi	21	22	1	3	2	5											
81	Echo L	7/5/2004	epi	31	25	2	3	1	0											
81	Echo L	7/18/2004	epi	22	23	2	3	2	15											
81	Echo L	8/1/2004	epi	28	25	2	3	1	5											
81	Echo L	8/15/2004	epi	24	23	2	3	1	5											
81	Echo L	8/29/2004	epi	31	26	2	3	1	0											
81	Echo L	9/12/2004	epi	26	23	2	3	1	0											
81	Echo L	9/26/2004	epi	21	21	2	2	1	0											
81	Echo L	6/20/2005	epi	23	22	1	3	1	0											
81	Echo L	7/5/2005	epi	26	26	1	3	1	0											
81	Echo L	7/31/2005	epi	32	27	1	3	1	0											
81	Echo L	8/15/2005	epi	27	27	1	3	1	0											
81	Echo L	9/5/2005	epi	28	22	2	3	1	0											

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81	Echo L	9/11/2005	epi	22	22	2	3	1	0												
81	Echo L	9/18/2005	epi	27	23	2	3	1	0												
81	Echo L	9/25/2005	epi	19	20	2	3	2	5												
81	Echo L	5/29/2006	epi	30	20	2	1	1	0												
81	Echo L	6/21/2006	epi	25	23	3	1	1	0												
81	Echo L	7/9/2006	epi	28	24	3	3	2	0												
81	Echo L	7/30/2006	epi	25	27	3	3	2	0												
81	Echo L	8/18/2006	epi	29	27	2	3	1	0												
81	Echo L	8/31/2006	epi	18	22	2	1	1	0												
81	Echo L	9/18/2006	epi	21	20	2	2	1	0												
81	Echo L	10/8/2006	epi	22	16	2	1	1	0												
81	Echo L	6/28/2007	epi	24	25	2	1	1	5												
81	Echo L	7/8/2007	epi	30	25	2	1	1	8												
81	Echo L	7/30/2007	epi	25	25		1	1	0												
81	Echo L	8/12/2007	epi	24	24	2	1	1	8												
81	Echo L	8/25/2007	epi	34	25	2	1	1	5												
81	Echo L	9/8/2007	epi	29	24	1	1	1	8												
81	Echo L	9/23/2007	epi	18	20	2	1	4	5												
81	Echo L	10/14/2007	epi	12	16	2	1	1	0												
81	Echo L	6/8/2008	epi	25	9	1	1	1	0												
81	Echo L	7/2/2008	epi	25	11	1	1	1	0												
81	Echo L	7/14/2008	epi	24	10	1	1	1	8												
81	Echo L	7/29/2008	epi	25	10	1	1	1	8												
81	Echo L	8/9/2008	epi	23	10	1	1	1	8												
81	Echo L	8/24/2008	epi	24	11	1	1	1	5												
81	Echo L	9/8/2008	epi	22	11																
81	Echo L	10/5/2008	epi	15	12	2	1	1	8												
81	Echo L	06/28/2009	epi	26	22	1	1	1	0												
81	Echo L	07/20/2009	epi	22	22	1	1	1	0												
81	Echo L	07/28/2009	epi	26	24	1	1	1	0												
81	Echo L	08/11/2009	epi	25	24	2	1	1	0												
81	Echo L	08/23/2009	epi	20	24	1	1	1	0												
81	Echo L	09/07/2009	epi	25	21	1	1	1	0												
81	Echo L	09/20/2009	epi	20	19	1	1	1	0												
81	Echo L	10/18/2009	epi	10	11	2	1	1	1												
81	Echo L	6/15/2010	epi	29	23	1	3	1	0	0	0										
81	Echo L	6/27/2010	epi	31	24	1	3	1	0	516	0										
81	Echo L	7/12/2010	epi	31	27	1	3	1	2	0	0										
81	Echo L	7/25/2010	epi	26	26	2	3	2	0	0	0										
81	Echo L	8/9/2010	epi	30	26	1	3	1	0	0	0										
81	Echo L	8/29/2010	epi	29	22	2	3	1	2	0	0										
81	Echo L	9/6/2010	epi	25	22	2	3	1	0	0	7										
81	Echo L	9/19/2010	epi	20	19	2	3	1	8	0	0										
81	Echo L	6/11/2012	epi	27	24	1	3	1	0	0	0	2.10	0.40	<0.30	<0.417			2.35	1.04	I	
81	Echo L	7/10/2012	epi	27	26	1	3	1	0	0	0	0.20	0.40	<0.30	<0.392			1.39	0.53	I	
81	Echo L	7/22/2012	epi	29	25	1	3	1	0	0	0	0.90	0.60	<0.30	<0.585			1.31	0.42	I	
81	Echo L	8/6/2012	epi	24	26	1	3	1	0	0	0	0.20	0.50	<0.30	<0.330			2.33	0.93	I	
81	Echo L	8/19/2012	epi	27	24	1	3	1	0	0	0	3.10	0.50	<0.30	<0.223			2.60	1.70	I	
81	Echo L	9/3/2012	epi	22	23	1	3	1	0	0	0	2.70	0.50	<0.30	<0.580			2.54	1.26	I	
81	Echo L	9/11/2012	epi	23	22	1	3	1	0	0	0	2.40	0.70	0.38	<3.205			1.16	0.42	I	
81	Echo L	10/28/2012	epi	11	12	2	4	2	5	0	0	5.40	0.50							I	
81	Echo L	5/21/2013	bloom												0.74	<1.550		774	769		
81	Echo L	6/3/2013	bloom												<0.60	<1.270		3140	3140		
81	Echo L	6/16/2013	epi	19	19	2	3	2	235	4	34	4.10	1.60	<0.30	<0.440			1.30	0.00		ABC
81	Echo L	6/17/2013	bloom												<0.60	<0.870		118	55		
81	Echo L	6/30/2013	epi	25	24	1	3	2	0	0	4	4.20	1.30	<0.30	<0.650			1.40	0.20	F	
81	Echo L	7/14/2013	bloom												<0.60	<0.980		97	69		
81	Echo L	7/14/2013	epi	27	25	1	3	2	0	0	4	3.90	2.60	<0.30	<0.370			2.40	0.00	F	E
81	Echo L	7/28/2013	epi	21	24	1	3	2	25	4	4	1.80	2.40	<0.30	<0.400			1.00	0.10	F	I
81	Echo L	8/11/2013	epi	20	23	1	3	2		0	0	3.50	2.50	<0.30	<0.380			2.60	0.30	F	I
81	Echo L	8/25/2013	epi	21	24	1	3	2	2	0	0	4.60	2.10	0.41	<0.570			1.30	0.50	FI	FI

