

## Butterfield Lake Questions and Answers, 2015 CSLAP

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

A1. Water quality conditions in Butterfield Lake were close to normal in 2014, as in 2015, although no shoreline blooms were reported.

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

A2. The chloride results were typical of lakes with “moderate” impacts from road salt, though typical of at least some other nearby lakes. It is not known if the lack of shoreline bloom samples corresponded to the lack of shoreline blooms.

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

A3. Butterfield Lake has lower water clarity, higher algae and nutrient levels, and more frequent blooms, than a typical Adirondack lake, but the lake is within the (wide range of) normal conditions for other Indian River lakes.

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

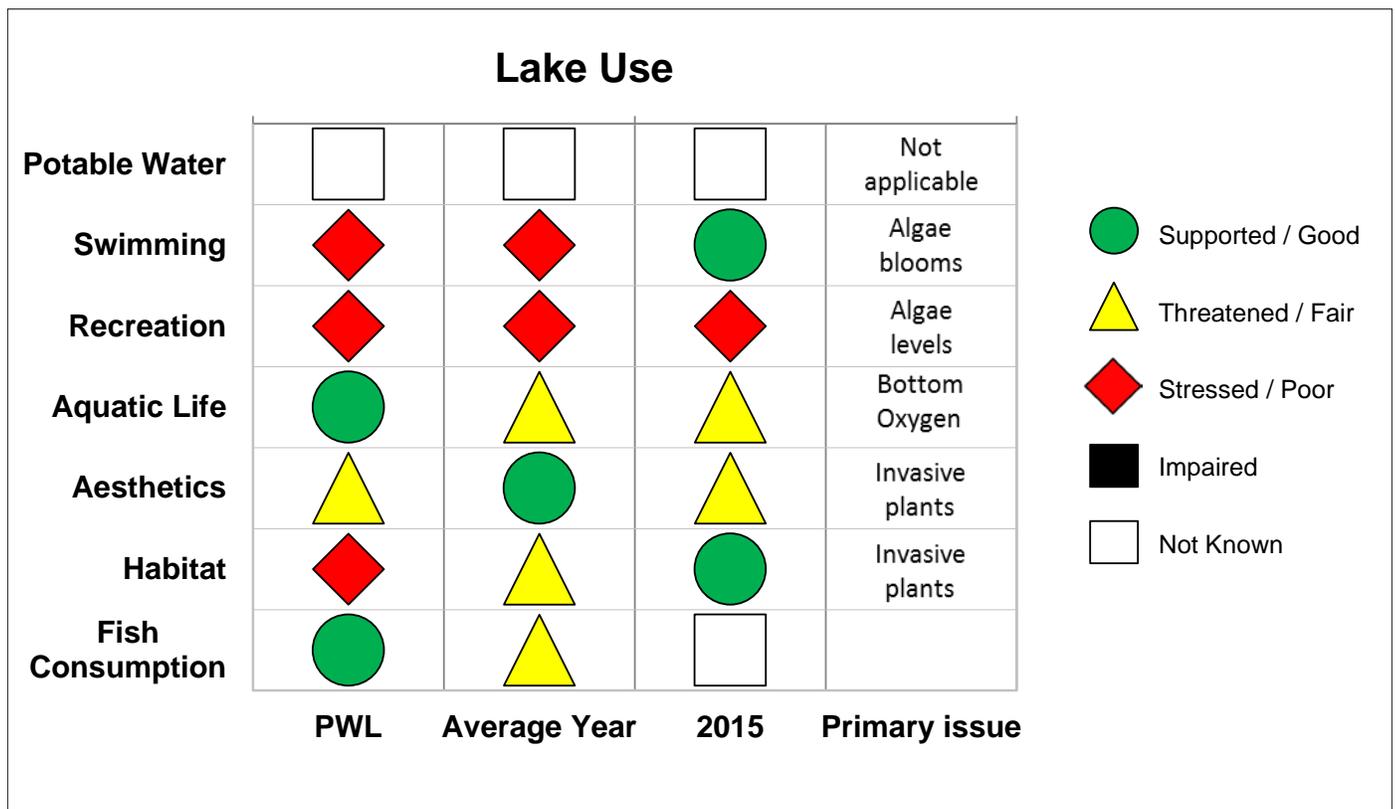
A4. No clear long-term trends are apparent, but overall algae levels have been slightly lower in the last decade, consistent with slightly improved water quality assessments over the same period, although water clarity has also been lower. Except for a recent drop in calcium, most of the other CSLAP indicators have not exhibited any clear changes.

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

A5. Butterfield Lake appears to be susceptible to algae blooms when overall nutrient levels increase. Higher algae levels in the lake and along the shoreline are increasingly associated with blue green algae; it is not known if this represents a change or also occurred prior to the evaluation of algae community structure starting in 2012. It is not known if this is triggered by weather shifts or phenomena that can be managed by the lake residents. Additional data will also help to determine if the lake is exhibiting more blue green algae blooms or they are just now being detected.

**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 reduce nutrient and sediment loading to the lake. Precipitation and other weather data should be evaluated to determine if nutrient spikes in the lake are in response to weather or other factors.

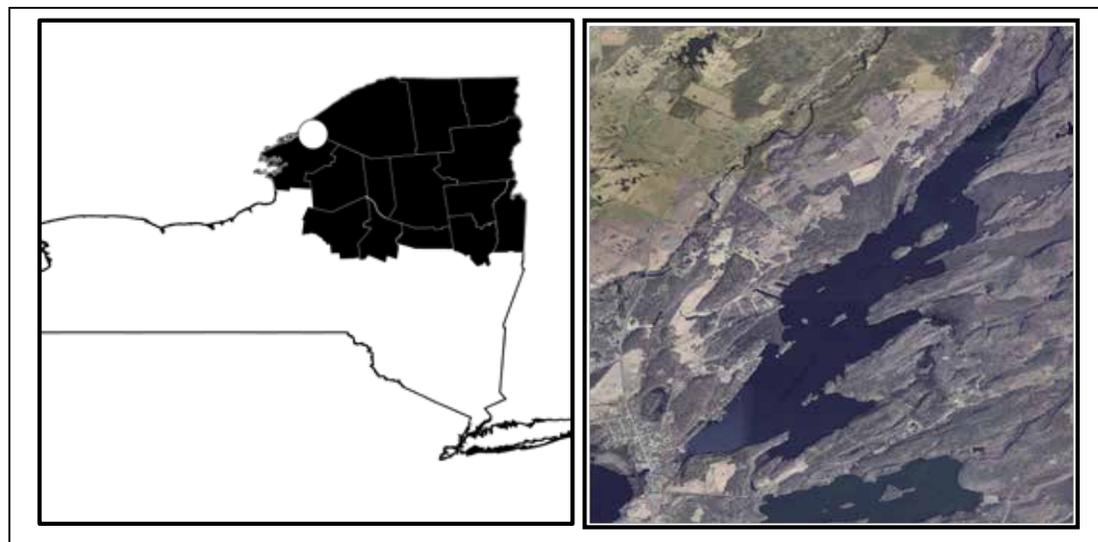


## CSLAP 2015 Lake Water Quality Summary: Butterfield Lake

### General Lake Information

<b>Location</b>	Town of Redwood
<b>County</b>	Jefferson
<b>Basin</b>	St. Lawrence River
<b>Size</b>	406.6 hectares (1,004.3 acres)
<b>Lake Origins</b>	Natural
<b>Watershed Area</b>	1,720 hectares (4,248.4 acres)
<b>Retention Time</b>	2.28 years
<b>Mean Depth</b>	4.4 meters
<b>Sounding Depth</b>	14.5 meters
<b>Public Access?</b>	DEC launch
<b>Major Tributaries</b>	Black Creek, unnamed tribs
<b>Lake Tributary To...</b>	Black Creek to Black Lake to Oswegatchie River to St. Lawrence River
<b>WQ Classification</b>	B (contact recreation = swimming)
<b>Lake Outlet Latitude</b>	44.343
<b>Lake Outlet Longitude</b>	-75.754
<b>Sampling Years</b>	1986-2010, 2012-2015
<b>2015 Samplers</b>	Walter Dutcher and Edie and Joe Pasquini
<b>Main Contact</b>	Walter Dutcher

### Lake Map



## **Background**

Butterfield Lake is a 1,004 acre, class B lake found in the Town of Redwood in Jefferson County, in the St. Lawrence River region of New York State. It was first sampled as part of CSLAP in 1986.

It is one of eight CSLAP lakes among the more than 140 lakes found in Jefferson County and one of 26 CSLAP lakes among the more than 1650 lakes and ponds in the St. Lawrence River drainage basin.

## **Lake Uses**

Butterfield Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing, aquatic life, and aesthetics. The lake is used by lake residents and the public for a variety of recreational purposes—the lake can be accessed via a DEC boat launch site.

Butterfield Lake has been regularly stocked with walleye, up to 4.6 million 0.4 to 4.8 inch fish annually (the larger fish are generally stocked in quantities ranging from 5,500 to 20,000). Fish species identified at the lake include black bullhead, black crappie, bluegill, largemouth bass, northern pike, smallmouth bass, walleye and yellow perch.

General statewide fishing regulations are applicable in Butterfield Lake. In addition, open season for walleye is the 1st Saturday May through March 15, with a minimum size of 18” and a daily limit of three fish. Ice fishing is allowed. There is an open season and no size or daily take limits for yellow perch and sunfish.

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

## **Historical Water Quality Data**

CSLAP sampling was conducted on Butterfield Lake each year from 1986 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 for Butterfield Lake can also be found on the NYSDEC web page at <http://www.dec.ny.gov/lands/77865.html>.

Butterfield Lake was sampled by the NYSDEC Division of Water as part of an ambient lake monitoring programs in 1979 and 1986 (the latter was the state Lake Classification and Inventory (LCI) survey), and as part of the U.S. Environmental Protection Agency Eastern Lakes Survey in the fall of 1984. These monitoring programs showed water quality conditions similar to those usually measured through CSLAP, at least for the water quality parameters measured in these programs.

The lake was also sampled as part of the Conservation Department (predecessor to the NYSDEC) survey of the St. Lawrence River basin in 1931. This study, conducted in late June, did not report water transparency measurements, but it found some dissolved oxygen reduction in deeper waters of the lake. However, this study did not find oxygen depletion (the lowest readings were 2 parts per million near the bottom), while present-day deepwater phosphorus data indicates that oxygen deficits now occur at the lake bottom. This indicates that the transition from low-to-no oxygen conditions near the lake bottom has occurred over the last 70 years. The

pH readings from this survey, the only parameter common to CSLAP and this study, have probably changed little over this period.

The field surveys conducted as part of the Biological Survey reported the following for Butterfield Lake:

*“From the point of view of fish life Butterfield Lake might be considered an extension of Black Lake, since both lakes support the same species, and since the lakes are connected by Black Creek, which is navigable for its entire length by canoe. Although the lake is fifty feet deep near its head much of it is under ten feet deep. Large weed beds are found in the bays and generally distributed over the shallow areas toward the foot of the lake. Every one admits that Butterfield provides excellent fishing, especially for pike-perch and northern pike. Muskellunge are reported to be taken occasionally. Minnows are abundant. The bottom temperature is low in deep water, 61F, as compared with 81.3F for the surface.*

*The shores of this lake are mostly rocky except along the narrow north end, which supports a weed area about a mile long. A few smaller weed beds were observed in the small bays along the south shore”*

The milfoil species (*Myriophyllum exalbescens*, or northern watermilfoil) found in 1931 may indeed have been Eurasian watermilfoil, since these species were commonly interchanged in identifications prior to the early 1980s. It is not known if the other plants found in this survey are presently found in the lake, or if they have been supplanted by other native or exotic plants.

Neither Black Creek nor the outlet of Butterfield Lake has been monitored through the NYSDEC Rotating Intensive Basins (RIBS) program or the state stream macroinvertebrate monitoring program. The lake was sampled by DEC fisheries staff in support of fish stocking activities. These data show higher water clarity readings than report through CSLAP, but each of the other water quality indicators appear to be comparable in both studies.

## **Lake Association and Management History**

Butterfield Lake is sampled by volunteers from the Butterfield Lake Cottage Owners Association. The lake association has been involved in a variety of lake management actions. These include:

- member survey in the late 1990s regarding weed management. This survey indicated a strong preference to use biocontrol
- sponsoring an herbivore study and plant survey by Cornell University in 2001
- conducting dye testing in the late 1980s to early 1990s
- conducting bacterial tests from late 1980s to early 1990s
- coordinating a septic management program, spearheaded by a presentation by NYSFOLA President John Miller in 1989, as part of an Adirondack region septic dye testing and education program conducted in the late 1990s
- educational efforts regarding concern over wastewater input from Mud Pond (Redwood STP)

It is not known if the BLCOA maintains a website.

## Summary of 2015 CSLAP Sampling Results

### Evaluation of 2015 Annual Results Relative to 1986-2014

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 – Butterfield Lake” section in Appendix C.

### Evaluation of Eutrophication Indicators

Water quality conditions in Butterfield Lake were close to normal in 2015, although the small differences from “normal” conditions may result in significant differences in apparent lake condition. In previous years, the peak blooms appear to occur in years when overall nutrient levels exceed 15-20 ug/l, suggesting an appropriate “endpoint” for nutrient control measures instituted for the lake watershed. Phosphorus readings in 2015 were slightly below this threshold, perhaps consistent with the lack of shoreline blooms. It is not clear what effect internal nutrient cycling (phosphorus release from bottom sediments) has on surface phosphorus levels, particularly since deepwater phosphorus (and ammonia) readings were much higher than normal in 2015. The latter suggest that deepwater oxygen levels were depressed.

Lake productivity increases during the typical CSLAP sampling season (or at least through August), as manifested in decreasing water clarity and increasing algae and nutrient levels. A similar seasonal pattern was observed in each of the last several years, although seasonal changes in nutrient levels were not as apparent.

The lake continues to be characterized as *mesoeutrophic*, based on water clarity, total phosphorus (both typical of *mesotrophic* lakes), and chlorophyll *a* readings (typical of *eutrophic* lakes), although algae levels in the last several years were also typical of *mesotrophic* lakes. The trophic state indices (TSI) evaluation suggests that chlorophyll *a* levels are often higher than expected given the nutrient levels in the lake. This suggests that the lake may be susceptible to small changes in nutrient loading- this may be consistent with the shoreline blooms apparent in recent years and confirms the need for nutrient control in the watershed. Overall trophic conditions are summarized on the Lake Scorecard and Lake Condition Summary Table.

### Evaluation of Potable Water Indicators

Algae levels at times are high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, but the lake is not classified for this use. Deepwater ammonia and phosphorus readings are much higher than those measured at the lake surface, and both were higher than normal in 2015. This suggests that deepwater intakes for “unofficial” potable water use might be compromised. Potable water conditions, at least as measurable through CSLAP, are summarized in the Lake Scorecard and Lake Condition Summary Table.

### Evaluation of Limnological Indicators

Calcium levels have decreased since the early 2000s, although most of this drop has occurred in the last two years. NO<sub>x</sub> and nitrogen-to-phosphorus ratios have dropped since the early 2010s, but no clear long term trends have been apparent. None of the other limnological indicators has exhibited significant long-term trends.

Chloride levels in the 2015 samples, collected for the first time through CSLAP and cited in Appendix A, ranged from 17 to 18 mg/l. These values fall within the “moderate road salt runoff” levels cited by the New Hampshire DES. These readings are well below the state potable water quality standard of 250 mg/l and within than the range of values found in many NYS lakes. These readings suggest a low to moderate likelihood of biological impact from road salt, although these impacts have not been measured or reported. Additional data will help to determine if these represent normal readings for the lake.

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

### **Evaluation of Biological Condition**

The fluoroprobe screening samples analyzed by SUNY ESF showed relatively low open water algae levels that at times (but not always) were predominantly comprised of blue green algae, and higher algae levels are often associated with blue green algae later in the summer. Along the shoreline, highly elevated algae levels and blue green algae levels were often apparent, although some “blooms” were comprised of other material (besides algae). These included *Lyngbya* benthic (bottom) blooms that may have contributed to skin reactions from swimmers or pets. Moderate toxicity was apparent in 2013, but only low toxin levels were apparent in 2014. Similar seasonal trends were apparent in 2015, but no shoreline blooms were apparent and all samples had undetectable levels of toxins.

Zooplankton data have not been collected through CSLAP at Butterfield Lake. A NYSDEC biomonitoring study of macroinvertebrate communities in the lake was conducted in 2010, but the results are still not yet available. Zebra mussels have been reported in the lake.

The limited plant survey data conducted in this study found at least 15 aquatic plant species in the lake, including one invasive exotic plant species (Eurasian watermilfoil, *Myriophyllum spicatum*). The modified floristic quality index (FQI) for the lake, based on this limited aquatic plant survey, indicates that the aquatic plant community can be described as “fair”. The lake association has been conducting plant surveys in recent years. The fish community in Butterfield Lake includes a mix of warmwater and coolwater fishery.

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

### **Evaluation of Lake Perception**

Water quality and recreational assessments and aquatic plant coverage were close to normal in 2015, consistent with mostly stable water quality conditions. Recreational assessments are influenced by both water quality and aquatic plants. None of these indicators of lake perception has exhibited any clear long-term trends, although lake perception has improved slightly since the early 2000s. Overall lake perception is summarized on the Lake Scorecard and Lake Condition Summary Table.

