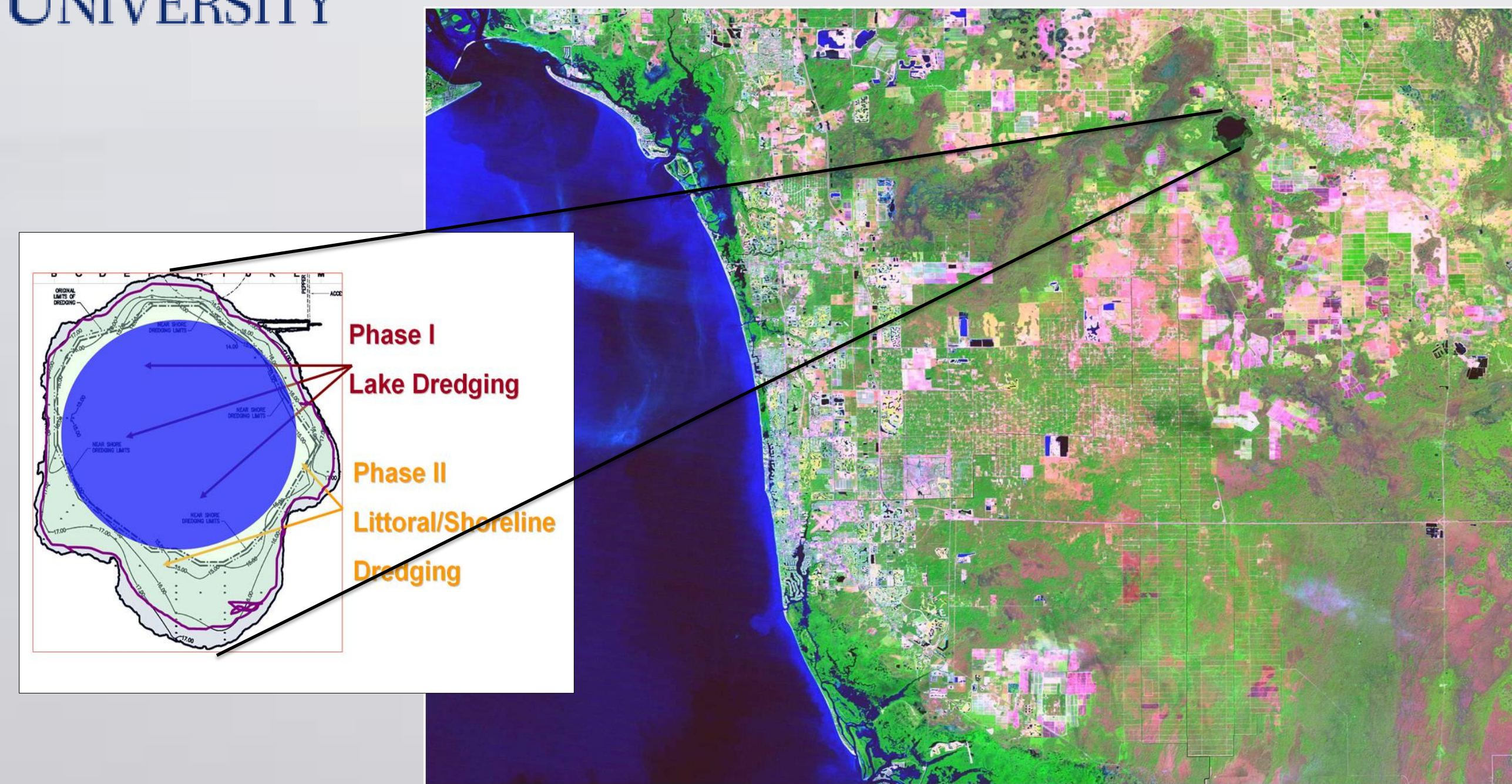


An update on the biological monitoring of the Lake Trafford Restoration Project, Collier County, Florida: A case for monitoring during restoration

David W. Ceilley, Edwin M. Everham III, Serge Thomas, John A. Morris, and Kory M. Ross, Inland Ecology Research Group at Florida Gulf Coast University



