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Utilization of ^{31}P NMR in the Phosphorus Speciation of Aquatic Systems in Northwestern Ohio

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Utilization of ^{31}P NMR in the Phosphorus Speciation of Aquatic Systems in Northwestern Ohio

Eutrophication continues to be an issue in the western Lake Erie basin as dissolved phosphorus (DRP) loads have increased since the mid-1990's. Efforts to mitigate and reduce DRP loads have not produced the intended results. P retained in sediments can buffer DRP concentrations in aquatic systems, particularly if held in unreactive forms. To date, however, little has been done to relate chemical speciation with sorption behavior. This study utilized ^{31}P NMR spectroscopy to determine the chemical speciation of extractable P from benthic sediments in the Tiffin and Blanchard Rivers. The relationship between chemical form and sorption parameters suggests that organic modification (e.g., monoesters) reduced sorption capacity and equilibrium P concentrations. Better understanding of chemical speciation may ultimately lead to the development of better mitigation strategies and reductions in DRP loads into Lake Erie.