Chlorophyll a analysis of Otsego Lake, summer 2010

Henry Bauer

INTRODUCTION

Every year the biotic and abiotic factors of Otsego Lake are analyzed in a limnological study (Harman et al. 1997). The factors are studied to discover and resolve any potential threats to the lake. One of the factors analyzed is vertical distribution of chlorophyll a concentrations.

Chlorophyll a is a light sensitive pigment used in photosynthesis. It is used as an indicator for relative abundance of algae. By measuring the amount of chlorophyll a one is able to compare the biomass of the algae from year to year. Algae also serve as an indicator for water quality and trophic status in the lake. As the primary producers in the lake, algae have a large impact on the fish populations. Algal blooms can threaten cold water fish as the decomposing algae in the hypolimnion consume oxygen. The algae population is mainly influenced by zooplankton grazing and nutrient availability. This survey provides information on where the algae are prospering, which may not be apparent through simple observation or using composite samples.

Monitoring of chlorophyll a concentrations in the Otsego Lake for the summer of 2010 has been concurrent with the evaluation of the overall chemical and physical parameters (Waterfield and Albright 2011).

Methods

Chlorophyll a samples were gathered at site TR4-C; the deepest point of the lake (Figure 1). Samples were gathered at 1 meter intervals from the surface to 20m using a Van Dorn sampler. Chlorophyll a is sensitive to light and heat so the samples were kept in a dark cooler with ice for transport.

At the lab 200ml of each sample was immediately filtered through a GF/A Whatman® 47mm Glass Micro fiber filter. The filters were then folded in half to protect the chlorophyll and blotted dry. The filters were then placed in 47mm sterile Millipore® Petri dishes which were covered in foil to keep them dark, labeled, and stored in the freezer (-20 °C) until they could be further processed.

Each filter was cut into small pieces using forceps and scissors. The pieces were placed in a glass grinding tube with about 3ml of buffered acetone. (Buffered acetone is ninety percent acetone and ten percent saturated MgCO₃.) Using a Teflon drill bit, the filter and solution was ground into a homogenous slurry. Buffered acetone was added to each mixture until they reached 10ml. The concentrated 10ml samples were then centrifuged for 10 minutes. Each sample was then placed in a cuvette and analyzed in a Turner Designs TD-700 Fluorometer. Following the procedures of Arar and Collins (1997), chlorophyll a concentrations were determined.

---

Figure 1. Otsego Lake Sample site TR4-C, used for water collections for chlorophyll a analysis, summer 2010.

RESULTS

Figure 2 shows the average chlorophyll a concentrations in Otsego Lake for the summer of 2010. The data was collected four times, from 1 July to 13 August. The chlorophyll a levels typically peaked around a depth of 10 meters. This indicated that some types of algae thrive at lower, dimmer levels of the lake.
Figure 2. Mean chlorophyll a concentrations, and standard error bars, over the summer, 2010.

Figure 3 shows average chlorophyll a levels for the summers of 2000 (Durie 2001), 2001 (Wayman 2002), 2002 (Wayman 2003), 2003 (Schmitt 2004), 2004 (Murray 2005), 2005 (Zurmuhlen 2006), 2006 (Stevens 2007), 2007(Ottley 2008), and 2010. (Data are lacking from 2008 and 2009). When compared to 2007, 2010 chlorophyll a levels are extremely similar, being lower than previous years. Over 2010, Secchi transparencies were substantially higher than any year since the early 1980s (Waterfield and Albright 2011).
REFERENCES


