

# The Relationship of Performance Characteristics and Data Quality to the Comparability of Biological Assessments

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## Biographical Sketches of Authors

Drs. James Stribling and Jerome Diamond are biologists in Tetra Tech's Baltimore Office and Directors in the Center for Ecological Sciences. Dr. Stribling has over 20 years of experience in the development and calibration of biological indicators for assessment of water resource quality. An integral part of that process is ensuring that implementation of routine monitoring programs using those indicators is directly applicable to technical and programmatic objectives.

Dr. Diamond has over 100 years of experience in designing and performing laboratory toxicity tests with emphasis on defining the relationship of controlled laboratory results to actual field conditions. Both have worked off and on for approximately 10 years with the Methods and Data Comparability Board in developing their approach for documenting and reporting data quality characteristics.

## Abstract

There is strong interest in the defensibility of combining different datasets for use in developing biological indicators and ecological assessments. Any efforts to combine are contingent upon the quality of data that users are willing to accept (i. e., their data quality objectives). Definition of data quality must occur at the level of the method; direct comparisons of only final assessments are inadequate. Data comparability should be evaluated at two levels: the method and the program. For a method, it is necessary to determine: what level of quality is attainable, and, what level of quality has been attained? Any measurement system (i. e., assessment protocol) is a series of methods (field sampling, laboratory sorting/subsampling [for benthic macroinvertebrates], taxonomic identification, enumeration, data entry, metric calculation, and site assessment), each of which has potential error sources associated with them. The key is to evaluate several data quality characteristics that are traditional to standard QC activities (such as precision, bias, representativeness, completeness, and sensitivity) for each of the methods that make up the biological assessment process. Once the capacity of a method to meet a certain level of quality is demonstrated, then that level becomes the performance characteristic. Thus, a series of performance characteristics is necessary to describe the quality of data produced by an assessment protocol. We demonstrate a framework for organizing performance characteristics and present case studies of their documentation; specifically, field sampling representativeness, laboratory sorting and subsampling bias, and taxonomic precision, as they relate to biological assessment accuracy and comparability.