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Using Watershed Ecological Risk Assessment to Improve Use Attainability Analyses and the Use Designation Process

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Designated uses are often assigned by regulatory agencies without complete knowledge of a given waterbody due to resource constraints. In many cases it is not clear whether the designated use is appropriate because of a lack of data and ambiguities in the way some uses are defined. Use attainability analyses (UAA) are often thwarted by similar issues: what is the “right” information to collect and how is the use defined? We demonstrate how EPA’s recently evolved watershed ecological risk assessment (WERA) framework could help address both of these deficiencies in a systematic and scientifically defensible manner.

The WERA framework differs from standard ERA practice in that: (a) stakeholders in the watershed (including resource agencies and wastewater dischargers) participate in defining the assessment process; (b) the assessment explicitly treats multiple stressors, including physical and biological, as well as water quality stressors; and (c) the assessment is necessarily place-based because it deals with a specific watershed or basin. All of the above attributes lead themselves to UAAs and the process of defining designated uses.

Using the EPA-sponsored Clinch-Powell River basin (Virginia) WERA as an example, we demonstrate several ways to improve the UAA process and the designation of uses. Five parts of the WERA process are especially useful: (1) selection of assessment endpoints, or valued, important ecological entities and their desired attributes, that define the designated use; (2) developing a conceptual model, linking sources, stressors, and assessment endpoints in the watershed, that explicitly recognizes chemical, physical, and biological factors that must be present for the use to be viable; (3) measures of effect that are quantifiable attributes or characteristics of the assessment endpoints; these help characterize the use and determine whether the use is being met; (4) risk analyses and risk characterization that determine the strength of relationships or hypotheses identified in the conceptual model. By examining the watershed holistically, it is possible to define which sources or factors are likely to have the most impact on the use; and (5) identifying uncertainties in the assessment helps to identify future data collection needs and prioritize management efforts. Greater uncertainties should lead to an interim assessment of use attainment, pending further data collection, to resolve whether the use is appropriate and whether it is being met or not. Depending on the nature of the uncertainties, this may lead to different “sub-uses” in which perhaps, only part of a use can be reasonably expected.