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
81	Echo L	9/15/2013	epi	18	18	1	3	3	5	0	0	8.30	5.70	<0.30	<19.130		5.90	1.30	FI	I
81	Echo L	9/29/2013	epi	17	16	2	3	2	25	0	0	4.30	7.00	<0.30	<10.600		7.30	0.00	FI	I
81	Echo L	5/10/2014	bloom											<0.73	<0.16	<0.001	2.80	0.00		
81	Echo L	6/1/2014	epi	20	20	2	3	2	5	0	4	0.10	7.00	<0.53	<0.40	<0.001	8.40	0.00	fi	
81	Echo L	6/15/2014	epi	24	20	2	3	2	125	0	0	0.20	7.70	<0.61	<0.08	<0.002	8.10	0.00	F	
81	Echo L	6/29/2014	epi	28	25	2	3	1	28	47	4	2.00	1.00	<0.48	<0.48	<0.002	2.50	0.00	F	
81	Echo L	7/14/2014	epi	26	25	2	3	2	1238	4	4	4.10	0.90	<0.40	<0.48	<0.001	3.20	0.00	H	
81	Echo L	7/27/2014	epi	23	24	2	3	2	1238	4	4	2.20	0.90	<0.63	<0.03	<0.001	3.60	0.00	F	F
81	Echo L	8/10/2014	epi	25	24	2	3	1	1238	4	4	1.60	1.40	<0.28	<0.05	<0.001	4.20	0.00	F	F
81	Echo L	8/24/2014	epi	22	24	2	3	2	123	4	4	2.60	1.30	<0.26	<0.10	<0.002	7.60	0.10	fi	fi
81	Echo L	9/6/2014	epi	26	23	2	3	3	123	4	4	4.30	0.90	<0.29	<0.14	<0.002	3.70	0.10	hi	hi
81	Echo L	5/4/2015	bloom											<1.50	<0.044	<0.130	77.74	0.00		c
81	Echo L	6/9/2015	epi	22	20	3	3	3	12356	4	4	4.60	0.20	<0.55	<0.027	<0.318	0.70	0.00	I	I
81	Echo L	6/21/2015	epi	24	24	3	3	3	12356	4	4	6.20	0.30	<0.55	<0.004	<0.024	2.00	1.10	I	I
81	Echo L	7/6/2015	epi	27	24	3	3	3	2356	4	4	1.50	0.40	<0.71	<0.003	<0.011	0.70	0.00	I	I
81	Echo L	7/19/2015	epi	29	24	3	3	3	2678	4	4	5.40	0.40	<0.36	<0.003	<0.018	1.20	0.20	I	I
81	Echo L	8/3/2015	epi	28	26	3	4	3	128	47	47	4.64	0.43	<0.18	<0.002	<0.009	0.90	0.20	I	I
81	Echo L	8/18/2015	epi	27	26	2	4	3	2	67	6	2.50	0.40	<0.65	<0.005	<0.015	0.50	0.00	I	I
81	Echo L	8/30/2015	epi	27	24	2	4	3	23	46	46			<0.39	<0.012	<0.031	0.70	0.10	I	I
81	Echo L	9/15/2015	epi	21	24	3	4	3	2	46	46	19.30	0.30	<0.37	<0.009	<0.022	1.30	0.10	I	I
81	Echo L	6/26/1993	hypo	22	9															
81	Echo L	8/21/1993	hypo	18	9	2	3	2												
81	Echo L	6/22/1994	hypo		16															
81	Echo L	7/16/1994	hypo		10															
81	Echo L	8/13/1994	hypo		11															
81	Echo L	9/11/1994	hypo		9															
81	Echo L	06/23/02	hypo	34	27	2	3	2	18											
81	Echo L	07/07/02	hypo	26	12	1	3	1	8											
81	Echo L	07/21/02	hypo	29	26	1	1	1												
81	Echo L	08/04/02	hypo	32	28	1	3	1												
81	Echo L	08/18/02	hypo	30	27	1	3	1												
81	Echo L	09/02/02	hypo	26	11															
81	Echo L	09/23/02	hypo	18	21	1	3	1	5											
81	Echo L	10/06/02	hypo	20	18	3	3	1												
81	Echo L	5/26/2003	hypo		16															
81	Echo L	6/8/2003	hypo		18															
81	Echo L	6/22/2003	hypo		9															
81	Echo L	7/6/2003	hypo		10															
81	Echo L	7/20/2003	hypo		23															
81	Echo L	8/3/2003	hypo		10															
81	Echo L	8/17/2003	hypo		11															
81	Echo L	9/7/2003	hypo		22															
81	Echo L	6/20/2004	hypo		9															
81	Echo L	7/5/2004	hypo		10															
81	Echo L	7/18/2004	hypo		9															
81	Echo L	8/1/2004	hypo		10															
81	Echo L	8/15/2004	hypo		11															
81	Echo L	8/29/2004	hypo		16															
81	Echo L	9/12/2004	hypo		14															
81	Echo L	9/26/2004	hypo		13															
81	Echo L	6/20/2005	hypo		10															
81	Echo L	7/5/2005	hypo		14															
81	Echo L	7/31/2005	hypo		10															
81	Echo L	8/15/2005	hypo		12															
81	Echo L	9/5/2005	hypo		14															
81	Echo L	9/11/2005	hypo		21															
81	Echo L	9/18/2005	hypo		13															
81	Echo L	9/25/2005	hypo		12															
81	Echo L	5/29/2006	hypo		11															
81	Echo L	6/21/2006	hypo		11															
81	Echo L	7/9/2006	hypo		11															

