

Stressor Identification for Short Fork Creek, Mississippi

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Dr. James Stribling is a biologist in Tetra Tech's Baltimore Office and a Director in the Center for Ecological Sciences. He 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.

Mr. Matthew Hicks (formerly, with the Mississippi Department of Environmental Quality [MDEQ]) is an aquatic ecologist with the Mississippi Field Office of The Nature Conservancy. He played a primary technical role in leading the redevelopment of the statewide biological monitoring program for Mississippi's stream and watersheds.

Mr. Jeffrey Thomas is Director of MDEQ's Water Quality Assessment Branch. He is the primary recipient and user of biological assessment results in writing the state's 305(b) report, developing its 303(d) list, and in performing diagnosis of the results for identification of stressors and sources.

Mr. Barry Tinning is a watershed management specialist in Tetra Tech's Kentucky office. He compiles existing and historical data for watershed characterization, manages technical workgroups for development of restoration designs, and performs extensive public outreach activities.

Abstract

This analysis has been developed to examine potential water quality impacts associated with the development of a major wastewater treatment plant (WWTP) in Desoto County, Mississippi. The analysis examines impacts of potential stressors using two different approaches: 1) monitoring and assessment, and 2) modelling. The biological indicator (the Mississippi Benthic Index of Stream Quality [M-BISQ]) uses the structure and function of the benthic macroinvertebrate assemblage, in comparison to other streams in the Northwest Bioregion of the state, to assess stream condition. The modelling effort employed land use/land cover characteristics to estimate the rate of annual pollutant loading under a Generalized Watershed Loading Functions (GWLF) model; overall, model results provide some estimate of the potential exposure of instream biota to pollutants. Following USEPA's Stressor Identification Guidance, a weight-of-evidence analysis was developed that identified those sources and stressors most likely contributing to impaired biological condition. Components of the SI process include plausibility of mechanism, spatial and temporal co-location, consistency, and strength of evidence. This analysis concluded that the primary stressors affecting the degraded biological condition are physical habitat (especially, channel morphology, including an abundance of sand/silt fines), and potentially some unknown stressor source that is indirectly indicated by total chlorides. Because the effluent from current facilities within the County is often poorly treated, implementation of the Short Fork Creek WWTP, which will collect and treat wastes from several of the existing permitted facilities, could actually lead to an overall improvement in these conditions.

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