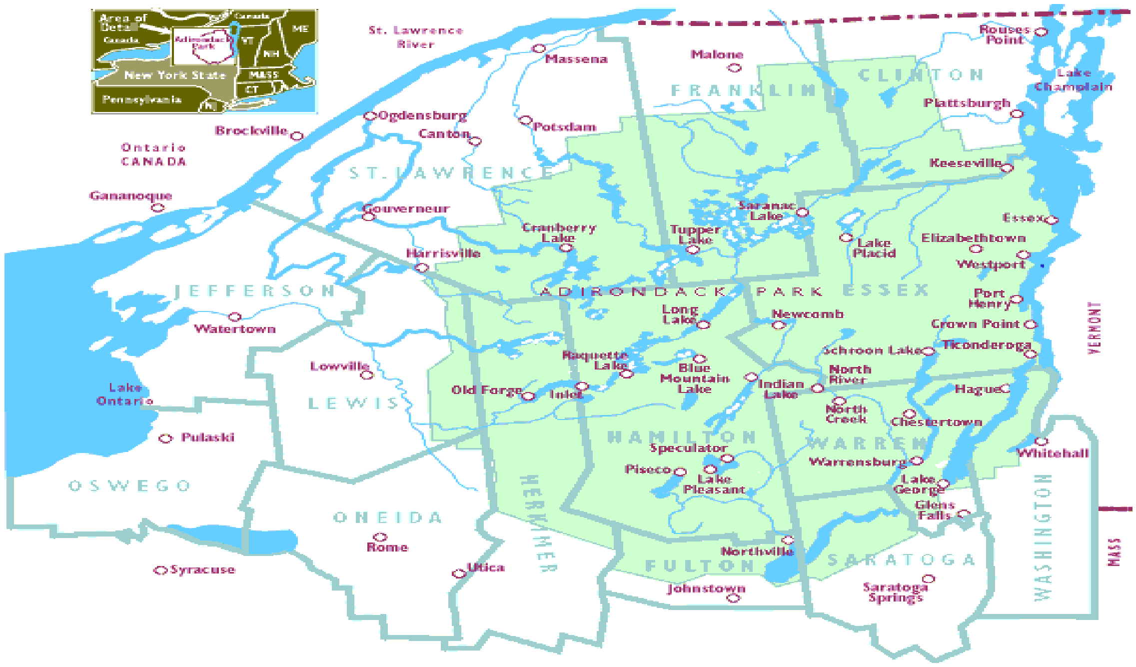
Adirondack Lake Assessment Program 2011



<u>Fourteen Years in the program</u>
Cranberry Lake, Loon Lake, Oven Mountain Pond, Blue Mountain Lake, Silver Lake, Eagle Lake
<u>Thirteen Years in the program</u>
Little Long Lake, Gull Pond, Stony Creek Ponds, Thirteenth Lake, Eli Pond
<u>Twelve Years in the program</u>
Austin Pond, Osgood Pond, Middle Saranac Lake, White Lake, Brandreth Lake, Trout Lake
<u>Eleven Years in the program</u>
Hoel Pond, Tripp Lake, Sherman Lake, Wolf Lake, Twitchell Lake, Deer Lake, Arbutus Pond, Rich Lake, Catlin Lake, Pine Lake, Lake of the Pines, Pleasant Lake
<u>Ten Years in the program</u>
Spitfire Lake, Upper St. Regis, Lower St. Regis, Garnet Lake, Lens Lake, Snowshoe Pond, Lake Ozonia, Long Pond, Lower Saranac Lake, Balfour Lake
<u>Nine Years in the program</u>
Raquette Lake, Lake Colby, Kiwassa Lake, Canada Lake
<u>Eight Years in the program</u>
Indian Lake, Schroon Lake, Big Moose Lake
<u>Seven Years in the program</u>
Dug Mountain Pond, Abanakee Lake, Moss Lake, Mountain View Lake, Indian Lake, Tupper Lake
<u>Six Years in the program</u>
Sylvia Lake, Fern Lake
<u>Five Years in the program</u>
Adirondack Lake, Lower Chateaugay Lake, Upper Chateaugay Lake, Lake Easka, Lake Tekeni
<u>Four Years in the program</u>
Simon Pond
<u>Three Years in the program</u>
Amber Lake, Jordan Lake, Otter Pond
<u>Two Years in the program</u>
Auger Lake, Lake Titus, Star Lake
<u>One Year in the program</u>
Chapel Pond, Lake Durant, Upper Cascade Lake

Adirondack Lake

Assessment Program

Schroon Lake

Summer 2011

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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' fourteenth year and continues to grow. 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 2011.

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 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. Samples taken by AWI staff were analyzed for the same parameters, as well as for calcium, chloride, and aluminum concentrations.

Results Summary

Schroon Lake was sampled three times by a volunteer in 2011. Samples were collected on the following dates: 5/30/11, 6/26/11 and 9/11/11. Results for 2011 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 2011 Adirondack Lake Assessment program, the acidity status of Schroon Lake is considered to be satisfactory. The pH values are satisfactory and the alkalinity values show a lake with a low sensitivity to further acidic inputs at this time. The calcium and CSI values show a lake with no vulnerability to further acid rain at this time.

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 2011 Adirondack Lake Assessment Program, Schroon Lake is considered to be a 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 Schroon Lake ranged from 6.82 to 7.14. The average pH was 6.97. Based solely on pH, Schroon Lake's acidity levels are considered to be satisfactory.

