



Chlorophyll “*a*” Monitoring Program for Honeoye Lake during 2011

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on behalf of
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Introduction

Problematic algal blooms have plagued Honeoye Lake over the last several decades. To date, several nutrient management activities have been employed to reduce phosphorus concentrations in the hope of curtailing algal productivity during the late summer and early fall months. Highlights of these activities include: the establishment of a perimeter sewer system to regulate some watershed nutrient contributions, removal of biologically absorbed nutrients through a macrophyte harvesting program, alum precipitation of deep, seasonally anoxic lake sediment to slow internal loading of phosphorus, and lake association encouragement of voluntary best management lawn care practices.

Despite these efforts, a significant algal bloom occurred at the end of the 2010 summer season (see August 25, 2010 shoreline image below). With the health concern for potential toxins in blue green algal species, it was deemed prudent to plan for biweekly monitoring of algal abundance the following year. Periodic monitoring of this nature will also reveal the effectiveness and longevity of the alum application that was completed in the fall of 2007.



Objective

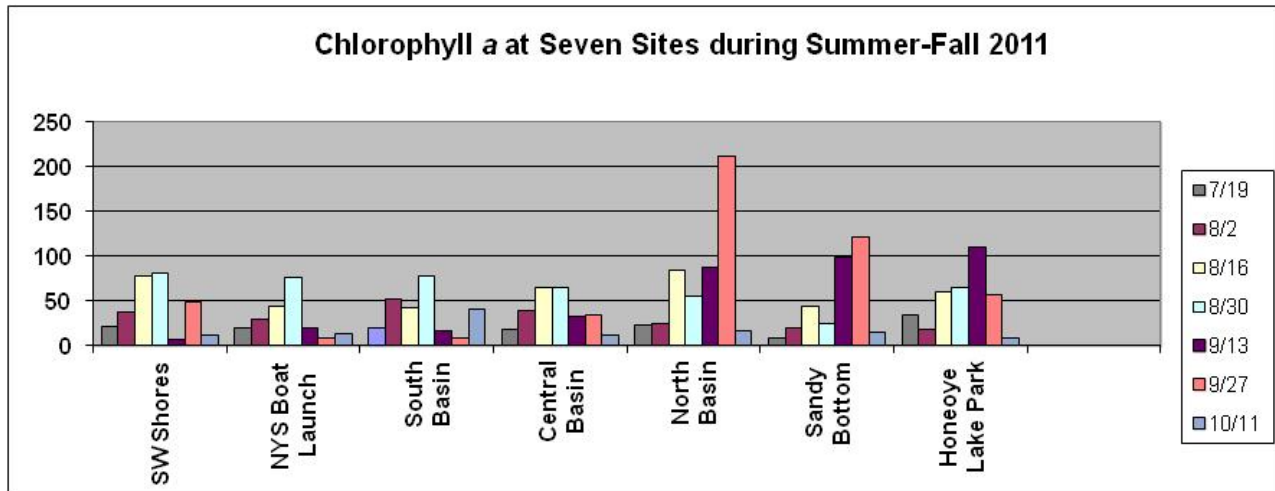
Chlorophyll "a" is a photosynthetic pigment found in all algae, and its abundance serves as an indirect measure of all algal productivity within the biologically diverse phytoplankton community. Because of the free-floating nature of most algae, currents and wind will create a spatially variable pattern of algae within the photic zone of lakes at any given time. This necessitates multiple sampling sites to capture a meaningful water quality summary of the trophic status of a lake.

Seven sites were selected in Honeoye Lake: three mid-lake stations (north across from Trident Marine, central in the deepest area near California Point and south across from the NYS Boat Launch) and four shoreline stations (Sandy Bottom, Honeoye Park, Southwest Shores and NYS Boat Launch). These sites have been sampled previously by FLCC Limnology classes during the fall season but not during the late summer when algal blooms are most common. Trained HVA volunteers collected approximately 2 liters of lake water using an integrated column sampling technique on six different dates (beginning of July through mid-September). Samples were immediately cooled, then delivered to Life Science Labs, Inc., for filtering and spectrophotometric analysis following alkaline acetone extraction of algal pigments. An

