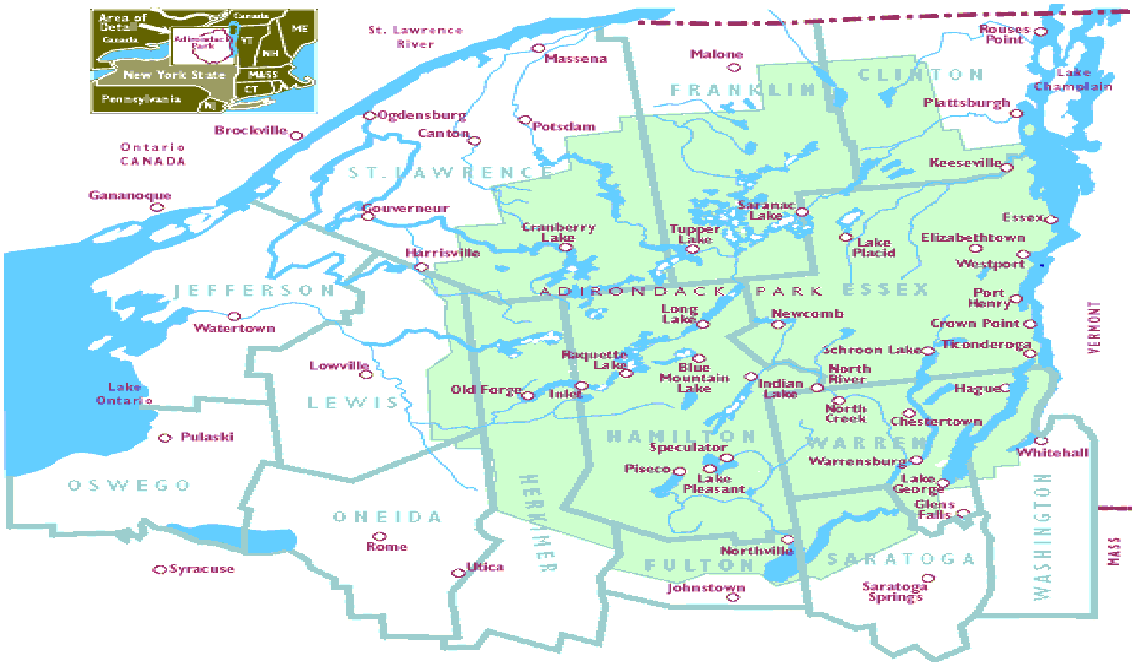
Adirondack Lake Assessment Program
2010



Thirteen Years in the program
Cranberry Lake, Loon Lake, Oven Mountain Pond, Blue Mountain Lake, Silver Lake, Eagle Lake

Twelve Years in the program
Little Long Lake, Gull Pond, Stony Creek Ponds, Thirteenth Lake, Eli Pond

Eleven Years in the program
Austin Pond, Osgood Pond, Middle Saranac Lake, White Lake, Brandreth Lake, Trout Lake

Ten Years in the program
Hoel Pond, Great Sacandaga Lake, Tripp Lake, Sherman Lake, Wolf Lake, Twitchell Lake, Deer Lake, Arbutus Pond, Rich Lake, Catlin Lake, Pine Lake, Lake of the Pines, Pleasant Lake

Nine Years in the program
Spitfire Lake, Upper St. Regis, Lower St. Regis, Garnet Lake, Lens Lake, Snowshoe Pond, Lake Ozonia, Long Pond, Lower Saranac Lake

Eight Years in the program
Raquette Lake, Lake Colby, Kiwassa Lake, Canada Lake

Seven Years in the program
Indian Lake, Schroon Lake, Lake Eaton, Chazy Lake, Big Moose Lake

Six Years in the program
Dug Mountain Pond, Seventh Lake, Abanakee Lake, Moss Lake, Mountain View Lake, Indian Lake, Tupper Lake

Five Years in the program
Sylvia Lake, Fern Lake

Four Years in the program
Adirondack Lake, Lower Chateaugay Lake, Upper Chateaugay Lake, Lake Easka, Lake Tekeni

Three Years in the program
Simon Pond

Two Years in the program
Amber Lake, Jordan Lake, Otter Pond, Rondaxe Lake

One Year in the program
Auger Lake, Lake Titus, Star Lake

Adirondack Lake
Assessment Program
Sylvia Lake

Summer 2010

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Author

Michael De Angelo

Project Participants

Michael De Angelo, Environmental Chemist, Aquatics Director of the AWI
Cory Laxson, Research Associate, AWI
Elizabeth Yerger, Laboratory and Field Technician, AWI

Prepared by:
The Adirondack Watershed Institute at Paul Smith's College
P.O. Box 244, Paul Smiths, NY 12970-0244
Phone: 518-327-6270; Fax: 518-327-6369; E-mail: mdeangelo@paulsmiths.edu

Program Management by:
Protect the Adirondacks! Inc.
P.O. Box 1180
Saranac Lake, NY 12983
E-mail: ALAP@protectadks.org

Introduction

The Adirondack Lake Assessment Program is a volunteer monitoring program established by the Residents' Committee to Protect the Adirondacks (RCPA) and the Adirondack Watershed Institute (AWI). The program is now in its' thirteenth year. The program was established to help develop a current database of water quality in Adirondack lakes and ponds. There were 70 participating lakes in the program in year 2010.

Methodology

Each month participants (trained by AWI staff) measured transparency with a secchi disk and collected a 2-meter composite of lake water for chlorophyll-a analysis and a separate 2-meter composite for total phosphorus and other chemical analyses. The participants filtered the chlorophyll-a sample prior to storage. Both the chlorophyll-a filter and water chemistry samples were frozen for transport to the laboratory at Paul Smith's College.

In addition to the volunteer samples, AWI staff sampled water quality parameters in most of the participating lakes as time and weather allowed. In most instances, a 2-meter composite of lake water was collected for chlorophyll-a analysis. Samples were also collected at depths of 1.5 meters from the surface (epilimnion) and within 1.5 meters of the bottom (hypolimnion) for chemical analysis. Once collected, samples were stored in a cooler and transported to the laboratory at Paul Smith's College.

All samples were analyzed by AWI staff in the Paul Smith's College laboratory using the methods detailed in *Standard Methods for the Examination of Water and Wastewater, 21st edition* (Greenberg, *et al*, 2005). Volunteer samples were analyzed for pH, alkalinity, conductivity, color, nitrate, chlorophyll a and total phosphorus concentrations.

Results Summary

Sylvia Lake was sampled three times by a volunteer in 2010 at two locations. Samples were collected on the following dates at Station #1 Inlet and Station #2 Center: 7/08/10, 8/07/10 and 9/01/10. Results for 2010 are presented in Appendix A and will be discussed in the following sections. Results are presented as concentrations in milligrams per liter (mg/L) or its equivalent of parts per million (ppm) and micrograms per liter (μg/L) or its equivalent of parts per billion (ppb).

1 mg/L = 1 ppm; 1 μg/L = 1 ppb; 1 ppm = 1000 ppb.