## **Evaluation of Local Climate Change**

Water temperatures were close to normal in the last several years, and neither air nor water temperatures have exhibited any clear long-term trends. Deepwater temperatures has been lower than normal over the last several years.

## **Evaluation of Algal Toxins**

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Fluoroprobe readings at times have exceeded the levels indicating susceptibility for harmful algal blooms (HABs). High blue green algae levels were found in some (but not all) of the shoreline blooms in recent years, though not in 2015. Blue green algae is more prevalent in the open water as overall algae levels increase, usually later in the summer. An analysis of algae samples has indicated microcystin levels that are at times above detection levels in the open water and shoreline, but are consistently below the WHO criteria for high risk for swimmers. Low overall algae and toxin levels were measured in 2015. The benthic algae *Lyngbya* may be present in multiple locations, suggesting the need for boaters and swimmers to avoid algae or macrophytes growing on the bottom of the lake.

## Lake Condition Summary

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Eutrophication Indicators	Water Clarity	1.00	2.72	5.95	3.16	Mesotrophic	Within Normal Range	No Change
	Chlorophyll <i>a</i>	0.10	10.59	48.80	6.51	Eutrophic	Within Normal Range	No Change
	Total Phosphorus	0.003	0.017	0.049	0.014	Mesotrophic	Lower Than Normal	No Change
Potable Water Indicators	Hypolimnetic Ammonia	0.01	0.48	1.68	0.86	Elevated Deepwater NH4	Higher than Normal	Not known
	Hypolimnetic Arsenic							Not known
	Hypolimnetic Iron							Not known
	Hypolimnetic Manganese							Not known
Limnological Indicators	Hypolimnetic Phosphorus	0.011	0.190	0.782	0.347	Elevated Deepwater TP	Higher than Normal	Not known
	Nitrate + Nitrite	0.00	0.02	0.81	0.01	Low NOx	Lower Than Normal	No Change
	Ammonia	0.00	0.03	0.36	0.03	Low Ammonia	Within Normal Range	No Change
	Total Nitrogen	0.17	0.52	1.17	0.46	Intermediate Total Nitrogen	Within Normal Range	No Change
	pH	6.43	7.82	8.90	7.89	Alkaline	Within Normal Range	No Change
	Specific Conductance	11	139	200	144	Intermediate Hardness	Within Normal Range	No Change
	True Color	2	14	73	11	Intermediate Color	Within Normal Range	No Change
	Calcium	10.5	16.6	19.6	10.6	May be Susceptible to Zebra Mussels	Lower Than Normal	Decreasing Significantly
Lake Perception	WQ Assessment	1	2.4	4	2.4	Not Quite Crystal Clear	Within Normal Range	No Change
	Aquatic Plant Coverage	1	2.6	5	2.9	Surface Plant Growth	Within Normal Range	No Change
	Recreational Assessment	1	2.5	4	2.0	Excellent	Within Normal Range	No Change
Biological Condition	Phytoplankton					Open water-low blue green algae biomass; Shoreline-high blue green algae in bloom	Not known	Not known
	Macrophytes					Fair quality of the aquatic plant community	Not known	Not known
	Zooplankton					Not sampled through CSLAP	Not known	Not known
	Macroinvertebrates					Not sampled through CSLAP	Not known	Not known
	Fish					Two story fishery	Not known	Not known
	Invasive Species					Zebra mussels, Eurasian watermilfoil	Not known	Not known
Local Climate Change	Air Temperature	4	21.8	34	21.3		Within Normal Range	No Change
	Water Temperature	12	21.9	28	22.1		Within Normal Range	No Change

Category	Indicator	Min	Overall Avg	Max	2015 Avg	Classification	2015 Change?	Long-term Change?
Harmful Algal Blooms	Open Water Phycocyanin	0	69	595	26	Some readings indicate high risk of BGA	Not known	Not known
	Open Water FP Chl.a	1	12	72	5	Few readings indicate high algae levels	Not known	Not known
	Open Water FP BG Chl.a	0	3	13	3	Few readings indicate high BGA levels	Not known	Not known
	Open Water Microcystis	<DL	0.2	0.9	<DL	Mostly undetectable open water MC-LR	Not known	Not known
	Open Water Anatoxin a	<DL	0.3	0.0	0.0	Open water Anatoxin-a at times detectable	Not known	Not known
	Shoreline Phycocyanin					No shoreline blooms sampled for PC	Not known	Not known
	Shoreline FP Chl.a	3	788	9228		Most readings indicate high algae levels	Not known	Not known
	Shoreline FP BG Chl.a	0	765	9228		Most readings indicate high BGA levels	Not known	Not known
	Shoreline Microcystis	<DL	1.5	6.0		At times measurable shoreline bloom MC-LR	Not known	Not known
	Shoreline Anatoxin a	<DL	<DL	<DL		Shoreline bloom Anatoxin-a consistently not detectable	Not known	Not known

## Evaluation of Lake Condition Impacts to Lake Uses

Butterfield Lake is presently among the lakes cited on the 2009 St. Lawrence River Basin Priority Waterbody List (PWL), with public bathing, recreation and habitat/hydrology listed as *stressed* due to excessive weed and algae growth. The PWL listing for the lake is in Appendix B.

### Potable Water (Drinking Water)

The CSLAP dataset at Butterfield 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 classified for this purpose. The limited data suggest that algae levels are at times high enough to impact potable water use of the lake, and deepwater ammonia levels are high enough to impact unofficial deepwater potable water intakes.

### Public Bathing

The CSLAP dataset at Butterfield Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggests that public bathing, if supported at a swimming beach, may be *stressed* by excessive algae, algae blooms, and weed growth, although the stressor (poor clarity or excessive weeds) may vary from year to year. This impairment may be driven by benthic algae blooms during some years, although it is not yet known if these blooms are common to Butterfield Lake. These impacts were not apparent in 2015. 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 Butterfield Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that recreation may be *stressed* by excessive algae, shoreline algae blooms, and excessive weed growth, although at times non-contact recreational use is not impacted by weeds.

### Aquatic Life

The CSLAP dataset on Butterfield Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aquatic life should may be *threatened* by

road salt runoff, deepwater anoxia and by invasive species, 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 Butterfield Lake, including water chemistry data, physical measurements, and volunteer samplers' perception data, suggest that aesthetics may be *threatened* by occasional algal blooms, particularly benthic blooms that may have been associated with impacts to swimmers and pets. Habitat may be *threatened* by excessive growth of invasive aquatic plants, particularly Eurasian watermilfoil.

### **Fish Consumption**

Fish consumption advisories are not posted for Butterfield Lake.

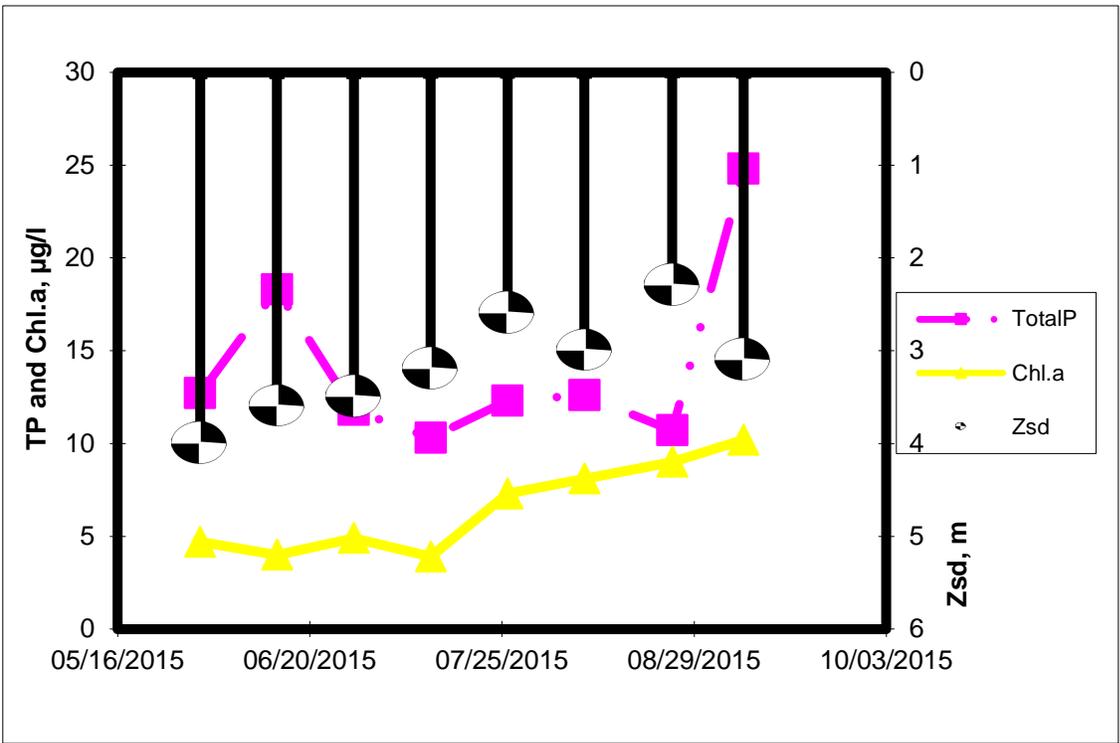
### **Additional Comments and Recommendations**

Additional plant survey information is needed to determine if the plant community is dominated by Eurasian watermilfoil or native plants, and sampling volunteers should report (and avoid exposure to) any shoreline algae blooms. Shoreline benthic algae blooms should also be documented; Butterfield Lake is a good candidate for any targeted studies looking at benthic algae communities. Any health impacts for swimmers or pets, particularly those associated with benthic (bottom) algae blooms, should be reported to the local health department.

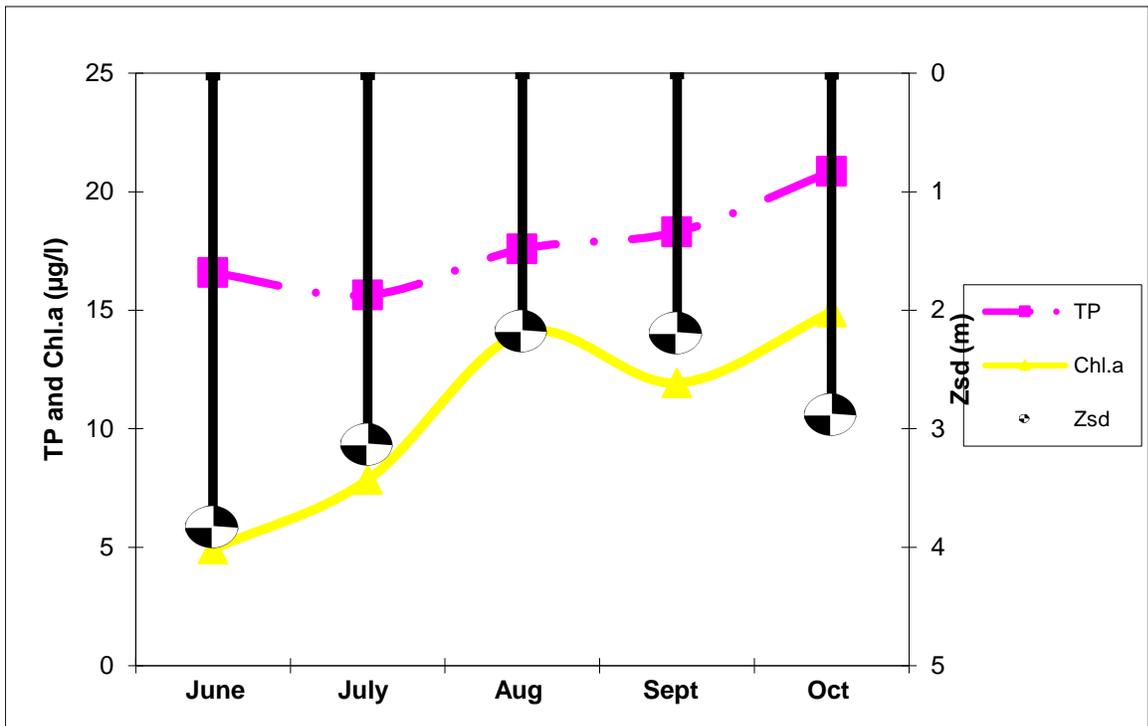
### **Aquatic Plant IDs-2015**

None submitted for identification in 2015.

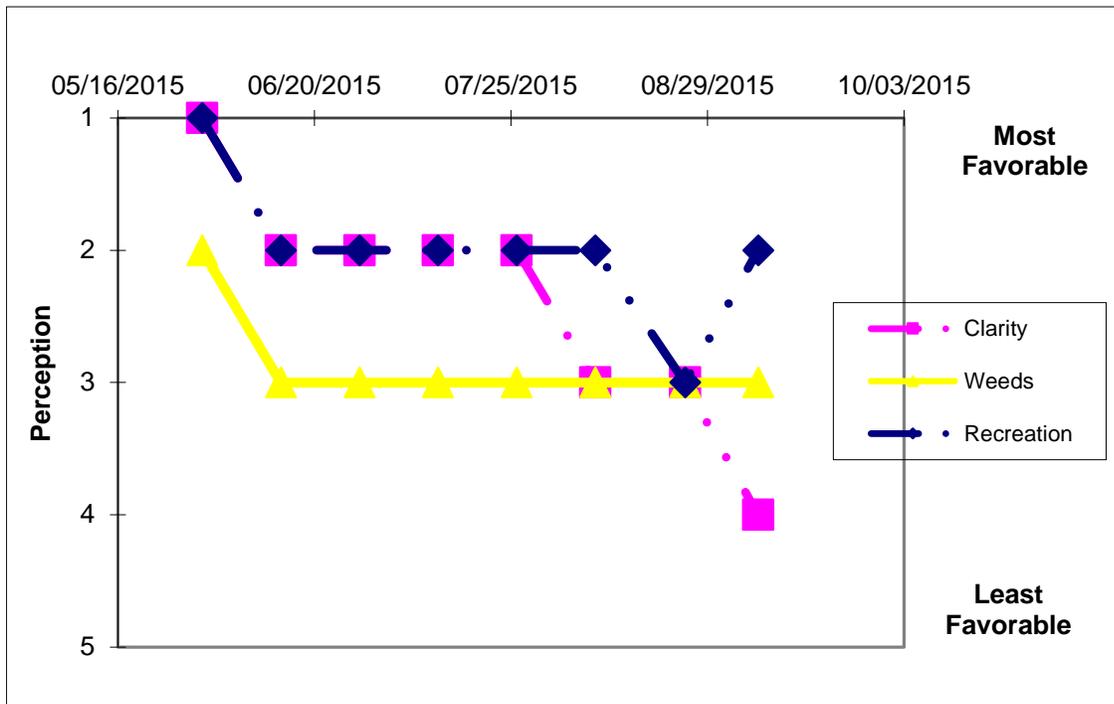
### Time Series: Trophic Indicators, 2015



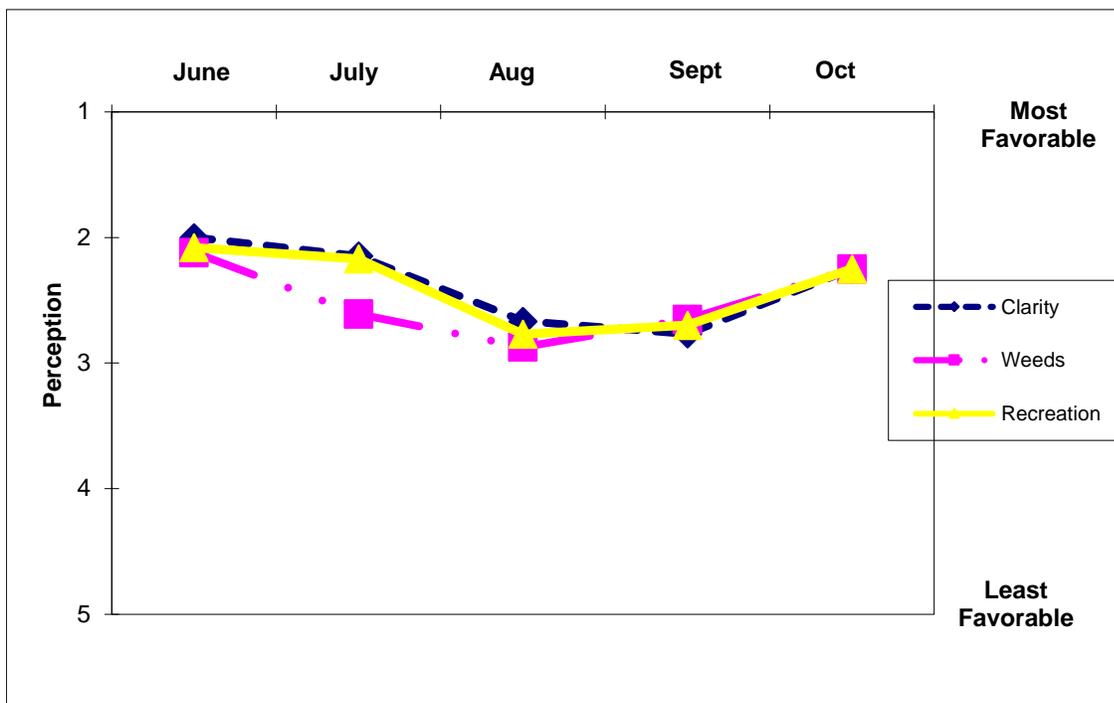
### Time Series: Trophic Indicators, Typical Year (1986-2015)



