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Setting expectations for the ecological condition of rivers: The concept of reference condition

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An important component of the biological assessment of stream and river condition is an evaluation of the direct or indirect effects of human activities or disturbances. The concept of a reference condition is increasingly used to describe the standard or benchmark against which current condition is compared. Many individual nations, and the European Union as a whole, have codified the concept of reference condition in legislation aimed at protecting and improving the ecological condition of streams and rivers. However, the phrase “reference condition” has many meanings in a variety of contexts. We argue the need for a “reference condition” term that is reserved for referring to the “naturalness” of the biota (structure and function) and that naturalness implies the absence of significant human disturbance or alteration. To avoid the confusion that arises when alternative definitions of reference condition are used, we propose that the original concept of reference condition be preserved in this modified form of the term: Reference Condition for Biological Integrity, or RC(BI). We further urge that these specific terms be used to refer to the concepts and methods used in individual bioassessments to characterize the expected condition to which current conditions are compared: Minimally Disturbed Condition (MDC); Historical Condition (HC); Least Disturbed Condition (LDC); and Best Attainable Condition (BAC). We argue that each of these concepts can be narrowly defined, and each implies specific methods for estimating expectations. We also describe current methods by which these expectations are estimated including: the reference site approach (condition at minimally or least disturbed sites); best professional judgment; interpretation of historical condition; extrapolation of empirical models; and evaluation of ambient distributions. Because different assumptions about what constitutes reference condition will have important effects on the final classification of streams into condition classes, we urge that bioassessments be consistent in describing the definitions and methods used to set expectations. Implications of these definitions and methods for defining reference condition for large rivers will be highlighted.

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