Adirondack lakes are subject to the effects of acidic precipitation (i.e. snow, rain). A water body's susceptibility to acid producing ions is assessed by measuring pH, alkalinity, calcium concentrations, and the Calcite Saturation Index (CSI). These parameters define both the acidity of the water and its buffering capacity. Based on the results of the 2010 Adirondack Lakes Assessment program, the acidity status of Sylvia Lake is considered to be satisfactory with no danger or possible future threat from further acidic inputs due to its' high alkalinity, high calcium level and high pH levels.

Limnologists, the scientists who study bodies of fresh water, classify lake health (trophic status) into three main categories: oligotrophic, mesotrophic, and eutrophic. The trophic status of a lake is determined by measuring the level of three basic water quality parameters: total phosphorus, chlorophyll-a, and secchi disk transparency. These parameters will be defined in the sections that follow. Oligotrophic lakes are characterized as having low levels of total phosphorus, and, as a consequence, low levels of chlorophyll-a and high transparencies. Eutrophic lakes have high levels of total phosphorus and chlorophyll-a, and, as a consequence, low transparencies. Mesotrophic lakes have moderate levels of all three of these water quality parameters. Based upon the results of the 2010 Adirondack Lakes Assessment Program, Sylvia Lake is considered to be a late oligotrophic or early mesotrophic water body.

pH

The pH level is a measure of acidity (concentration of hydrogen ions in water), reported in standard units on a logarithmic scale that ranges from 1 to 14. On the pH scale, 7 is neutral, lower values are more acidic, and higher numbers are more basic. In general, pH values between 6.0 and 8.0 are considered optimal for the maintenance of a healthy lake ecosystem. Many species of fish and amphibians have difficulty with growth and reproduction when pH levels fall below 5.5 standard units. Lake acidification status can be assessed from pH as follows:

pH less than 5.0	Critical or Impaired
pH between 5.0 and 6.0	Endangered or Threatened
pH greater than 6.0	Satisfactory or Acceptable

The pH in the upper waters of Sylvia Lake ranged from 8.02 to 8.32. The average pH for the lake center was 8.15 and for Inlet it was 8.11. Based solely on pH, Sylvia Lake's acidity levels should be considered satisfactory with no harm from further acidic inputs. The pH's for both stations were very similar.

Alkalinity

Alkalinity (acid neutralizing capacity) is a measure of the buffering capacity of water, and in lake ecosystems refers to the ability of a lake to absorb or withstand acidic inputs. In the northeast, most lakes have low alkalinities, which mean they are sensitive to the effects of acidic precipitation. This is a particular concern during the spring when large amounts of low pH snowmelt runs into lakes with little to no contact with the soil's natural buffering agents. Alkalinity is reported in milligrams per liter (mg/L) or microequivelents per liter (μeq/L). Typical summer concentrations of alkalinity in northeastern lakes are around 10 mg/l (200 μeq/L). Lake acidification status can be assessed from alkalinity as follows:

Alkalinity less than 0 ppm	Acidified
Alkalinity between 0 and 2 ppm	Extremely sensitive
Alkalinity between 2 and 10 ppm	Moderately sensitive
Alkalinity between 10 and 25 ppm	Low sensitivity
Alkalinity greater than 25 ppm	Not sensitive

The alkalinity of the upper waters of Sylvia Lake ranged from 136.0 ppm to 154.0 ppm. The average alkalinity for the lake center was 142.7 ppm, and for inlet it was 140.0 ppm. These values indicate no sensitivity to acidification. The alkalinity for the inlet is slightly lower than for the lake center and this could be due to acidic runoff from Adirondack rain which is typically acidic.

Calcium

Calcium is one of the buffering materials that occur naturally in the environment. However, it is often in short supply in Adirondack lakes and ponds, making these bodies of water susceptible to acidification by acid precipitation. Calcium concentrations provide information on the buffering capacity of that lake, and can assist in determining the timing and dosage for acid mitigation (liming) activities. Adirondack lakes containing less than 2.5 ppm of calcium are considered to be sensitive to acidification.

The calcium in Sylvia Lake for the lake center was ranged from 23.9 ppm to 26.9 ppm. The average calcium concentration for the lake center was 25.3 ppm and for the lake Inlet it was 24.4 ppm. These values indicate no sensitivity due to further acidic inputs.

Calcite Saturation Index

The Calcite Saturation Index (CSI) is another method that is used to determine the sensitivity of a lake to acidification. High CSI values are indicative of increasing sensitivity to acidic inputs. CSI is calculated using the following formula:

$$CSI = -\log_{10}\frac{Ca}{40000} - \log_{10}\frac{Alk}{50000} - pH + 2$$

Where Ca = Calcium level of water sample in ppm or mg/L

Alk = Alkalinity of the water sample in ppm or mg/L

pH = pH of the water sample in standard units

Lake sensitivity to acidic inputs is assessed from CSI as follows:

CSI greater than 4	Very vulnerable to acidic inputs
CSI between 3 & 4	Moderately vulnerable to acidic inputs
CSI less than 3	Low vulnerability to acidic inputs

CSI values for Sylvia Lake were found to be 0.0 for the lake center and 0.0 for the lake inlet. This shows that Sylvia Lake has no vulnerability to further acidic inputs.

Total Phosphorus

Phosphorus is one of the three essential nutrients for life, and in northeastern lakes, it is often the controlling, or limiting, nutrient in lake productivity. Total phosphorus is a measure of all forms of phosphorus, both organic and inorganic. Total phosphorus concentrations are directly related to the trophic status (water quality conditions) of a lake. Excessive amounts of phosphorus can lead to algae blooms and a loss of dissolved oxygen within the lake. Surface water (epilimnion) concentrations of total phosphorus less than 10 ppb are associated with oligotrophic (clean, clear water) conditions. Concentrations greater than 25 ppb are associated with eutrophic (nutrient-rich) conditions.

The total phosphorus in the upper waters of Sylvia Lake ranged from 8 ppb to 11 ppb. The average for the lake center was 9 ppb and for the lake inlet the average was 11 ppb. These values are indicative of oligotrophic conditions for the lake center and late oligotrophic to early mesotrophic conditions for the inlet lake station. The inlet lake station may be slightly elevated due to phosphorous entering the lake through runoff through the lake inlet.

Chlorophyll-a

Chlorophyll-a is the green pigment in plants used for photosynthesis, and measuring it provides information on the amount of algae (microscopic plants) in lakes. Chlorophyll-a concentrations are also used to classify a lakes trophic status. Concentrations less than 2 ppb is associated with oligotrophic conditions and those greater than 8 ppb are associated with eutrophic conditions.

The chlorophyll-a concentrations in the upper waters of Sylvia Lake ranged from 1.72 ppb to 2.96 ppb. The average concentration for the lake center was 2.22 ppb and for the lake inlet it was 3.01 ppb. These values are indicative of late oligotrophic to early mesotrophic conditions for the lake center and early mesotrophic conditions for the inlet lake station. The inlet lake station may be slightly elevated due to phosphorous entering the lake through runoff through the lake inlet causing an increase in algae growth and thus an increase in chlorophyll-a levels.

