Assessing Aquatic Macroinvertebrate Communities in Wetland Reserve Easements in the Mississippi Alluvial Valley

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Nutrient and sediment runoff into wetlands affects water quality and biota and some taxa are particularly sensitive to stressors (e.g., nutrient enrichment). Aquatic macroinvertebrate communities, for example, may be especially impacted in watersheds with predominately agriculture land use, such as the Mississippi Alluvial Valley. The Agricultural Conservation Easement Program - Wetland Reserve Easements, a conservation program administered by the Natural Resources Conservation Service, aims to restore wetlands and mitigate loss. Thus, to assess restoration success, we examined abundance and diversity of aquatic macroinvertebrate communities of Wetland Reserve Easements in Mississippi and Louisiana. We sampled macroinvertebrates from 36 sites (4 crop fields, 5 historic wetlands, and 27 Wetlanchd Reserve Easements) once between March and May (i.e., spring) 2024 and from 19 sites (3 crop fields, 1 historic wetland, 15 Wetland Reserve Easements) once in August (i.e., late summer) 2024. Identification of macroinvertebrates collectively totaled 12,546 individuals and 22 unique taxa. Shannon's Diversity and Simpson's Diversity Indices were used to estimate diversity in these aquatic systems. We found no differences between historic wetland and Wetland Reserve Easement sites ($P > 0.05$), but there were differences between crop and historic wetland sites, and crop and Wetland Reserve Easement sites. No differences were detected in late summer or between different landcover types (emergent wetlands and bottomland hardwood forests). To further investigate differences in invertebrate abundance and richness, we modeled the potential impact of water quality parameters and site type. Water depth had the greatest association with both invertebrate abundance and richness in spring, while water temperature had the greatest influence on abundance in the late summer season. We also modeled community composition between site types, and crop sites were most dissimilar from Wetland Reserve Easement and historic wetland sites. Invertebrate assemblages in spring differed by site type and by landcover types. We found no effect between site types and invertebrate communities for the late summer sampling period. Water depth appears to be a primary driver of abundance and richness of aquatic macroinvertebrates. Additionally, landcover types may influence invertebrate assemblages, where, for example, we found the order Sphaeriida to comprise 24% of invertebrates found in bottomland hardwood forests and only 2% of invertebrates in emergent wetlands. Our results indicate similarities in abundance and diversity of aquatic invertebrates between historic wetlands and Wetland Reserve Easement sites, indicating the successful establishment of macroinvertebrate communities following restoration.