Abstracts

Wednesday, April 30

Session H1: Monitoring and Assessing Large River Ecosystems

1:30 – 3:00 pm | Room 263

Creation of a Multi-metric Macroinvertebrate Index and Implications for Annual Ohio River Assessments

Ryan Argo
Ohio River Valley Water Sanitation Commission (ORSANCO), Cincinnati, Oh.

Abstract
A central task of the ORSANCO Biological Programs is to ensure that the Ohio River is capable of maintaining healthy wildlife populations. Our program currently employs a multi-metric fish index to assess the overall quality of the Ohio River as part of a biannual report to congress to fulfill 305(b) requirements. In 2007, a macroinvertebrate collection method comparison study was initiated to determine which method, or combination of methods, is the most appropriate for characterizing Ohio River macroinvertebrate communities. This study was completed in 2012 by comparing the results of multiple indices derived from three macroinvertebrate collection methods (*e.g.*, two Hester-Dendy deployments and a multi-habitat sweep) and four abiotic gradients identified from various environmental measures (*e.g.*, water and sediment chemistry, sestonic and sedimentary nutrients). Data used to generate the abiotic gradients was obtained via our involvement in a cooperative Environmental Monitoring and Assessment Program (EMAP) project. As the ultimate goal of this study was to facilitate the creation of a second biological indicator, our last task was to determine how to incorporate the new index into our annual assessments of Ohio River segments. There are two common approaches, independent application and weight of evidence, employed by regulatory agencies when interpreting the results of multiple biological indicators. We held a discussion of these two approaches with agency representatives of our consignatory states and the federal government before arriving at the appropriate approach for our Ohio River assessments.

A Multi-Disciplinary Large River Assessment of the Susquehanna River, Pennsylvania

Michael Lookenbill and Tony Shaw
Pennsylvania Dept. of Environmental Protection, Harrisburg, Pa.

Abstract
The Susquehanna River basin is the largest river system in Pennsylvania and is the largest tributary to the Chesapeake Bay; providing about 50% of the Bay's fresh water. The lower Susquehanna River and its larger tributaries were well known for its world-class smallmouth bass (SMB) fishery. The health and vitality of the Susquehanna River's SMB population fishery has declined in recent years as evidenced by wide-scale, disease-related young-of-year (YOY) mortality, and occurrence of intersex SMB male fish.

This declining health of the River's SMB fishery prompted many local stakeholders to call for listing the River as impaired in Pennsylvania's 305(b) & 303(d) report to EPA. After some initial water quality pilot studies, the Pennsylvania Department of Environmental Protection (PA-DEP) is implementing a rigorous three year study of the River and its major tributaries to support a sound, scientifically defensible assessment of the Susquehanna River and its SMB fishery. The study incorporates a wide array of protocols and analytical methods to examine both natural and anthropogenic stressors as possible sources and causes of the River's SMB decline. These sampling protocols and analytical methods include inorganic water chemistry sampling; continuous instream physical chemistry monitoring; biological sampling (benthic macroinvertebrates, fish, mollusks, and periphyton); nutrients and fatty acid analysis (algae and SMB); fish histo-pathology; storm event sampling; sediment and organic water grab and passive Polar Organic Chemical Integrative Sampler/Semi-Permeable Membrane sampling for pharmaceuticals, antibiotics, hormones, organic wastewater compounds, and pesticides; and flow.

Much of the River's larger segments exhibit very wide and shallow stream channels that inhibit mixing and effectively splits the Lower Susquehanna into three characteristically different river flow channels. Because of this lack of mixing, sampling locations for the larger mainstem segments are being sampled in separate transects across the three flow channels while those on the narrower Juniata River tributary are being transect sampled across two channels.

In addition to PA-DEP staff, USGS, Susquehanna River Basin Commission, and Pennsylvania Fish & Boat Commission are assisting with field sampling and laboratory efforts. This multi-disciplinary study will continue through 2015. This presentation will summarize findings and progress made through 2013.

Ranking Relative Effects of Environmental Factors at Various Spatial Scales on Ohio River Biotic Condition

Jeff Thomas
Ohio River Valley Water Sanitation Commission, Cincinnati, Oh.

Abstract
With recent increased availability of accurate land use and hydrology datasets, it has become almost common place to use a geographical information system (GIS) to conduct detailed analyses of various factors affecting biotic condition of small streams. Due to the complexity of large rivers, and a relative shortfall of comprehensive biological datasets, very few similar efforts have been undertaken on these systems. Operating under a cooperative agreement with USEPA as an extension of the Environmental Monitoring and Assessment Program - Great Rivers Ecosystems, the Ohio River Valley Water Sanitation Commission (ORSANCO) recently completed an investigation of environmental stressors on the condition of Ohio River fish and macroinvertebrates. As part of the study, which ran from 2007 to 2012, fish and macroinvertebrate population surveys were conducted at 336 unique 0.5 km long locations along the main stem shoreline of the Ohio River. Along with biotic community data, at each location within the same sampling season, water and sediment chemistry parameters were also collected, along with field estimates of local and neighborhood (upsteam two miles and downstream one mile) riparian condition. Using a GIS, land use characteristics were summarized at various scales relating to each of the biological sampling locations. In this way, data were derived for the entire catchment basin upstream of each navigational pool (distance between two high-lift dams) that the sites fell into, as well as for the lateral inputs draining into each pool individually. Using these parameters, ORSANCO biologists were able to rank the relative influence of multiple stressors at several scales on the biotic condition of 18 of the 19 Ohio River navigational pools.

The New England Non-Wadeable Rivers Fish Assemblage Assessment Project

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Abstract

An assessment of the fish assemblages of the large rivers in New England occurred in 2008-9. A standardized raft and boat mounted electrofishing method that was previously developed and tested in Maine during 2002-7 was used to sample the fish assemblages of non-wadeable rivers. A probabilistic sampling design derived from the 2008-9 National Rivers and Streams Assessment (NRSA) was employed. An intensive survey design was embedded alongside and provided the opportunity to compare the assessment outcomes of the two sampling designs on a river-specific and regional basis. In terms of survey logistics, less than 10% of the probabilistic sites were rejected. Reasons for rejection included sites being wadeable (the target was for raftable and boatable sites) and either access or safety issues. The break point between wadeable and non-wadeable generally occurred at the Strahler order IV-V boundary with most order IV sites being wadeable and most order V sites being non-wadeable, although a few exceptions did occur. A comparison of the assessment outcomes for both spatial designs was accomplished regionally and for the non-tidal portion of the Connecticut River mainstem. The probabilistic and intensive survey designs produced roughly comparable median Maine River IBI results for the regional and the Connecticut River cases. However, in both comparisons the intensive survey design uniquely revealed the highest quality sites and river segments in New England based on Maine River IBI scores and an accompanying scaling to a Biological Condition Gradient (BCG). BCG Level II (highest quality found) scores were evident only from the intensive survey design and most were located in northern and western Maine. No probabilistic sites had IBI scores above BCG Level III. A first order analysis of regional stressors was also accomplished and limiting factors included hydrological, local habitat, location and number of barriers, and land use related factors. These gradients of disturbance generally increased from north to south across New England and it corresponded to Maine IBI scores and other fish assemblage indicators. An initial examination of signals in the biological data revealed significant weaknesses in both the coverage and relevance of the regional scale stressor gradients.