Secchi Disk Transparency

Transparency is a measure of water clarity in lakes and ponds. It is determined by lowering a 20 cm black and white disk (Secchi) into a lake to the depth where it is no longer visible from the surface. This depth is then recorded in meters. Since algae are the main determinant of water clarity in non-stained, low turbidity (suspended silt) lakes, transparency is also used as an indicator of the trophic status of a body of water. Secchi disk transparencies greater than 4.6 meters (15.1 feet) are associated with oligotrophic conditions, while values less than 2 meters (6.6 feet) are associated with eutrophic conditions (DEC & FOLA, 1990).

Secchi disk transparency in Sylvia Lake ranged from 4.5 to 5.5 meters. The average for the lake center was 5.0 meters and for the lake inlet the average was 4.5 meters. These values are indicative of oligotrophic conditions for the lake center and early mesotrophic conditions for the lake inlet station. The inlet lake station may have a slightly decreased transparency due to phosphorous entering the lake through runoff through the lake inlet causing an increase in algae growth and thus a decrease in transparency.

Nitrate

Nitrogen is another essential nutrient for life. Nitrate is an inorganic form of nitrogen that is naturally occurring in the environment. It is also a component of atmospheric pollution. Nitrogen concentrations are usually less than 1 ppm in most lakes. Elevated levels of nitrate concentration may be indicative of lake acidification or wastewater pollution.

Nitrate in Sylvia Lake ranged from 0.2 to 0.2 ppm. The average nitrate in the upper waters was found to be 0.20 ppm for the lake center and 0.20 ppm for the lake inlet. These values are typical for an Adirondack lake.

Chloride

Chloride is an anion that occurs naturally in surface waters, though typically in low concentrations. Background concentrations of chloride in Adirondack Lakes are usually less than 1 ppm. Chloride levels 10 ppm and higher is usually indicative of pollution and, if sustained, can alter the distribution and abundance of aquatic plant and animal species. The primary sources of additional chloride in Adirondack lakes are road salt (from winter road de-icing) and wastewater (usually from faulty septic systems). The most salt impacted waters in the Adirondacks usually have chloride concentrations of 100 ppm or less.

The chloride in the upper waters of Sylvia Lake ranged from 14.4 ppm to 15.0 ppm. The chloride concentration was 14.8 ppm for the lake center and for the Inlet it was 12.8 ppm. The inlet lake station is usually slightly elevated due to salt and other minerals entering the lake through runoff through the lake inlet.

Conductivity

Conductivity is a measure of the ability of water to conduct electric current, and will increase as dissolved minerals build up within a body of water. As a result, conductivity is also an indirect measure of the number of ions in solution, mostly as inorganic substances. High conductivity values (greater than 50 μohms/cm) may be indicative of pollution by road salt runoff or faulty septic systems. Conductivities may be naturally high in water that drains from bogs or marshes. Eutrophic lakes often have conductivities near 100 μohms/cm, but may not be characterized by pollution inputs. Clean, clear-water lakes in our region typically have conductivities up to 30 μohms/cm, but values less than 50 μohms/cm are considered normal.

The conductivity in the upper waters of Sylvia Lake ranged from 170.5 μohms/cm to 199.9 μohms/cm. The average conductivity for the lake center was 185.1 μohms/cm, and for the inlet it was 177.8 μohms/cm. The inlet lake station is usually slightly elevated due to salt and other minerals entering the lake through runoff through the lake inlet.

Color

The color of water is affected by both dissolved materials (e.g., metallic ions, organic acids) and suspended materials (e.g., silt and plant pigments). Water samples are collected and compared to a set of standardized chloroplatinate solutions in order to assess the degree of coloration. The measurement of color is usually used in lake classification to describe the degree to which the water body is stained due to the accumulation of organic acids. The standard for drinking water color, as set by the United States Environmental Protection Agency (US EPA) using the platinum-cobalt method, is 15 Pt-Co. However, dystrophic lakes (heavily stained, often the color of tea) are common in this part of the country, and are usually found in areas with poorly drained soils and large amounts of coniferous vegetation (i.e., pines, spruce, hemlock). Dystrophic lakes usually have color values upwards of 75 Pt-Co.

Color can often be used as a possible index of organic acid content since higher amounts of total organic carbon (TOC) are usually found in colored waters. TOC is important because it can bond with aluminum in water, locking it up within the aquatic system and resulting in possible toxicity to fish (see Aluminum).

The color in the upper waters of Sylvia Lake ranged from 0 Pt-Co to 20 Pt-Co. The average color for the lake center it was 11.3 Pt-Co and for the lake inlet it was 22.0 Pt-Co. Both stations had similar color levels.

Aluminum

Aluminum is one of the most abundant elements found within the earth’s crust. Acidic runoff (from rainwater and snowmelt) can leach aluminum out of the soil as it flows into streams and lakes. If a lake is acidic enough, aluminum may also be leached from the sediment at the bottom of it. Low concentrations of aluminum can be toxic to aquatic fauna in acidified water bodies, depending on the type of aluminum available, the amount of dissolved organic carbon available to bond with the aluminum, and the pH of the water. Aluminum can form thick mucus that has been shown to cause gill destruction in aquatic fauna (i.e., fish, insects) and, in cases of prolonged exposure, can cause mortality in native fish populations (Potter, 1982). Aluminum concentrations are reported as mg/L of total dissolved aluminum.

The aluminum was measured and found to be a very low 0.0 ppm for both lake stations.

Dissolved Oxygen

The dissolved oxygen in a lake is an extremely important parameter to measure. If dissolved oxygen decreases as we approach the bottom of a lake we know that there is a great amount of bacterial decay that is going on. This usually means that there is an abundance of nutrients, like phosphorous that have collected on the lake bottom. Oligotrophic lakes tend to have the same amount of dissolved oxygen from the surface waters to the lake bottom, thus showing very little bacterial decay. Eutrophic lakes tend to have so much decay that their bottom waters will have very little dissolved oxygen. Cold-water fish need 6.0 ppm dissolved oxygen to thrive and reproduce. Warm water fish need 4.0 ppm oxygen.

The dissolved oxygen profiles for 2007 and 2008 are included in the appendix for both the center deep hole and the inlet area. There was greater than 8 ppm dissolved oxygen at both locations and this value actually increased with depth. These values are excellent for cold water fish survival. A profile was not run in 2009 and 2010 due to the lack of a site visit.

Summary

Sylvia Lake was an unproductive oligotrophic lake for the lake center and a late oligotrophic to early mesotrophic lake for the inlet lake station during 2010. Based on the results of the 2007 – 2010 Adirondack Lakes Assessment program, the acidity status of Sylvia Lake is considered to be satisfactory with no possible future threat from further acidic inputs due to its’ high alkalinity, calcium and pH levels. Both stations showed similar results for all tests performed. The dissolved oxygen levels were excellent for cold water fish survival.

Graphs showing trends in Sylvia Lake over the last four years are included in Appendix A. When comparing the results for 2006 – 2010, the pH and alkalinity increased over the first four years with only a slight decrease during the summer of 2009. The total phosphorous, chlorophyll a, and Secchi disk transparency were very stable with very little change over the four years of study. This past summer was very wet and the total phosphorous concentrations were elevated. This led to an increase in algal growth and chlorophyll-a concentrations which caused a much lower Secchi disk transparency. When comparing the lake center to the lake inlet stations, we see oligotrophic conditions for the lake center station and late oligotrophic to early mesotrophic conditions for the lake inlet station. This is most likely due to runoff from the surrounding watershed that is entering the lake through the inlet. This increased runoff is carrying more nutrients and minerals that are having a small affect on the water quality of the lake at that location.