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QE	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cyl	FP-Chl	FP-BG	HAB-form	Shore HAB
81	Echo L	7/30/2006	hypo		13																
81	Echo L	8/18/2006	hypo		12																
81	Echo L	8/31/2006	hypo		11																
81	Echo L	9/18/2006	hypo		11																
81	Echo L	10/8/2006	hypo		12																
81	Echo L	6/28/2007	hypo		9																
81	Echo L	7/8/2007	hypo		10																
81	Echo L	7/30/2007	hypo		11																
81	Echo L	8/12/2007	hypo		10																
81	Echo L	8/25/2007	hypo		12																
81	Echo L	9/8/2007	hypo		13																
81	Echo L	9/23/2007	hypo		12																
81	Echo L	10/14/2007	hypo		12																
81	Echo L	6/8/2008	hypo		9																
81	Echo L	7/2/2008	hypo		11																
81	Echo L	7/14/2008	hypo		10																
81	Echo L	7/29/2008	hypo		10																
81	Echo L	8/9/2008	hypo		10																
81	Echo L	8/24/2008	hypo		11																
81	Echo L	9/8/2008	hypo		11																
81	Echo L	10/5/2008	hypo		12																
81	Echo L	06/28/2009	hypo		22																
81	Echo L	07/20/2009	hypo		22																
81	Echo L	07/28/2009	hypo		24																
81	Echo L	08/11/2009	hypo		24																
81	Echo L	08/23/2009	hypo		24																
81	Echo L	09/07/2009	hypo		21																
81	Echo L	09/20/2009	hypo		19																
81	Echo L	10/18/2009	hypo		11																
81	Echo L	6/15/2010	hypo		11																
81	Echo L	7/12/2010	hypo		11																
81	Echo L	8/9/2010	hypo		13																
81	Echo L	9/6/2010	hypo		12																
81	Echo L	6/11/2012	hypo		11																
81	Echo L	7/22/2012	hypo		24																
81	Echo L	8/19/2012	hypo		13																
81	Echo L	9/11/2012	hypo		13																
81	Echo L	6/16/2013	hypo		17																
81	Echo L	7/14/2013	hypo		14																
81	Echo L	8/11/2013	hypo		10																
81	Echo L	9/15/2013	hypo		11																
81	Echo L	6/1/2014	hypo		12																
81	Echo L	6/15/2014	hypo		13																
81	Echo L	6/29/2014	hypo		11																
81	Echo L	7/14/2014	hypo		14																
81	Echo L	7/27/2014	hypo		11																
81	Echo L	8/10/2014	hypo		11																
81	Echo L	8/24/2014	hypo		10																
81	Echo L	9/6/2014	hypo		12																
81	Echo L	6/9/2015	hypo		9																
81	Echo L	6/23/2015	hypo		15																
81	Echo L	7/6/2015	hypo		10																
81	Echo L	7/19/2015	hypo		11																
81	Echo L	8/3/2015	hypo		11																
81	Echo L	8/18/2015	hypo		11																
81	Echo L	8/30/2015	hypo		11																
81	Echo L	9/15/2015	hypo		10																

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	Cylindrospermopsis (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 Echo Lake

Echo Lake (0602-0093)

NoKnownImpct

Waterbody Location Information

Revised: 07/06/2009

Water Index No:	SR- 44-23-11-P81	Drain Basin:	Susquehanna River
Hydro Unit Code:	02050102/040	Str Class:	C
Waterbody Type:	Lake (Unknown Trophic)	Reg/County:	7/Chenango Co. (9)
Waterbody Size:	60.7 Acres	Quad Map:	SMITHVILLE FLATS (L-17-2)
Seg Description:	entire lake		

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

Use(s) Impacted	Severity	Problem Documentation
NO USE IMPAIRMNT		

Type of Pollutant(s)

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

Source(s) of Pollutant(s)

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

Resolution/Management Information

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

Further Details

Water Quality Sampling

Echo Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1991 through 1996 and from 2002 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. Phosphorus levels in the lake are consistently below the state guidance values indicating impacted/stressed recreational uses. Corresponding transparency measurements easily 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 weakly colored, but color does not limit water transparency. (DEC/DOW, BWAM/CSLAP, August 2007)

Recreational Assessment

Public perception of the lake and its uses is also evaluated as part of the CSLAP program. This assessment indicates recreational suitability of the lake to be very favorable. The recreational suitability of the lake is described most frequently as "could not be nicer" to "excellent." The lake itself is most often described as "not quite crystal clear," an assessment that is consistent measured water quality characteristics. Assessments have noted that aquatic plants typically grow to the lake surface but not densely. Aquatic plants are dominated by native and have not been cited as impacting recreational uses. (DEC/DOW, BWAM/CSLAP, August 2007)

Lake Uses

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

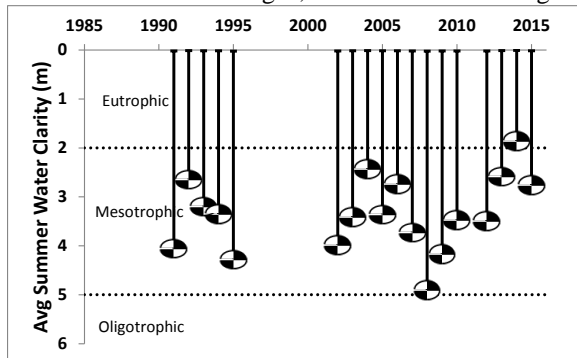
Segment Description

This segment includes the total area of the entire lake.