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 Schroon Lake ranged from 15.6 ppm to 24.4 ppm. The average alkalinity was 19.9 ppm. These values indicate a low sensitivity to acidification.

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 Schroon Lake was measured in 2011 and ranged from 3.82 ppm to 5.17 ppm. The average calcium concentration was found to be 4.47 ppm. This shows us a lake that is not sensitive to further acidification.

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:

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

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

The CSI value in the upper waters of Schroon Lake was calculated and found to be 2.40. This shows us a lake that has no vulnerability to further acidic inputs at this time.

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 Schroon Lake ranged from 10 ppb to 12 ppb. The total phosphorus level averaged 10.7 ppb. This is indicative of mesotrophic conditions.

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 are associated with oligotrophic conditions and those greater than 8 ppb are associated with eutrophic conditions.

The chlorophyll-a concentrations in the upper waters of Schroon Lake ranged from 4.98 ppb to 7.82 ppb. The average concentration was 6.48 ppb. This is indicative of mesotrophic conditions.

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 Schroon Lake ranged from 2.5 meters to 3.5 meters and averaged 3.07 meters. These values are indicative of mesotrophic conditions.

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.

The nitrate concentration in the upper waters of Schroon Lake ranged from 0.170 to 0.207 ppm. The average nitrate concentration was found to be 0.183 ppm.

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 Schroon Lake was measured and ranged from 5.73 ppm to 8.75 ppm. The average chloride concentration was found to be 7.41 ppb. This is elevated for the Adirondack Park and could be due to road salt contamination.

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 Schroon Lake ranged from 36.3 μohms/cm to 48.4 μohms/cm. The average conductivity was 43.3 μohms/cm. This again is elevated and could be due to road salt contamination.

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 Schroon Lake ranged from 47 Pt-Co to 58 Pt-Co. The average color was 52.7 Pt-Co.

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 in the upper waters of Schroon Lake was measured and ranged from 0.190 ppm to 0.220 ppm. The average aluminum concentration was found to be a low 0.203 ppm.

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 profile for Schroon Lake in 2004 and 2008 can be found in the appendix. Both years the profiles are very similar. The dissolved oxygen levels are sufficient for cold water fish survival.

Summary

Schroon Lake was a moderately productive mesotrophic lake during 2011. Based on the results of the 2011 Adirondack Lake Assessment program, the acidity status of Schroon Lake is considered to be satisfactory. The pH values are satisfactory and the alkalinity values show a lake with no sensitivity to further acidic inputs at this time. The calcium and CSI values show a lake with no vulnerability to further acid rain at this time. The dissolved oxygen levels are sufficient for cold water fish survival.

If we look at the yearly averages for precipitation in the Adirondacks, the amount of precipitation last year was a record and way above average. We had a very wet winter, spring and summer. For the year we received over 44 inches of precipitation. A typical Adirondack year we would receive about 35 – 38 inches of precipitation. Some of the changes to water quality on Schroon Lake could have been weather related.

Eight years of data is sufficient to detect water quality trends. We can also compare 2011 to 2004 - 2010. In 2011, the pH, alkalinity, conductivity, total phosphorous, Secchi disk transparency, calcium, and chloride decreased as compared to 2010. The color, chlorophyll a, nitrate and aluminum increased in 2011 when compared to 2010.

The last five years have been dramatically different when it comes to weather conditions in the Adirondack Park. The Adirondacks had very wet summers in 2008, 2009 and the record precipitation for 2011. The other two years, we see a normal 2010 and a very dry summer in 2007. This led to a trend that showed itself in many lakes including Schroon Lake the past five years. During 2008, 2009 and 2011, this extra precipitation led to falling pH's due to the acidic nature of our rainwater but, during the dry summer of 2007 and the normal summer of 2010, pH values rebounded in Schroon Lake. Alkalinity values also followed this pattern and increased during 2007 and 2010. This extra acidified precipitation lowered the calcium, total phosphorous and chloride concentration. The color and chlorophyll-a concentrations increased in turn causing the much lower Secchi disk transparency.