Literature Cited

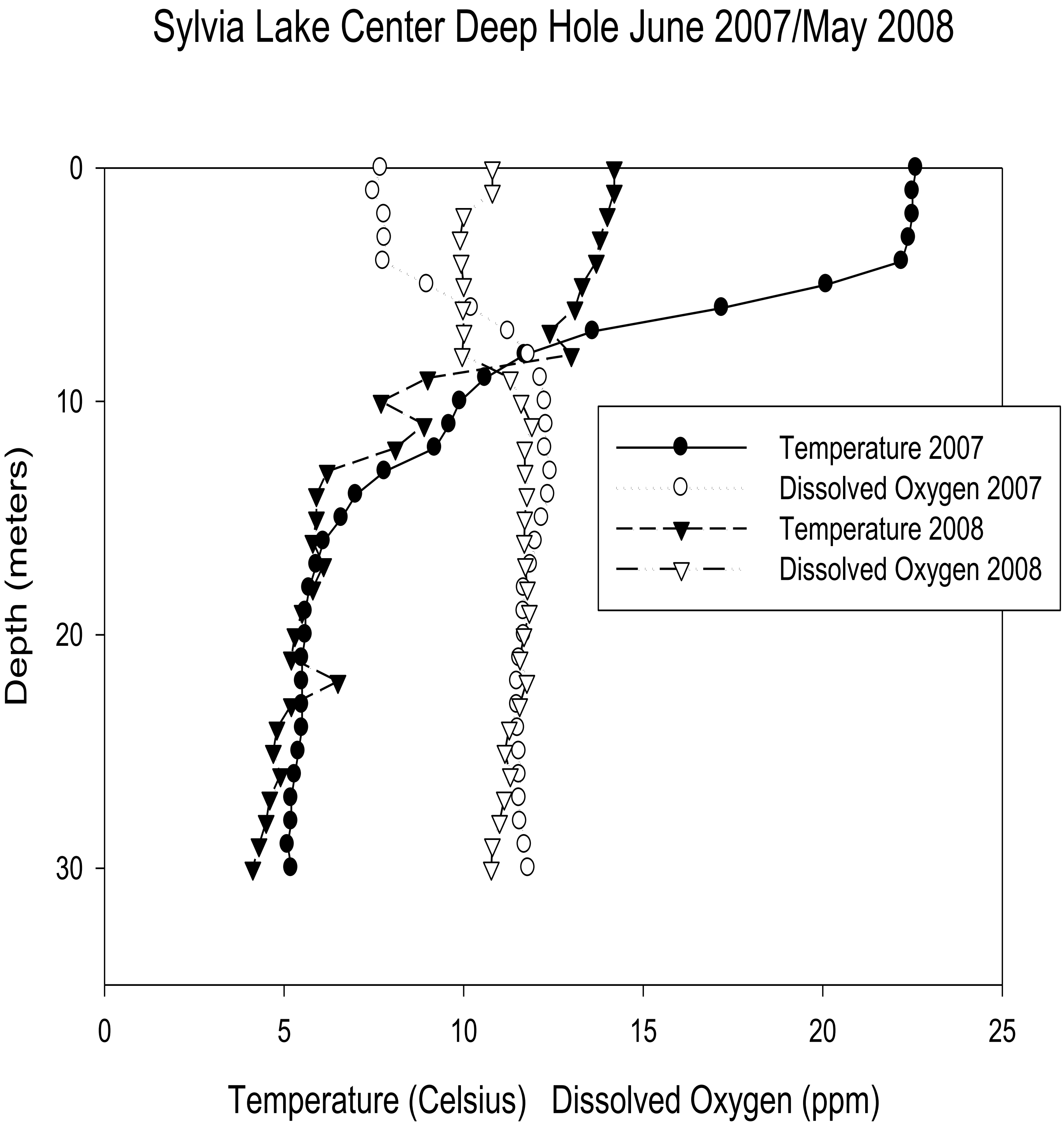
DEC & FOLA. (1990). Diet for a Small Lake: A New Yorker's Guide to Lake Management. New York State Department of Environmental Conservation & The Federation of Lake Associations, Inc.: Albany, New York.

Greenberg, A.E., Eaton, A.D., and Leseri, L.A. (editors). (2005). Standard Methods for the Examination of Water and Wastewater, 21st Edition. American Public Health Association: Washington, D.C.

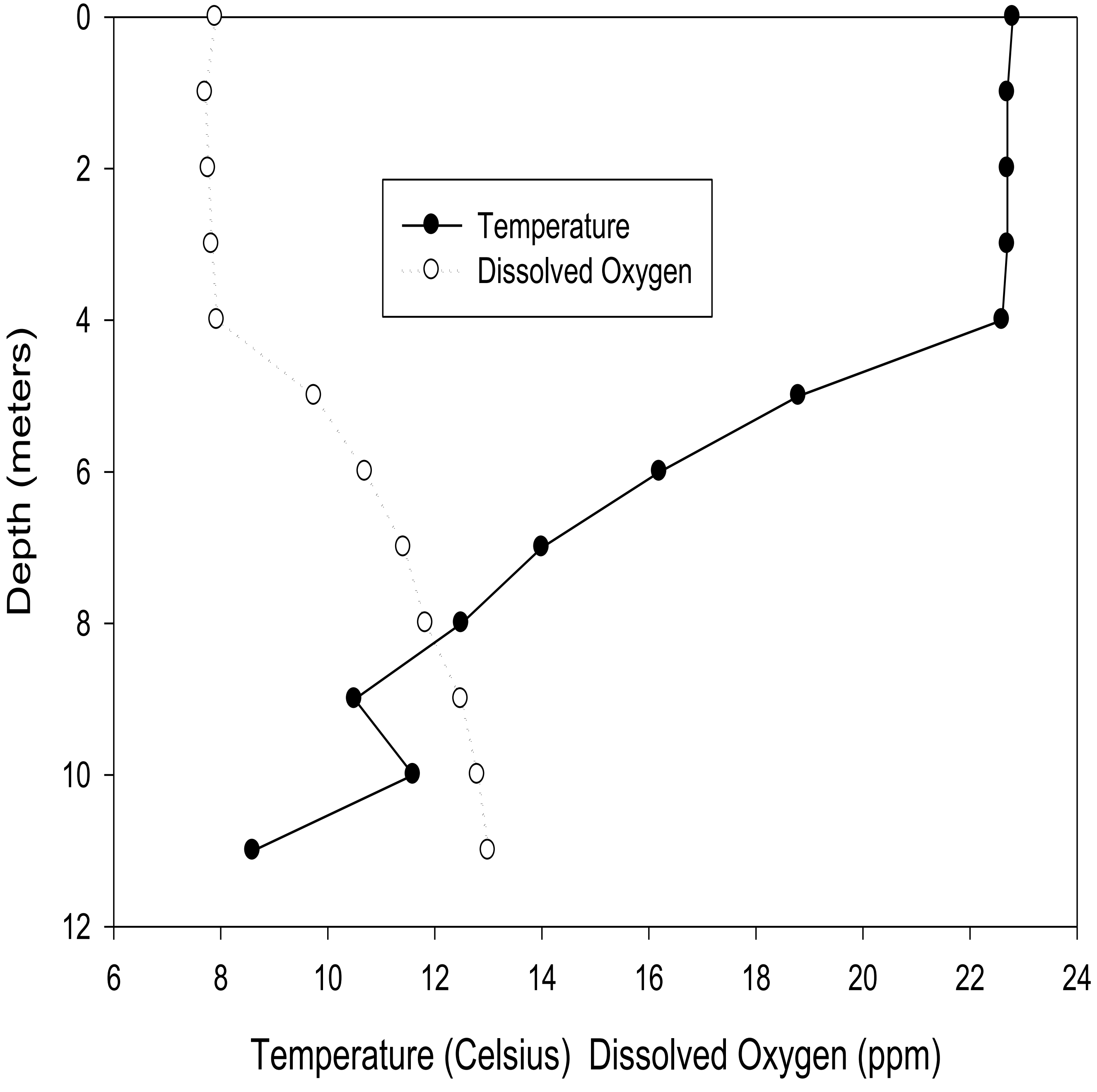
Potter, W. (1982). *The Effects of Air Pollution and Acid Rain on Fish, Wildlife and Their Habitats – Lakes*. Technical Report FWS/OBS – 80/50.4. United States Fish and Wildlife Service, Biological Services Program: Washington, D.C.

