2009 Schroon Lake Phytoplankton Monitoring Project
Schroon Lake (Essex County), New York
February 2010

performed by

Adirondack Ecologists, LLC
Crown Point, New York

I. Introduction:

A limited study of the phytoplankton community of Schroon Lake was performed by the Crown Point-based, lake management firm of Adirondack Ecologists, LLC (**AE**) during the summer of 2009. This was the second year in a row that grab samples were collected and microscopically-analyzed. The principal investigator for the study was Steven A. LaMere, a Certified Lake Manager and Certified Fisheries Professional, and the president of **AE.**

Since limited historical data on this population exists, the primary objective of the study was to assist in the creation of a scientific database that could be used as a historical "benchmark" to compare the results of future phytoplankton monitoring efforts with. It was hoped that this database, once established, would serve as an educational and informational resource for lakeshore property owners. Understanding the character and function of the phytoplankton community is a key component to understanding the dynamics of any lake system and its food web.

Phytoplankton or algae are microscopic plants that live in the open waters of lakes and ponds and they serve as an important food source for many aquatic organisms. Many of these small plants do not root to the lake bottom or attach themselves to other objects, but rather float freely throughout the water column of the lake. Like rooted, vascular plants, algae produce dissolved oxygen and are nutrient-limited in their growth. Cyanobacteria (blue-green algae) are also organisms that float freely throughout the water column and possess photosynthetic capabilities. Unlike green and yellow-brown algae, however, blue-green algae are not "true" algae, but instead are a type of bacteria.

The abundance and species composition of algae can have significant implications with regard to both the water clarity and quality of any given body of water. Since there is normally a strong statistical correlation between secchi disk transparency (SDT) and algal biomass, with both parameters usually following predictable seasonal patterns, a change in the composition of the phytoplankton community may result in decreased water clarity and increased nutrient loading. These changes, if observed, would likely occur during the summer. The reason for this requires a short explanation.

Algae metabolize more efficiently under higher water temperatures, and since they utilize nutrients directly from the water column for photosynthesis, the higher the nutrient concentrations, the more "productive" algae become. In the spring and fall, when water temperatures are cooler and total phosphorus (TP) levels are lower, algal biomass decreases and SDT increases. As summer progresses and water temperature increases, TP levels normally increase and algal biomass responds accordingly by increasing. As algal biomass increases in the water, the SDT decreases, and this decrease is often very noticeable through visual observation.

II. Methods

Phytoplankton were collected on August 27 via surface water grab sampling at both the north and south lake basin testing sites, and these samples were immediately preserved in Lugol's Solution (approximately 1mL per 100 mL of sample) and shipped to Aquatic Analysts in Friday Harbor, Washington for laboratory analysis.

III. Results & Discussion:

Two years is a relatively short period of time to study the algae of a particular lake system. The economic realities of securing funding for long-term research projects, however, usually dictate the need for more conservatively-designed, cost-conscious studies than most scientists are ordinarily comfortable performing.

Furthermore, lakes are dynamic, and as such, they "react" to environmental stimuli. Factors like weather and temperature can impart profound changes on the water quality, water clarity, and ecological character of lacustrine environments. Often, the more extreme the weather change or temperature fluctuation is, the more profound the effect on the water body. These changing conditions pose a real challenge to lake scientists trying to search for trends in environmental data over relatively short periods of time.

The following narrative consists of a "summarized interpretation" of the August 2009 phytoplankton data collected on Schroon Lake. All raw data obtained from the laboratory involved in the analysis of these collections is contained within the Appendix section of this report. As monitoring of this community continues, a more comprehensive understanding of the lake itself will exist.

Schroon Lake Phytoplankton

A total of twenty-five species of phytoplankton were documented in the 2009 Schroon Lake samples. By comparison, a total of twenty-eight species were observed in the 2008 collections. Nineteen species of algae were observed in the 2009 samples taken from the south basin of the lake and twenty species were observed in the north basin.

The most common algal species in the south basin were *Rhodomonas minuta* (25%) and *Dinobryon sertularia* (18%). In the north basin, *Rhodomonas minuta* (46%) and *Dinobryon sertularia* (16%) dominated the collections. *Rhodomonas minuta* is a very widespread alga (probably the most common alga in the U.S.) and it is found under a wide range of ecological conditions.