Literature Cited

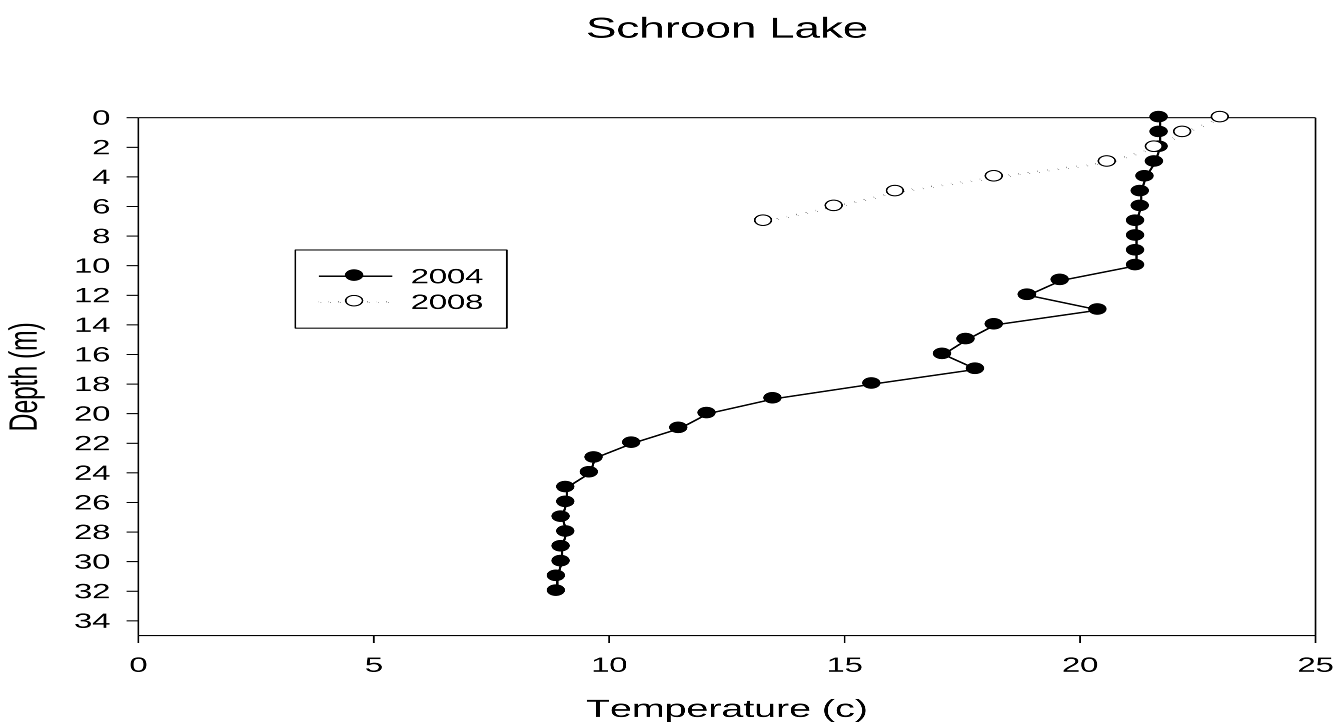
DEC & FOLA. (1990). Diet for a Small Lake: A New Yorker's Guide to Lake Management. New York State Department of Environmental Conservation & The Federation of Lake Associations, Inc.: Albany, New York.

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


Schroon Lake
Depth (m)
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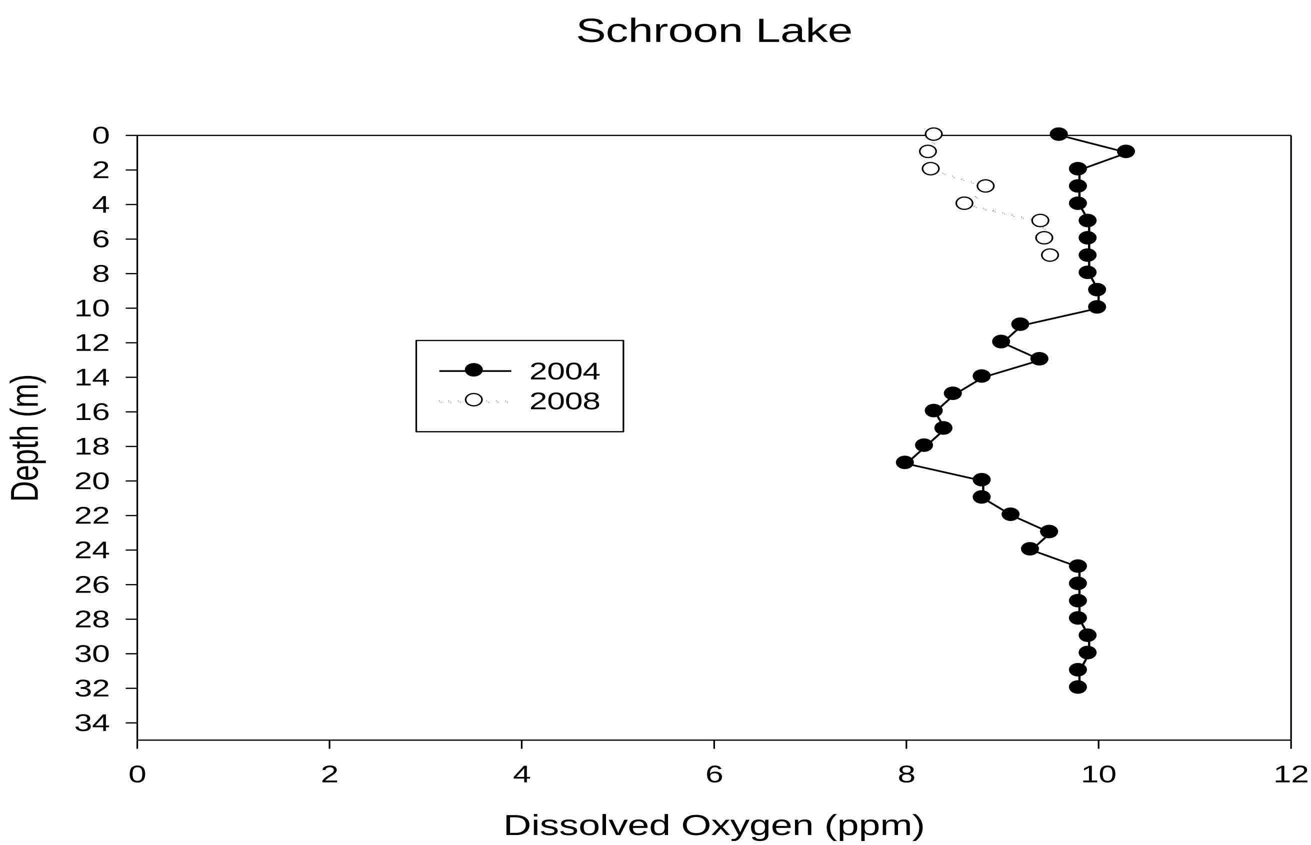
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
2004
2008
0
5
10
15
20
25
Temperature (c)