Appendix C- Long Term Trends: Echo Lake

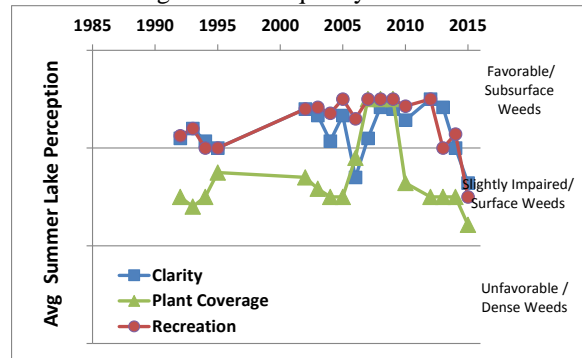
Long Term Trends: Water Clarity

- Decreasing since late 00s
- Most readings typical of *mesotrophic* lakes, consistent w/algae, lower than TP readings



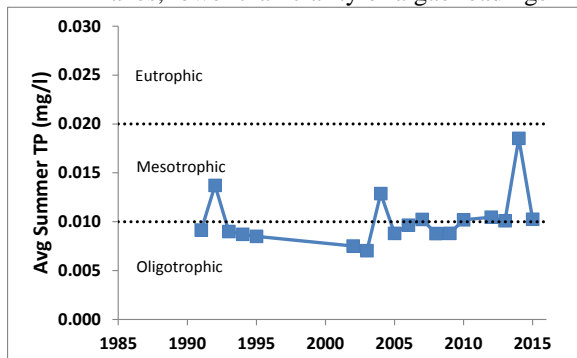
Long Term Trends: Lake Perception

- Highly variable; less favorable last few yrs
- Recreational perception recently linked to changes in water quality



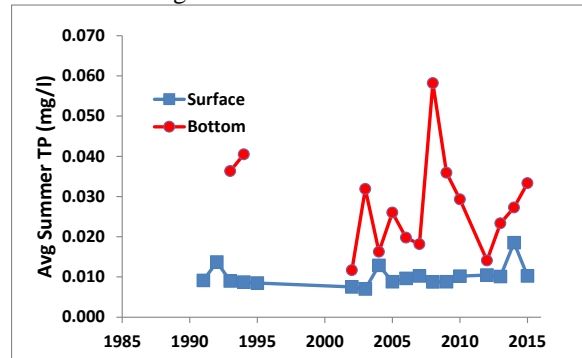
Long Term Trends: Phosphorus

- No trends apparent (TP ↓ from '14 peak)
- Most readings typical of *mesoligotrophic* lakes, lower than clarity or algae readings



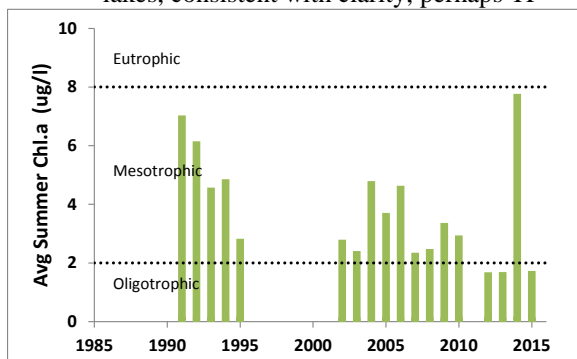
Long Term Trends: Bottom Phosphorus

- Bottom and surface TP usually similar
- Similar readings suggests little nutrient loading from bottom to surface waters



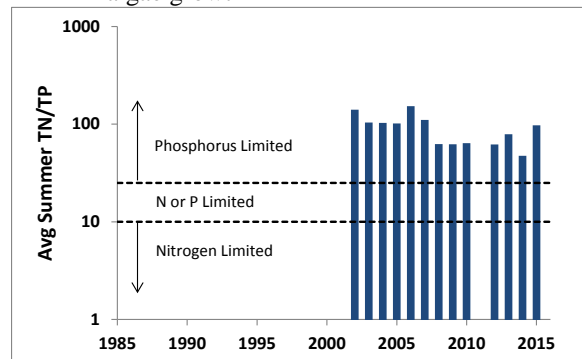
Long Term Trends: Chlorophyll a

- Algae levels generally ↓ since early 00's
- Most readings typical of *mesoligotrophic* lakes, consistent with clarity, perhaps TP



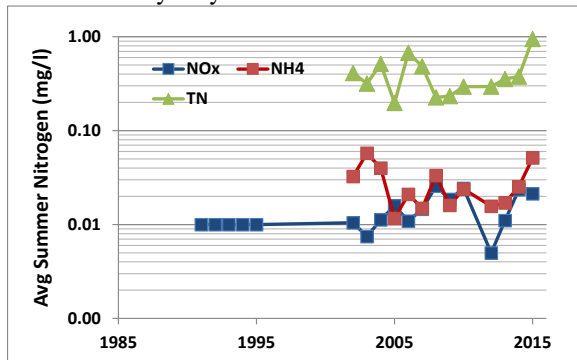
Long Term Trends: N:P Ratio

- Slightly decreasing ratios?
- Most readings still indicate phosphorus limits algae growth



