

Modeling the Sensitivity of Primary Production in Lake Michigan to Nutrient Loads With and Without Dreissenid Mussels

M. D. Rowe, J. J. Pauer, P. A. DePetro, and R. G. Kreis

Dreissenid (quagga) mussels became established in large numbers in Lake Michigan beginning around 2004. Since then, significant changes have been observed in Lake Michigan open-water chlorophyll and nutrient concentrations, and in primary production. We updated the LM3-Eutro model to investigate the response of chlorophyll concentrations and primary production in Lake Michigan to nutrient loading scenarios with and without representation of dreissenid mussel filter feeding. LM3-Eutro is a high resolution (5-km horizontal, 19 sigma-layers) nutrient, phytoplankton, zooplankton, and detritus model. We made several improvements to the model: 1) updated daily N and P loads for 1994-2008, 2) an interactive sediment compartment for nutrients, 3) updated photosynthesis-irradiance curves, and 4) representation of dreissenid mussel filter-feeding effects. Mussel biomass and temperature-dependent filtration rate were specified, based on literature values. The model was calibrated and verified over the period 1994-2008 using available data. Model runs illustrate the sensitivity of chlorophyll and primary production to changes in nutrient loads with and without dreissenid mussels. This abstract does not necessarily represent the official position of US EPA.

Session 11. Eutrophication Management in the Great Lakes: Past, Present and Future

Chaired by Steven Chapra and David Dolan

Steven Chapra, Tufts University, Civil and Environmental Engineering, Medford, MA 02155 USA; Phone: (617) 627-3654; E-mail: schapr01@tufts.edu.

David Dolan, University of Wisconsin - Green Bay, Natural and Applied Sciences, Green Bay, WI 54311 USA; Phone: (920) 465-2986; E-mail: doland@uwgb.edu.

This session will feature presentations that review the current status of phosphorus management in the Great Lakes. The success of data collection efforts and models that were used to support target phosphorus loads for the Great Lakes and their utility today as ongoing management tools will be examined. Recommendations on the need for improvements in monitoring and reporting based on the collective experience of investigators will be sought. The session will also include presentations related to Great Lakes ecosystem changes that have occurred that require modifications for future monitoring, modeling, and strategies related to managing the Great Lakes.