Appendix A

Water Quality Data


Sylvia Lake Center Deep Hole June 2007/May 2008
Depth (meters)
0
10
20
30
0
5
10
15
20
25
Temperature (Celsius) Dissolved Oxygen (ppm)
Temperature 2007
Dissolved Oxygen 2007
Temperature 2008
Dissolved Oxygen 2008

Sylvia Lake Inlet Area June 2007

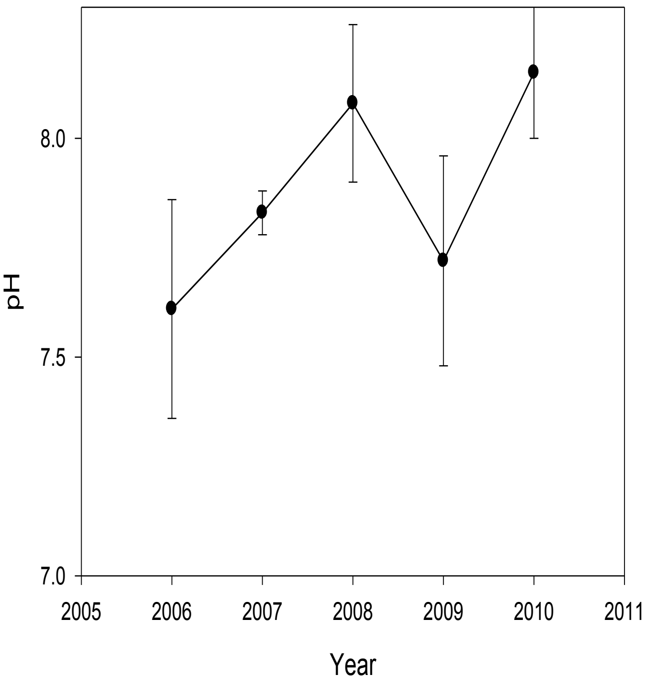


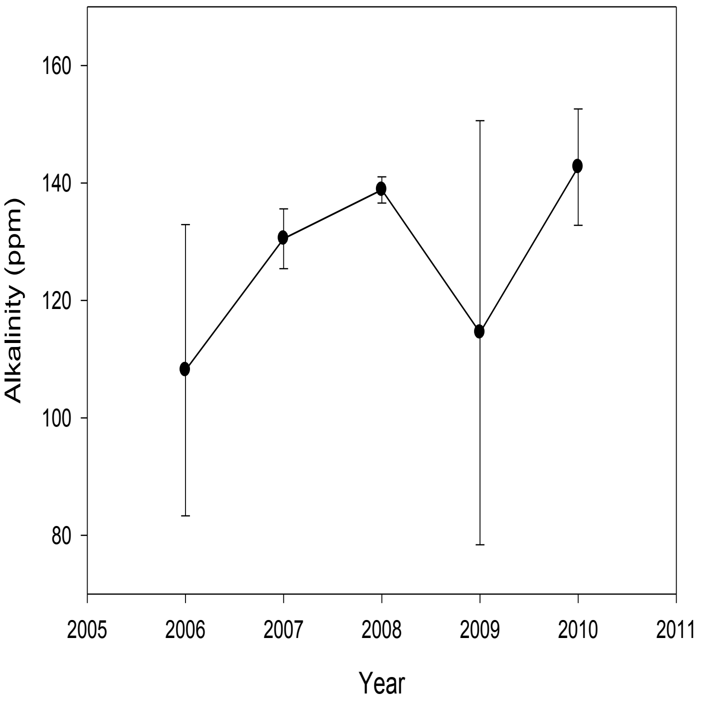
Source	Lake Name	Location	Station	Date	pH	Alk (ppm)	Cond µohms/cm	Color Pt-Co	TP (ppm)
Vol	Sylvia Lake	Marsh		7/17/2006	7.69	102.4	210.0	23	0.008
Vol	Sylvia Lake	Marsh		8/18/2006	7.61	112.0	216.0	10	0.011
Vol	Sylvia Lake	Marsh		9/21/2006	7.58	84.4	174.7	17	0.009
				Mean	7.63	99.6	200.2	16.7	0.009
				Std Dev	0.06	14.0	22.3	6.5	0.002
Vol	Sylvia Lake	Center		7/24/2006	7.39	124.4	227.0	22	0.011
Vol	Sylvia Lake	Center		8/21/2006	7.88	120.4	200.0	10	0.008
Vol	Sylvia Lake	Center		9/21/2006	7.56	79.6	161.6	10	0.007
				Mean	7.61	108.1	196.2	14.0	0.009
				Std Dev	0.25	24.8	32.9	6.9	0.002
AWI	Sylvia Lake	Center	epi	6/21/2007	7.97	142.0	232.0	0.0	0.008
Vol	Sylvia Lake	Center	2	7/6/2007	7.87	134.6	194.6	19.0	0.011
Vol	Sylvia Lake	Center	2	8/4/2007	7.85	132.2	174.8	3.0	0.009
Vol	Sylvia Lake	Center	2	9/7/2007	7.77	124.8	196.0	0.0	0.011
				Mean	7.83	130.5	188.5	7.3	0.010
				Std Dev	0.05	5.1	11.9	10.2	0.001
AWI	Sylvia Lake	Center	hypo	6/21/2007	7.55	110.0	232.0	1.0	0.009
AWI	Sylvia Lake	Center	epi	5/26/2008	7.81	135.6	236.0	0.0	0.010
Vol	Sylvia Lake	Center	2	6/25/2008	8.13	140.2	215.0	28.0	0.006
Vol	Sylvia Lake	Center	2	8/5/2008	8.17	138.8	201.0	0.0	0.009
Vol	Sylvia Lake	Center	2	9/3/2008	8.21	140.4	154.0	2.0	0.010
				Mean	8.08	138.8	201.50	7.50	0.009
				Std Dev	0.18	2.22	34.78	13.70	0.002
AWI	Sylvia Lake	Center	hypo	5/26/2008	7.95	140.4	235.0	1.0	0.008
Vol	Sylvia Lake	Center	2	6/28/2009	7.95	144.0	169.6	14	0.005
Vol	Sylvia Lake	Center	2	7/30/2009	7.48	74.2	148.7	20	0.008
Vol	Sylvia Lake	Center	2	8/25/2009	7.72	125.2	118.5	11	0.011
				Mean	7.72	114.5	145.6	15.0	0.008
				Std Dev	0.24	36.1	25.7	4.6	0.003
Vol	Sylvia Lake	Center	2	7/8/2010	8.32	154.0	170.5	0.0	0.008
Vol	Sylvia Lake	Center	2	8/7/2010	8.12	138.0	199.9	14.0	0.011
Vol	Sylvia Lake	Center	2	9/1/2010	8.02	136.0	185.0	20.0	0.009
				Mean	8.15	142.7	185.1	11.3	0.009
				Std Dev	0.15	9.9	14.7	10.3	0.002