Schroon Lake
Depth (m)
0
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24
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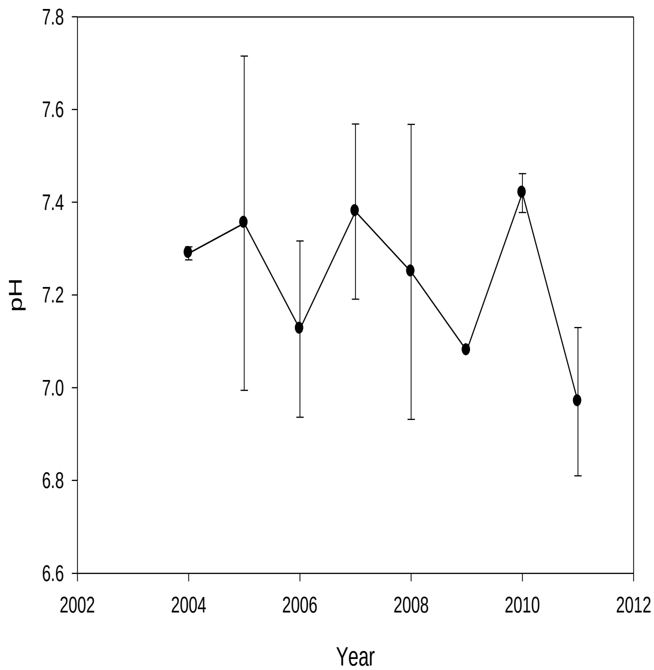
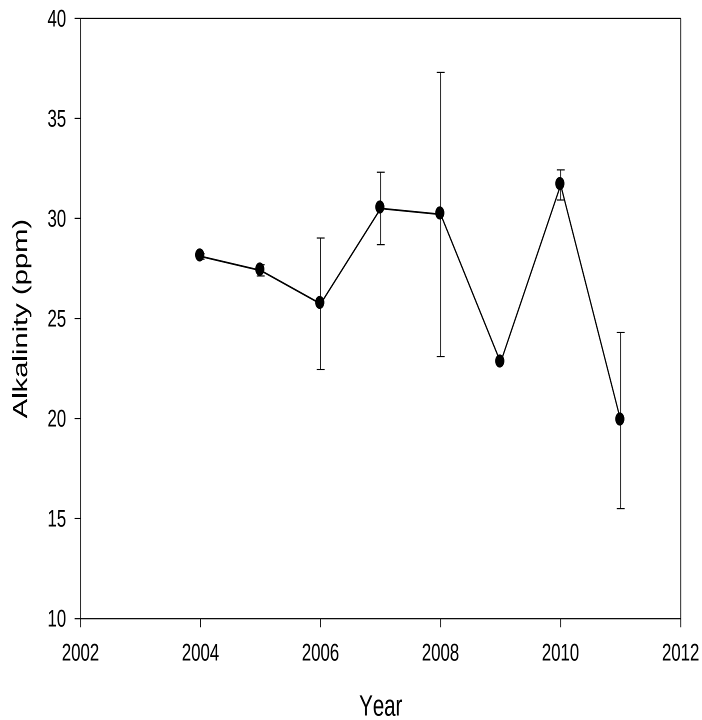
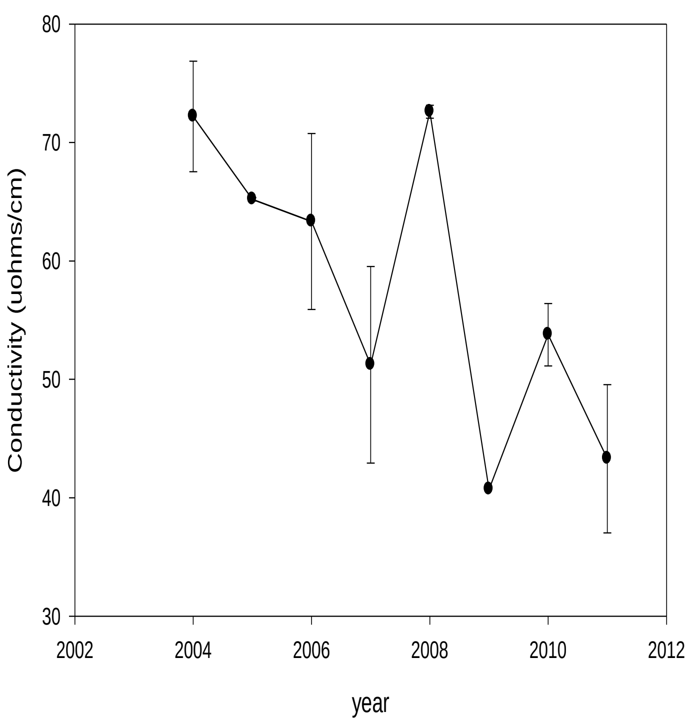
30
32
34
2004
2008
0
2
4
6
8
10
12
Dissolved Oxygen (ppm)

