A REVIEW ON SETTING APPROPRIATE REACH LENGTH FOR BIOASSESSMENT OF STREAMS AND RIVERS

Joseph E. Flotemersch, USEPA, Office of Research and Development, and James B. Stribling, Tetra Tech, Inc.

Primary Contact Name and Affiliation:
Joseph E. Flotemersch, U.S. Environmental Protection Agency, 26 W. Martin Luther King Dr., Cincinnati, OH 45268 (Phone 513-569-7086, Email – flotemersch.joseph@epa.gov)

Researchers working on streams and rivers are often presented with the difficult task of selecting an appropriate stream length, or reach length, from which data will be collected. As a result, many different approaches have been used with differing rationale and varying degrees of success. Ideally, the sampling effort applied is the minimum that will allow stated objectives to be addressed as required by a study. Comparisons based on estimates of insufficient sampling effort can be confounded because real differences in assemblage structure may be indistinguishable from method error. In a bioassessment context, this can translate to a decreased ability to distinguish among sites of varying condition. In general, use of long reaches (e.g., multiple kilometers) are considered advantageous for describing the overall mean condition of a larger section of river as they minimize the influence of small scale conditions and localized impairments. This advantage, however, can also be viewed as a disadvantage in that long reach lengths may mask small scale habitat conditions and impairments that may be of interest. They may also decrease the sensitivity of indicators to detect linkages between local river conditions and the drivers of those conditions. Conversely, the use of short reach lengths (e.g., < 1 km) can be criticized for being too sensitive to local conditions and thus provide a biased reading of the overall condition of the system. Often, the reach lengths selected for a study is based on judgment, past history, or the need to match some other aspect of sampling or management activities. Alternatively, reach lengths can be set by evaluating the response of biological parameters (e.g., species accumulation curves, assemblage metrics; IBI scores), as a function of geomorphology (e.g. channel widths, meander wavelengths, riffle-pool sequences), or a combination of the two. In short, what is deemed an appropriate reach length should be a balance between intensity of data collection for a particular event, and the number of events that can be sampled; all of which is further tempered by careful consideration of the question(s) being addressed, the quality of data (in part, the precision, accuracy, and sensitivity) required to address the question, the statistical approach that will be used to analyze any resulting data, and present and future resource availability. This presentation will review issues related to definition of the appropriate sample unit, or sampling reach, forstreams and rivers, with examples.

KEYWORDS
Stream length, sampling distance, electrofishing distance, sampling effort, electrofishing effort