Application of multiple index development approaches to benthic invertebrate data from the

Virginian Biogeographic Province

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Abstract.  Benthic invertebrate indices have commonly been utilized to assess benthic invertebrate communities.  These indices have been constructed using different techniques, but have shown different levels of application success.  For example, the EMAP Virginian Province Index did not perform well in a smaller estuarine complex.  Similarly, the Chesapeake Bay Benthic Index of Biotic Integrity did not perform well outside of Chesapeake Bay, despite multiple metric and good habitat separation.  In this study, we assembled multiple variables (metrics) from the literature and applied different methods of index compilation to explore the relative strengths and weaknesses of the indices.  Three different approaches were utilized -- two multimetric indices (Chesapeake Bay approach and the Mebane approach) and a logistic regression technique.  The data were subdivided by habitat (salinity and grain size) and indices compiled using the same initial group of benthic metrics.  Each approach was examined for its classification accuracy for both reference and impaired sites for the entire Virginian Province. The Chesapeake Bay approach did not perform well in this study.  In contrast, another multimetric approach, the Mebane approach, performed well, as did the logistic regression approach.  Both techniques have promise for index development and could be useful in applying a biological condition gradient to estuaries.