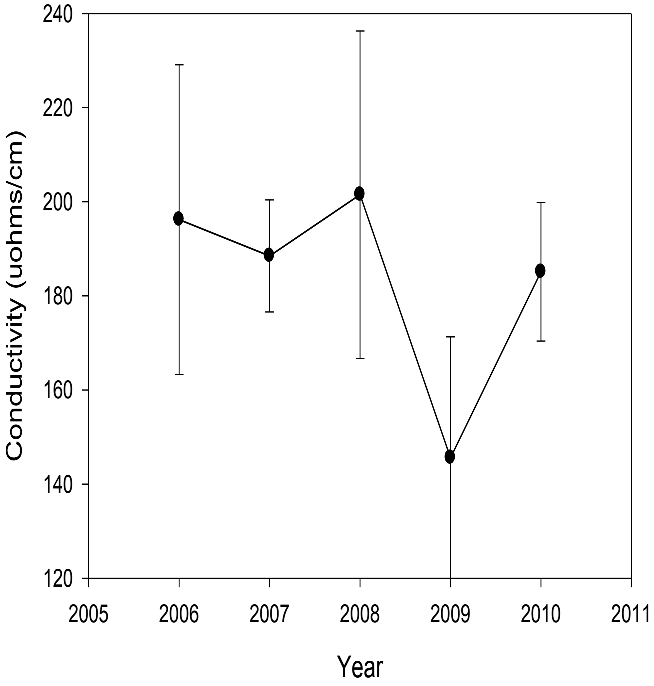
Location	Date	Secchi (meters)	Nitrate (ppm)	Chloride (ppm)	Calcium (ppm)	Aluminum (ppm)	Chl A µg/L
Marsh	7/17/2006	6.5	0	14			1.64
Marsh	8/18/2006	5.0	0	15			2.45
Marsh	9/21/2006	6.0	0.1	12			1.84
	Mean	5.8	0.0	13.7			1.98
	Std Dev	0.8	0.1	1.5			0.42
Center	7/24/2006	5	0	15			2.43
Center	8/21/2006	6.3	0	14			1.84
Center	9/21/2006	6.5	0.1	10			1.47
	Mean	5.9	0.0	13.0			1.91
	Std Dev	0.8	0.1	2.6			0.48
epi	6/21/2007	6.4	0.0	17.0		0.0	1.87
	7/6/2007	5.0	0.0				2.04
	8/4/2007	6.0	0.0				1.95
	9/7/2007	5.5	0.0				2.12
	Mean	5.5	0.0				2.04
	Std Dev	0.5	0.0				0.09
hypo	6/21/2007		0.1	20.0		0	
epi	5/26/2008	4.2	0.0	21.0	18.2	0	3.12
	6/25/2008	7	0.2				1.43
	8/5/2008	5.5	0.2				1.89
	9/3/2008	5	0.1				2.05
	Mean	5.43	0.13	21.00			2.12
	Std Dev	1.18	0.10				0.72
hypo	5/26/2008	x	0.0	21.0	18.6	0	x
Center	6/28/2009	7.5	0.1	11.0	19.1	0	1.21
Center	7/30/2009	6	0.6				1.82
Center	8/25/2009	5	0.0				2.23
	Mean	6.17	0.2				1.75
	Std Dev	1.26	0.3				0.51
Center	7/8/2010	5.50	0.2	14.9	26.9	0	1.72
Center	8/7/2010	4.50	0.2	14.4	23.9	0	2.96
Center	9/1/2010	5.00	0.2	15.0	25	0	1.98
	Mean	5.00	0.2	14.8	25.3	0.0	2.22
	Std Dev	0.50	0.0	0.3	1.5	0.0	0.65

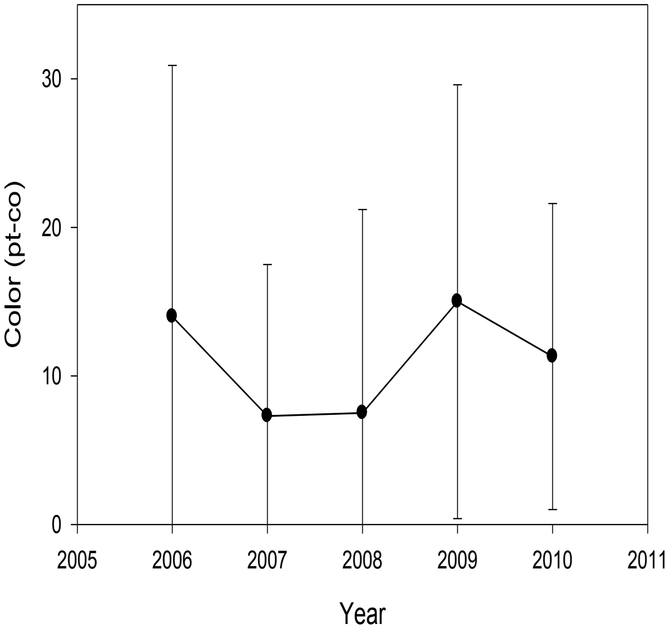
Source	Lake Name	Location	Station	Date	pH	Alk (ppm)	Cond µohms/cm	Color Pt-Co	TP (ppm)
Vol	Sylvia Lake	Inlet	1	7/24/2006	7.88	113.2	211.0	10	0.013
Vol	Sylvia Lake	Inlet	1	8/21/2006	7.93	86.0	176.5	10	0.010
Vol	Sylvia Lake	Inlet	1	9/21/2006	7.98	103.6	208.0	10	0.007
				Mean	7.93	100.9	198.5	10.0	0.010
				Std Dev	0.05	13.8	19.1	0.0	0.003
AWI	Sylvia Lake	Inlet	epi	6/21/2007	7.70	137.0	232.0	0	0.008
Vol	Sylvia Lake	Inlet	1	7/6/2007	7.77	124.8	192.2	4	0.010
Vol	Sylvia Lake	Inlet	1	8/4/2007	7.74	122.8	130.4	21	0.008
Vol	Sylvia Lake	Inlet	1	9/7/2007	7.88	128.6	152.6	0	0.011
				Mean	7.80	125.4	158.4	8.3	0.010
				Std Dev	0.07	2.9	31.3	11.2	0.002
AWI	Sylvia Lake	Inlet	hypo	6/21/2007	7.72	139.0	232.0	1	0.008
Vol	Sylvia Lake	Inlet	1	6/25/2008	7.79	138	228	27	0.006
Vol	Sylvia Lake	Inlet	1	8/5/2008	8.44	146	176	0	0.012
Vol	Sylvia Lake	Inlet	1	9/3/2008	7.62	122	162	13	0.011
				Mean	7.95	135.3	188.7	13.3	0.010
				Std Dev	0.43	12.2	34.8	13.5	0.003
Vol	Sylvia Lake	Inlet	1	6/28/2009	7.63	118.8	222	25	0.008
Vol	Sylvia Lake	Inlet	1	7/30/2009	7.69	123.6	226	22	0.014
Vol	Sylvia Lake	Inlet	1	8/25/2009	7.66	122.8	193.3	17	0.012
				Mean	7.66	121.7	213.8	21.3	0.011
				Std Dev	0.03	2.6	17.8	4.0	0.003
Vol	Sylvia Lake	Inlet	1	7/8/2010	8.31	152	195.9	17	0.011
Vol	Sylvia Lake	Inlet	1	8/7/2010	8.14	139	190.6	28	0.013
Vol	Sylvia Lake	Inlet	1	9/1/2010	7.89	129	147	21	0.01
				Mean	8.11	140.0	177.8	22.0	0.011
				Std Dev	0.21	11.5	26.8	5.6	0.002