## Time Series: Lake Perception Indicators, 2015



## Time Series: Lake Perception Indicators, Typical Year (1986-2015)



## Appendix A- CSLAP Water Quality Sampling Results for Butterfield Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
12	Butterfield L	6/22/1986	13.0	3.63	1.5	0.015	0.03				10	7.45	121		3.26	
12	Butterfield L	6/26/1986		3.38	1.5	0.011	0.03				12	7.49	121		2.29	
12	Butterfield L	7/3/1986		3.63	1.5	0.034	0.03				15	7.50	130		2.15	
12	Butterfield L	7/17/1986		4.75	1.5	0.013	0.03				10	7.75	134		2.37	
12	Butterfield L	7/24/1986		3.63	1.5		0.03				15	7.69	124		3.48	
12	Butterfield L	7/30/1986		2.88	1.5	0.015	0.03				15	7.80	124		10.90	
12	Butterfield L	8/8/1986	14.0	2.50	1.5	0.018	0.03				15	7.34	124		11.30	
12	Butterfield L	8/14/1986	13.0	2.50	1.5	0.017	0.03				15	7.19	124		10.60	
12	Butterfield L	8/21/1986	13.0	1.88	1.5	0.021	0.03				18	7.60	125		17.70	
12	Butterfield L	8/27/1986	13.0	2.00	1.5	0.027	0.03				13	7.48	125		10.90	
12	Butterfield L	9/3/1986	13.0	1.88	1.5	0.016	0.03				6	7.90	149		1.63	
12	Butterfield L	9/10/1986	13.0	1.88	1.5	0.020	0.03				18	7.27	130		6.22	
12	Butterfield L	9/17/1986	13.0	2.13	1.5	0.022					16	7.64	129		1.44	
12	Butterfield L	9/24/1986	13.0	2.50	1.5	0.023	0.03				17	7.19	125			
12	Butterfield L	6/27/1987	14.0	3.00	1.5	0.018	0.01				15	7.81	132		12.60	
12	Butterfield L	7/6/1987	14.0	4.00	1.5	0.020	0.01				15	7.63	134			
12	Butterfield L	7/12/1987	14.0	3.88	1.5	0.016					14	7.34	133		5.90	
12	Butterfield L	7/20/1987	14.0	3.00	1.5	0.005					15	7.52	132		14.20	
12	Butterfield L	7/27/1987	14.0	2.42	1.5	0.016	0.02				16	7.85	132		13.00	
12	Butterfield L	8/1/1987	14.0	3.00	1.5	0.015					16	7.58	133		20.70	
12	Butterfield L	8/3/1987	14.0	2.13	1.5	0.017					15	7.56	132		27.40	
12	Butterfield L	8/10/1987	13.4	2.25	1.5	0.010					15	7.52	132		20.70	
12	Butterfield L	8/18/1987	14.0	1.88	1.5	0.019	0.01				15	7.75	135		17.00	
12	Butterfield L	8/24/1987	13.4	2.13	1.5	0.018					12	7.68	130		23.70	
12	Butterfield L	8/31/1987	14.0	1.88	1.5	0.018					7	7.90	130			
12	Butterfield L	9/7/1987	14.0	1.88	1.5	0.028	0.01				8	7.45	129		31.80	
12	Butterfield L	9/14/1987	14.0	1.88	1.5	0.022					12	8.09	132		12.70	
12	Butterfield L	9/21/1987	14.0	1.88	1.5	0.012	0.01				14	7.70	136		20.30	
12	Butterfield L	6/27/1988	14.0	2.38	1.5	0.034	0.01				17	7.84	138		17.80	
12	Butterfield L	7/11/1988	14.0	2.50	1.5	0.014	0.01				11	8.56	135		6.81	
12	Butterfield L	7/25/1988	14.0	1.63	1.5	0.022	0.02				15	8.07			22.20	
12	Butterfield L	8/1/1988	14.0	1.63	1.5	0.027	0.01				10	7.97	131		16.30	
12	Butterfield L	8/9/1988	14.0	1.55	1.5	0.015	0.01				15	7.70	126		17.80	
12	Butterfield L	8/15/1988	14.0	1.50	1.5	0.018	0.01				13	7.89	119		17.80	
12	Butterfield L	8/23/1988	14.0	1.38	1.5	0.025	0.01				13	8.18	131		13.50	
12	Butterfield L	8/30/1988	14.0	1.63	1.5	0.028	0.01				8	7.80	132		18.50	
12	Butterfield L	9/6/1988	14.0	2.63	1.5	0.018	0.01				11	7.95	131		10.40	
12	Butterfield L	9/14/1988	14.0	2.50	1.5	0.014	0.01				12	7.89	129		8.50	
12	Butterfield L	9/19/1988	14.0	2.90	1.5	0.014	0.01				8	7.94	156		6.88	
12	Butterfield L	9/26/1988	14.0	3.13	1.5	0.015	0.01				12	7.78	138		9.68	
12	Butterfield L	6/20/1989	14.0	2.42	1.5	0.012	0.07				20	7.99	131		13.60	
12	Butterfield L	7/11/1989	14.0	2.50	1.5	0.014					20	7.65	132		12.60	
12	Butterfield L	7/17/1989	14.0	2.88	1.5	0.018					20	7.02	136		11.60	
12	Butterfield L	7/31/1989	14.0	1.88	1.5	0.021	0.01				15	7.85	132		19.30	
12	Butterfield L	8/7/1989	14.0	1.63	1.5	0.024					16	7.96	128		21.50	
12	Butterfield L	8/14/1989	14.0	1.55	1.5	0.018					16	7.67	140		20.70	
12	Butterfield L	8/21/1989	14.0	1.28	1.5	0.023	0.01				12	8.20			22.30	
12	Butterfield L	8/28/1989	14.0	2.05	1.5	0.016					11	8.17	133		14.80	
12	Butterfield L	9/5/1989	14.0	2.45	1.5	0.018					15	7.99	135		12.00	
12	Butterfield L	9/11/1989	14.0	2.78	1.5	0.030	0.01				12				9.91	
12	Butterfield L	9/18/1989	14.0	2.90	1.5	0.019					17	7.75	141		34.80	
12	Butterfield L	9/26/1989	14.0	2.90	1.5	0.019					12	8.04	134		12.50	
12	Butterfield L	7/2/1990	14.0	5.55	1.5	0.021	0.01				15	7.95	133		7.95	
12	Butterfield L	7/17/1990	14.0	4.13	1.5	0.013					13	7.08	132		4.72	
12	Butterfield L	8/2/1990	14.0	4.80	1.5	0.010	0.01				12	8.64	120		3.78	
12	Butterfield L	8/15/1990	14.0	4.00	1.5	0.012					15	7.88	130		8.74	
12	Butterfield L	8/27/1990	14.0	2.55	1.5	0.015	0.01				17	7.91	132		5.86	
12	Butterfield L	9/10/1990	14.0	2.10	1.5	0.013					16	6.94	148		16.10	
12	Butterfield L	9/24/1990	14.0	2.65	1.5	0.015	0.01				15	7.77	137		6.85	
12	Butterfield L	6/19/1991	14.0	3.25												
12	Butterfield L	6/25/1991	14.0	3.50												
12	Butterfield L	7/8/1991	14.0	4.25												
12	Butterfield L	7/22/1991	14.0	3.88												

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	Cl
12	Butterfield L	8/5/1991	14.0	3.50												
12	Butterfield L	8/20/1991	14.0	2.88												
12	Butterfield L	9/2/1991	14.0	1.88												
12	Butterfield L	6/19/1992	15.0	4.13	1.5	0.013					15	8.01	131		4.11	
12	Butterfield L	7/18/1992	14.0	3.38	1.5	0.012					14	8.10	128		5.52	
12	Butterfield L	8/15/1992	14.0	3.00	1.5	0.017					17	7.94	131		11.80	
12	Butterfield L	9/12/1992	14.0	1.60	1.5	0.017					16	7.76			1.68	
12	Butterfield L	7/11/1993	14.0	5.25	1.5	0.009					8	8.00	126		1.43	
12	Butterfield L	8/8/1993	14.0	4.50	1.5	0.012					9	7.82	125		5.85	
12	Butterfield L	9/12/1993	14.0	2.00	1.5	0.029					11	7.40	129		15.60	
12	Butterfield L	10/14/1993	14.0	4.00	1.5	0.028					8	8.06	129		16.00	
12	Butterfield L	7/17/1994	14.0	1.50	1.0	0.018					8	8.69	127		32.90	
12	Butterfield L	8/28/1994	14.0	1.80	1.5	0.021					14	7.75	123		7.68	
12	Butterfield L	9/16/1994	14.0	2.00	1.5	0.021					9	7.84	127		18.00	
12	Butterfield L	10/12/1994	14.0	3.00	1.5	0.025					10	8.10	130		40.70	
12	Butterfield L	6/18/1995	14.0	4.05	1.5	0.026					8	7.97	134		3.52	
12	Butterfield L	7/4/1995	14.0	4.90	1.5	0.007					10	8.06	134		3.28	
12	Butterfield L	7/19/1995	14.0	4.10	1.5	0.010						7.94	134		8.83	
12	Butterfield L	9/9/1995	14.0	1.80	1.5	0.017						8.01	132		48.80	
12	Butterfield L	10/23/1995	14.0	3.88	1.5	0.025					8	7.98	139		3.17	
12	Butterfield L	6/17/1996	14.0	4.05	1.5	0.012	0.03				15	7.82	133		4.40	
12	Butterfield L	7/10/1996	14.0	2.05	1.5	0.016	0.01				15	7.99	130		20.30	
12	Butterfield L	7/23/1996	14.0	1.65	1.5	0.022	0.01				15	8.36	132		24.00	
12	Butterfield L	8/12/1996	14.0	1.85	1.5	0.018	0.01				15	8.26	132		19.10	
12	Butterfield L	8/26/1996	14.0	1.70	1.5	0.021					15	7.92	130		16.50	
12	Butterfield L	9/9/1996	14.0	1.35		0.020					10	8.42	130		32.30	
12	Butterfield L	9/30/1996	14.0	1.95	1.5	0.024					15	7.98	132		15.00	
12	Butterfield L	10/15/1996	14.0	2.60	1.3	0.028					8	7.47	134		11.00	
12	Butterfield L	6/4/1997	15.0	5.95	1.5	0.014	0.02				15	8.04	135		2.93	
12	Butterfield L	6/16/1997	15.0	5.20	1.5	0.012	0.01				10	7.84	132		3.01	
12	Butterfield L	6/30/1997	15.0	4.50	1.5	0.013	0.01				15	7.99	134		2.84	
12	Butterfield L	7/14/1997	15.0	3.00	1.5	0.016	0.01				15	7.48	133		5.38	
12	Butterfield L	7/29/1997	15.0	2.80		0.016					15	8.06	133		8.65	
12	Butterfield L	8/27/1997	15.0	1.75		0.014	0.01				13	7.92	132		20.70	
12	Butterfield L	9/8/1997	15.0	2.05	1.5	0.020					13	7.58	133		5.06	
12	Butterfield L	9/15/1997	15.0	2.10	1.5	0.019					13	7.98	131		0.68	
12	Butterfield L	6/28/1998	14.0	5.30	1.5		0.01				5	7.65	135		2.85	
12	Butterfield L	7/13/1998	14.0	4.00	1.5		0.01				10	8.02	130		5.92	
12	Butterfield L	7/28/1998	14.5	3.30	1.5		0.01				10	7.96	135		6.85	
12	Butterfield L	8/11/1998	14.0	2.30	1.5		0.01				3	8.23	130		9.72	
12	Butterfield L	8/26/1998	14.0	2.20	1.5		0.01				9	7.84	134		15.20	
12	Butterfield L	9/9/1998	14.0	2.20	1.5	0.015										
12	Butterfield L	9/21/1998	14.0		1.5	0.021					10	7.70	135		11.60	
12	Butterfield L	10/5/1998	14.0	2.75	1.5	0.012					10	7.90	137		11.50	
12	Butterfield L	6/23/1999	15.0	5.00	1.5	0.011	0.01				10	7.21	146		2.20	
12	Butterfield L	7/5/1999	14.0	5.10	1.5	0.008	0.01				8	7.66	143		5.60	
12	Butterfield L	7/19/1999	14.0	4.30	1.5	0.010	0.01				13	8.09	140		8.25	
12	Butterfield L	8/2/1999	14.0	2.40	1.5	0.015	0.01				10	8.28	136		11.20	
12	Butterfield L	8/16/1999	14.0	2.10	1.5	0.014	0.01				11	7.78	141		18.00	
12	Butterfield L	9/1/1999	14.0	2.50	1.5	0.012	0.01				10	7.15	143		10.40	
12	Butterfield L	9/13/1999	14.0	2.60	1.5	0.014	0.01				10	6.59	143		11.60	
12	Butterfield L	9/27/1999	14.0	2.20	2.0	0.017	0.01				11	7.87	142		14.90	
12	Butterfield L	6/5/2000	14.0	3.50	2.0	0.023	0.01				12	7.90	147		5.30	
12	Butterfield L	6/19/2000	14.0	3.50	2.0		0.01				15	6.91	144		3.40	
12	Butterfield L	7/10/2000	14.0	3.45	2.0	0.014	0.01				13	7.74	145		0.89	
12	Butterfield L	7/24/2000	14.0	3.50	2.0	0.013	0.01				12	7.28	147		6.45	
12	Butterfield L	8/8/2000	14.0	2.50	2.0	0.015	0.01				12	7.30	151		12.20	
12	Butterfield L	8/21/2000	14.0	1.50	2.0	0.013	0.01				11	7.83	146		17.10	
12	Butterfield L	9/12/2000	14.0	2.25	2.0	0.018	0.01				9	6.87	144		15.60	
12	Butterfield L	9/19/2000	14.0	2.50	2.0	0.021	0.01				12	7.48	147		11.20	
12	Butterfield L	7/18/2001	14.0	3.60	2.0	0.011	0.01				9	8.23	150		5.25	
12	Butterfield L	8/15/2001	14.0	2.10	2.0	0.015	0.01				13	8.52	151		14.73	
12	Butterfield L	9/5/2001	14.0	2.10	2.0	0.018	0.01				8	7.80	152		7.37	
12	Butterfield L	9/26/2001	14.0	2.70	2.0	0.018	0.01				7	7.69	151		7.65	
12	Butterfield L	06/26/02	14.0	3.00	2.0	0.015	0.02	0.05	0.51	76.86	40	7.65	159		6.54	
12	Butterfield L	07/08/02	14.0	2.40	2.0	0.026		0.04	0.58	49.52	12	8.29	158		16.60	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	CI
12	Butterfield L	07/24/02	14.0	1.90	2.0	0.019	0.01	0.06	0.59	68.58	13	7.67	160		15.03	
12	Butterfield L	08/07/02	13.0	1.25	2.0	0.025	0.02	0.04	0.61	54.77	7	7.91	160		32.82	
12	Butterfield L	08/18/02	13.0	1.25	2.0	0.022	0.00	0.04	0.85	86.17	17	8.62	159		24.12	
12	Butterfield L	09/05/02	13.0	1.70	2.0	0.025	0.00	0.02	0.65	56.19	9	7.83	162		16.97	
12	Butterfield L	09/16/02	14.0	1.80	2.0	0.023	0.03	0.02	0.65	64.00	7	7.78	162		15.34	
12	Butterfield L	09/29/02	14.0	1.50	2.0	0.016	0.02	0.01	0.71	94.76	17	7.86	162		9.32	
12	Butterfield L	6/27/2003	14.0	3.10	2.0	0.015	0.00	0.01	0.34	49.31	18	7.85	162	18.0	5.28	
12	Butterfield L	7/8/2003	14.0	2.90	2.0	0.017	0.00	0.02	0.36	48.00	16	7.53	167		6.67	
12	Butterfield L	7/22/2003	14.0	2.70	2.0	0.014	0.00	0.03	0.42	66.05	14	7.39	160		7.60	
12	Butterfield L	8/4/2003	14.0	2.50	2.0	0.014	0.01	0.01	0.33	53.15	19	7.93	161		8.23	
12	Butterfield L	8/19/2003	14.0	2.20	2.0	0.010	0.00	0.01	0.87	198.25	10	8.16	160	18.0	9.93	
12	Butterfield L	9/2/2003	14.0	2.10	2.0	0.013	0.02	0.01	0.49	83.05	11	7.29	158		13.71	
12	Butterfield L	9/16/2003	14.0	2.50		0.015	0.00	0.00	0.32	48.02	12	7.88	159		10.90	
12	Butterfield L	9/30/2003	14.0	2.50		0.016	0.01	0.03	0.22	30.23	10	7.84	163		8.27	
12	Butterfield L	6/23/2004	14.0	4.00	2.0	0.004	0.02	0.01	0.48	264.01	19	6.43	166		4.08	
12	Butterfield L	7/6/2004	14.0	3.00	2.0	0.012	0.01	0.01	0.22	40.50	20	7.03	168		4.60	
12	Butterfield L	7/20/2004	13.0	4.75	2.0	0.011	0.12	0.05	0.66	132.52	12	6.81	163		10.00	
12	Butterfield L	8/4/2004	13.0	3.30	2.0	0.013	0.07	0.04	0.48	79.15	13	8.38	200		8.10	
12	Butterfield L	8/17/2004	13.0	2.60	2.0	0.013	0.01	0.02	0.45	76.39	13	8.45	158	18.63	8.70	
12	Butterfield L	8/31/2004	13.0	2.40	2.0	0.016	0.01	0.01	0.41	56.53	11	8.12	147		9.60	
12	Butterfield L	9/14/2004	14.0	2.10	2.0	0.018	0.01	0.01			34	7.74	127		8.30	
12	Butterfield L	9/28/2004	13.7	2.70		0.014	0.02	0.01	0.70	113.72	9	7.48	144			
12	Butterfield L	6/23/2005	13.7	4.20	2.0	0.014	0.01	0.01	0.17	26.95	18	8.00	155	17.5	5.50	
12	Butterfield L	7/5/2005	12.8	3.30	2.0	0.020	0.02	0.01	0.58	63.70	13	7.52	155		3.16	
12	Butterfield L	7/19/2005	12.8	2.50	2.0	0.015	0.03	0.01	0.17	25.34	10	7.83	95		5.57	
12	Butterfield L	8/3/2005	12.8	3.50	2.0	0.021	0.01	0.01			10	8.90	164		23.17	
12	Butterfield L	8/22/2005	13.4	1.50		0.025	0.02	0.01	0.43	37.63	2	8.09	148		14.08	
12	Butterfield L	9/7/2005	13.4	1.50	2.0	0.020	0.01	0.01	0.30	32.41	10	7.98	162		14.00	
12	Butterfield L	9/20/2005	13.4	1.50	2.0	0.017	0.01	0.03	0.27	35.66	13	7.73	149		18.29	
12	Butterfield L	10/31/05	13.7	2.75	2.0	0.025	0.10	0.06	0.40	34.36	19	8.24	149		7.80	
12	Butterfield L	6/28/2006	12.2	3.33	1.5	0.016	0.01	0.07	0.66	91.57	22	8.09	160	17.5	0.85	
12	Butterfield L	7/12/2006	12.2	2.67	3.3	0.015	0.01	0.07	0.93	138.77	73	8.01	123		0.10	
12	Butterfield L	7/27/2006	12.2	1.67	1.2											
12	Butterfield L	8/9/2006	12.2	1.33	1.2	0.022	0.01	0.05	0.61	61.08	11	7.85	156		10.93	
12	Butterfield L	8/22/2006	12.2	1.33	1.4	0.017	0.00	0.05	0.58	75.58	16	8.40	151	17.7	24.74	
12	Butterfield L	9/5/2006	7.0	1.90	1.2	0.025	0.02	0.06	0.75	67.78	14	7.37	139		12.04	
12	Butterfield L	9/18/2006	12.0	2.00	1.2	0.019	0.02	0.11	1.17	138.60	24	7.28	152		8.95	
12	Butterfield L	10/11/2006		2.00	1.2											
12	Butterfield L	7/12/2007		3.00	1.8	0.028	0.02	0.04	1.01	80.29	25	8.3	158	18.0	4.95	
12	Butterfield L	7/31/2007		3.00	2.0	0.012	0.01	0.01	0.71	135.21	12	8.4	148		3.64	
12	Butterfield L	8/21/2007		2.00	2.0	0.015	0.01	0.02	0.70	103.96	8	7.8	150		4.69	
12	Butterfield L	9/14/2007		2.00	2.0	0.014	0.00	0.01	0.70	110.25	27	8.5	128		0.32	
12	Butterfield L	9/30/2007		2.30	2.0	0.014	0.01	0.04	0.62	97.80	17	8.2	125		3.48	
12	Butterfield L	6/29/2008	14.0	4.30	2.5	0.013	0.02	0.02	0.48	83.69		7.58	129	16.4	0.52	
12	Butterfield L	7/8/2008		3.50	1.5	0.014	0.03	0.03	0.85	129.66	17	8.25	116		1.12	
12	Butterfield L	7/22/2008	14.0	4.00	1.5	0.011	0.01	0.02	0.18	36.99	11	8.53	139		4.50	
12	Butterfield L	8/5/2008	14.0	3.00	1.5	0.013	0.02	0.09	0.45	75.01	12	7.88	96		7.57	
12	Butterfield L	8/19/2008		1.70	1.5	0.016	0.00	0.07	0.51	71.92	30	7.92	101	16.2	1.40	
12	Butterfield L	9/2/2008	14.5	1.70	1.5	0.015	0.01	0.03	0.52	76.52	25	8.36	132		5.74	
12	Butterfield L	9/16/2008	13.0	1.75	1.5	0.017	0.02	0.07	0.72	92.08	9	7.58			8.45	
12	Butterfield L	9/29/2008		2.50	1.5	0.017	0.02	0.03	0.59	77.37	17	7.77	115		1.75	
12	Butterfield L	06/21/2009		3.90	1.0	0.027	0.01	0.03	1.01	82.52	20	7.45	119	18.3	6.45	
12	Butterfield L	07/05/2009		3.25	1.0	0.006	0.02	0.02	0.47	173.80	30	8.01	105		1.74	
12	Butterfield L	07/19/2009		1.88	1.0	0.014	0.01	0.04	0.43	65.85	24	7.29	111		6.72	
12	Butterfield L	08/09/2009		1.50	1.0	0.015	0.01	0.02	0.43	63.64	35	7.65	122		5.18	
12	Butterfield L	08/16/2009		1.75	1.5	0.018	0.01	0.01	0.41	51.08	17	8.55	111		9.80	
12	Butterfield L	08/30/2009		1.80	1.5	0.020	0.01	0.02	0.48	53.49	19	7.08	135		12.00	
12	Butterfield L	09/14/2009		2.10	1.5	0.017	0.81	0.36	0.43	54.30	19	8.14	151		8.20	
12	Butterfield L	09/27/2009				0.016	0.01	0.01	0.37	51.01	13	8.35	99		8.70	
12	Butterfield L	06/21/2010	14.0	3.75	1.0	0.033	0.01	0.03	0.68	44.59	6	7.80	159	19.6	2.80	
12	Butterfield L	07/05/2010	14.0	2.63	1.5	0.014	0.04	0.02	0.32	49.27	14	7.71	158		6.00	
12	Butterfield L	07/20/2010		2.15	1.5	0.012	0.08	0.03	0.36	67.33	6	8.79	95		8.20	
12	Butterfield L	08/01/2010		1.75	1.5	0.019	0.01	0.05	0.57	65.88	12	8.42	157		16.70	
12	Butterfield L	08/16/2010	14.0	1.50	1.5	0.014	0.10	0.05	0.61	97.96	9	8.27	152	17.2	24.30	
12	Butterfield L	09/06/2010	12.0	1.95	1.5	0.020	0.01	0.02	0.50	55.90	13	7.98	163		16.20	
12	Butterfield L	09/19/2010	12.0	2.00	1.5	0.018	0.11	0.01	0.28	34.11	13	7.66	167		16.20	