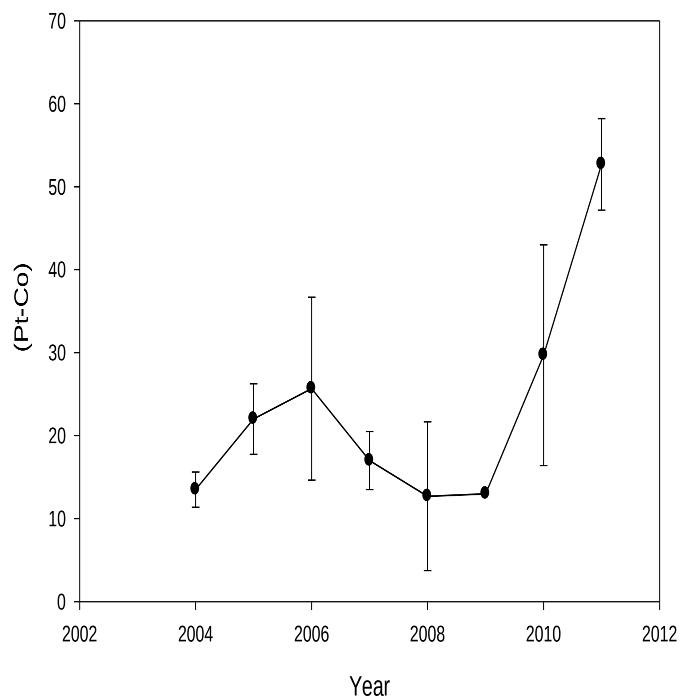
Source	Lake/Pond Name	Sampling Location	Sampling Date	pH (units)	Alkalinity (ppm)	Conductivity (μohms/cm)	Color (Pt-Co)	Total P (ppm)	Chla (μg/L)
AWI	Schroon Lake	Epilimnion	8/23/2004	7.3000	28.0000	68.9000	12.0000	0.0120	2.0900
Vol	Schroon Lake	Deephole	8/23/2004	7.2800	28.2000	75.5000	15.0000	0.0120	2.1300
			Mean	7.2900	28.1000	72.2000	13.5000	0.0120	2.1100
			Std Dev	0.0141	0.1414	4.6669	2.1213	0.0000	0.0283
AWI	Schroon Lake	Hypolimnion	8/23/2004	6.4700	23.2000	76.3000	15.0000	0.0140	
Vol	Schroon Lake	Deephole	6/4/2005	7.1000	27.6000	65.1000	19.0000	0.0100	1.9200
Vol	Schroon Lake	Deephole	7/30/2005	7.6100	27.2000	65.3000	25.0000	0.0140	4.4200
			Mean	7.3550	27.4000	65.2000	22.0000	0.0120	3.1700
			Std Dev	0.3606	0.2828	0.1414	4.2426	0.0028	1.7678
Vol	Schroon Lake	Deephole	6/24/2006	6.9400	22.0000	62.1000	25.0000	0.0160	3.8700
Vol	Schroon Lake	Deephole	7/22/2006	7.3200	28.2000	71.3000	15.0000	0.0190	4.6800
Vol	Schroon Lake	Deephole	9/19/2006	7.1200	27.0000	56.6000	37.0000	0.0140	4.2600
			Mean	7.1267	25.7333	63.3333	25.6667	0.0163	4.2700
			Std Dev	0.1901	3.2884	7.4272	11.0151	0.0025	0.4051
Vol	Schroon Lake	Deephole	6/10/2007	7.1700	28.8000	51.3000	15.0000	0.0120	2.2400
Vol	Schroon Lake	Deephole	8/12/2007	7.4200	30.2000	59.5000	21.0000	0.0140	4.4600
Vol	Schroon Lake	Deephole	9/23/2007	7.5400	32.4000	42.9000	15.0000	0.0110	3.3400
			Mean	7.3767	30.4667	51.2333	17.0000	0.0123	3.3467
			Std Dev	0.1888	1.8148	8.3002	3.4641	0.0015	1.1100
AWI	Schroon Lake	Epilimnion	6/24/2008	7.4500	34.4000	73.0000	7.0000	0.0130	2.47
Vol	Schroon Lake	Deephole	6/24/2008	7.4100	34.2000	72.0000	23.0000	0.0100	2.32
Vol	Schroon Lake	Deephole	9/7/2008	6.8800	22.0000	72.9000	8.0000	0.0120	2.17
			Mean	7.2467	30.2000	72.6333	12.6667	0.0117	2.3200
			Std Dev	0.3182	7.1021	0.5508	8.9629	0.0015	0.1500
AWI	Schroon Lake	Hypolimnion	6/24/2008	7.5600	35.5000	74.7000	2.0000	0.0190	x
Vol	Schroon Lake	Deephole	8/14/2009	7.0800	22.8000	40.7000	13.0000	0.0180	5.22
Vol	Schroon Lake	Deephole	6/18/2010	7.4300	32.0000	52.1000	45.0000	0.0130	2.7700
Vol	Schroon Lake	Deephole	8/9/2010	7.4500	32.2000	56.8000	22.0000	0.0120	2.8900
Vol	Schroon Lake	Deephole	9/24/2010	7.3700	30.8000	52.4000	22.0000	0.0110	2.2800
			Mean	7.4167	31.6667	53.7667	29.6667	0.0120	2.6467
			Std Dev	0.0416	0.7572	2.6312	13.2791	0.0010	0.3232
Vol	Schroon Lake	Deephole	5/30/2011	6.9600	15.6000	36.3000	53.0000	0.0100	4.9800
Vol	Schroon Lake	Deephole	6/26/2011	7.1400	19.6000	45.1000	47.0000	0.0120	6.6500
Vol	Schroon Lake	Deephole	9/11/2011	6.8200	24.4000	48.4000	58.0000	0.0100	7.8200
			Mean	6.9733	19.8667	43.2667	52.6667	0.0107	6.4833
			Std Dev	0.1604	4.4061	6.2549	5.5076	0.0012	1.4273