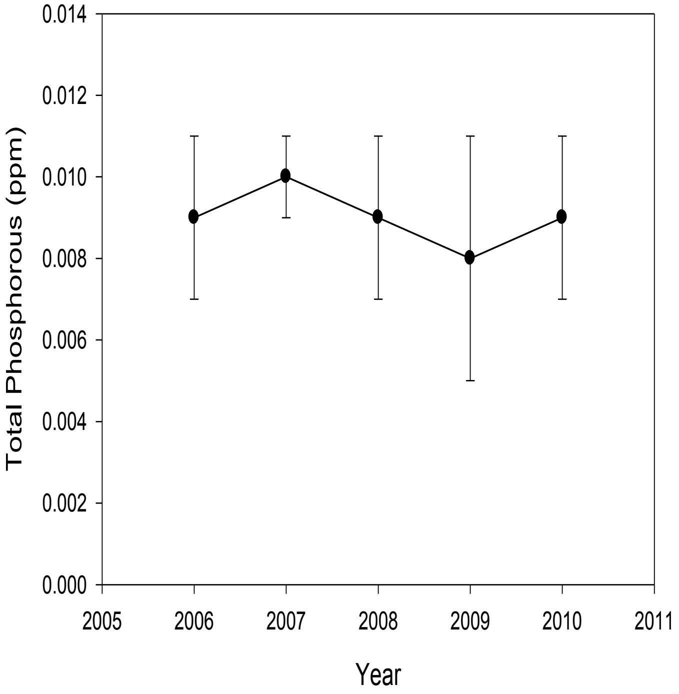
Location	Date	Secchi (meters)	Nitrate (ppm)	Chloride (ppm)	Calcium (ppm)	Aluminum (ppm)	Chl A µg/L
Inlet	7/24/2006	4.7	0.1	15			2.75
Inlet	8/21/2006	5.4	0	12			1.89
Inlet	9/21/2006	6.5	0	15			1.57
	Mean	5.5	0.0	14.0			2.07
	Std Dev	0.9	0.1	1.7			0.61
Inlet	6/21/2007	7	0.1	16		0	1.77
	7/6/2007	5.5	0.1				1.98
	8/4/2007	6	0				1.89
	9/7/2007	5	0				2.12
	Mean	5.5	0.0				2.00
	Std Dev	0.5	0.1				0.12
Inlet	6/21/2007		0	16			
Inlet	6/25/2008	7	0.2				1.75
	8/5/2008	4.25	0.1				3.07
	9/3/2008	4.5	0.1				2.57
	Mean	5.3	0.1				2.46
	Std Dev	1.5	0.1				0.67
Inlet	6/28/2009	6	0	17	17.4	0	1.87
	7/30/2009	4.5	0				2.67
	8/25/2009	4.75	1				2.25
	Mean	5.1	0.3				2.26
	Std Dev	0.8	0.6				0.40
Inlet	7/8/2010	4.5	0.24	13.8	26.9	0.03	3.01
	8/7/2010	4	0.17	12	24	0.03	4.04
	9/1/2010	5	0.189	12.6	22.3	0.07	1.98
	Mean	4.5	0.2	12.8	24.4	0.0	3.01
	Std Dev	0.5	0.0	0.9	2.3	0.0	1.03