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a	CI
12	Butterfield L	10/01/2010	14.0	2.10	1.5	0.003	0.05	0.05	0.46	389.23	8	7.34	162		14.30	
12	Butterfield L	06/15/2012		4.50	1.5	0.018	0.01	0.03	0.74	90.70	16	8.44	144	18.1	8.00	
12	Butterfield L	07/01/2012	14.0	3.10	0.9	0.049	0.01	0.03	0.47	21.23	12	8.12	151			
12	Butterfield L	07/21/2012		3.25	1.5	0.017	0.01	0.02	0.48	62.14	10	8.45	131		3.30	
12	Butterfield L	07/29/2012	14.0	2.38	1.5	0.018	0.02	0.03	0.47	58.09	9	7.63	124		3.90	
12	Butterfield L	08/13/2012	11.5	2.50	1.5	0.029	0.01	0.01	0.46	35.23	11	7.72	129	18.6	6.50	
12	Butterfield L	08/26/2012	14.5	1.75	1.5	0.019	0.01	0.03	0.66	77.29	15	8.18	151		11.60	
12	Butterfield L	09/09/2012	14.0	2.50	1.5	0.017	0.01	0.03	0.42	54.48	12	8.43	93		9.70	
12	Butterfield L	09/23/2012	13.5	2.80		0.016	0.01	0.02	0.52	72.09	12	7.22	152		8.20	
12	Butterfield L	06/09/2013	14.0	3.80	1.5	0.016	0.02	0.03	0.57	76.73	17	7.72	159		7.10	
12	Butterfield L	06/13/2013			B1											
12	Butterfield L	06/13/2013			B1_a											
12	Butterfield L	06/13/2013			B1_b											
12	Butterfield L	06/13/2013			B1_b											
12	Butterfield L	06/23/2013	14.9	2.75	1.5	0.016			0.49	65.43	15	8.00	158		7.60	
12	Butterfield L	07/07/2013	15.0	2.05	1.5	0.015	0.01	0.02	0.61	87.71	13	7.88	153		9.00	
12	Butterfield L	07/16/2013			B2											
12	Butterfield L	07/16/2013			B99											
12	Butterfield L	07/17/2013			B11											
12	Butterfield L	07/21/2013	15.1	1.95	1.5	0.019			0.46	52.96	22	8.11	169		6.50	
12	Butterfield L	08/11/2013	15.5	1.65	1.5	0.017	0.01	0.03	0.54	69.88	18	7.43	158		15.80	
12	Butterfield L	08/18/2013	14.0	1.00	1.5	0.023					15	7.96	165		13.60	
12	Butterfield L	08/18/2013			bloom											
12	Butterfield L	09/01/2013	15.2	2.00	1.5	0.019	0.01	0.01	0.59	70.66	14	7.83	156		9.90	
12	Butterfield L	09/15/2013	16.0	1.95	1.5	0.021			0.56	59.08	19	7.46	162		9.50	
12	Butterfield L	5/22/2014	14.3	5.25	1.5	0.012	0.03	0.05	0.36	66.00	15	7.30	157	12.0	1.30	
12	Butterfield L	6/8/2014	14.2	4.15	1.5	0.017			0.50	64.58	19	8.11	149		3.70	
12	Butterfield L	6/8/2014			bloom											
12	Butterfield L	6/21/2014			bloom											
12	Butterfield L	6/22/2014	14.0	4.00	1.5	0.016	0.00	0.02	0.47	66.14	9	7.14	148		3.80	
12	Butterfield L	6/23/2014			bloom											
12	Butterfield L	6/23/2014			bloom											
12	Butterfield L	6/23/2014			bloom											
12	Butterfield L	7/6/2014	14.0	3.00	1.5	0.024			0.46	42.17	12	7.36	128		7.10	
12	Butterfield L	7/20/2014		2.45	1.5	0.013	0.01	0.03	0.41	67.31	12	7.59	153	16.3	6.70	
12	Butterfield L	8/11/2014	14.0	3.27	1.5				0.44		11	8.40	159		6.20	
12	Butterfield L	8/24/2014	14.0	2.35	1.5	0.016	0.03	0.01	0.51	71.18	11	7.66	123		8.20	
12	Butterfield L	9/28/2014			bloom											
12	Butterfield L	10/12/2014			bloom											
12	Butterfield L	9/7/2014	14.0	2.85	1.5	0.013			0.40	67.35	12	7.34	147		10.20	
12	Butterfield L	5/31/2015	15.5	4.00	1.5	0.013	0.03	0.01	0.37	28.98	13	7.44	160	10.5	4.70	
12	Butterfield L	6/14/2015	14.5	3.60	1.5	0.018			0.35	19.18	7	7.83	171		4.00	
12	Butterfield L	6/28/2015	15.5	3.50	1.5	0.012	0.00	0.02	0.42	35.17	8	7.35	147		4.90	17.6
12	Butterfield L	7/12/2015	14.0	3.20	1.5	0.010			0.48	46.99	13	7.88	146		3.90	
12	Butterfield L	7/26/2015	15.0	2.60	1.5	0.012	0.01	0.03	0.46	37.15	12	8.03	166	10.7	7.30	
12	Butterfield L	8/9/2015	14.5	3.00	1.5	0.013					12	8.42	56		8.10	
12	Butterfield L	8/25/2015	15.0	2.30	1.5	0.011	0.00	0.05	0.57	52.80	10	8.17	161		9.00	17.7
12	Butterfield L	9/7/2015		3.10	1.5	0.025			0.60	24.23	10	8.02	143		10.20	
12	Butterfield L	7/11/1993	6.5	5.25	11.0	0.110										
12	Butterfield L	8/8/1993	14.0		11.0	0.012										
12	Butterfield L	9/12/1993	14.0		11.0	0.019										
12	Butterfield L	10/14/1993			11.0	0.030										
12	Butterfield L	7/28/1998	14.5			0.702										
12	Butterfield L	8/26/1998			13.0	0.563										
12	Butterfield L	9/21/1998			13.0	0.170										
12.1	Butterfield L-2	7/18/1992	3.0	3.00	1.5	0.018					14	8.07	130		11.50	
12.1	Butterfield L-2	9/12/1992	3.0	1.50	1.5	0.023					15				41.40	
12.1	Butterfield L-2	7/11/1993	6.5	5.25	1.5	0.009					13	7.34	128		2.98	
12.1	Butterfield L-2	9/12/1993	2.5	2.00	1.5	0.016					7	8.01	126		16.90	
12	Butterfield L	06/26/02	14.0	3.00			0.03		0.79							
12	Butterfield L	07/08/02	14.0	2.40		0.179		0.37	0.71	3.96						
12	Butterfield L	07/24/02	14.0	1.90		0.176	0.01	0.47	0.90	5.10						
12	Butterfield L	08/07/02	13.0	1.25		0.261	0.03	0.39	0.76	2.90						
12	Butterfield L	08/18/02	13.0	1.25		0.030	0.01	0.10	0.68	23.13						
12	Butterfield L	09/05/02	13.0	1.70			0.00	0.20	0.67							
12	Butterfield L	09/16/02	14.0	1.80		0.128	0.01		0.81	6.37						

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4							NO2
12	Butterfield L	09/29/02	14.0	1.50		0.017	0.01	0.01	0.63	36.36					
12	Butterfield L	6/27/2003	14.0			0.245	0.08	0.42							
12	Butterfield L	7/8/2003	14.0			0.040	0.23	0.07	0.55	13.60					
12	Butterfield L	7/22/2003	14.0			0.268	0.05	0.46	0.60	2.24					
12	Butterfield L	8/4/2003	14.0			0.385	0.01	0.56	0.43	1.12					
12	Butterfield L	8/19/2003	14.0			0.477	0.01	1.68	0.74	1.55					
12	Butterfield L	9/2/2003	14.0			0.441	0.01	0.83	0.70	1.59					
12	Butterfield L	9/16/2003	14.0			0.093	0.00	0.26	0.18	1.93					
12	Butterfield L	9/30/2003	14.0			0.026	0.01	0.04	0.20	7.57					
12	Butterfield L	6/23/2004	14.0			0.180	0.07	0.29	0.36	1.98					
12	Butterfield L	7/6/2004	14.0			0.180	0.06	0.31	0.26	1.45					
12	Butterfield L	7/20/2004	13.0			0.071	0.15								
12	Butterfield L	8/4/2004	13.0			0.557	0.22	0.05	0.29	0.52					
12	Butterfield L	8/17/2004	13.0			0.285	0.01	0.50	0.59	2.08					
12	Butterfield L	8/31/2004	13.0			0.701	0.01		0.52	0.74					
12	Butterfield L	9/14/2004	14.0			0.655	0.01	0.01	0.44	0.67					
12	Butterfield L	9/28/2004	13.7			0.428	0.01	0.46	0.53	1.23					
12	Butterfield L	6/23/2005				0.145									
12	Butterfield L	7/5/2005				0.014									
12	Butterfield L	7/19/2005				0.022									
12	Butterfield L	8/3/2005				0.026									
12	Butterfield L	8/22/2005				0.021									
12	Butterfield L	9/7/2005				0.016									
12	Butterfield L	9/20/2005				0.019									
12	Butterfield L	10/31/05				0.026									
12	Butterfield L	6/28/2006	12.2			0.017									
12	Butterfield L	7/12/2006	12.2		12.5	0.084									
12	Butterfield L	8/9/2006	12.2		11.0	0.019									
12	Butterfield L	8/22/2006	12.2		14.0	0.017									
12	Butterfield L	9/5/2006	7.0		7.0	0.021									
12	Butterfield L	9/18/2006	12.0		12.0	0.019									
12	Butterfield L	7/12/2007		3.00	1.8	0.028									
12	Butterfield L	7/31/2007		3.00	2.0	0.012									
12	Butterfield L	8/21/2007		2.00	2.0	0.015									
12	Butterfield L	9/14/2007		2.00	2.0	0.014									
12	Butterfield L	9/30/2007		2.30	2.0	0.014									
12	Butterfield L	6/29/2008	14.0	4.30	2.5	0.013									
12	Butterfield L	7/8/2008		3.50	1.5	0.014									
12	Butterfield L	7/22/2008	14.0	4.00	1.5	0.011									
12	Butterfield L	8/5/2008	14.0	3.00	1.5	0.013									
12	Butterfield L	8/19/2008		1.70	1.5	0.016									
12	Butterfield L	9/2/2008	14.5	1.70	1.5	0.015									
12	Butterfield L	9/16/2008	13.0	1.75	1.5	0.017									
12	Butterfield L	9/29/2008		2.50	1.5	0.017									
12	Butterfield L	06/21/2009			13.5	0.050		0.05							
12	Butterfield L	07/05/2009			10.0	0.030		0.04							
12	Butterfield L	07/19/2009			9.0	0.011		0.02							
12	Butterfield L	08/09/2009			<b>22.0</b>	0.294		0.70							
12	Butterfield L	08/16/2009			10.0	0.317		0.01							
12	Butterfield L	08/30/2009			12.0	0.782		1.44							
12	Butterfield L	09/14/2009			12.0	0.296		0.76							
12	Butterfield L	09/27/2009				0.221		0.68							
12	Butterfield L	06/21/2010	14.0		13.0	0.269		0.53							
12	Butterfield L	07/05/2010	14.0		12.0	0.042		0.17							
12	Butterfield L	07/20/2010			13.0	0.282		0.54							
12	Butterfield L	08/01/2010			13.0	0.358		0.84							
12	Butterfield L	08/16/2010	14.0		12.0	0.316		0.58							
12	Butterfield L	09/06/2010	12.0		12.0	0.136		0.45							
12	Butterfield L	09/19/2010	12.0		10.5	0.398		1.22							
12	Butterfield L	10/01/2010	14.0		12.0	0.028		0.39							
12	Butterfield L	06/15/2012			14.4	0.165		0.37							0.01
12	Butterfield L	07/01/2012			14.0	0.104		0.12							0.01
12	Butterfield L	07/21/2012			12.5	0.292		0.46							0.00
12	Butterfield L	07/29/2012			12.5	0.406		0.09							0.00
12	Butterfield L	08/13/2012			11.5	0.257		0.38							0.00
12	Butterfield L	08/26/2012				0.444		0.98							0.00

