

ORAL PRESENTATION

CONSEQUENCES OF TAXONOMIC DISCORD IN A GREAT LAKES MONITORING PROGRAM

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The EPA's Great Lakes National Program Office (GLNPO) is now in its 26th year of comprehensive monitoring of the Great Lakes. Pelagic monitoring includes physical and chemical parameters, phytoplankton, zooplankton and benthic invertebrates. Monitoring data have revealed significant changes in whole-lake conditions, particularly within the last decade, thus justifying GLNPO's mandate to track changes under the Great Lakes Water Quality Act of 1978. As a long-term monitoring program it is critical that operating procedures, particularly taxonomy of organisms, remain consistent over time. Changes in primary contractors for GLNPO's phytoplankton program necessitated taxonomic workshops for new analysts, but unfortunately several complex taxonomic issues arose. The impacts of taxonomic discord can be extensive, including poor indicator development and inability to adequately track long-term changes in the ecosystem. During the last two years substantial efforts were made to correct taxonomic inconsistencies in the diatom and other algal data, and ensure data quality.

Based on Niche Theory, the environmental optima and tolerances of diatom species should be consistent over time. With this in mind we developed three Great Lakes phytoplankton-phosphorus transfer functions, each derived from samples collected in a particular year and assessed by different analytical laboratories. Taxonomic efforts focused on ensuring consistency between 1999 and 2007 datasets, and a 2003 dataset was left "uncorrected" (i.e., it contained several known taxonomic problems). Transfer functions were developed using weighted averaging and we tested each model's ability to estimate measured phosphorus. Workshop efforts to refine taxonomic consistency had a clear positive influence on maintaining species coefficients between 1999 and 2007, whereas the impact of even subtle taxonomic variations in 2003 resulted in large differences in species coefficients among models.

With the promise of a revitalized algae program, innovative applications for these monitoring data are briefly presented. The diatoms are especially known to provide better integrated information about stressors than direct measurements, and they are particularly suited to paleolimnological applications. At a time when long-term data are needed to distinguish natural from human trends, and to reveal the causes and magnitudes of environmental insults, contemporary monitoring alone is not sufficient to answer important management questions regarding climate change, pollution and invasive species in the Great Lakes. New indicator-based and paleoecological applications, and attention to taxonomic quality, are needed to address the myriad environmental issues that require long-term data for critical remedial decisions.