Background

Lake Trafford is a shallow, subtropical lake that was subjected to increasing anthropogenic nutrient loading over several decades. Excessive growth of the invasive exotic aquatic plant *Hydrilla verticillata* choked out native aquatic plants and negatively impacted sport fisheries. Herbicide treatments for *Hydrilla* removal were successful but the eradication led to accumulation of a deep organic muck layer throughout the lake and since then Lake Trafford has been a phytoplankton dominated lake with frequent algal blooms and fish kills. As a direct result of a grass roots initiative, the Big Cypress Basin of the SFWMD implemented a restoration project that involves hydraulic dredging of muck sediments from the lake. The removal of over 4 million cubic yards of sediments was completed in 2008. Additional de-mucking is currently underway with an expected completion date of April 2011. Natural recruitment of native aquatic macrophytes has been hindered by turbidity and reduced water clarity from remaining muck being easily re-suspended in the water column from wind generated waves. As the remaining muck is removed from Lake Trafford, exposing a sand and shell/clay bottom, we expect to see dramatic shifts in water clarity, phytoplankton/zooplankton communities, and sedimentation rates.



Restoration Goals & Monitoring

A primary restoration goal is to return Lake Trafford to a meso-trophic, native macrophyte dominated lake with a stable sport fishery. The following monitoring plan elements are proposed to document the post-muck removal lake conditions of Lake Trafford and track performance measures of restoration success:

- 1) seasonal diurnal zooplankton surveys;
- 2) biweekly chlorophyll, phytoplankton, and PhytoPam analysis;
- 3) annual SAV surveys and Lake Vegetation Index (LVI);
- 4) benthic and littoral zone macroinvertebrate community assessments;
- 5) littoral zone fish community structure;
- 6) sediment surveys and sedimentation rate monitoring;
- 7) weather station installation and monitoring;
- 8) modified water quality monitoring plan; and most importantly
- 9) development of a *Lake Management Plan* in cooperation with FDEP, SFWMD, FFWCC, USFWS, ACOE, and Collier County.



Methods & Preliminary Results

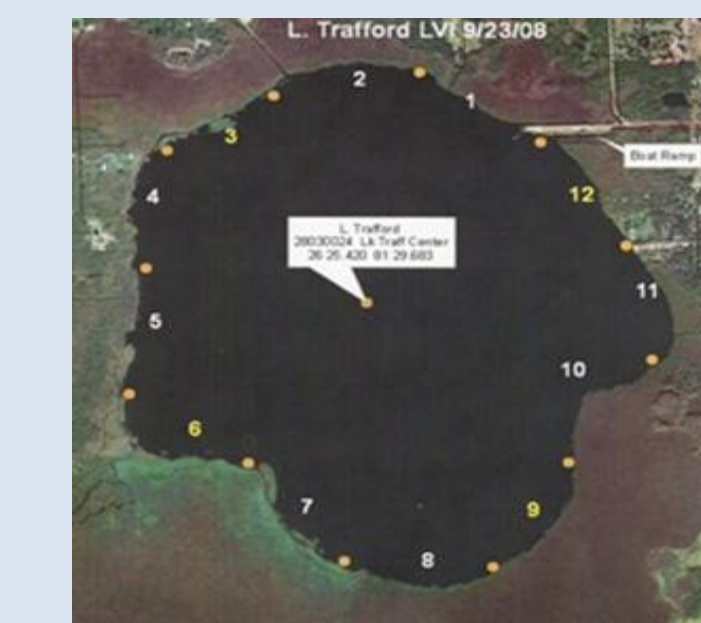
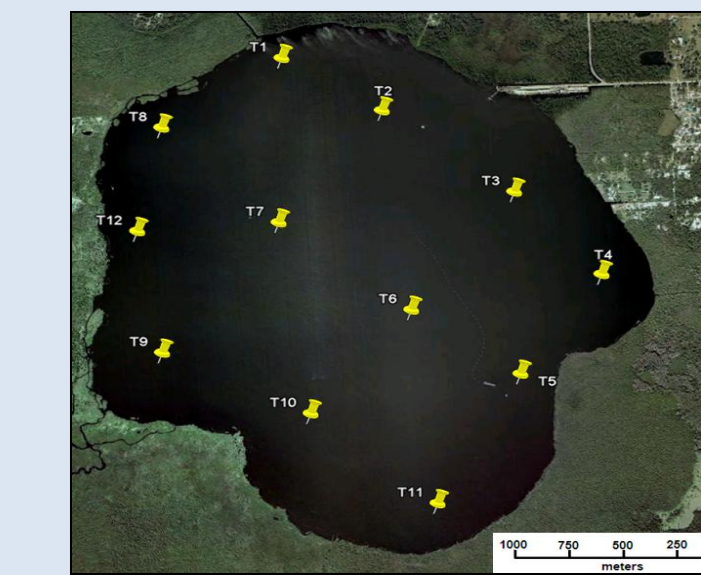
➤ **Field water quality parameters and phytoplankton communities** have been sampled biweekly by boat since early March 2010 at 12 locations. Lake samples are returned to FGCU labs for analysis using PHYTO-PAM which calculates photosynthesis and can determine for each algal group present in the water sample (cyanobacteria, green algae and Diatoms/dinoflagellates pooled together).

