A reference condition approach for the Great Rivers of the Central Basin: The Ohio, Missouri and Upper Mississippi Rivers

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Empirical bioassessment of rivers is based on the comparison of conditions of sampled sites to conditions at sites in the same or comparable resource considered to be in "reference" condition. In the Environmental Monitoring and Assessment Program for Great River Ecosystems (EMAP-GRE) we use "least disturbed condition" (LDC) as our definition of reference. Our underlying (optimistic) assumption is that although none of the Great Rivers of the Central Basin is in pristine condition, and there are no other closely comparable large and pristine Central Basin rivers, there is variation in condition (or degree of impairment) along each river that provides the scope for bioassessment. We use a 3-phased approach to obtaining our set of internal least disturbed sites on each river. We use a GIS model to find locations on each river with the highest probability of being in LDC condition. We use a natural gradient approach to filter out the best (and worst) sites from all the sampled sites. Finally, we will verify our reference site selection using metrics based on biotic assemblages (e.g., fish, macroinvertebrates). Our GIS models allows us to score every potential sample location on each river based on the proximity to upriver and local human disturbances including tributaries, dams, NPDES permits, urban areas, river crossings, and floodplain land use. Tributary influence on the mainstem is weighted by tributary watershed land use. Model outputs are used to define LDC candidate reaches that are then randomly sampled using a probability design. Model-suggested, and all other sites that are actually sampled are filtered by scoring each site based on multiple (>12) abiotic metrics relative to a natural gradient for each metric (river mile as a surrogate for watershed area). Abiotic filtering metrics include water chemistry (e.g., nutrients, chloride), habitat (woody debris, sediment toxicity, riparian vegetation) and landscape metrics (scores from the GIS proximity model). Comparing biotic metrics between filtered LDC sites and the entire population of probability sites will provide a test of the efficiency of our approach. This abstract does not necessarily reflect EPA Policy.

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