Shampa A. Panda, University of North Carolina at Chapel Hill. Nutrient Dynamics and Primary Productivity in a Biomanipulated Eutrophic Lake. Mentors: Mr. Steve Di Lonardo and Dr. John Wehr

Abstract: A study was conducted in summer 2011 on North Lake, in suburban Armonk, NY, a lake managed to control aquatic vegetation and monitored for ten years for water clarity, nutrient chemistry, algal biomass, and phytoplankton community structure. North Lake receives nutrients from runoff, wildlife, and other human activities, and experiences episodes of dense aquatic vegetation and elevated phytoplankton biomass. Past data suggest that removal of aquatic vegetation by grass carp may have led to increases in internal nutrient loading and greater phytoplankton levels. To determine the factors driving algal productivity, a mesocosm experiment consisting of 12, 4-L cubitainers was conducted using a 2 x 2 factorial design: control, nitrogen, phosphorus, nitrogen + phosphorus. Three 4-day experiments quantified changes in chlorophyll-*a*, phytoplankton composition, and water chemistry under these treatments at 0-h, 3-h, and 4-d. In all three experiments the +N+P treatment resulted in the greatest algal biomass. Nutrient uptake (NH_4^+, NO_3^-, TDN, PO_4^{3-}, TDP) over 4 days was estimated and compared against algal biomass, with greatest rates of N and P uptake measured in +P treatments. The relationship was positive and significant for the uptake of all nutrient forms measured. Results indicate that algal biomass (as chlorophyll-*a*) was co-limited by the supply of N and P, and that nutrient uptake (both N and P) was limited by P availability. Managing phytoplankton blooms in North Lake in the future may require the identification and careful regulation of the sources of both nitrogen and phosphorus inputs into the lake.