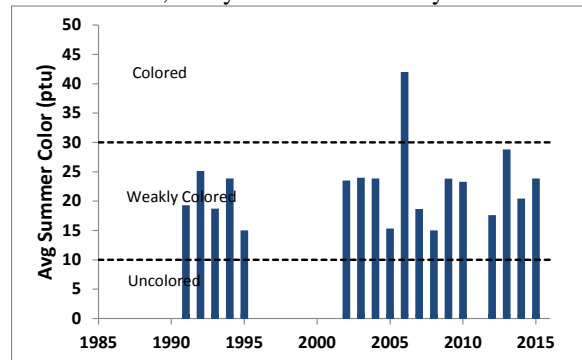
Long Term Trends: Nitrogen

- TN increasing slightly over last six years
- Low NO_x, ammonia and TN readings in nearly all years



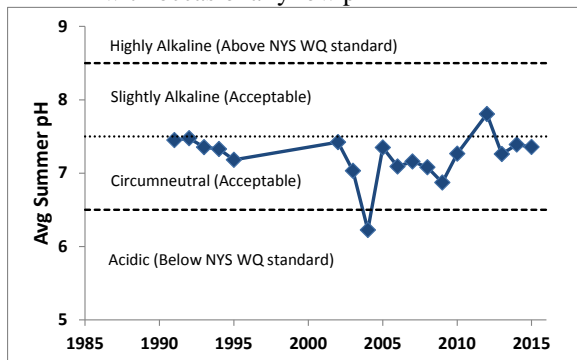
Long Term Trends: Color

- No trends apparent
- Most readings typical of *weakly colored* lakes; likely no effect on clarity



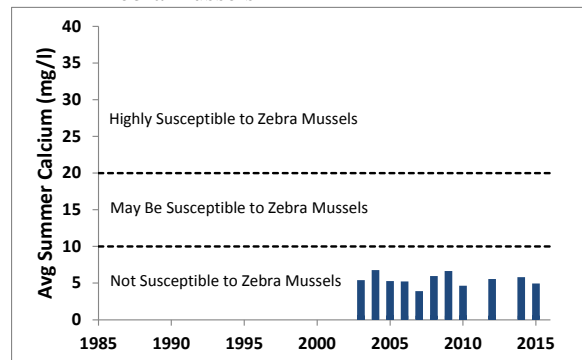
Long Term Trends: pH

- Slight increase since mid-2000s
- Most readings typical of *circumneutral* lakes with occasionally low pH



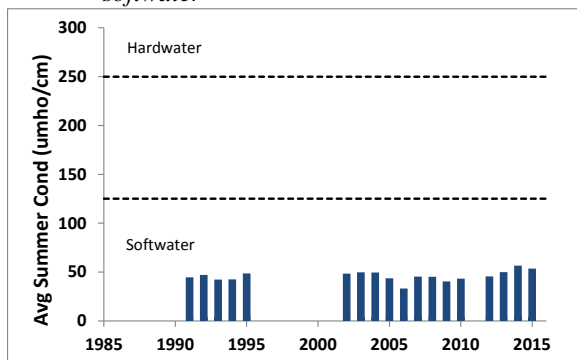
Long Term Trends: Calcium

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



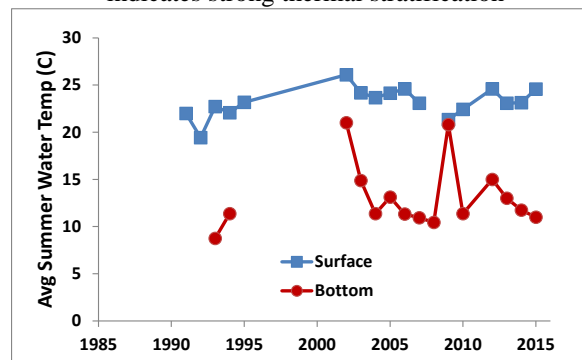
Long Term Trends: Conductivity

- Slight increase since mid-2000s
- Most readings still typical of lakes with *softwater*



Long Term Trends: Water Temperature

- Slight increase since early 90s
- Much lower bottom temperatures most years indicates strong thermal stratification



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.