➤ **Zooplankton communities** have been surveyed in conjunction with the phytoplankton sampling using standard 367-micron mesh plankton net to exclude nano-plankton. Organisms collected were identified to the lowest practical taxonomic level with density estimates for major taxa prepared based on length of tow, diameter of the net aperture, and Sedgewick-Rafter cell counts. Zooplankton counts were averaged from five sites (T-1, T-4, T-6, T-11 and T-12) for each date for this progress report.

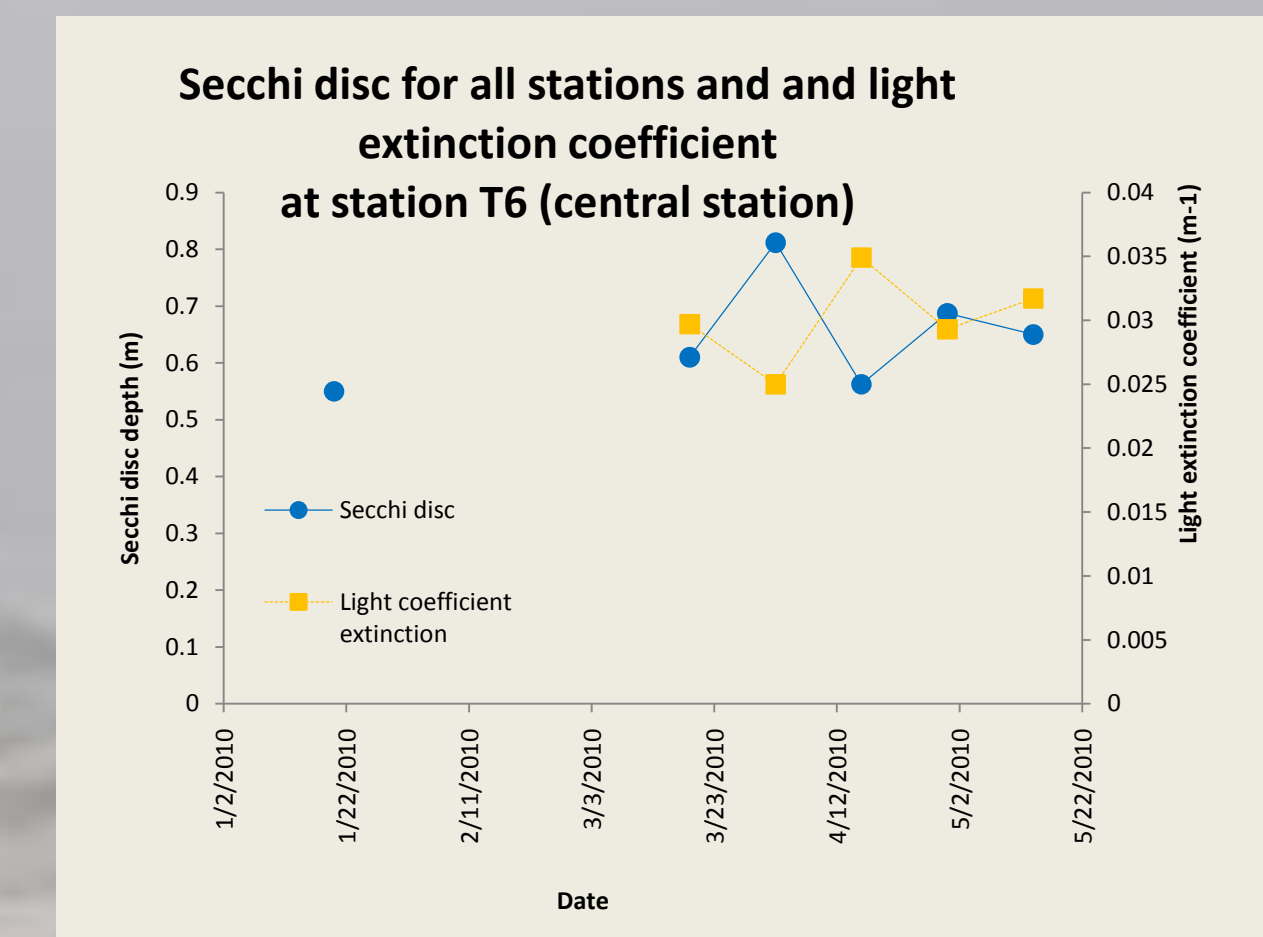
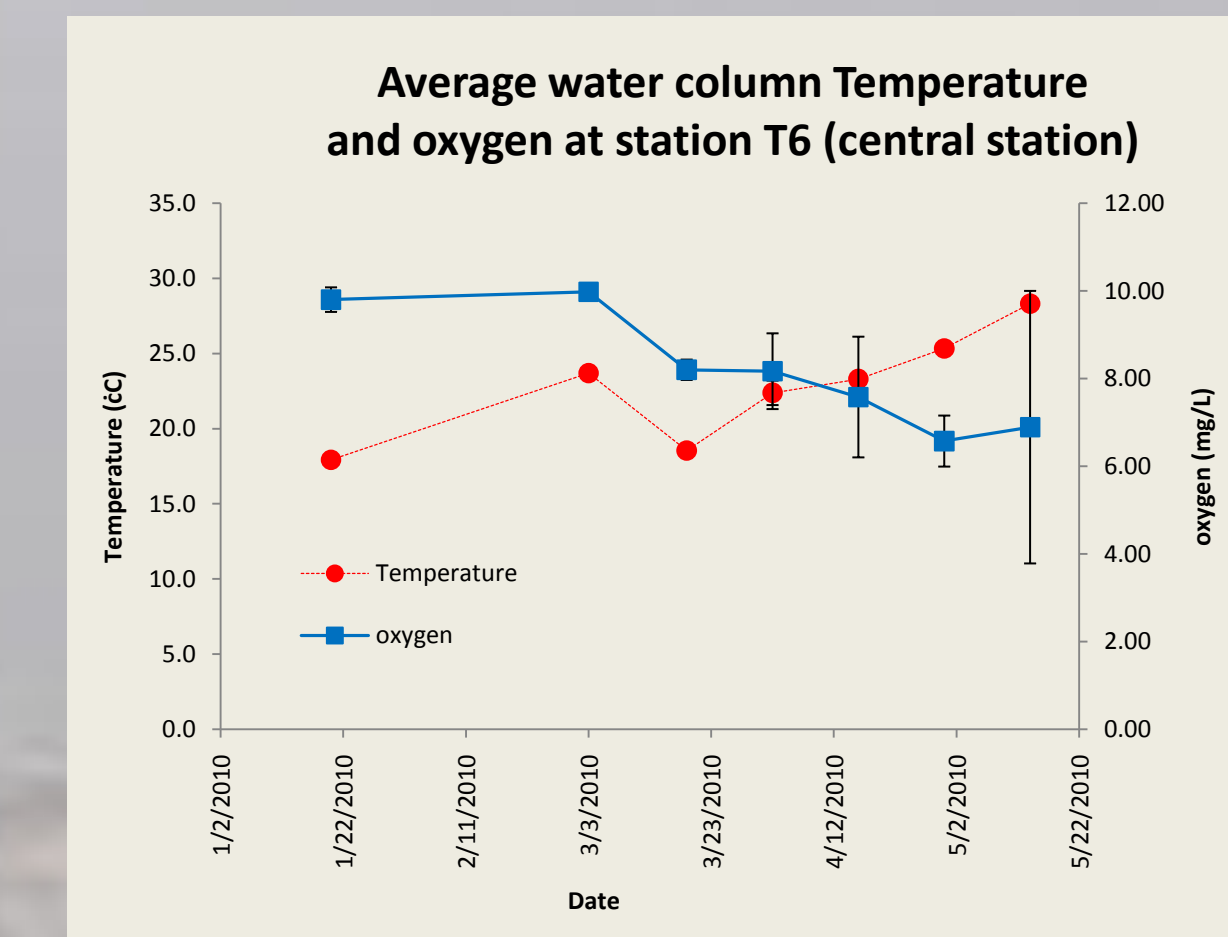
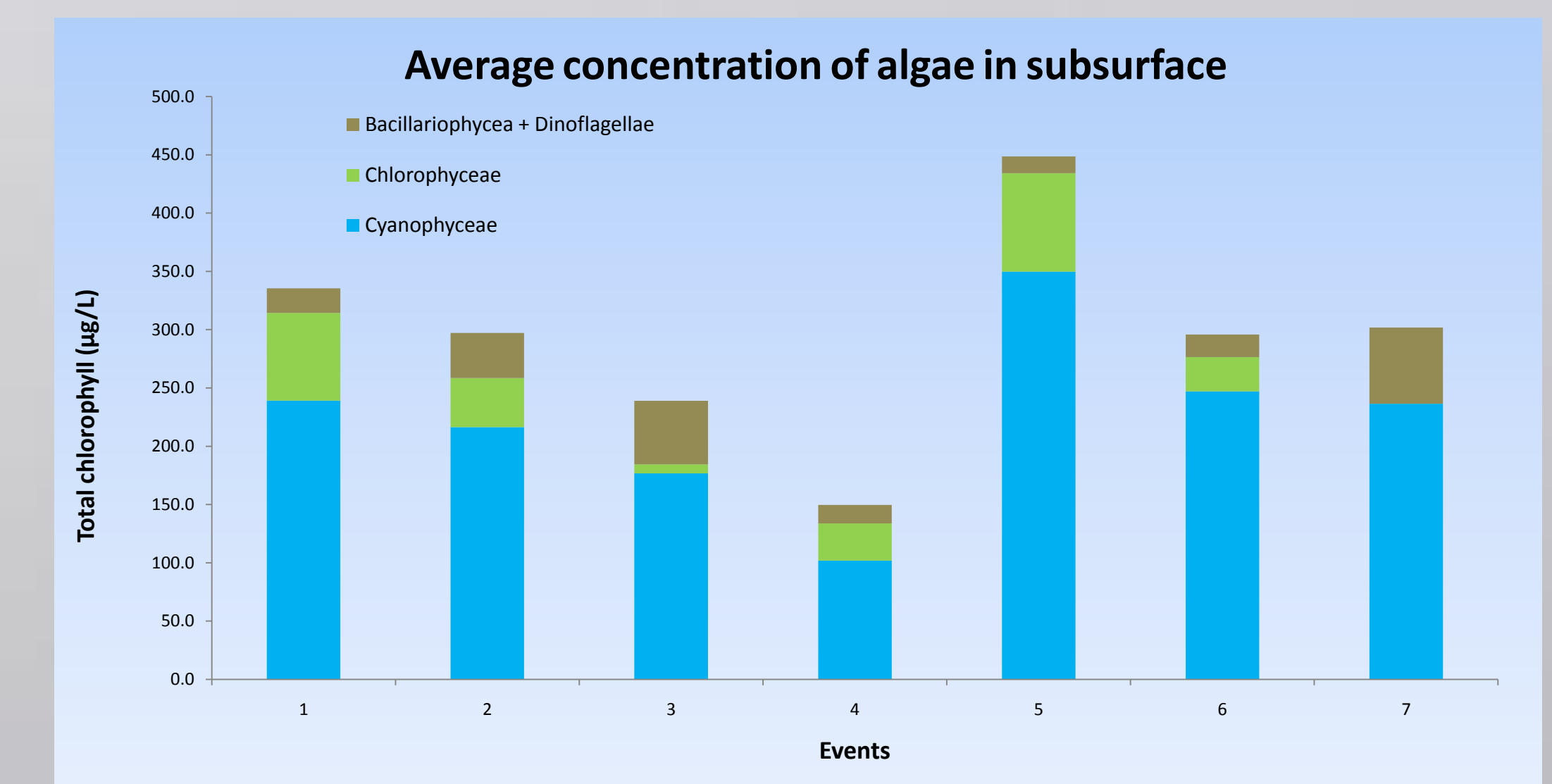
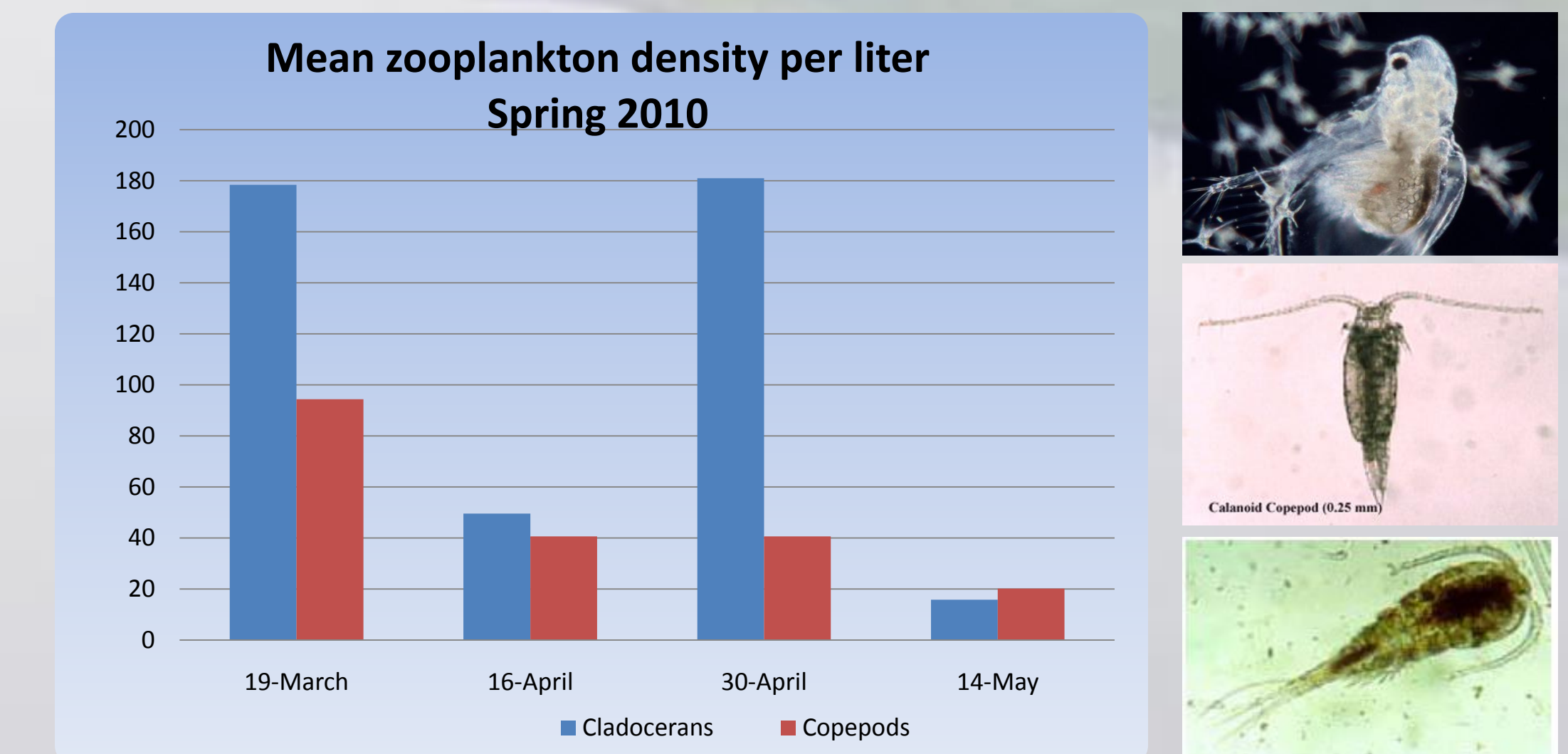
➤ **Transect profiles** of the Lake bottom and survey for submerged aquatic vegetation (SAV) were completed on 27 May 2010 using a Biosonics Echosounder™. General depth profiles of the Lake bottom were graphed along with signatures of a soft-bottom or unconsolidated flocculent organic material. Transects were ground-truthed at selected intervals using petite Ponar dredge and PVC pipe. No SAV were detected from the transects or grab samples. *Hydrilla verticillata* was found in three canals on 4/27/10 when touring the Lake with FWC Biologists. Locations of *Hydrilla* were GPS mapped and sent to FWC and SFWMD for herbicidal treatment for control.

