ABSTRACT

DISSERTATION: Solving the Problems of an Ohio River Basin Benthic Macroinvertebrate Assemblage Analysis using the State Water Quality Inventory Reports

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Variation in stream collection and assessment methods limit the aggregation and comparability of datasets across political jurisdictions in the United States (U.S.). The purpose of this dissertation is to solve the problems related to evaluating benthic macroinvertebrate assemblage quality using multiple state datasets within the Ohio River basin, U.S. This study focused on three central objectives: 1) detail the assessment, reporting, and formatting methods for four state macroinvertebrate assessment data and GIS digitized stream assessment data; 2) determine whether four macroinvertebrate bioassessments provide the same trends on a single dataset; and 3) develop a benthic macroinvertebrate multi-metric index (MMI) from a multi-state dataset within the Ohio River basin. Through the analysis of state water quality inventory reports and a statistical comparison of state macroinvertebrate community data, this study found that the calculation of an MMI score transcended political jurisdictions. However, the definition of impaired stream was inconsistent among state assessment programs. These results led to the development of an Ohio River Basin Index for Macroinvertebrates (ORBIfM), a MMI that uniformly categorizes stream impairment status across the Ohio River basin. The creation of the ORBIfM improves the ability to share data among states and to accurately assess large-scale, basin-wide stream condition. Further, the ORBIfM allows the states and the U.S. EPA to meet the mandates of the CWA using a hydrologically and ecologically connected ecosystem rather than a piece-meal picture of stream quality across the basin.