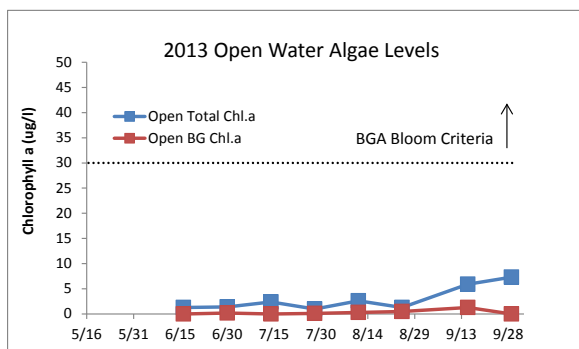


Figure D1:
2013 Open Water Total and BGA Chl.a

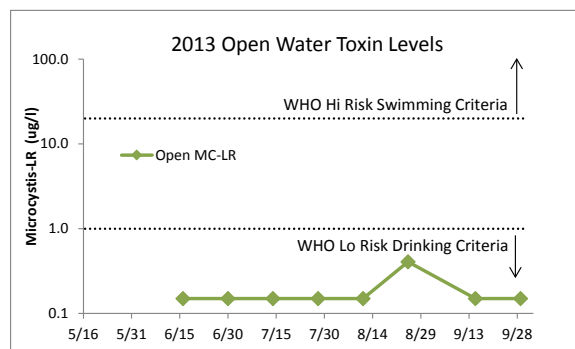


Figure D2:
2013 Open Water Microcystin-LR

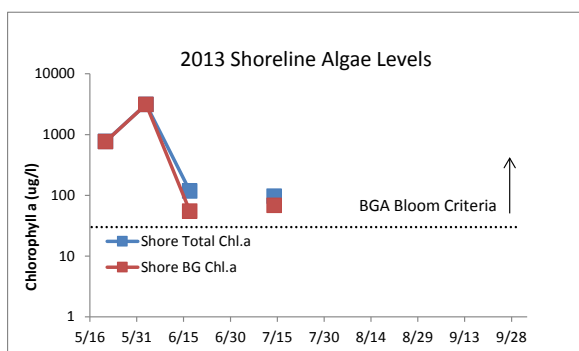


Figure D3:
2013 Shoreline Total and BGA Chl.a

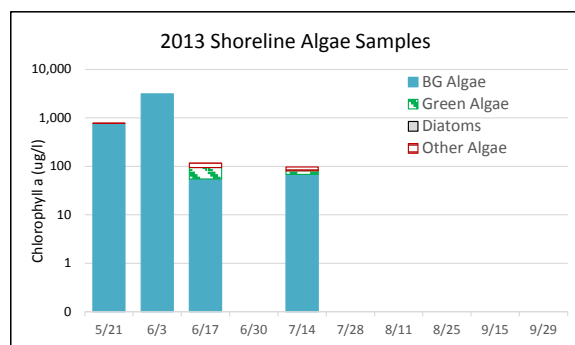


Figure D4:
2013 Shoreline Microcystin-LR

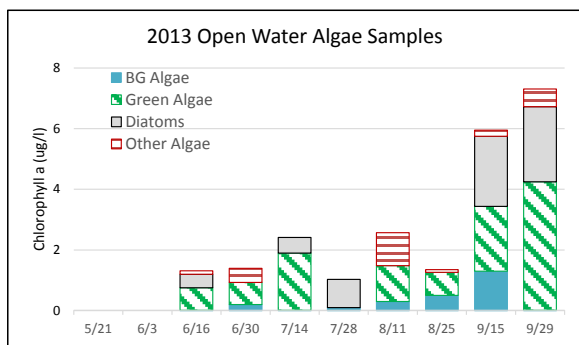


Figure D5:
2013 Open Water Algae Types

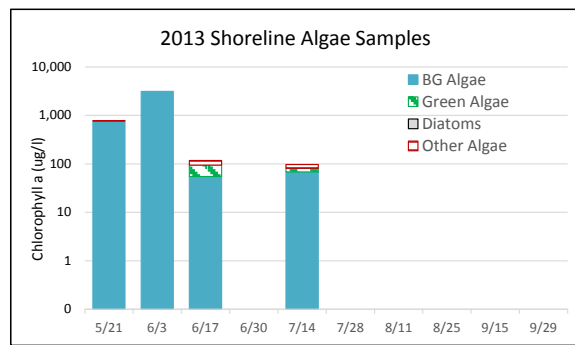


Figure D6:
2013 Shoreline Algae Types

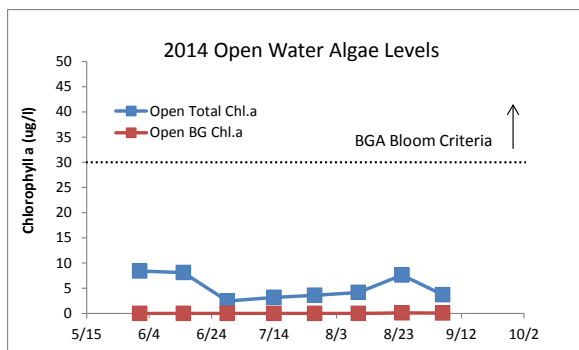


Figure D7:
2014 Open Water Total and BGA Chl.a

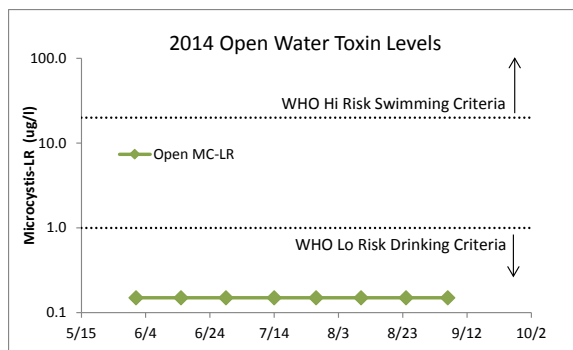


Figure D8:
2014 Open Water Microcystin-LR

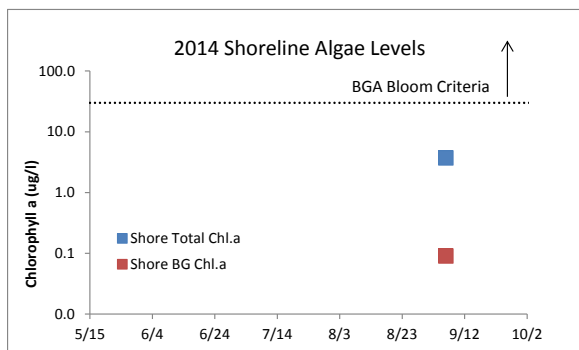


Figure D9:
2014 Shoreline Total and BGA Chl.a

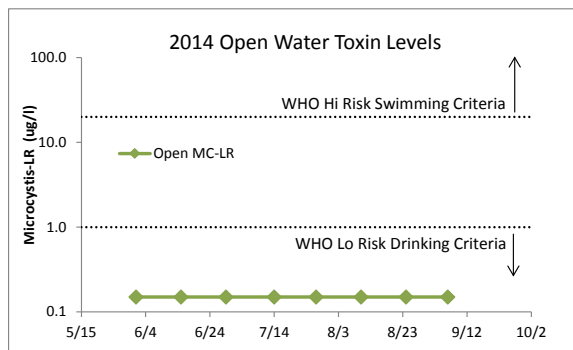


Figure D10:
2014 Shoreline Microcystin-LR

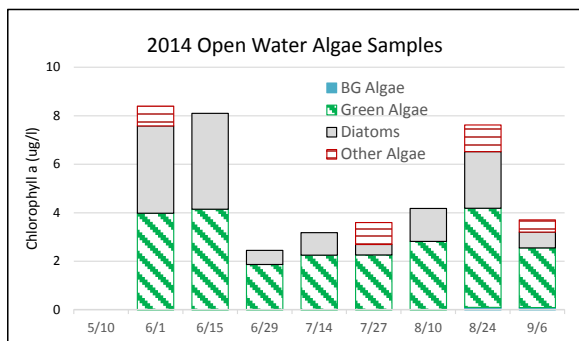


Figure D11:
2014 Open Water Algae Types

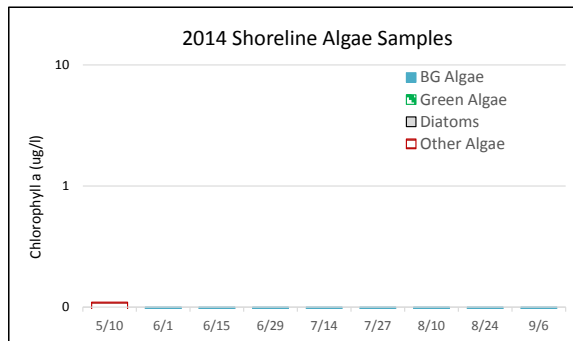


Figure D12:
2014 Shoreline Algae Types

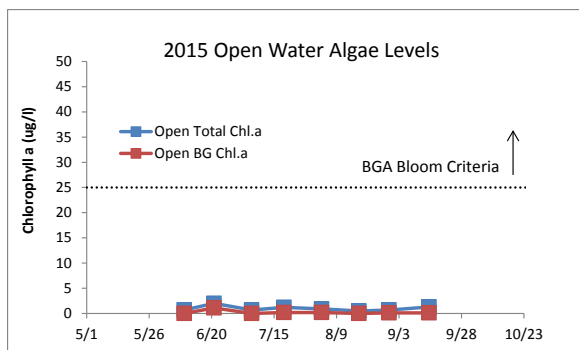


Figure D13:
2015 Open Water Total and BGA Chl.a

