

## Effects of sediment contaminants on benthic macroinvertebrate communities in Northeast Florida

Aisa Ceric<sup>1</sup>, Palmer Kinser<sup>1</sup>, Doug Strom<sup>2</sup>, David Evans<sup>2</sup>, and Greg Durell<sup>3</sup>

<sup>1</sup> St. Johns River Water Management District, 4049 Reid Street, Palatka, FL 2177

<sup>2</sup>Water & Air Research, Inc. 6821 S.W. Archer Road, Gainesville, FL 32608

<sup>3</sup> Battelle, 397 Washington Street, Duxbury, MA 02332

### Biographical Sketches of Authors

Aisa Ceric is an environmental scientist with over twenty-five years experience in water resources management. During the last ten years she has been responsible for designing and conducting water quality, sediment and biological monitoring studies in Northeast Florida, preparing regional assessments and providing data to the public.

Palmer Kinser is an environmental scientist and manager with over twenty-five years experience in water resource assessment and the aquatic sciences. He currently oversees wetland, water quality, and other environmental monitoring and assessment studies in Northeast Florida and is currently focused on potential threats to Florida's wetlands, lakes, streams, and springs from drainage, water and sediment pollution, basin development, and groundwater withdrawal.

Doug Strom is an aquatic ecologist with over twenty-three years experience in environmental assessment. He has authored or co-authored many reports and articles reporting assessments of Florida lakes, streams, and estuaries. His primary areas of interest include taxonomy of chironomids and polychaetes and the use of statistics to relate macroinvertebrate community structure to water and sediment quality.

David Evans has over twenty-five years of experience in the field of aquatic and wetland ecology. Areas of expertise include water quality compliance monitoring and documentation, fish and macroinvertebrate surveys, mapping and quantitative characterization of aquatic macrophyte communities, wetland mitigation design and evaluation, natural resource audits, contamination audits, and biological inventories.

Greg Durell is a senior research scientist with over twenty years experience in environmental chemistry. Last fifteen years he has been involved in the planning and oversight of multidisciplinary environmental assessment projects, with particular interest in contaminated sediments. His emphasis has been on assessing the magnitude, distribution, and fate of contaminants in aquatic systems, establishing the ecological characteristics, and determining the environmental relevance of measured contamination.

### Abstract

A baseline survey of sediment quality and benthic macroinvertebrate communities was conducted between 1999 and 2002 by staff and contractors of the St. Johns River Water Management District (SJRWMD), an agency created by the Florida legislature to protect, improve, or restore water resources in northeast Florida. The overall objective of the investigation was to document possible effects of organic and metallic sediment contaminants on benthic macroinvertebrate community composition and structure.

Sediment and benthos data were analyzed and interpreted to evaluate the relationships between biological metrics and sediment pollution indices. A Composite Benthic Sediment Quality Index (CBSI) was developed by combining biological metrics (Augmented Florida Index and Total Number of Taxa) that were significantly correlated with sediment Hazard Index (HI) values based on Threshold Effect Concentrations (HI-TEC). The correlation of CBSI with HI-TEC risk was tested on a series of lakes in the Ocklawaha River Basin. The average CBSI by lake was inversely correlated with HI-TEC (Spearman's Rank Correlation Coefficient = -0.699 and  $p = 0.011$ ). Sites with average CBSI > 14 were considered to have good biological health and sediment quality, while

the sites with CBSI < 14 were judged as having poor biological health and polluted sediments. The CBSI or similar indices using benthic macroinvertebrates data may be valuable tools for screening candidate sites for sediment contaminant surveys and/or sediment toxicity - bioassay sampling.