

Lake Superior phytoplankton characterization from the 2006 probability based survey. J. A. Thompson, Knuth, M.L., Siefert, L., Yurista, P.M., Kelly, J.R., Miller, S.E., and Van Alstine, J.

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We conducted a late summer probability based survey of Lake Superior in 2006 which consisted of 52 sites stratified across 3 depth zones. As part of this effort, we collected composite phytoplankton samples from the epilimnion and the fluorescence maxima (Fmax) at 29 of the sites. Pigment content and chlorophyll-a were measured using HPLC. Phytoplankton were identified to the lowest practical level using light microscopy at 500x magnification. Cells were counted and biomass was calculated based on measured volume. We examined taxonomic distribution across the lake and compared the phytoplankton measures between the depth zones and between the epilimnion and the Fmax. Three Ontario bays (Black, Thunder and Nipigon) had disproportionately high measures of both chlorophyll-a and estimated biomass. Mean lakewide epilimnion biomass (excluding the bays) was  $49.3 \text{ mg/m}^3$  and Chlorophyll-a was  $0.92 \text{ }\mu\text{g/L}$ . Lakewide, the most abundant groups present were Bacillariophyta and Cyanophyta. Nonmetric multidimensional scaling (NMS) examining 47 lower taxonomic levels (mainly family and genus) demonstrated wide differences across the Lake. Taxa that were strongly correlated ( $r > 0.5$ ) with the NMS axes were *Fragilaria sp.*, *Aphanocapsa sp.*, *Merispopedia sp.* and *Anabeana sp.* and centric diatoms (when bays were excluded from the analyses). Chlorophyll concentration was significantly higher in the nearshore (Ontario bays excluded), then intermediate and off- shore sites, but estimates of biomass were not. Using paired t-tests, we found differences in pigments, chl-a, and taxonomic composition between the epilimnion and the Fmax. Our results indicated that over-all biomass is not changing from previous studies in Lake Superior, but there is some indication that the community structure may be changing. Our results also demonstrate that surveys based on epilimnion samples may be useful for tracking trends over time.