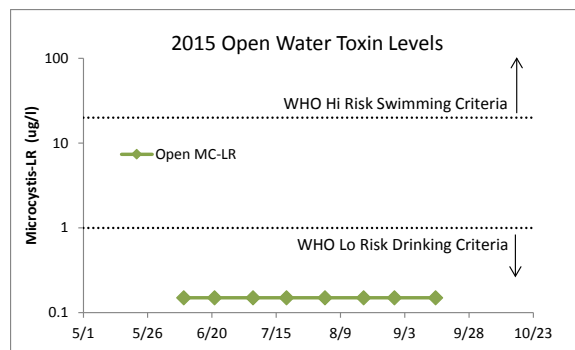


Figure D14:
2015 Open Water Microcystin-LR

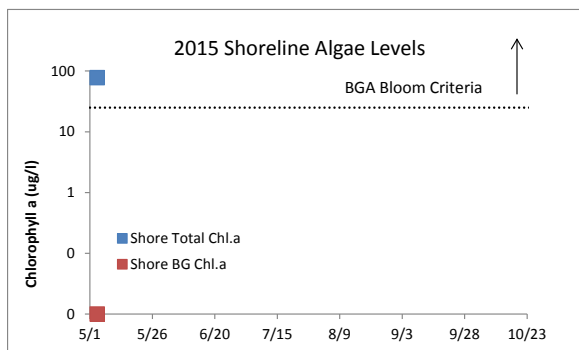


Figure D15:
2015 Shoreline Total and BGA Chl.a

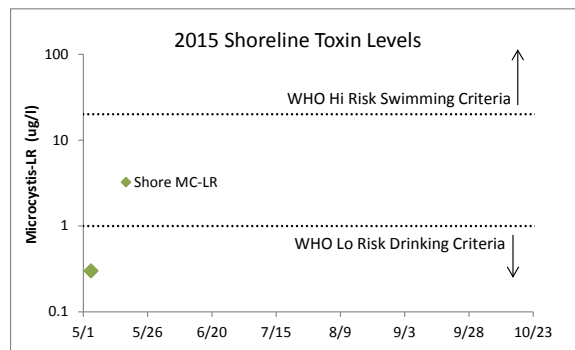


Figure D16:
2015 Shoreline Microcystin-LR

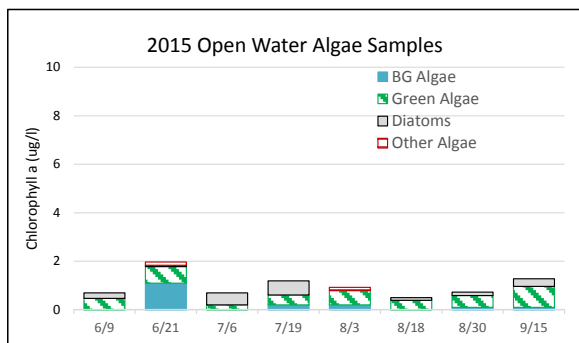


Figure D17:
2015 Open Water Algae Types

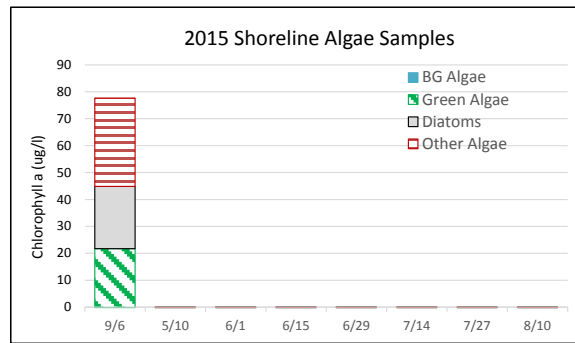


Figure D18:
2015 Shoreline Algae Types

Appendix E: AIS Species in Chenango County

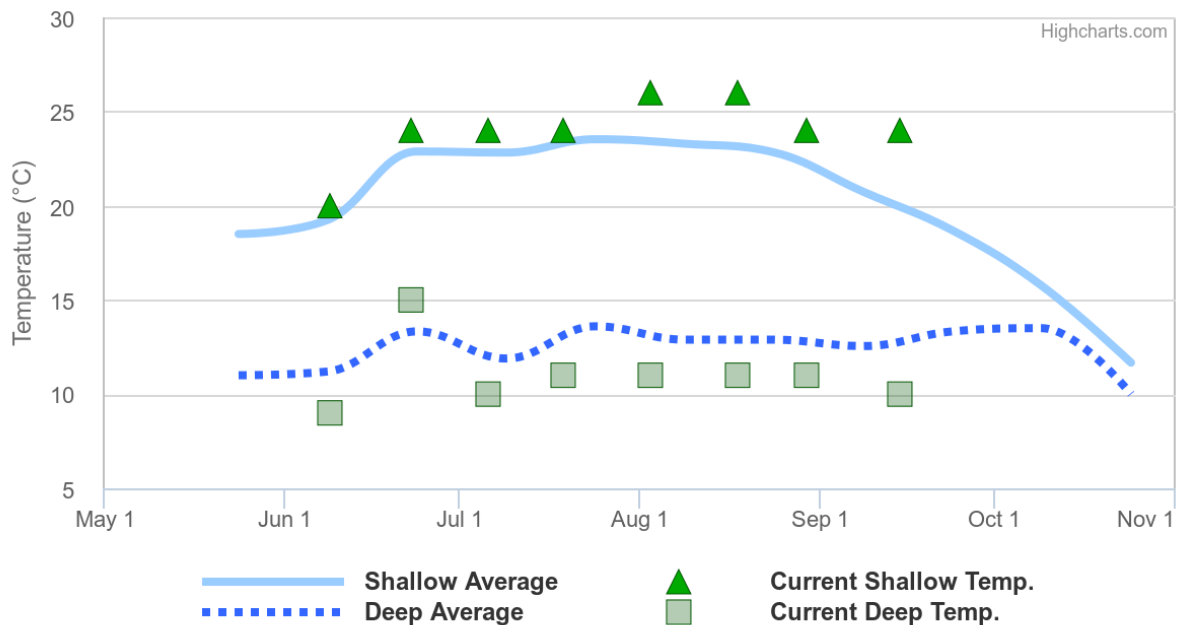
The table below shows the invasive aquatic plants and animals that have been documented in Chenango County, as cited in either the iMapInvasives database (<http://www.imapinvasives.org/>) or in the NYSDEC Division of Water database. These databases may include some, but not all, non-native plants or 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	<i>Myriophyllum heterophyllum</i>
Bowman Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Chenango Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Chenango River near Greene	Animal	Asian clam	<i>Corbicula fluminea</i>