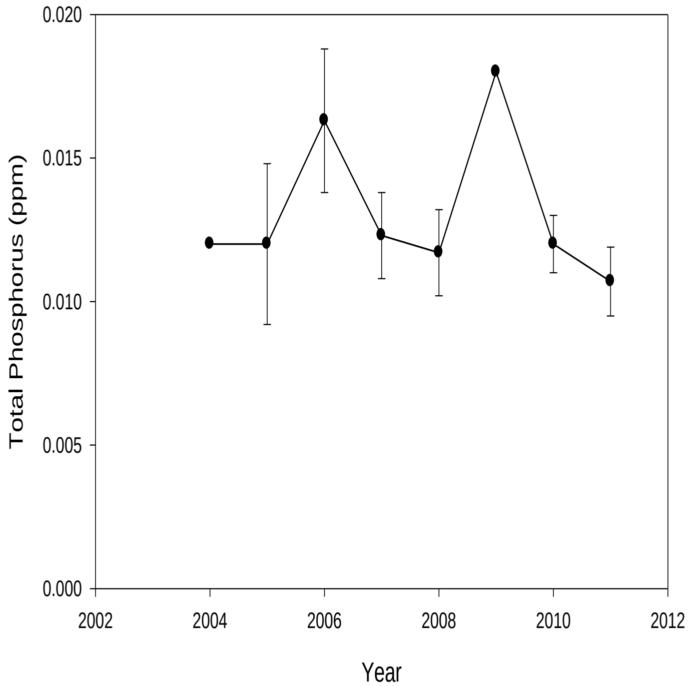
Source	Lake/Pond Name	Sampling Location	Sampling Date	Secchi (meters)	Nitrate (ppm)	Calcium (ppm)	Chloride (ppm)	Aluminum (ppm)	CSI
AWI	Schroon Lake	Epilimnion	8/23/2004	5.1000	0.0000	6.0700	12.0000	0.0000	2.3600
Vol	Schroon Lake	Deephole	8/23/2004	5.0000	0.0000				
			Mean	5.0500	0.0000				
			Std Dev	0.0707	0.0000				
AWI	Schroon Lake	Hypolimnion	8/23/2004		0.0000	5.3300	12.0000	0.0040	2.5800
Vol	Schroon Lake	Deephole	6/4/2005	5.0000	0.2000				
Vol	Schroon Lake	Deephole	7/30/2005	3.7500	0.1000				
			Mean	4.3750	0.1500				
			Std Dev	0.8839	0.0707				
Vol	Schroon Lake	Deephole	6/24/2006	3.5000	0.1000				
Vol	Schroon Lake	Deephole	7/22/2006	3.0000	0.0900				
Vol	Schroon Lake	Deephole	9/19/2006	3.5000	0.1000				
			Mean	3.3333	0.0967				
			Std Dev	0.2887	0.0058				
Vol	Schroon Lake	Deephole	6/10/2007	4.5000	0.2000				
Vol	Schroon Lake	Deephole	8/12/2007	3.8000	0.1000				
Vol	Schroon Lake	Deephole	9/23/2007	4.1000	0.1000				
			Mean	4.1333	0.1333				
			Std Dev	0.3512	0.0577				
AWI	Schroon Lake	Epilimnion	6/24/2008	4.0000	0.1000	6.2700	13.0000	0.0130	1.8000
Vol	Schroon Lake	Deephole	6/24/2008	5.0000	0.2000				
Vol	Schroon Lake	Deephole	9/7/2008		0.0000				
			Mean	4.5000	0.1000				
			Std Dev	0.7071	0.1000				
AWI	Schroon Lake	Hypolimnion	6/24/2008	x	0.0000	6.3400	13.0000	0.0100	
Vol	Schroon Lake	Deephole	8/14/2009	3.1000	0.0000	4.9800	11.0000	0.0080	2.2000
Vol	Schroon Lake	Deephole	6/18/2010	4.2000	0.1900	6.5500	13.6000	0.0300	
Vol	Schroon Lake	Deephole	8/9/2010	4.2000	0.1800	6.9300	13.8000	0.0400	
Vol	Schroon Lake	Deephole	9/24/2010	4.5000	0.2100	7.2800	13.2000	0.0300	
			Mean	4.3000	0.1933	6.9200	13.5333	0.0333	
			Std Dev	0.1732	0.0153	0.3651	0.3055	0.0058	
Vol	Schroon Lake	Deephole	5/30/2011	3.5000	0.2070	3.8200	5.7300	0.2200	
Vol	Schroon Lake	Deephole	6/26/2011	3.2000	0.1730	4.4200	7.7500	0.1900	
Vol	Schroon Lake	Deephole	9/11/2011	2.5000	0.1700	5.1700	8.7500	0.2000	
			Mean	3.0667	0.1833	4.4700	7.4100	0.2033	
			Std Dev	0.5132	0.0206	0.6764	1.5384	0.0153	

