

**Delaware Sea Grant Project:**

Development of diatoms as indicators of water quality in Delaware's inland bays (R/BT-2)

**Investigator:**

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**Project Abstract:**

Delaware's Inland Bays are among the most eutrophic systems in the United States, due to massive inputs of agricultural runoff, urban sewage discharges and long water residence times. In response to growing concern about degradation of water quality within these bays, the Center for the Inland Bays was established as part of the National Estuary Program and a comprehensive management plan was developed to guide management and restoration efforts. In order to evaluate outcome of these efforts, a number of indicators were developed to assess the health of the bays. While improvements in water quality have been noted in the bays since organized clean-up efforts began, future predicted changes in watershed land use are likely to significantly impact water quality in the near future. Additional indicators of water quality for this region are now needed to provide a more coherent assessment of water quality in the Inland Bays and their watershed.

Algae, and diatoms in particular, are excellent indicators of environmental condition in aquatic ecosystems and are routinely used to monitor water quality in freshwater ecosystems. Recent research has also demonstrated the utility of diatoms as reliable indicators of water quality within marine systems. Several studies have shown, for example, that diatom community composition and relative abundances of species are particularly responsive to nutrient concentrations. For this project, our goal is to identify and develop benthic diatoms as indicators of water quality for the Delaware Inland Bays. A suite of molecular and statistical methods will be used to evaluate community and species-specific responses of diatoms to nutrient concentrations over a broad range of ecosystems within the inland bays. Nonlinear responses of diatom communities and indicator species to specific pollutants will also be evaluated.

One of the primary objectives of this project is the active transfer of this technology to management agencies and monitoring personnel. Workshops will be conducted in year three to provide hands-on training to personnel at Delaware's Dept. of Natural Resources and Environmental Control and at the Center for the Inland Bays. Workshop participants will also be provided with a detailed manual of protocols developed during this project. The manual will be supported by a website maintained at the UD College of Earth, Ocean, and Environment. The purpose of the manual and website will be to assist monitoring personnel in the implementation of molecular technologies into their monitoring program for assessment of benthic diatom indices.

This project includes the participation of the Inland Bays Citizen Phytoplankton Monitoring Group, a community-supported effort for monitoring water quality in the Delaware Inland Bays. This group routinely collects water quality data from the bays, including nutrient concentrations, temperatures, salinities, and phytoplankton and bacterial abundances. The participation of the Citizen Phytoplankton Monitoring Group is essential to our success and they will be included in

regular meetings, training sessions, and informal seminars to inform them of our research progress.

During this project, we will also maintain close communication with the Center for the Inland Bays, so that diatom indicators developed during the project will be integrated into currently employed water quality indices for a more comprehensive assessment of water quality in the Inland Bays and their watershed.