Session J7: Standardizing and Enhancing Biological Assessment Methods

Room C124
1:00 – 2:30 pm

0158
J7-1

A Tool to Evaluate the Health of Streams and Rivers within the Chesapeake Bay Watershed

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The Chesapeake Bay Program and its partners developed a benthic index of biotic integrity ("Chessie B-IBI") that provides a regional assessment of the health of the streams and rivers in the Chesapeake Bay watershed. More than twenty state, federal, and local monitoring programs collect benthic macroinvertebrate samples in the 64,000 square mile Chesapeake Bay watershed. These programs use somewhat similar field methods and calculate a common suite of indicators from the data. The challenge is that each program uses different protocols to score and evaluate these indicators in order to assess waters for regulatory purposes. The objective of the Chessie B-IBI is to evaluate non- tidal benthic community health in a uniform manner and in the context of the entire Chesapeake Bay watershed. This approach incorporates the data into an overall watershed-wide B-IBI that standardizes the indicators at the family level.

The Chessie B-IBI was applied 7,886 locations associated with random or systematic sampling designs to evaluate small and moderately-sized watersheds for the 9-year period of 2000 - 2008. By using only random or systematic sites, B-IBI scores can be averaged across a large watershed area without introducing bias associated with sampling designs that target areas with known degraded or high quality waters. Averaging and area-weighting the B-IBI results by moderately-sized (HUC8) watersheds indicates that 30% of the Chesapeake Bay basin area has an *average* stream condition of poor or very poor, 48% fair, and 13% good. No HUC8 watershed had an excellent rating (although several smaller watersheds rated excellent), and 9% of the basin area could not be scored due to small sample sizes within the watersheds. Variation in the Chessie B-IBI can be linked to land-based activities in individual watersheds.

The most important implication of this method is that the results can be compared across jurisdictional boundaries. As such, the Chessie B-IBI is an example of a tool that can be developed to standardize and utilize multi- jurisdictional data for regional water quality assessments. The results from this B-IBI will help managers and watershed groups focus efforts to restore streams needing improvement and protect the quality of the healthiest streams.

0224
J7-2

Standardizing Bioassessment Protocols: Collaboration without a carrot or a stick

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Our goal is a regional biomonitoring program for Puget Sound streams that integrates data collected by cities, counties, tribes and state agencies. Our intention is to create monitoring tools and collaborative opportunities that support group decisions and engagement at the regional level.

Approximately 20 local jurisdictions collect stream macroinvertebrates and calculate a multimetric index using different protocols for sample collection, taxonomic identification and data analysis. Although bioassessment methods are similar, questions remain about how comparable index values are across programs and watersheds. Standardization means that someone has to change what they do; and change brings the potential for loss of continuity in long-term data sets.

Our first task was to identify partners and advisors. We developed a core team of 5 people to provide a regulatory perspective from the county, state and federal level. We interviewed key people from local jurisdictions and asked how they use bioassessment data, what are the risks associated with changing protocols, and what support do they need for their biological monitoring programs.

We designed our first regional meeting to showcase local projects that were innovative in using bioassessment data. Presenters told their stories about diagnosing problems with fish returns, bringing bioassessment data to land use planners, and communicating with city council members. We measured the success of our meeting by the number of participants (42 people from 21 agencies) and the number of people who signed up to review documents (25), attend future meetings (27), participate in training sessions (26), and collaborate on other projects. In the field, we joined 10 local jurisdictions for side-by-side comparison of their sampling protocol and the proposed standard. As we engaged more directly with our colleagues, we encountered more surprises that will influence how we approach data analysis.

One measure of success is the number of agencies willing to adopt a standardized protocol. A truer measure is the impact of biological assessments on decisions made at the local and regional scale to protect and restore streams.

0379
J7-3

Development of a Fish Assemblage Tolerance Index for the National Rivers and Streams Assessment

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Whittier et al. (Trans. Amer. Fish. Soc. 136:254-271) developed an assemblage tolerance index (ATI) for stream fishes in the western US based on quantitative tolerance values developed for individual fish and amphibian species. The ATI is conceptually similar to the Hilsenhoff Biotic Index developed for benthic macroinvertebrates, but is based on species tolerances to general human disturbance. We applied the general process of ATI development of Whittier et al. to fish data collected from ~1,900 stream and river sites across the conterminous US in 2008-2009 as part of the US EPA's National Rivers and Streams Assessment (NRSA). Quantitative tolerance values were derived for those fish species collected in NRSA, and an ATI metric was calculated from the individual species tolerance values. We compared the tolerance values to those from other published information, and evaluated the ATI metric for repeatability and responsiveness to disturbance. The database of species tolerance values derived from the NRSA data and the ATI metric in general represent improved tools for use in bioassessment of stream and river systems. This is an abstract and does not necessarily reflect EPA policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

0431
J7-4

Standardizing and Enhancing Bioassessment Protocols: Developing a Science-Based Performance Measure of Stream Condition

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Biological assessment protocols for streams in the Puget Sound region have been developed and applied by numerous local, tribal, and state jurisdictions since the early 1990s. The goal of this project is to evaluate differences in protocols related to taxonomic resolution, macroinvertebrate field collection, and data analysis and to develop standardized methods that will integrate monitoring and reporting across local and regional scales. Over 20 cities, counties and tribes use a multimetric index derived from macroinvertebrate samples to report stream health. The backbone of this project is a database created to house macroinvertebrate data from thousands of site visits from across the region. Changes in data analysis protocols can be applied to all data previously collected to make multimetric indexes more comparable across programs.

Pooled data are being used to evaluate, recalibrate, and enhance the multimetric index. To date, we have found that variance associated with natural differences, e.g., elevation and watershed area, are minimal compared to the variance in index scores associated with summary measures of human disturbance. The designations of tolerant and intolerant taxa originally developed from best professional judgment using an independent gradient of human disturbance have been updated. Variance of the multimetric index was reduced by standardizing sample counts and sampling methods and recalibrating the scoring criteria for component metrics.

This multimetric index connects local jurisdictions to each other by providing a comparable measure of stream condition across

watersheds and natural ecological gradients. The macroinvertebrate index also connects regional and state programs, for example, the multimetric index is one of the 21 key ecosystem indicators selected by the Puget Sound Partnership for regional reporting. A standardized measure of stream condition allows regional prioritization for restoration and protection, provides a way to measure the effectiveness of management actions, and provides a science-based performance measure for streams.