Cayuga Lake TMDL Sediment Core Analysis
Goals:

• to document the history of TP levels in Cayuga Lake, as background to TMDL assessment of TP on the southern shelf

• To independently corroborate modeling results, based on comparison between mechanistic hindcast and paleolimnologic inference TP modeling
Project Participants

• USEPA
  • Abt Associates
    • Anchor QEA
    • St. Croix Watershed Research Station (MN)
  • Hutchinson Environmental Sciences
  • Washington University of Saint Louis
  • Life Science Labs

• NYSDEC
  • Rensselaer Polytechnic Institute

• Hobart and William Smith Colleges
Project Tasks

1) Sediment Coring – completed 5/13/2014

2) Core sample analyses – complete, Abt report complete

3) Diatom TP inference modeling – complete

4) Data correlation – in progress

5) Historical water quality interpretation – part of final report

Cayuga Lake

County: Seneca, Cayuga, Tompkins
Surface Area: 42,956 Acres

Scale: 0 — 22,000 ft
Cayuga Lake
Sediment Core

Black layer 1990-2000
*Geology* 26; 443-446.

![Graph showing Pb ppm (ppb) and carbonate percentage versus year for Cayuga Lake Box Core CL-1.](image)

**Figure 3.** Dry weight percent calcium carbonate and total organic matter (TOM) content versus depth for box core CL-1 (see Fig. 1). Date of A.D. 1963 is based on direct $^{137}$Cs and $^{210}$Pb data, whereas date of A.D. 1940 is based on linear extrapolation from A.D. 1963.
Figure 2. Profiles of dominant diatom taxa (n=15, maximum abundance >5) for the Cayuga Lake core with PCA sample scores and zonation by CONISS.
Preliminary Conclusions

- Adequate core recovery and age control to carry out project objectives

- Oligotrophic lake until 1840s, mesotrophic into 1950s, borderline eutrophic from late 1950s into late 1980s, mesotrophic to recent

- Inferred TP comparison to measured TP data and model hindcast pending……..

- Some carbonate deposition associated with increased lake productivity

- Terrigenous material and volatile solids rise until 1960s, then continue with episodic variability

- Carbonate decline starts and the most recent rise in terrigenous material occurs in late 1990s