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A Comparison of Selected Diversity, Similarity, and Biotic Indices for Detecting Changes in Benthic-Invertebrate Community Structure and Stream Quality

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Abstract. Implementation of advanced wastewater treatment at the two municipal wastewater-treatment plants for Indianapolis, Indiana, resulted in substantial improvement in the quality of the receiving stream and significant changes in the benthic-invertebrate community. Diversity, similarity, and biotic indices were compared to determine which indices best reflected changes in the composition of the biota in the river. None of the indices perfectly reflected the changes in river quality or community structure. Similarity indices, especially percentage similarity, exhibit the most promise of the three classes of indices. Diversity indices were least useful, wrongly indicating that water quality deteriorated after the upgrade of the wastewater-treatment plants. The most descriptive tool in analyzing the data was the percentage of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa present. Using a mixture of indices and other analytical tools, such as EPT, in the analysis of biological data will ensure the most effective investigations of water quality.