

PERFORMANCE OF DIATOM METRICS IN AGRICULTURALLY DOMINATED WATERSHEDS

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This study was designed to determine whether diatom community composition responded to ranges in nutrient concentrations found in low and high levels of agricultural land use. Diatom community composition, nutrient concentrations, and landscape characteristics were determined at 232 sites in eight agriculturally dominated study areas of the continental United States. The eight study areas were separated into two subgroups based on differences in diatom response signature for human disturbance. Two eastern study areas were grouped because they had lower median TP, a lower range in nutrient concentrations, and more wetlands in watersheds than the eight west-central study areas. Diatoms responded to nutrients and ionic gradients in the eastern subgroup of sites and more exclusively to nutrient concentrations in the west-central group of sites. Homogenization of diatom flora in streams as a result of agricultural disturbance was observed at this nationwide scale with the flora converging on taxa adapted to higher alkalinities and nutrient concentrations. Diatom metrics were well related to TN and TP concentration, a multimetric index for nitrogen and phosphorus concentration, and indicators of agricultural land use in watersheds, especially percent row crops. Diatom metrics were more precisely related to N concentrations than P concentrations, but other lines of evidence indicated responses were more likely related to P limitation or N and P co-limitation. The lack of causal linkage between metrics and P concentration may be due to proportionally higher P than N uptake in streams. Diatom community composition responses were related to changes in streams in high as well as low ranges of agricultural activity, which indicates that assessment tools and restoration targets for agriculturally dominated watersheds could be developed using diatom assemblages.

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