➤ **Lake Vegetation Index (LVI)** sampling was conducted by FDEP and FGCU biologists in September 2008. Standard Operating Procedures for Macrophyte Sampling (FS7300) and Lake Vegetation Index (LVI) Sampling (FS-7310). No submerged aquatic vegetation (SAV) were found in the four transects in 2008.

➤ **Restoration of native emergent (bulrush) and submergent (tape grass) plant communities** are critical components of the restoration plan by the Florida Fish and Wildlife Commission. A tape grass restoration feasibility study was initiated by FGCU in June 2008 during a period of extreme low water levels and high water clarity. High water levels and decrease water clarity following Tropical Storm Faye in September 2008 likely caused *Vallisneria* (tape grass) plantings to fail but tubers may persist. Bulrush planting at one location by FWC was completed in June 2009 with additional plantings on hold until the completion of the de-mucking project in March 2011.



Performance Measures



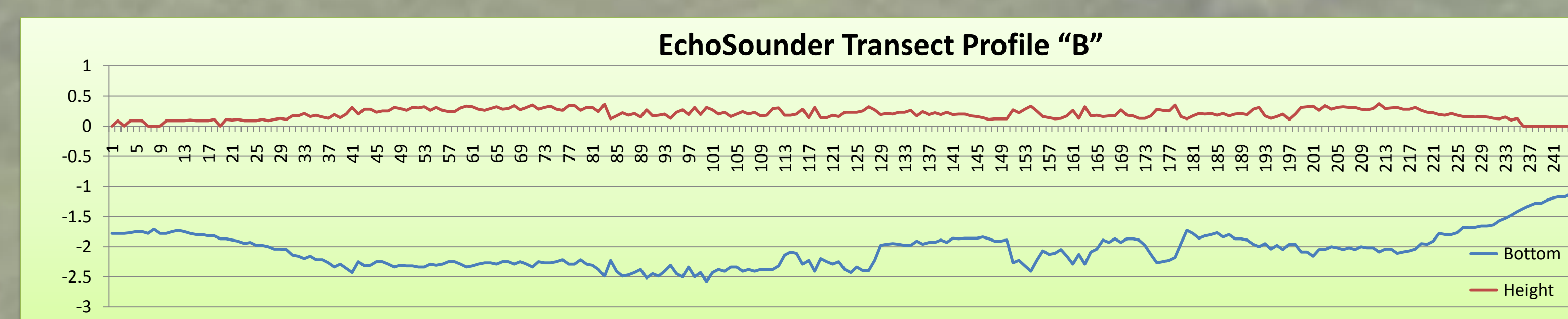
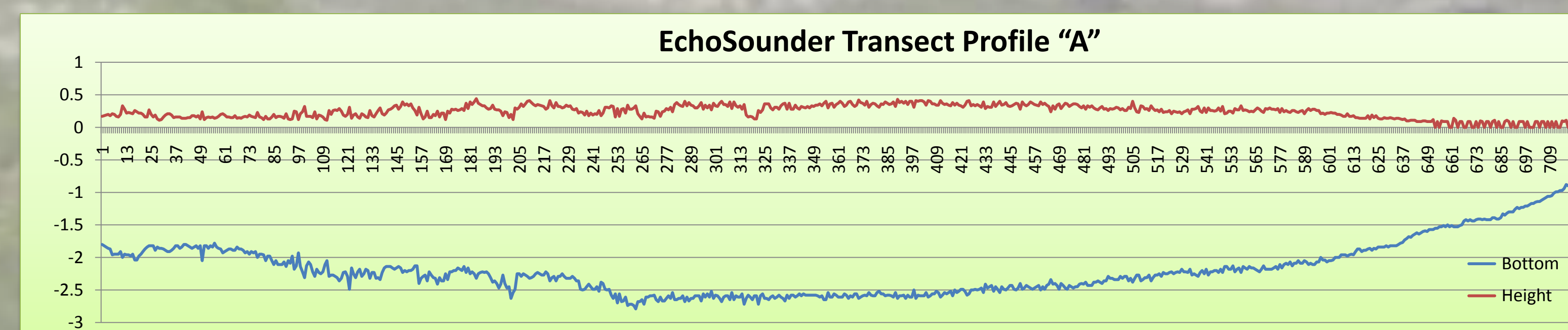
Preliminary Conclusions

➤ Lake Trafford abiotic gradients – turbidity, temperature, and light (PAR) attenuation are problematic and the Lake remains phytoplankton dominated. Water clarity should become a performance measure to allow SAV recovery.

➤ Native SAV communities are absent based on recent transects and grab samples, but *Hydrilla* has been observed in un-dredged canals feeding into the Lake.

➤ Post-dredging restoration activities – SAV plantings and fish stocking – will be influenced by the legacy of the dredging activity, water quality, and control of exotics.

➤ Tracking abiotic and biotic factors will be necessary to understanding the current lake system dynamics toward guiding the post-dredging restoration efforts and management activities.



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