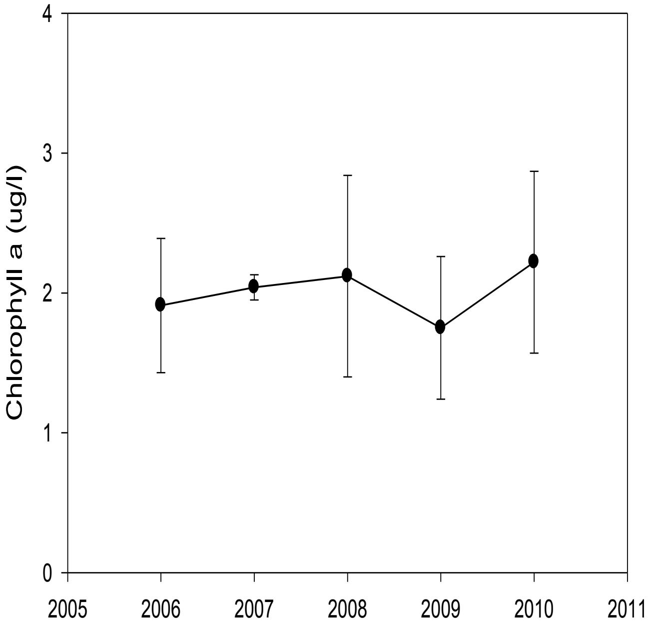

pH
8.0
7.5
7.0
2005
2006
2007
2008
2009
2010
2011
Year

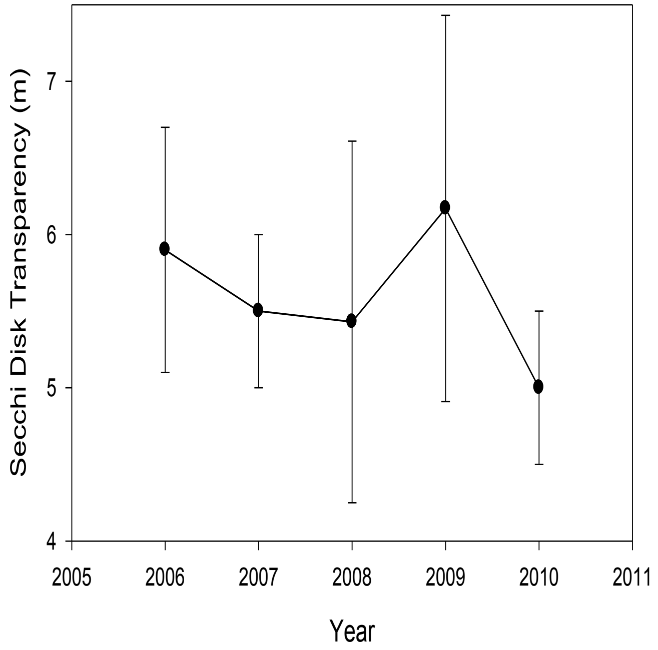

Alkalinity (ppm)
160
140
120
100
80
2005
2006
2007
2008
2009
2010
2011
Year

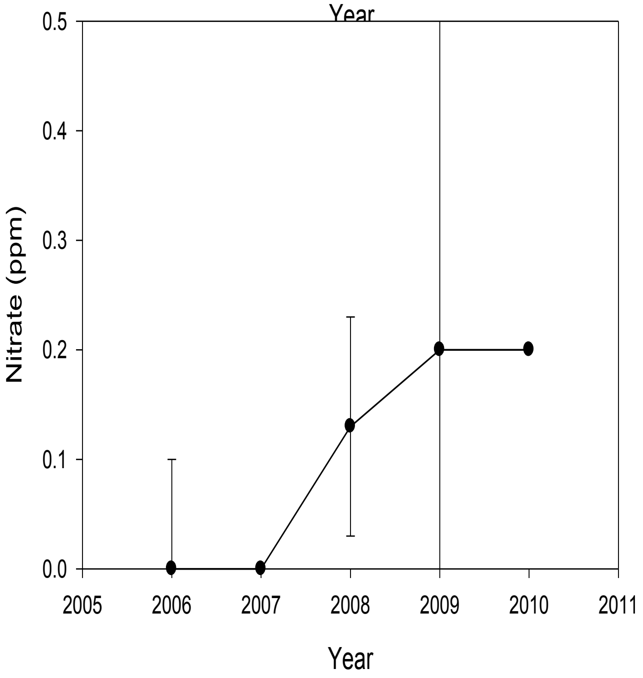

Conductivity (uohms/cm)
240
220
200
180
160
140
120
2005
2006
2007
2008
2009
2010
2011
Year

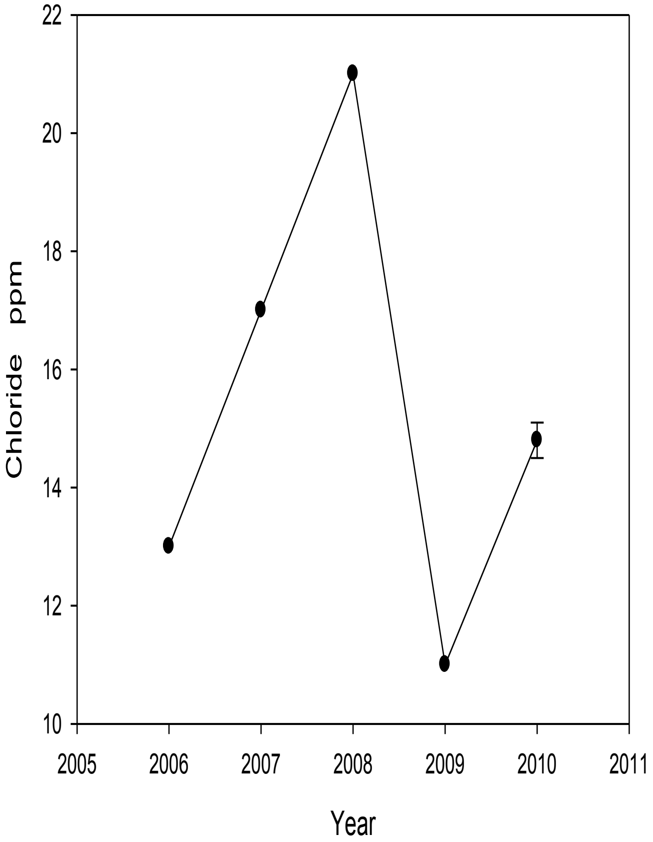

Color (pt-co)
30
20
10
0
2005
2006
2007
2008
2009
2010
2011
Year

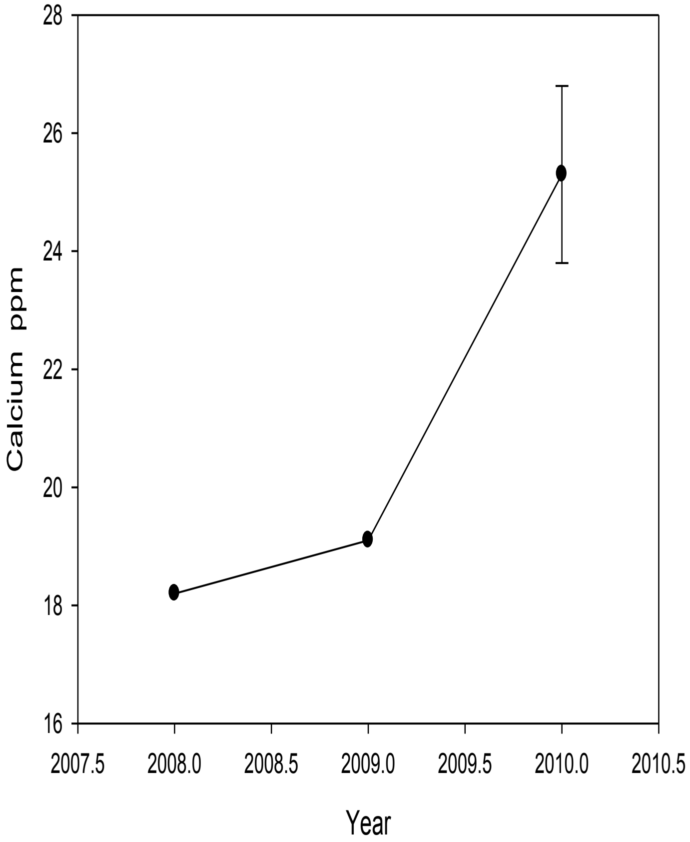

Total Phosphorous (ppm)
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
2005
2006
2007
2008
2009
2010
2011
Year


Chlorophyll a (ug/l)
4
3
2
1
0
2005
2006
2007
2008
2009
2010
2011
Year


Secchi Disk Transparency (m)
7
6
5
4
2005
2006
2007
2008
2009
2010
2011
Year


Nitrate (ppm)
0.5
0.4
0.3
0.2
0.1
0.0
2005
2006
2007
2008
2009
2010
2011
Year


22
20
18
16
14
12
10
Chloride ppm
2005
2006
2007
2008
2009
2010
2011
Year


28
26
24
22
20
18
16
Calcium ppm
2007.5
2008.0
2008.5
2009.0
2009.5
2010.0
2010.5
Year