Chenango River near Oxford	Animal	Asian clam	<i>Corbicula fluminea</i>
Guilford Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Hunt Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Jackson Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Long Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Mill Brook Reservoir	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Mud Creek e of Cortland	Animal	Asian clam	<i>Corbicula fluminea</i>
Otselic River near Pitcher	Animal	Asian clam	<i>Corbicula fluminea</i>
Plymouth Reservoir	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Warn Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Warn Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>

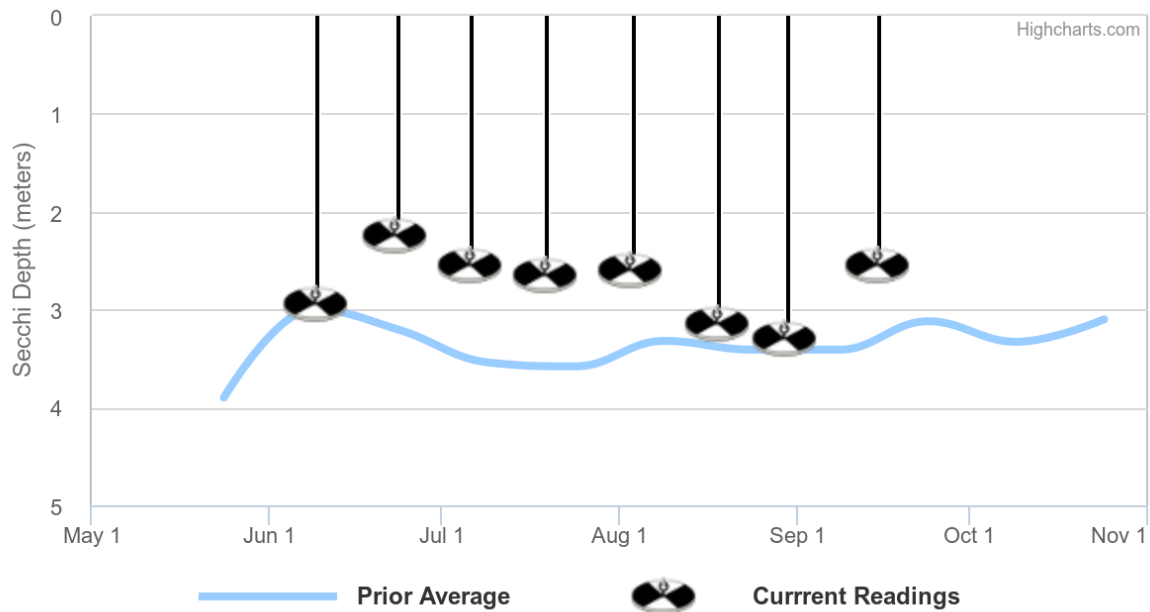
Appendix F: Current Year vs. Prior Averages for Echo Lake

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. This year's deep water sample temperatures are tending to be lower than normal when compared to the average of readings collected from 1993 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 Echo Lake

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

