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A SYNTHESIS ANALYSIS OF DREISSENIID INVASION
IMPACTS ON CHLOROPHYLL AND TOTAL PHOSPHORUS IN LAKE ECOSYSTEMS

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ABSTRACT: Dreissenid mussels were first documented in the Laurentian Great Lakes in the late 1980s. They have spread quickly, being detected in 612 freshwater lakes in 26 U.S. states in addition to all five of the Great Lakes (as of March 2011). Dreissenids appear at high densities, filter a large amount of water with suspended materials, redirecting nutrients from the water column to the lake sediment. Thus, they can alter nutrient cycling and availability in the lentic ecosystems. Chlorophyll a (Chl) and total phosphorus (TP) concentrations were obtained for 24 U.S. lakes that were invaded by dreissenids. For each lake, the changes in Chl and TP levels were estimated during the post-invasion period, and an analysis was performed to see if the degree of changes was related to seasonal stratification or morphological characteristics of the lakes. For the five lakes where Chl and TP data were available for longer ten years after the invasion, it was estimated if the effects of dreissenid invasion on Chl and TP levels have diminished or extended over 10-20 years of invasion. To examine the change in the relationship between Chl and TP possibly caused by dreissenid invasion, a Bayesian hierarchical regression was employed that allows for estimating slope and intercept parameters during pre- and post-invasion periods, respectively, for individual lakes as well as across lakes. The results are expected to give a better understanding of how dreissenids would alter the processes that determine phytoplankton biomass in the lentic ecosystems.

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