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4										NO2
12	Butterfield L	09/09/2012				0.467		0.88										0.00
12	Butterfield L	09/23/2012			12.5	0.620		1.46										0.00
12	Butterfield L	06/09/2013			13.1	0.018		0.07										
12	Butterfield L	06/23/2013			14.5	0.299												
12	Butterfield L	07/07/2013			13.5	0.212		0.43										
12	Butterfield L	07/21/2013			14.2	0.172												
12	Butterfield L	08/11/2013			14.0	0.157		0.35										
12	Butterfield L	08/20/2013			12.2	0.340												
12	Butterfield L	09/01/2013			13.7	0.369		1.16										
12	Butterfield L	09/15/2013			14.5	0.137												
12	Butterfield L	5/22/2014			10	0.016		0.10										
12	Butterfield L	6/8/2014			13	0.113												
12	Butterfield L	6/22/2014			12.5	0.170		0.64										
12	Butterfield L	7/6/2014			12	0.018												
12	Butterfield L	7/20/2014				0.072		0.25										
12	Butterfield L	8/11/2014			11	0.032												
12	Butterfield L	8/24/2014			11	0.025		0.08										
12	Butterfield L	9/7/2014			11	0.061												
12	Butterfield L	5/31/2015			14	0.025		0.24										
12	Butterfield L	6/14/2015			13	0.140												
12	Butterfield L	6/28/2015			15	0.282		0.73										
12	Butterfield L	7/12/2015			13	0.334												
12	Butterfield L	7/26/2015			13.5	0.521		1.18										
12	Butterfield L	8/9/2015			13.5	0.409												
12	Butterfield L	8/25/2015			13.5	0.423		1.28										
12	Butterfield L	9/7/2015			13	0.639												

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QE	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB	
12	Butterfield L	6/22/1986	epi	23	21																	
12	Butterfield L	6/26/1986	epi	14	17																	
12	Butterfield L	7/3/1986	epi	16	19																	
12	Butterfield L	7/17/1986	epi	22	20																	
12	Butterfield L	7/24/1986	epi	22	20																	
12	Butterfield L	7/30/1986	epi	15	20																	
12	Butterfield L	8/8/1986	epi	23	24																	
12	Butterfield L	8/14/1986	epi	21	23																	
12	Butterfield L	8/21/1986	epi	23	24																	
12	Butterfield L	8/27/1986	epi	21	22																	
12	Butterfield L	9/3/1986	epi	18	20																	
12	Butterfield L	9/10/1986	epi	15	18																	
12	Butterfield L	9/17/1986	epi	20	18																	
12	Butterfield L	9/24/1986	epi	19	17																	
12	Butterfield L	6/27/1987	epi	23	22																	
12	Butterfield L	7/6/1987	epi	25	23																	
12	Butterfield L	7/12/1987	epi	30	26																	
12	Butterfield L	7/20/1987	epi	26	25																	
12	Butterfield L	7/27/1987	epi	22	25																	
12	Butterfield L	8/1/1987	epi	24	26																	
12	Butterfield L	8/3/1987	epi	26	25																	
12	Butterfield L	8/10/1987	epi	23	24																	
12	Butterfield L	8/18/1987	epi	23	25																	
12	Butterfield L	8/24/1987	epi	17	22																	
12	Butterfield L	8/31/1987	epi	24	21																	
12	Butterfield L	9/7/1987	epi	25	21																	
12	Butterfield L	9/14/1987	epi	20	20																	
12	Butterfield L	9/21/1987	epi	19	18																	
12	Butterfield L	6/27/1988	epi	28	18																	
12	Butterfield L	7/11/1988	epi	25	24																	
12	Butterfield L	7/25/1988	epi	28	26																	
12	Butterfield L	8/1/1988	epi	31	26																	
12	Butterfield L	8/9/1988	epi	26	26																	
12	Butterfield L	8/15/1988	epi	25	26																	

LNum	PName	Date	Site	TAir	TH2O	QA	QB	QC	QD	QE	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
12	Butterfield L	8/23/1988	epi	22	24															
12	Butterfield L	8/30/1988	epi	20	21															
12	Butterfield L	9/6/1988	epi	17	19															
12	Butterfield L	9/14/1988	epi	20	19															
12	Butterfield L	9/19/1988	epi	23	20															
12	Butterfield L	9/26/1988	epi	14	18															
12	Butterfield L	6/20/1989	epi	22	20															
12	Butterfield L	7/11/1989	epi	25	24															
12	Butterfield L	7/17/1989	epi	21	24															
12	Butterfield L	7/31/1989	epi	28	25															
12	Butterfield L	8/7/1989	epi	18	24															
12	Butterfield L	8/14/1989	epi	26	24															
12	Butterfield L	8/21/1989	epi	24	24															
12	Butterfield L	8/28/1989	epi	24	24															
12	Butterfield L	9/5/1989	epi	18	21															
12	Butterfield L	9/11/1989	epi	19	22															
12	Butterfield L	9/18/1989	epi	23	20															
12	Butterfield L	9/26/1989	epi	12	16															
12	Butterfield L	7/2/1990	epi	19	20															
12	Butterfield L	7/17/1990	epi	24	23															
12	Butterfield L	8/2/1990	epi	26	25															
12	Butterfield L	8/15/1990	epi	24	24															
12	Butterfield L	8/27/1990	epi	24	25															
12	Butterfield L	9/10/1990	epi	18	20															
12	Butterfield L	9/24/1990	epi	13	16															
12	Butterfield L	6/25/1991	epi	25	23															
12	Butterfield L	6/19/1991	epi	25	22															
12	Butterfield L	7/8/1991	epi	25	24															
12	Butterfield L	7/22/1991	epi	30	26															
12	Butterfield L	8/5/1991	epi	28	20															
12	Butterfield L	8/20/1991	epi	24	24															
12	Butterfield L	9/2/1991	epi	16	22															
12	Butterfield L	6/19/1992	epi	22	22	1	2	1	5											
12	Butterfield L	7/18/1992	epi	28	23															
12	Butterfield L	8/15/1992	epi	23	22	2	3	4	5											
12	Butterfield L	9/12/1992	epi	18	20	4	3	3	125											
12	Butterfield L	7/11/1993	epi	27	27	1	3	1	2											
12	Butterfield L	8/8/1993	epi	23	23															
12	Butterfield L	9/12/1993	epi	14	20	3	3	3	2											
12	Butterfield L	10/14/1993	epi	4	12	3	4	4	2											
12	Butterfield L	7/17/1994	epi	30	25	3	3	2												
12	Butterfield L	8/28/1994	epi	28	24	3	4	3	2											
12	Butterfield L	9/16/1994	epi	20	19	3	2	4	123											
12	Butterfield L	10/12/1994	epi	9	12	3	2	3	135											
12	Butterfield L	6/18/1995	epi	23	22	2	2	2	3											
12	Butterfield L	7/4/1995	epi	22	25	2	3	2												
12	Butterfield L	7/19/1995	epi	34	25	2	2	2												
12	Butterfield L	9/9/1995	epi	23	21	3	2	3	1											
12	Butterfield L	10/23/1995	epi	13	12	2	2	2												
12	Butterfield L	6/17/1996	epi	27	25	3	3	4	23											
12	Butterfield L	7/10/1996	epi	20	22	3	3	3	123											
12	Butterfield L	7/23/1996	epi	25	23	4	3	3	123											
12	Butterfield L	8/12/1996	epi	23	24	4	3	3	123											
12	Butterfield L	8/26/1996	epi	19	23	4	3	3	123											
12	Butterfield L	9/9/1996	epi	24	23	4	3	4	1234											
12	Butterfield L	9/30/1996	epi	15	16	3	3	3	123											
12	Butterfield L	10/15/1996	epi	5	13	2	3	2	2											
12	Butterfield L	6/4/1997	epi	23	20	2	1	2	6											
12	Butterfield L	6/16/1997	epi	19	20	2	1	2	5											
12	Butterfield L	6/30/1997	epi	25	24	2	2	2												
12	Butterfield L	7/14/1997	epi	26	25	2	2	2												

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP- BG	HAB form	Shore HAB
12	Butterfield L	7/29/1997	epi	21	23	2	2	2	6											
12	Butterfield L	8/27/1997	epi	22	24	2	2	3	1											
12	Butterfield L	9/8/1997	epi	16	18	2	2	2	12											
12	Butterfield L	9/15/1997	epi	19	18	2	2	2												
12	Butterfield L	6/28/1998	epi	26	24	2	2	2	6											
12	Butterfield L	7/13/1998	epi	24	22	2	3	3	2											
12	Butterfield L	7/28/1998	epi	24	24															
12	Butterfield L	8/11/1998	epi	24	25	2	2	2	2											
12	Butterfield L	8/26/1998	epi	23	23	2	2	2	2											
12	Butterfield L	9/9/1998	epi	16	21	2	3	3	2											
12	Butterfield L	9/21/1998	epi			2	2	3	2											
12	Butterfield L	10/5/1998	epi	16	17	2	1	2	1											
12	Butterfield L	6/23/1999	epi	26	24	2	3	3	2											
12	Butterfield L	7/5/1999	epi	30	26	2	3	3	2											
12	Butterfield L	7/19/1999	epi	25	25	3	3	3	2											
12	Butterfield L	8/2/1999	epi	23	25	3	3	3	2											
12	Butterfield L	8/16/1999	epi	21	22	3	3	3	2											
12	Butterfield L	9/1/1999	epi	19	22	3	4	3	2											
12	Butterfield L	9/13/1999	epi	23	21	3	4	3	2											
12	Butterfield L	9/27/1999	epi	17	17	2	2	3	1											
12	Butterfield L	6/5/2000	epi	10	16	2	2	2	5											
12	Butterfield L	6/19/2000	epi	15	20	2	2	2												
12	Butterfield L	7/10/2000	epi	20	22	2	2	2												
12	Butterfield L	7/24/2000	epi	25	24	2	2	2	13											
12	Butterfield L	8/8/2000	epi	25	22	2	2	3	1											
12	Butterfield L	8/21/2000	epi	20	22	3	2	2	13											
12	Butterfield L	9/12/2000	epi	22	22	2	2	3	15											
12	Butterfield L	9/19/2000	epi	20	20	2	2	2	1											
12	Butterfield L	7/18/2001	epi	22	23	2	2	2												
12	Butterfield L	8/15/2001	epi	23	25	3	2	2												
12	Butterfield L	9/5/2001	epi	15	21	3	3	3	2											
12	Butterfield L	9/26/2001	epi	13	19	2	3	3	2											
12	Butterfield L	06/26/02	epi	26	22	2	2	3	25											
12	Butterfield L	07/08/02	epi	24	25	2	3	3	2											
12	Butterfield L	07/24/02	epi	20	23	3	3	3	23											
12	Butterfield L	08/07/02	epi	19	24	4	4	4	1234											
12	Butterfield L	08/18/02	epi	28	25	4	5	4	123											
12	Butterfield L	09/05/02	epi	20	22	3	4	4	23											
12	Butterfield L	09/16/02	epi	18	20	3	1	2	18											
12	Butterfield L	09/29/02	epi	18	20	2	3	3	3											
12	Butterfield L	6/27/2003	epi	24	21	2	1	1	8											
12	Butterfield L	7/8/2003	epi	24	24	2	3	2												
12	Butterfield L	7/22/2003	epi	20	23	2	3	2												
12	Butterfield L	8/4/2003	epi	29	25	2	3	2												
12	Butterfield L	8/19/2003	epi	22	26	2	2	3												
12	Butterfield L	9/2/2003	epi	20	22	2	2	2												
12	Butterfield L	9/16/2003	epi	22	21	2	2	2												
12	Butterfield L	9/30/2003	epi	17	14	2	2	2												
12	Butterfield L	6/23/2004	epi	23	22	1	2	2	8											
12	Butterfield L	7/6/2004	epi	19	22	2	3	3	2											
12	Butterfield L	7/20/2004	epi	22	24	2	3	3	2											
12	Butterfield L	8/4/2004	epi	19	24	3	3	3	2											
12	Butterfield L	8/17/2004	epi	19	23	3	3	3	2											
12	Butterfield L	8/31/2004	epi	23	22	3	3	3	2											
12	Butterfield L	9/14/2004	epi	18	20	3	2	2	2											
12	Butterfield L	9/28/2004	epi	15	19	3	3	3	2											
12	Butterfield L	6/23/2005	epi	17	22	3	3	3	23											
12	Butterfield L	7/5/2005	epi	24	25	3	1	3	28											
12	Butterfield L	7/19/2005	epi	28	28	3	3	3	2											
12	Butterfield L	8/3/2005	epi	28	28	3	3	3	34											
12	Butterfield L	8/22/2005	epi	17	24	4	3	4	12348											

LNum	PName	Date	Site	TAir	TH2O	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP- BG	HAB form	Shore HAB
12	Butterfield L	9/7/2005	epi	23	21	3	2	3	1238											
12	Butterfield L	9/20/2005	epi	23	22	4	3	4	12348											
12	Butterfield L	10/31/05	epi	14	12	2	3	2	5											
12	Butterfield L	6/28/2006	epi	28	24	2	1	2	8											
12	Butterfield L	7/12/2006	epi	22	23	2	3	2	2											
12	Butterfield L	7/27/2006	epi	22	25	2	2	2	0											
12	Butterfield L	8/9/2006	epi	26	25	3	2	3	3											
12	Butterfield L	8/22/2006	epi	21	20	4	2	3	348											
12	Butterfield L	9/5/2006	epi	17	20	3	2	3	3											
12	Butterfield L	9/18/2006	epi	23	20	2	2	2	8											
12	Butterfield L	10/11/2006	epi	19	15	2	2	2	0											
12	Butterfield L	7/12/2007	epi	19	23	2	2	2	0											
12	Butterfield L	7/31/2007	epi	26	26	2	2	2												
12	Butterfield L	8/21/2007	epi	18	22															
12	Butterfield L	9/14/2007	epi	20	20	3	3	3	2											
12	Butterfield L	9/30/2007	epi	12	20	3	3	3	8											
12	Butterfield L	6/29/2008	epi	19	21	2	1	1	0											
12	Butterfield L	7/8/2008	epi	27	24	2	2	2	0											
12	Butterfield L	7/22/2008	epi	21	24	2	3	2	2											
12	Butterfield L	8/5/2008	epi	22	21	2	3	2	0											
12	Butterfield L	8/19/2008	epi	14	20	2	3	3	25											
12	Butterfield L	9/2/2008	epi	22	23	3	3	3	23											
12	Butterfield L	9/16/2008	epi	11	20	3	4	4	123											
12	Butterfield L	9/29/2008	epi		17	3	2	3	0											
12	Butterfield L	06/21/2009	epi	19	20	2	2	2	25											
12	Butterfield L	07/05/2009	epi	18	22	2	4	2	25											
12	Butterfield L	07/19/2009	epi	22	22	2	4	2	25											
12	Butterfield L	08/09/2009	epi	21	23	2	3	3	2											
12	Butterfield L	08/16/2009	epi	29	26	2	3	3	2					0.08						
12	Butterfield L	08/16/2009	bloom											1.06						
12	Butterfield L	08/30/2009	epi	19	22	2	2	2	25											
12	Butterfield L	09/14/2009	epi	20	20	2	2	2	5			189.70		0.10						
12	Butterfield L	06/21/2010	epi	26	21	2	3	2	0	0	0	199.90								
12	Butterfield L	07/05/2010	epi	28	22	2	3	2	0	4	0									
12	Butterfield L	07/20/2010	epi	25	26	2	3	2	0	0	0									
12	Butterfield L	08/01/2010	epi	27	25	3	3	3	12	0	0									
12	Butterfield L	08/16/2010	epi	25	23	3	2	3	23	0	0	226.00		0.07						
12	Butterfield L	09/06/2010	epi	20	21	3	3	3	5	0	0	98.77								
12	Butterfield L	09/19/2010	epi	26	18	3	1	2	0	0	0	595.10		0.16						
12	Butterfield L	10/01/2010	epi	16	16	2	1	1	0											
12	Butterfield L	06/15/2012	epi	33	22	2	3	4	23	0	0	246.00		0.15						
12	Butterfield L	07/01/2012	epi	24	23	2	1	2	2	0	0	5.30	1.60	<0.30	<0.413					C
12	Butterfield L	07/21/2012	epi	28	25	1	1	1	0	0	0	-0.10	0.20	<0.30	<0.392		0.58	0.37		I
12	Butterfield L	07/29/2012	epi	29	25	2	1	2	0	0	0	11.40	0.40	<0.30	<0.328		2.94	1.55		I
12	Butterfield L	08/13/2012	epi	24	24	2	3	3	2	0	0	24.00	0.50	<0.30	<0.292		4.39	2.71		I
12	Butterfield L	08/26/2012	epi	27	23	3	4	3	12	1	1	43.20	0.70	0.46	<0.552		5.37	3.33		I
12	Butterfield L	09/09/2012	epi	20	21	3	5	2	2	0	0	56.00	0.70	0.34	<0.551		3.17	1.03		F
12	Butterfield L	09/23/2012	epi	15	18	3	3	2	1	0	0	40.60	0.80	0.49	<0.725		7.06	4.15		I
12	Butterfield L	06/09/2013	epi	25	18	2	2	2	5	4	0	42.00	2.30	<0.30	<0.420	42.00	2.30	42.00		F
12	Butterfield L	06/13/2013	bloom											<0.60	<0.870	11.50	9.30			
12	Butterfield L	06/13/2013	bloom											3.12	<0.000	75.30	12.70			
12	Butterfield L	06/13/2013	bloom											3.59	<0.000	52.70	2.20			
12	Butterfield L	06/13/2013	bloom											2.90	<1.200	98.30	0.00			
12	Butterfield L	06/23/2013	epi	28	22	2	3	2	15	0	0	13.40	2.20	<0.30	<0.370	13.40	2.20	13.40		FI
12	Butterfield L	07/07/2013	epi	23	26	2	4	2	25	0	24	44.50	2.80	<0.30	<0.510	44.50	2.80	44.50		F
12	Butterfield L	07/16/2013	bloom											1.45	<0.750	177.10	97.00			
12	Butterfield L	07/16/2013	bloom											<0.60	<0.750	8.40	6.20			
12	Butterfield L	07/17/2013	bloom											<0.60	<0.750	4.60	1.50			
12	Butterfield L	07/21/2013	epi	32	25	2	3	2	0	346	346	68.00	3.00	<0.30	<0.910	9.90	6.60	68.00		I
12	Butterfield L	08/11/2013	epi	20	23	3	4	3	12	0	0	117.70	2.60	<0.30	<0.380	15.20	13.00	117.70		F
12	Butterfield L	08/18/2013	epi	25	22	3	4	3	34	4	4	88.3	3.1	<0.30	<0.510	12.20	9.20	88.3		F