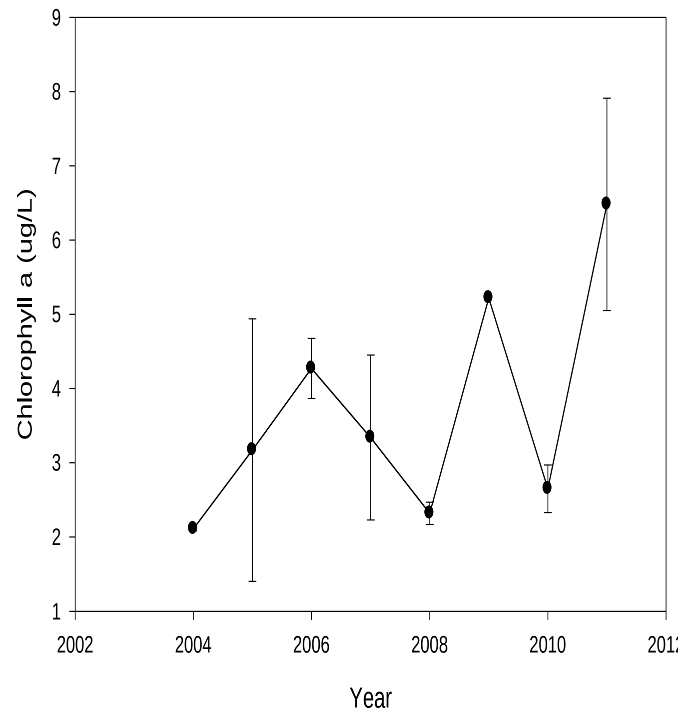

pH
Year

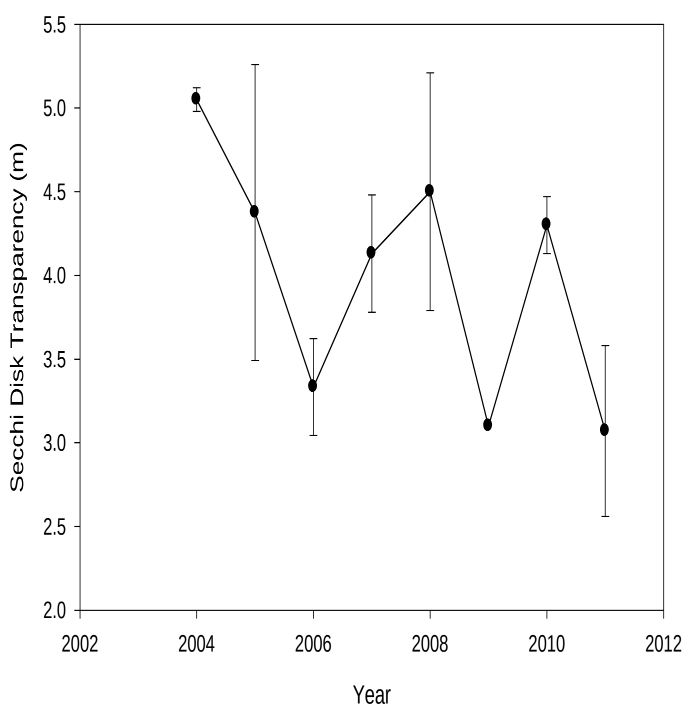

Alkalinity (ppm)
Year

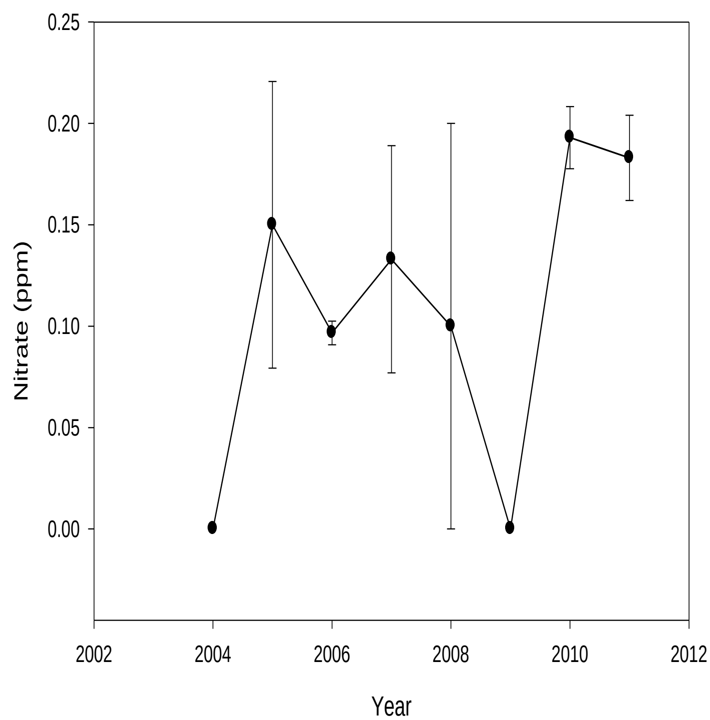

Conductivity (uohms/cm)
year

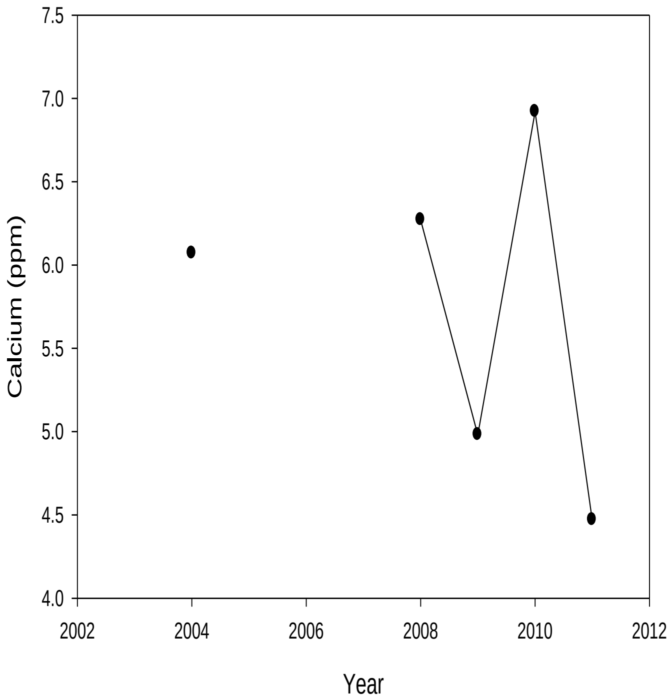

(Pt-Co)
Year


Total Phosphorus (ppm)
0.020
0.015
0.010
0.005
0.000
2002
2004
2006
2008
2010
2012
Year

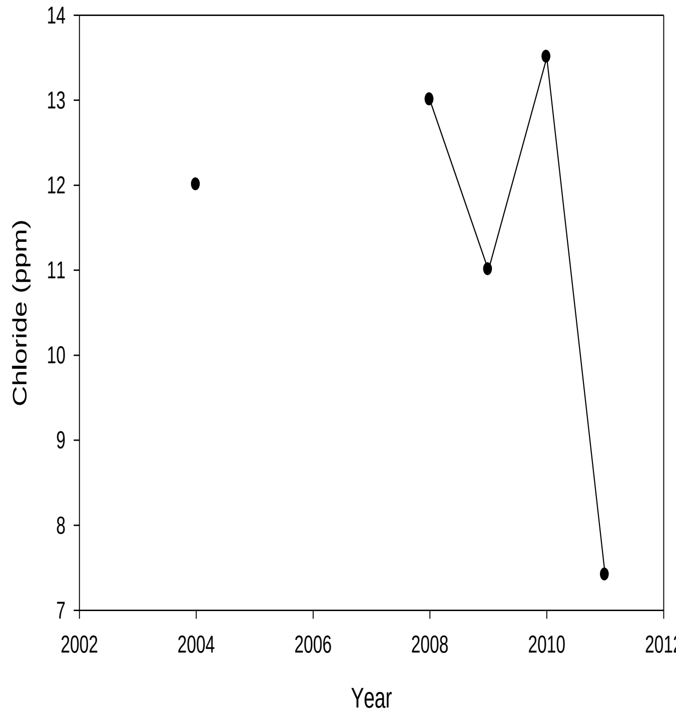

Chlorophyll a (ug/L)
9
8
7
6
5
4
3
2
1
2002
2004
2006
2008
2010
2012
Year