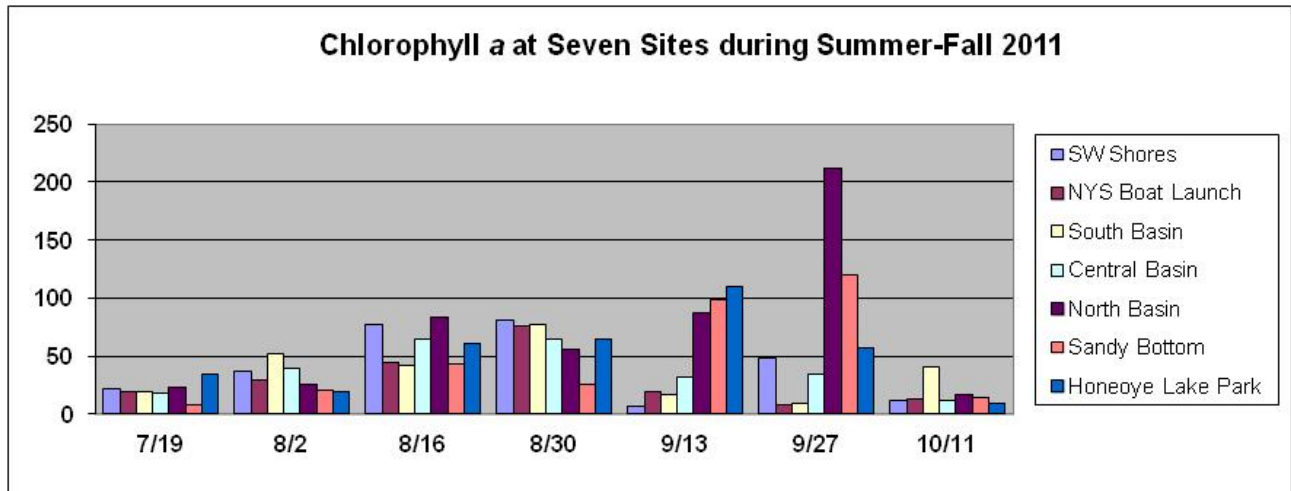
additional seventh round of sampling was completed *gratis* by Bruce Gilman of Finger Lakes Community College using the same sampling protocol and analytic procedures.

Results

A total of 49 water samples were analyzed, with results ranging from 7.2 to 212.3 µg/L of chlorophyll *a*. A concentration exceeding 8 µg/L is used to indicate eutrophic lake conditions. Not surprising, this indicator of lake trophic status confirms the known nutrient-rich conditions that have existed in Honeoye Lake for decades. In the graphic display of results below, sampling stations in the northern portion of the lake (North Basin, Sandy Bottom and Honeoye Lake Park) had the highest and most variable algal concentrations during this sample period of 2011.



Algal abundance varied biweekly, with a trend of increasing chlorophyll *a* concentrations through September followed by an apparent decline in algal populations in the cooling waters of October. It is thought that this trend is created by a series of species replacements with the blue green alga *Gloeotrichia* accounting for chlorophyll *a* concentrations in July, followed by the blue green alga *Anabaena* in August and finally the blue green alga *Microcystis* in September.



General Conclusions

- Chlorophyll *a* levels increased, on average, from mid-July through September. This lake wide increase is likely correlated to surface water temperature, an important regulator of biological processes like algal growth.
- Chlorophyll *a* levels in the southern basin were generally lower and less variable on most days. This suggests that the state owned Honeoye Inlet Wildlife Management Area, an 880 acre wetland complex, may be serving as a stabilizing nutrient sink during the active growing season.
- On September 13, chlorophyll *a* levels strongly increased northward in the lake basin. This is likely related to a favorable northerly wind direction on that specific day as well as natural flow to the lake outlet.
- Chlorophyll *a* levels in the northern basin are highest in late summer, and are the highest levels experienced throughout the entire lake. While this may suggest that nutrient inputs are greater in the northern half of the watershed, no data exists to test this hypothesis. A future stream sampling program, focused on storm events, might provide some insight.

Sharing Results

A PowerPoint slide presentation has already been given to the Water Resources Council at one of their Friday morning meetings. Others interested in the program may request it from Bruce Gilman by contacting him through e-mail (gilmanba@flcc.edu) or office phone (585-785-1255). The final report will also be posted on the HVA website for public dissemination.