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
12	Butterfield L	08/18/2013	bloom											6.00	<1.140	9228	9228			
12	Butterfield L	09/01/2013	epi	24	23	3	3	2	23	0	0	71.50	4.10	0.33	<1.100	71.50	4.10	71.50	i	i
12	Butterfield L	09/15/2013	epi	19	19	3	3	2	125	0	0	60.80	4.10	0.50	<19.130	60.80	4.10	60.80	F	i
12	Butterfield L	5/22/2014	epi	25	19	1	2	1	0	0	0	0.10	0.60	<0.53	<0.09	<0.001	1.40	0.00	i	
12	Butterfield L	6/8/2014	epi	25	20	2	1	1	6	0	0	1.10	1.70	<1.83	<0.17	<0.001	2.90	0.40	i	
12	Butterfield L	6/8/2014	bloom											<5.49	<0.52	<0.004	961.30	961.30		e
12	Butterfield L	6/21/2014	bloom											<0.95	<0.88	<0.004	19.30	0.00		
12	Butterfield L	6/22/2014	epi	22	22	2	3	1	0	0	0	2.90	0.40	<0.47	<0.44	<0.002	2.00	0.00	i	h
12	Butterfield L	6/23/2014	bloom											<0.95	<0.88	<0.004	24.80	8.00		e
12	Butterfield L	6/23/2014	bloom											<0.32	<0.09	<0.000	2.68	0.00		
12	Butterfield L	6/23/2014	bloom											<0.32	<0.09	<0.000	3.22	0.13		
12	Butterfield L	7/6/2014	epi	24	23	2	2	1	0	0	0	22.70	0.50	<0.62	<0.03	<0.002	4.10	1.90	i	
12	Butterfield L	7/20/2014	epi	29	23	2	3	1	0	0	0	17.90	0.40	<0.39	<0.09	<0.002	4.40	2.30	fi	
12	Butterfield L	8/11/2014	epi	28	24	1	4	2	2	0	0	10.20	0.30	<0.28	<0.05	<0.001	2.30	1.40	i	i
12	Butterfield L	8/24/2014	epi	28	24	2	4	2	0	0	0	27.50	0.60	<0.26	<0.10	<0.002	6.40	2.54	i	i
12	Butterfield L	9/28/2014	bloom											<0.38	<0.24	<0.002	5.80	4.50		
12	Butterfield L	10/12/2014	bloom											<1.46	<0.25	<0.002	1146.30	1146.30		
12	Butterfield L	9/7/2014	epi	24	23	3	3	1	0	0	0	30.50	0.40	<0.29	<0.14	<0.002	8.30	5.40	f	f
12	Butterfield L	5/31/2015	epi	8	18	3	3	1	0	0	0	10.90	0.70	<0.45	<0.089	<0.199	1.70	0.00	i	i
12	Butterfield L	6/14/2015	epi	23	20	1	2	1	5	0	0	8.60	0.40	<0.55	<0.018	<0.139	2.00	0.00	i	i
12	Butterfield L	6/28/2015	epi	16	22	2	3	2	0	0	0	14.60	0.40	<0.86	<0.39	<0.000	2.30	0.70	i	i
12	Butterfield L	7/12/2015	epi	26	23	2	3	2	5	0	0	17.80	0.40	<0.76	<0.005	<0.028	2.90	1.30	i	i
12	Butterfield L	7/26/2015	epi	28	24	2	3	2	2	0	0	39.40	0.40	<0.30	<0.002	<0.014	5.80	4.10	i	i
12	Butterfield L	8/9/2015	epi	23	24	2	3	2	0	0	27	38.90	0.60	<0.44	<0.002	<0.014	6.00	4.10	i	i
12	Butterfield L	8/25/2015	epi	20	22	3	3	2	67	0	0	10.20	1.90	<0.50	<0.007	<0.040	8.40	6.60	i	i
12	Butterfield L	9/7/2015	epi	26	24	3	3	3	8	6	0	65.20	0.70	<0.26	0.00	<0.086	8.70	6.20	i	i
12	Butterfield L	7/11/1993	hypo	27	27															
12	Butterfield L	8/8/1993	hypo	23	18															
12	Butterfield L	9/12/1993	hypo	14	14															
12	Butterfield L	8/26/1998	hypo		11															
12	Butterfield L	9/9/1998	hypo		11															
12.1	Butterfield L-2	7/18/1992	epi	28	22	2	2	1	56											
12.1	Butterfield L-2	9/12/1992	epi	18	20															
12.1	Butterfield L-2	7/11/1993	epi	27	27															
12.1	Butterfield L-2	9/12/1993	epi	14	20															
12	Butterfield L	06/26/02	hypo	26	12	2	2	3	25											
12	Butterfield L	07/08/02	hypo	24	13	2	3	3	2											
12	Butterfield L	07/24/02	hypo	20	13	3	3	3	23											
12	Butterfield L	08/07/02	hypo	19	13	4	4	4	1234											
12	Butterfield L	08/18/02	hypo	28	15	4	5	4	123											
12	Butterfield L	09/05/02	hypo	20	14	3	4	4	23											
12	Butterfield L	09/16/02	hypo	18	14	3	1	2	18											
12	Butterfield L	09/29/02	hypo	18	14	2	3	3	3											
12	Butterfield L	6/27/2003	hypo		10															
12	Butterfield L	7/8/2003	hypo		12															
12	Butterfield L	7/22/2003	hypo		11															
12	Butterfield L	8/4/2003	hypo		11															
12	Butterfield L	8/19/2003	hypo		10															
12	Butterfield L	9/2/2003	hypo		11															
12	Butterfield L	6/23/2004	hypo		11															
12	Butterfield L	7/6/2004	hypo		12															
12	Butterfield L	7/20/2004	hypo		12															
12	Butterfield L	8/4/2004	hypo		11															
12	Butterfield L	8/17/2004	hypo		12															
12	Butterfield L	8/31/2004	hypo		12															
12	Butterfield L	9/28/2004	hypo		14															
12	Butterfield L	6/23/2005	hypo		13															
12	Butterfield L	8/3/2005	hypo		25															
12	Butterfield L	8/22/2005	hypo		23															
12	Butterfield L	9/7/2005	hypo		20															
12	Butterfield L	6/28/2006	hypo		19															

LNum	PName	Date	Site	TAir	TH20	QA	QB	QC	QD	QE	QF	QG	AQ-PC	AQ-Chla	MC-LR	Ana-a	Cylin	FP-Chl	FP-BG	HAB form	Shore HAB
12	Butterfield L	7/12/2006	hypo		21																
12	Butterfield L	7/27/2006	hypo		24																
12	Butterfield L	8/9/2006	hypo		25																
12	Butterfield L	8/22/2006	hypo		15																
12	Butterfield L	9/5/2006	hypo		19																
12	Butterfield L	9/18/2006	hypo		19																
12	Butterfield L	10/11/2006	hypo		15																
12	Butterfield L	7/12/2007	hypo		25																
12	Butterfield L	7/31/2007	hypo		25																
12	Butterfield L	8/21/2007	hypo		20																
12	Butterfield L	9/30/2007	hypo		18																
12	Butterfield L	7/8/2008	hypo		21																
12	Butterfield L	7/22/2008	hypo		20																
12	Butterfield L	8/5/2008	hypo		24																
12	Butterfield L	8/19/2008	hypo		20																
12	Butterfield L	9/2/2008	hypo		22																
12	Butterfield L	9/16/2008	hypo		20																
12	Butterfield L	9/29/2008	hypo		17																
12	Butterfield L	06/21/2010	hypo		10																
12	Butterfield L	07/05/2010	hypo		11																
12	Butterfield L	07/20/2010	hypo		11																
12	Butterfield L	08/01/2010	hypo		10																
12	Butterfield L	08/16/2010	hypo		10																
12	Butterfield L	09/06/2010	hypo		11																
12	Butterfield L	09/19/2010	hypo		10																
12	Butterfield L	10/01/2010	hypo		14																
12	Butterfield L	06/15/2012	hypo		10																
12	Butterfield L	07/01/2012	hypo		10																
12	Butterfield L	07/21/2012	hypo		10																
12	Butterfield L	07/29/2012	hypo		11																
12	Butterfield L	08/13/2012	hypo		10																
12	Butterfield L	09/23/2012	hypo		10																
12	Butterfield L	06/09/2013	hypo		11																
12	Butterfield L	06/23/2013	hypo		9																
12	Butterfield L	07/07/2013	hypo		9																
12	Butterfield L	07/21/2013	hypo		9																
12	Butterfield L	08/11/2013	hypo		9																
12	Butterfield L	08/20/2013	hypo		10																
12	Butterfield L	09/01/2013	hypo		10																
12	Butterfield L	09/15/2013	hypo		10																
12	Butterfield L	5/22/2014	hypo		10																
12	Butterfield L	6/8/2014	hypo		9																
12	Butterfield L	6/22/2014	hypo		9																
12	Butterfield L	7/6/2014	hypo		11																
12	Butterfield L	7/20/2014	hypo		10																
12	Butterfield L	8/11/2014	hypo		12																
12	Butterfield L	8/24/2014	hypo		12																
12	Butterfield L	9/7/2014	hypo		11																
12	Butterfield L	5/31/2015	hypo		10																
12	Butterfield L	6/14/2015	hypo		9																
12	Butterfield L	6/28/2015	hypo		8																
12	Butterfield L	7/12/2015	hypo		10																
12	Butterfield L	7/26/2015	hypo		8																
12	Butterfield L	8/9/2015	hypo		10																
12	Butterfield L	8/25/2015	hypo		9																
12	Butterfield L	9/7/2015	hypo		9																

## Legend Information

<i>Indicator</i>	<i>Description</i>	<i>Detection Limit</i>	<i>Standard (S) / Criteria (C)</i>
<b>General Information</b>			
Lnum	lake number (unique to CSLAP)		
Lname	name of lake (as it appears in the Gazetteer of NYS Lakes)		
Date	sampling date		
<b>Field Parameters</b>			
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
<b>Laboratory Parameters</b>			
Tot.P	total phosphorus (mg/l)	0.003 mg/l	0.020 mg/l ( C)
NOx	nitrate + nitrite (mg/l)	0.01 mg/l	10 mg/l NO3 (S), 2 mg/l NO2 (S)
NH4	total ammonia (mg/l)	0.01 mg/l	2 mg/l NH4 (S)
TN	total nitrogen (mg/l)	0.01 mg/l	none
TN/TP	nitrogen to phosphorus (molar) ratio, = (TKN + NOx)*2.2/TP		none
TCOLOR	true (filtered) color (ptu, platinum color units)	1 ptu	none
pH	powers of hydrogen (S.U., standard pH units)	0.1 S.U.	6.5, 8.5 S.U. (S)
Cond25	specific conductance, corrected to 25C (umho/cm)	1 umho/cm	none
Ca, Cl	calcium, chloride (mg/l)	1 mg/l	none
Chl.a	chlorophyll a (ug/l)	0.01 ug/l	none
Fe	iron (mg/l)	0.1 mg/l	1.0 mg/l (S)
Mn	manganese (mg/l)	0.01 mg/l	0.3 mg/l (S)
As	arsenic (ug/l)	1 ug/l	10 ug/l (S)
AQ-PC	Phycocyanin (aquafior) (unitless)	1 unit	none
AQ-Chl	Chlorophyll a (aquafior) (ug/l)	1 ug/l	none
MC-LR	Microcystis-LR (ug/l)	0.01 ug/l	1 ug/l potable (C) 20 ug/l swimming (C)
Ana	Anatoxin-a (ug/l)	variable	none
Cyl	Cylindrospermopsin (ug/l)	0.1 ug/l	none
FP-Chl, FP-BG	Fluoroprobe total chlorophyll, fluoroprobe blue-green chlorophyll (ug/l)	0.1 ug/l	none
<b>Lake Assessment</b>			
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 Butterfield Lake

### Butterfield Lake ( 0906-0020)

### MinorImpacts

#### Waterbody Location Information

Revised: 11/13/2008

<b>Water Index No:</b>	SL-25- 7/P1- 8- P54	<b>Drain Basin:</b>	Saint Lawrence River
<b>Hydro Unit Code:</b>	04150303/080	<b>Str Class:</b>	B
<b>Waterbody Type:</b>	Lake	<b>Reg/County:</b>	6/Jefferson Co. (23)
<b>Waterbody Size:</b>	969.6 Acres	<b>Quad Map:</b>	REDWOOD (D-17-3)
<b>Seg Description:</b>	entire lake		

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

Use(s) Impacted	Severity	Problem Documentation
Public Bathing	Stressed	Suspected
Recreation	Stressed	Suspected
Habitat/Hydrology	Stressed	Known

#### Type of Pollutant(s)

Known: ALGAL/WEED GROWTH  
 Suspected: NUTRIENTS (phosphorus)  
 Possible: - - -

#### Source(s) of Pollutant(s)

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

#### Resolution/Management Information

<b>Issue Resolvability:</b>	1 (Needs Verification/Study (see STATUS))		
<b>Verification Status:</b>	4 (Source Identified, Strategy Needed)		
<b>Lead Agency/Office:</b>	ext/WQCC		<b>Resolution Potential:</b> Medium
<b>TMDL/303d Status:</b>	n/a		

#### Further Details

##### Overview

Public Bathing and other recreational uses in Butterfield Lake are known to experience minor impacts due to excessive aquatic weed and algal growth, including rooted invasive plants (Eurasian milfoil). Excessive nutrient loading may also be contributing to the plant growth.

