

Biological monitoring: Assessing environmental contaminants in large river systems

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The BEST Large Rivers program has brought together scientists from the US Geological Survey and University of Florida that have years of experience and expertise examining the effects of contaminants in fish.

Abstract

The Biomonitoring of Environmental Status and Trends (BEST) Large Rivers program examines fish health in US river basins by using a suite of organismal and suborganismal endpoints, which monitor and assess the effects of environmental contaminants on aquatic biota. These endpoints include organismal health (condition factor, somatic indices, etc), residue analyses (elemental and organochlorides), immune system indicators (macrophage aggregate parameters), various molecular biomarkers (EROD, vitellogenin), and reproductive indicators (steroid hormones, gonadal histology). Biochemical, physiological, morphological, histopathological, organismal, and population metrics have been chosen to integrate responses at all of these levels of biological organization. Data are compared spatially and temporally by examining trends of various persistent contaminants and incorporating existing information from other monitoring efforts. As a national monitoring program, BEST is unique in that it utilizes biomarkers to evaluate less persistent chemicals in aquatic environments and to detect molecular-level changes before population effects may be evident. Efforts are being made to establish threshold levels or criteria for the various biomarker endpoints as the BEST dataset expands. Results from field studies, such as the BEST program, allows for the examination of the applicability of laboratory-based criteria. As new technologies and methods emerge, the BEST large rivers program will continue to reassess current methods and incorporate new technologies to ensure the program can address future issues and concerns in our nation's waters.