In many respects, the two basins were similar in terms of species composition and abundance. Most of the species in Schroon Lake are typical of oligotrophic lakes, with a few minor exceptions. *Fragilaria crotonensis*, *Anabaena flos-aquae* and *Anabaena planctonica* are eutrophic algae. This is the second year in a row that eutrophic algae have appeared in the south basin phytoplankton collections. *Anabaena flos-aquae* can potentially be toxic if it blooms, but it was found in very low abundance.

The densities of algae indicate indicate low end mesotrophic conditions. The Trophic State Indices were 34.1 and 39.8 for the north and south basin, respectively.

A summary of the phytoplankton data can be found in *Appendix A* of this report.

IV. Conclusions:

The species composition of the phytoplankton community was, for the most part, normal for a late oligotrophic or early mesotrophic lake. Algal densities were more indicative of a lake at the low end of mesotrophic conditions.

AE recommends that phytoplankton sampling be performed once every three years to maintain the existing database. Attention will be paid to the presence of *Anabaena flos-aquae* or any other potentially problematic algal species in future Schroon Lake phytoplankton collections

APPENDIX A

Phytoplankton Data

Phytoplankton Sample Analysis

Sample: Schroon Lake
Sample Site: North basin
Sample Depth:
Sample Date: 27-Aug-09

Total Density (#/mL): 764
Total Biovolume (um^3/mL): 111,327
Trophic State Index: 34.1

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent
1	Rhodomonas minuta	352	46.0	7,033	6.3
2	Dinobryon sertularia	122	16.0	16,144	14.5
3	Sphaerocystis schroeteri	46	6.0	10,434	9.4
4	Chroococcus minimus	46	6.0	4,944	4.4
5	Cryptomonas erosa	31	4.0	15,900	14.3
6	Kephyrion littorale	23	3.0	2,179	2.0
7	Glenodinium sp.	23	3.0	16,053	14.4
8	Aphanothece sp.	15	2.0	2,752	2.5
9	Asterionella formosa	15	2.0	20,180	18.1
10	Chromulina sp.	15	2.0	306	0.3
11	Chrysococcus rufescens	8	1.0	650	0.6
12	Achnanthes minutissima	8	1.0	382	0.3
13	Chlamydomonas sp.	8	1.0	2,484	2.2
14	Quadrigula closterioides	8	1.0	1,835	1.6
15	Synedra radians	8	1.0	2,752	2.5
16	Nitzschia dissipata	8	1.0	2,056	1.8
17	Dinobryon bavaricum	8	1.0	917	0.8
18	Oocystis pusilla	8	1.0	1,651	1.5
19	Cosmarium sp.	8	1.0	1,605	1.4
20	Synedra rumpens	8	1.0	1,070	1.0

Aquatic Analysts **Sample ID:** MK31

Phytoplankton Sample Analysis

Sample: Schroon Lake
Sample Site: South basin
Sample Depth:
Sample Date: 27-Aug-09

Total Density (#/mL): 421
Total Biovolume (um^3/mL): 247,494
Trophic State Index: 39.8

	Species	Density #/mL	Density Percent	Biovolume um^3/mL	Biovolume Percent
1	Rhodomonas minuta	105	25.0	2,107	0.9
2	Dinobryon sertularia	76	18.0	9,104	3.7
3	Cryptomonas erosa	38	9.0	19,726	8.0
4	Sphaerocystis schroeteri	38	9.0	17,260	7.0
5	Chlamydomonas sp.	30	7.0	9,589	3.9
6	Aphanothece sp.	30	7.0	8,320	3.4
7	Glenodinium sp.	17	4.0	11,802	4.8
8	Chroococcus minimus	17	4.0	708	0.3
9	Tabellaria fenestrata	17	4.0	129,483	52.3
10	Oocystis pusilla	8	2.0	1,821	0.7
11	Rhizosolenia eriensis	8	2.0	801	0.3
12	Fragilaria crotonensis	8	2.0	24,784	10.0
13	Anabaena flos-aquae	4	1.0	2,259	0.9
14	Unidentified flagellate	4	1.0	84	0.0
15	Asterionella formosa	4	1.0	3,709	1.5
16	Anabaena planctonica	4	1.0	4,628	1.9
17	Synedra rumpens	4	1.0	590	0.2
18	Achnanthes minutissima	4	1.0	211	0.1
19	Dinobryon bavaricum	4	1.0	506	0.2

Anabaena flos-aquae cells/mL = 34

Anabaena planctonica cells/mL = 25

Aquatic Analysts

Sample ID: MK32