##### Water Quality Sampling

Butterfield Lake has been sampled as part of the NYSDEC Citizen Statewide Lake Assessment Program (CSLAP) beginning in 1986 and continuing through the present. 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 somewhat productive. The lake was more productive in 2006, although the drop in water transparency may have also been attributable to the higher water color readings in 2006. Phosphorus levels in the lake occasionally exceed the state guidance values indicating impacted/stressed recreational uses. However, corresponding transparency measurements consistently meet and exceed what is 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 colored and reflect the natural soil

and vegetation characteristics of the watershed. Color does not typically limit water transparency, although in the most recent sampling year (2006) color may have had impact of lake transparency. (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 highly variable, dependent upon water quality and aquatic plant densities. The recreational suitability of the lake is described along a range of "excellent" to "slightly impacted." The description of the lake itself varies from "not quite crystal clear" to having "definite algal greenness" throughout the summer. The measured water quality characteristics are consistent with some level of slight impacts. Aquatic plants occasionally grow to the lake surface, and are probably controlled by Eurasian watermilfoil. Recreational assessments at Butterfield Lake appear to be sensitive to changes in both water quality and aquatic plant coverage, while water quality assessments are closely aligned to water clarity readings. These assessments were slightly less favorable later in the summer, consistent with the seasonal increase in lake (algae) productivity and weed growth. (DEC/DOW, BWAM/CSLAP, May 2006)

#### Lake Uses

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

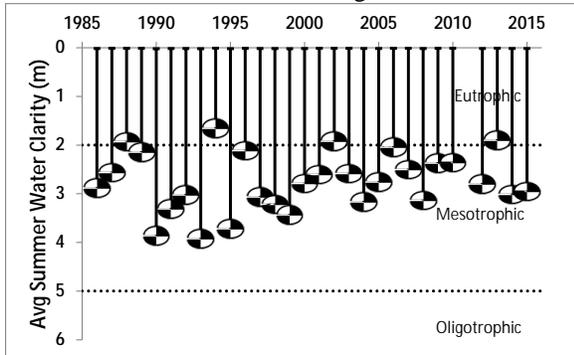
#### Previous Assessment

Rooted aquatic vegetation (Eurasian milfoil) and algae is generally limited to shallow portions of the lake. Regional DOW staff reports the growth is not evident over entire shoreline. Nonetheless, the spread and control of milfoil is of considerable concern to local residents/lake association. There is also local concern that failing and/or inadequate on-site septic system serving residences along the shore may be contributing excess nutrients to the lake. The Jefferson County WQCC has maintained a monitoring site for conventional pollutants on the lake. The WQCC was considering the development and implementation of a Lake Management Plan. (Jefferson Co. WQCC, April 1998)

# Appendix C- Long Term Trends: Butterfield Lake

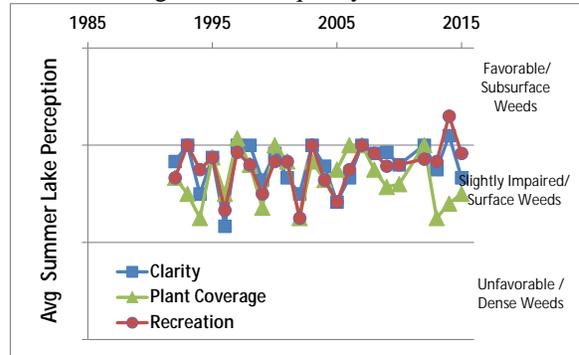
## Long Term Trends: Water Clarity

- Slight decrease but mostly highly variable
- Most readings typical of *mesoeutrophic* lakes, consistent with algae and TP levels



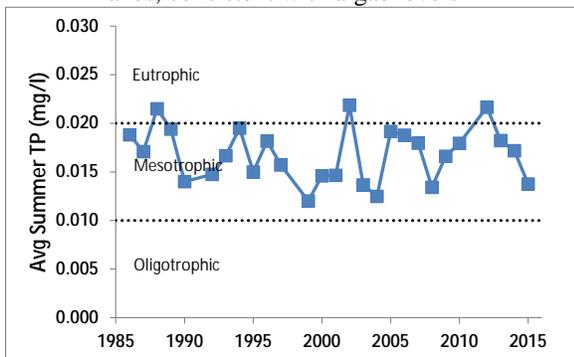
## Long Term Trends: Lake Perception

- Generally improved over last decade
- Recreational perception closely linked to changes in water quality and weeds



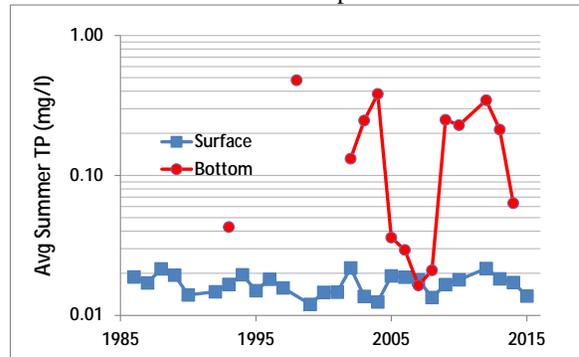
## Long Term Trends: Phosphorus

- No trends, but at times above 20ppm limit
- Most readings typical of *mesoeutrophic* lakes, consistent with algae levels



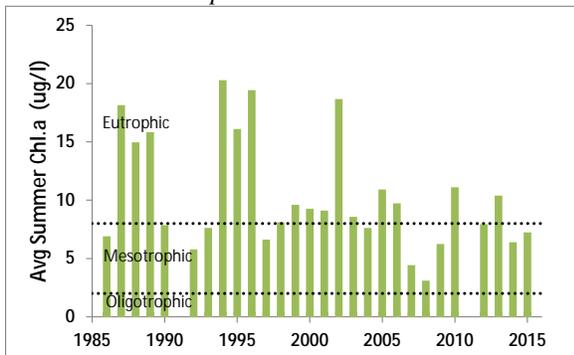
## Long Term Trends: Bottom Phosphorus

- Bottom TP decreasing last three years
- Weak thermal layer leaves lake susceptible to summer bottom TP inputs to surface



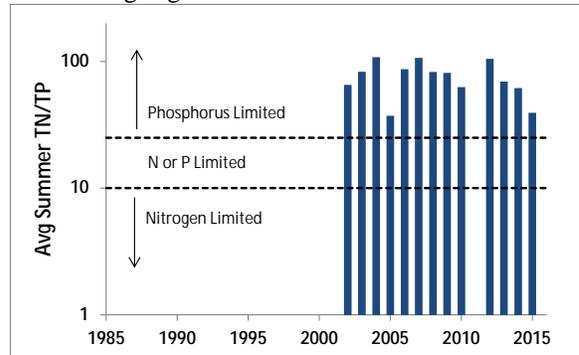
## Long Term Trends: Chlorophyll a

- Decrease since early '00s but some blooms
- Highly variable readings typical of *mesoeutrophic* lakes



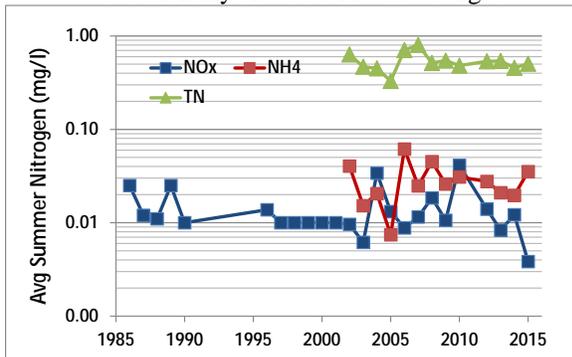
## Long Term Trends: N:P Ratio

- No trends apparent
- Most readings indicate phosphorus limits algae growth



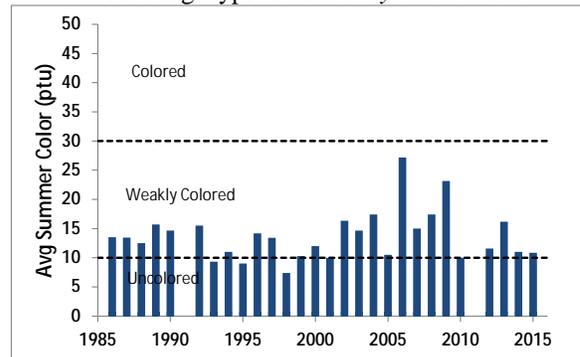
### Long Term Trends: Nitrogen

- NOx ↓ last 5-10yrs; other N forms variable
- Low nitrate, ammonia and total nitrogen, but occasionally elevated TN due to algae



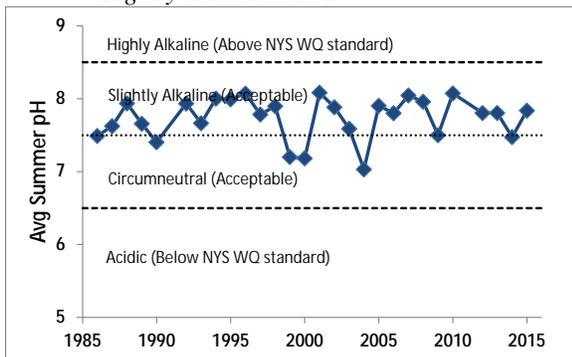
### Long Term Trends: Color

- No clear trend in color reading; lower in last few years
- Readings typical of *weakly colored* lakes



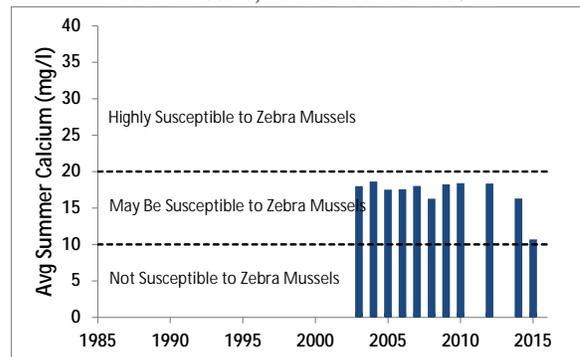
### Long Term Trends: pH

- No trends apparent; bounces from yr to yr
- Most readings typical of *circumneutral* to *slightly alkaline* lakes



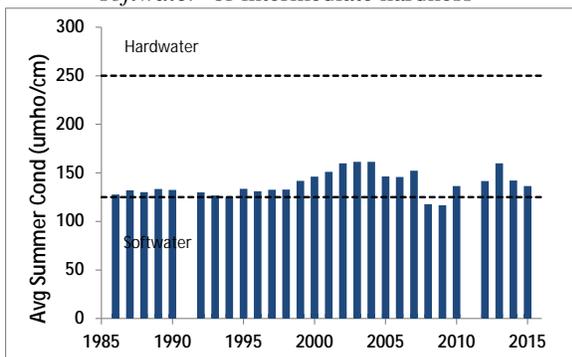
### Long Term Trends: Calcium

- No trends apparent
- Readings indicate moderate susceptibility to zebra mussels, found in lake in 2012



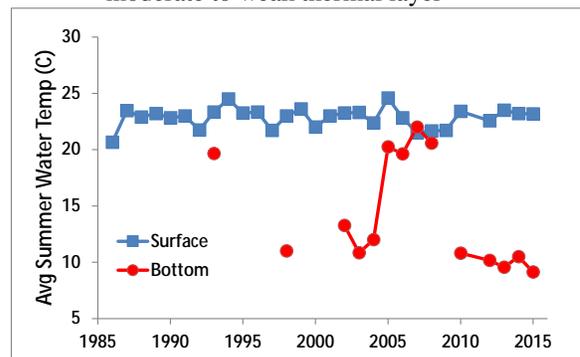
### Long Term Trends: Conductivity

- No trends apparent, but more variable
- Most readings typical of lakes having *softwater* or intermediate hardness



### Long Term Trends: Water Temperature

- Bottom T dropping? Surface T stable
- Decreasing deepwater temperature indicates moderate to weak thermal layer



## **Appendix D: Algae Testing Results from SUNY ESF Study**

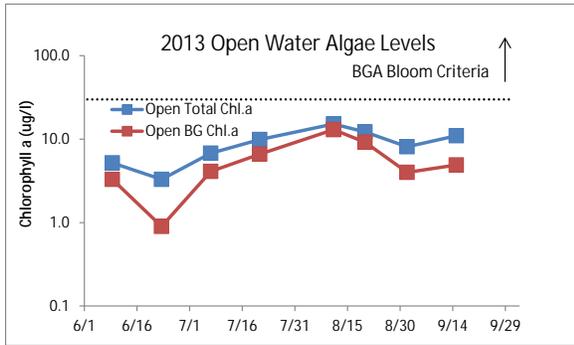
Most algae are harmless, naturally present, and an important part of the food web. However excessive algae growth can cause health, recreational, and aesthetic problems. Some algae can produce toxins that can be harmful to people and animals. High quantities of these algae are called harmful algal blooms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

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

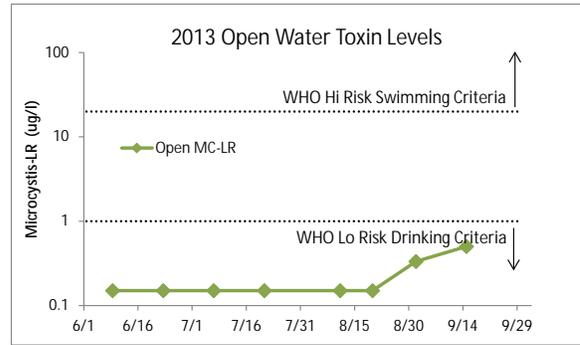
Some of these results are reported in other portions of these reports. This appendix the seasonal change in blue green algae, other algae types, and the primary algal toxin (microcystin-LR, a liver toxin). Analysis was completed on open water samples and, for some lakes, shoreline samples that were collected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

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

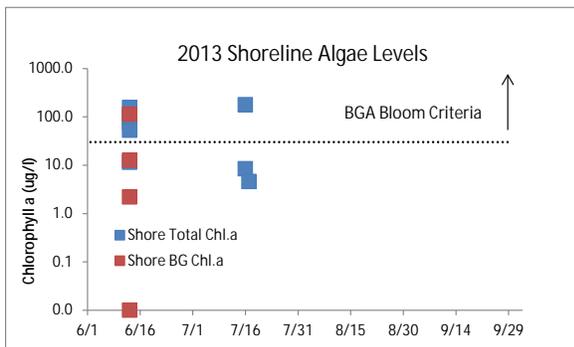
The results from these samples are summarized within the CSLAP report for the lake.



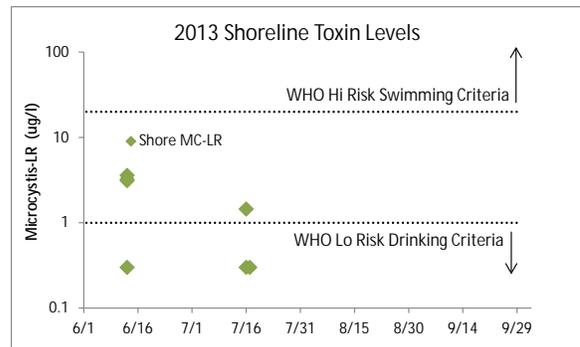
**Figure D1:**  
2013 Open Water Total and BGA Chl.a



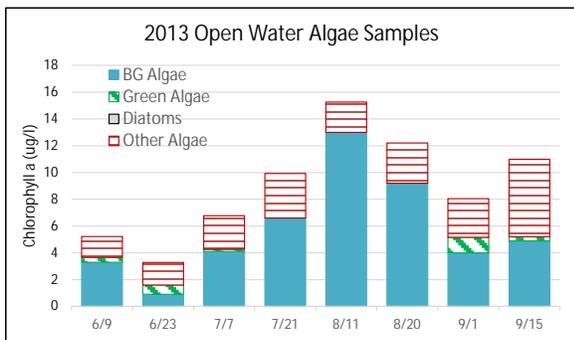
**Figure D2:**  
2013 Open Water Microcystin-LR



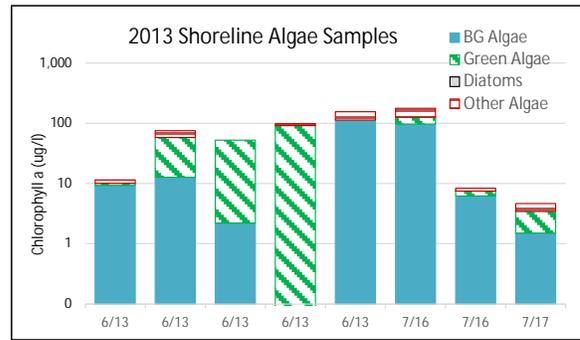
**Figure D3:**  
2013 Shoreline Total and BGA Chl.a



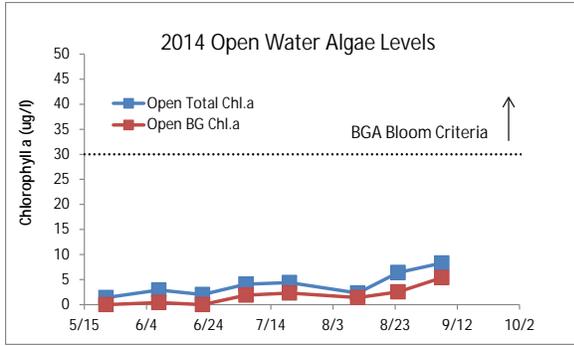
**Figure D4:**  
2013 Shoreline Microcystin-LR



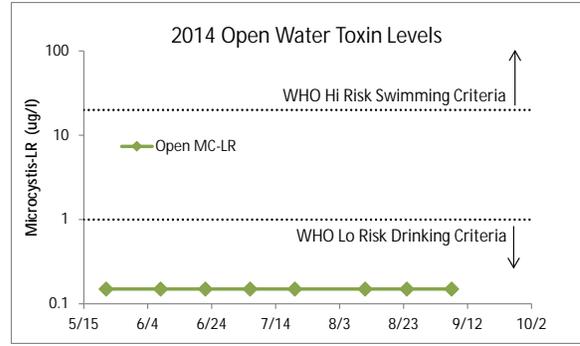
**Figure D5:**  
2013 Open Water Algae Types



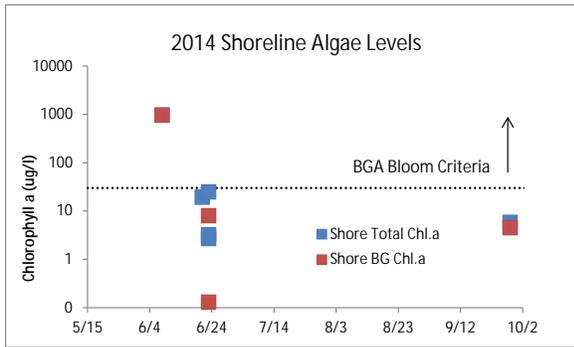
**Figure D6:**  
2013 Shoreline Algae Types