Secchi Disk Transparency (m)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
2002
2004
2006
2008
2010
2012
Year

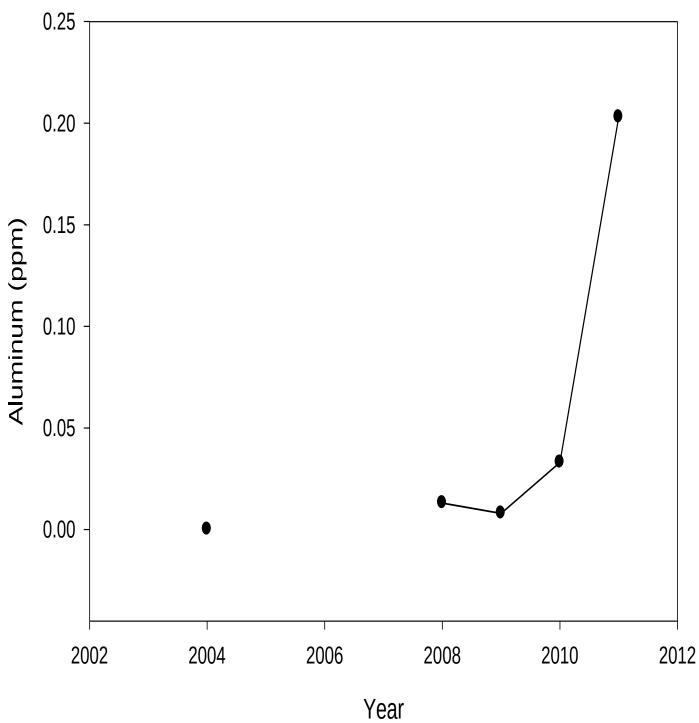

Nitrate (ppm)
0.25
0.20
0.15
0.10
0.05
0.00
2002
2004
2006
2008
2010
2012
Year



Calcium (ppm)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
2002
2004
2006
2008
2010
2012
Year



Chloride (ppm)
14
13
12
11
10
9
8
7
2002
2004
2006
2008
2010
2012
Year



Aluminum (ppm)
0.25
0.20
0.15
0.10
0.05
0.00
2002
2004
2006
2008
2010
2012
Year