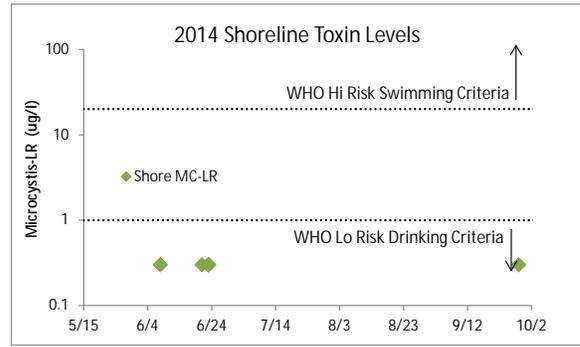
**Figure D7:**  
2014 Open Water Total and BGA Chl.a



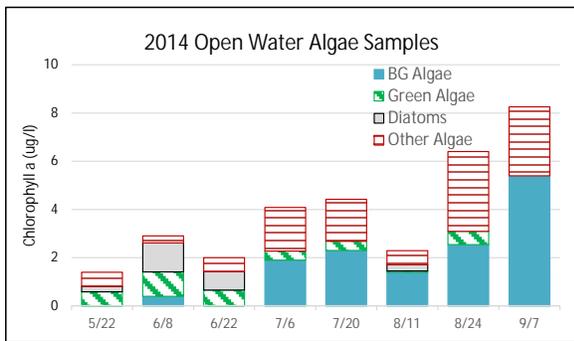
**Figure D8:**  
2014 Open Water Microcystin-LR



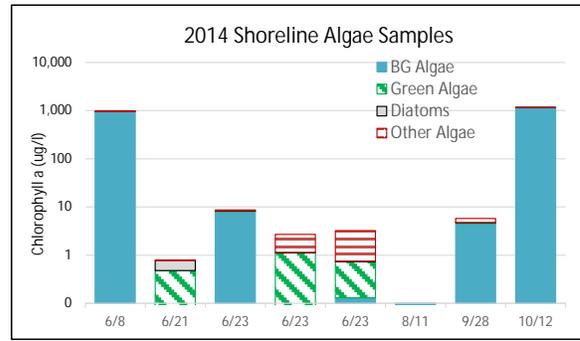
**Figure D9:**  
2014 Shoreline Total and BGA Chl.a



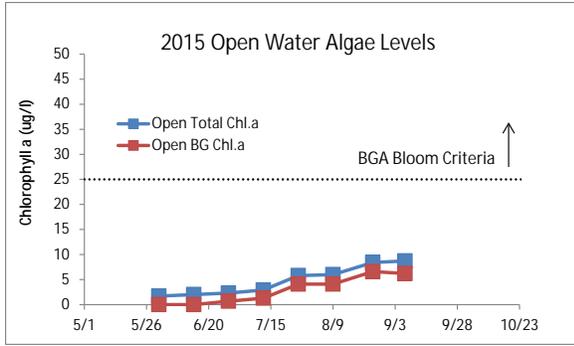
**Figure D10:**  
2014 Shoreline Microcystin-LR



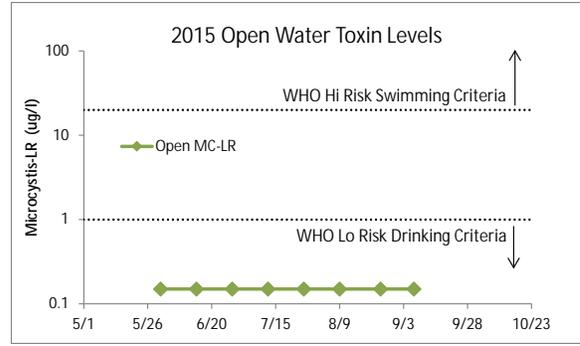
**Figure D11:**  
2014 Open Water Algae Types



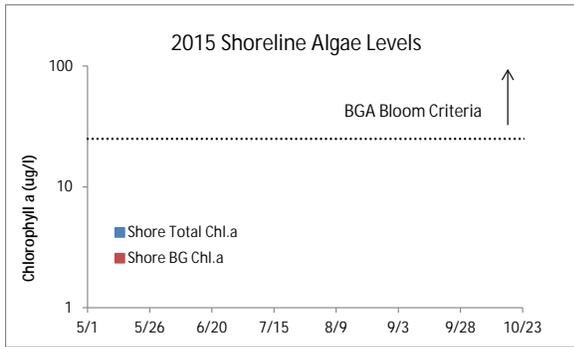
**Figure D12:**  
2014 Shoreline Algae Types



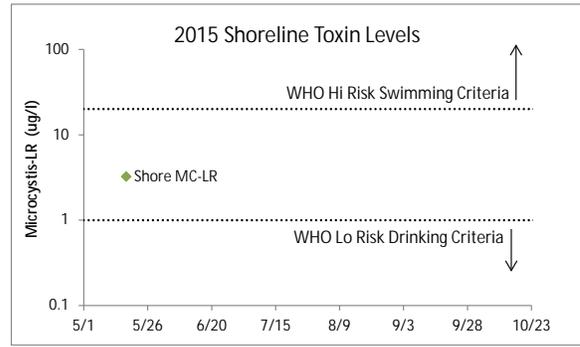
**Figure D13:**  
2015 Open Water Total and BGA Chl.a



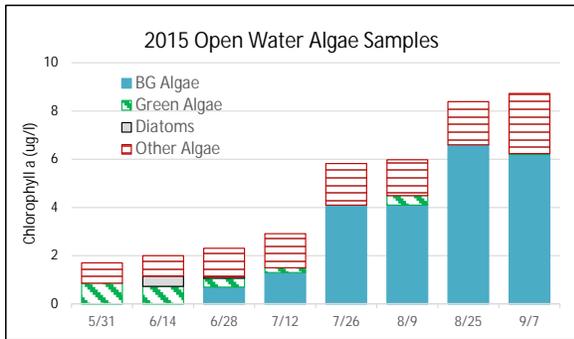
**Figure D14:**  
2015 Open Water Microcystin-LR



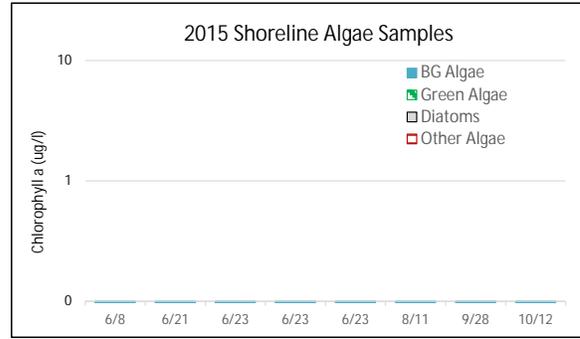
**Figure D15:**  
2015 Shoreline Total and BGA Chl.a



**Figure D16:**  
2015 Shoreline Microcystin-LR



**Figure D17:**  
2015 Open Water Algae Types



**Figure D18:**  
2015 Shoreline Algae Types

## Appendix E: AIS Species in Jefferson County

The table below shows the invasive aquatic plants and animals that have been documented in Jefferson 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](http://www.dec.ny.gov/docs/lands_forests_pdf/islist.pdf)).

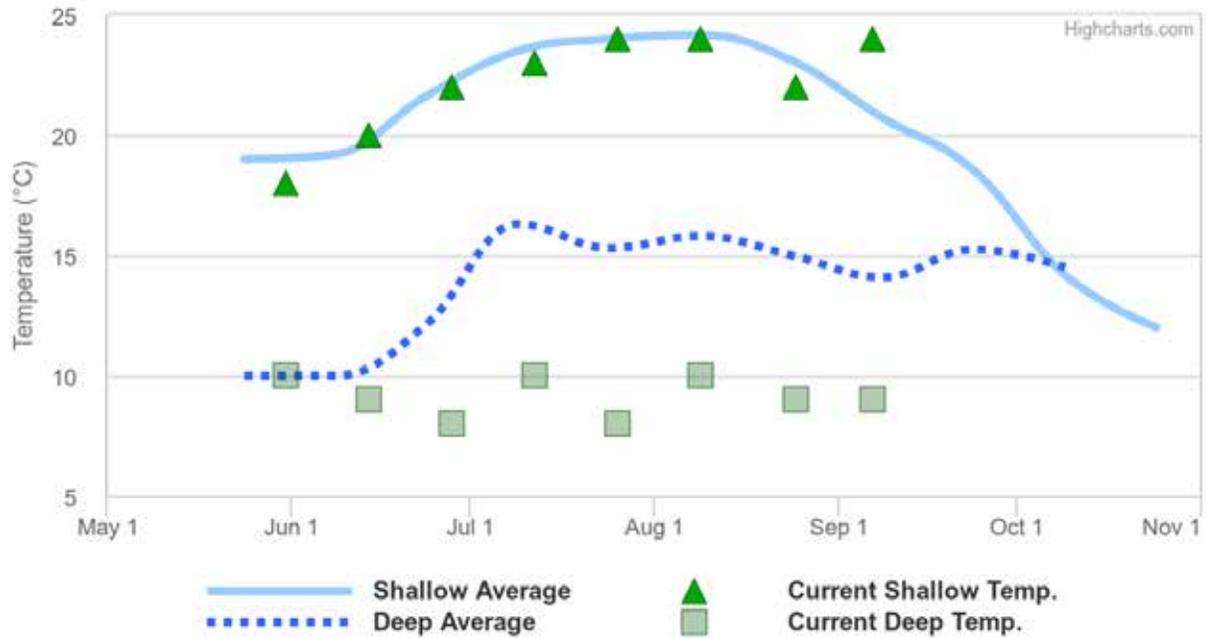
This list is not complete, but instead represents only those species that have been reported and verified within the county. If any additional aquatic invasive species (AIS) are known or suspected in these or other waterbodies in the county, this information should be reported through iMap invasives or by contacting NYSDEC at [dowinfo@dec.ny.gov](mailto:dowinfo@dec.ny.gov).

<b>Aquatic Invasive Species – Jefferson County</b>			
<b>Waterbody</b>	<b>Kingdom</b>	<b>Common name</b>	<b>Scientific name</b>
Black Pond	Animal	Common carp	<i>Cyprinus carpio</i>
Black Pond	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Black Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Butterfield Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Cranberry Pond	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Crooked Creek	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Floodwood Pond	Plant	Common carp	<i>Cyprinus carpio</i>
Floodwood Pond	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Floodwood Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Floodwood Pond	Plant	Brittle naiad	<i>Najas minor</i>
Floodwood Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Floodwood Pond	Plant	Water chestnut	<i>Trapa natans</i>
Goose Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Hyde Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake of the Isles	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake of the Woods	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Ontario	Plant	Flowering-rush	<i>Butomus umbellatus</i>
Lake Ontario	Animal	Common carp	<i>Cyprinus carpio</i>
Lake Ontario	Animal	Quagga mussel	<i>Dreissena bugensis</i>
Lake Ontario	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
Lake Ontario	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Lake Ontario	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lake Ontario	Plant	Brittle naiad	<i>Najas minor</i>
Lake Ontario	Animal	Round goby	<i>Neogobius melanostomus</i>
Lake Ontario	Plant	Starry stonewort	<i>Nitellopsis obtusa</i>

<b>Waterbody</b>	<b>Kingdom</b>	<b>Common name</b>	<b>Scientific name</b>
Lake Ontario	Animal	Allegheny crayfish	<i>Orconectes obscurus</i>
Lake Ontario	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Lake Ontario	Plant	Water chestnut	<i>Trapa natans</i>
Lakeview Pond	Animal	Common carp	<i>Cyprinus carpio</i>
Lakeview Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Lakeview Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
<b>Lakeview Pond</b>	<b>Plant</b>	<b>European frogbit</b>	<b><i>Hydrocharis morsus-ranae</i></b>
Millsite Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Millsite Lake	Plant	Banded mystery snail	<i>Viviparus georgianus</i>
Moon Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Moon Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
Mud Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
<b>Mud Lake</b>	<b>Plant</b>	<b>European frogbit</b>	<b><i>Hydrocharis morsus-ranae</i></b>
Muskellunge Lake	Animal	Rudd	<i>Scardinius erythrophthalmus</i>
North Colwell Pond	Plant	Brittle naiad	<i>Najas minor</i>
North Colwell Pond	Plant	Water chestnut	<i>Trapa natans</i>
<b>North Colwell Pond</b>	<b>Plant</b>	<b>Eurasian watermilfoil</b>	<b><i>Myriophyllum spicatum</i></b>
<b>North Pond</b>	<b>Plant</b>	<b>European frogbit</b>	<b><i>Hydrocharis morsus-ranae</i></b>
<b>North Pond</b>	<b>Plant</b>	<b>Eurasian watermilfoil</b>	<b><i>Myriophyllum spicatum</i></b>
Payne Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Payne Lake	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
<b>Perch Lake</b>	<b>Plant</b>	<b>Eurasian watermilfoil</b>	<b><i>Myriophyllum spicatum</i></b>
<b>Perch Lake</b>	<b>Plant</b>	<b>Curly leafed pondweed</b>	<b><i>Potamogeton crispus</i></b>
Pleasant Lake	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Pleasant Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
Red Lake	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
<b>Red Lake</b>	<b>Animal</b>	<b>Common carp</b>	<b><i>Cyprinus carpio</i></b>
Saint James Lake	Animal	Common carp	<i>Cyprinus carpio</i>
Saint James Lake	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
Saint James Lake	Animal	Round goby	<i>Neogobius melanostomus</i>
Saint James Lake	Plant	Water chestnut	<i>Trapa natans</i>
<b>Sixberry Lake</b>	<b>Plant</b>	<b>Eurasian watermilfoil</b>	<b><i>Myriophyllum spicatum</i></b>
South Colwell Pond	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
South Colwell Pond	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
South Colwell Pond	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>
South Colwell Pond	Plant	Water chestnut	<i>Trapa natans</i>
<b>South Colwell Pond</b>	<b>Plant</b>	<b>Brittle naiad</b>	<b><i>Najas minor</i></b>
St. Lawrence River	Animal	Zebra mussel	<i>Dreissena polymorpha</i>
St. Lawrence River	Plant	European frogbit	<i>Hydrocharis morsus-ranae</i>
St. Lawrence River	Plant	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
St. Lawrence River	Plant	Starry stonewort	<i>Nitellopsis obtusa</i>
St. Lawrence River	Plant	Curly leafed pondweed	<i>Potamogeton crispus</i>

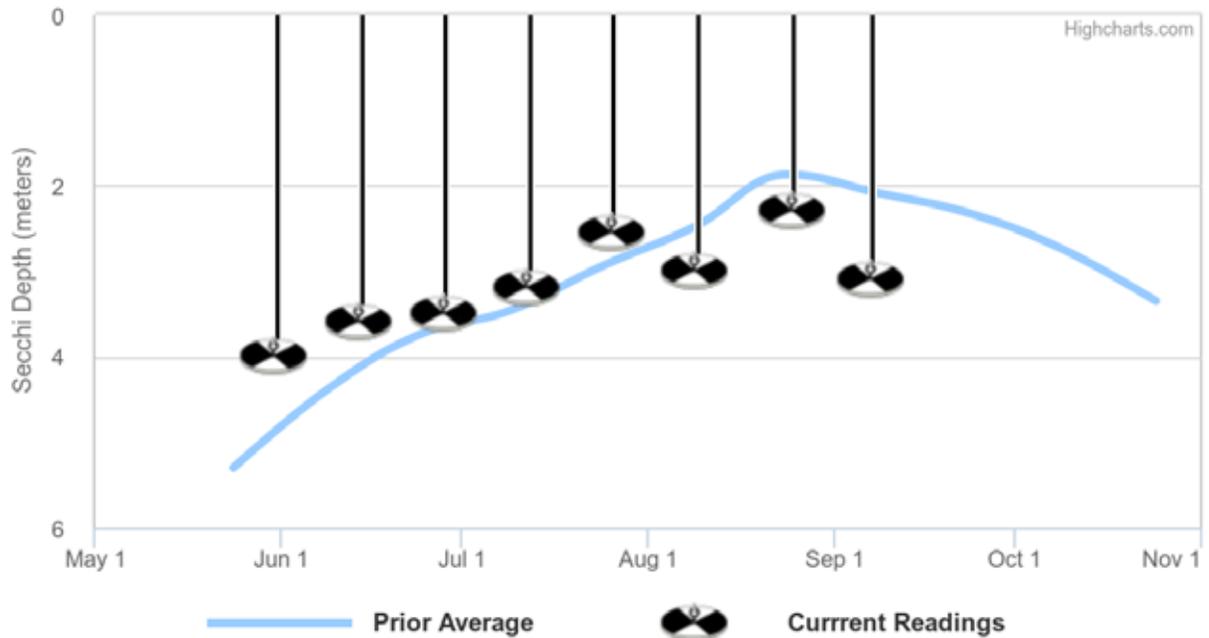
## Appendix F: Current Year vs. Prior Averages for Butterfield Lake

### Current Year Water Temperatures vs. Prior Average



This year's shallow water sample temperatures are tending to be higher than normal when compared to the average of readings collected from 1986 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 higher than normal when compared to the average of readings collected from 1986 to 2014.

## Appendix G: Watershed and Land Use Map for Butterfield 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.

