

## AN ABSTRACT OF A THESIS

# CHARACTERIZATION OF BENTHIC MACROINVERTEBRATE COMMUNITIES WITHIN THE EMORY RIVER WATERSHED, TENNESSEE

David W. Goodfred

Master of Science in Biology

Sedimentation, resulting from natural and anthropogenic sources, is a primary concern within the Emory River Watershed (ERW). Mining, logging, and agricultural practices, as well as urban development, occur within the ERW, and these practices generate excess sediment which can negatively influence lotic ecosystems and their resident fauna. Macroinvertebrate communities are directly affected by sedimentation, and any streambed alteration from deposited sediment can have substantial effects upon these communities. The objectives of this study were to: (1) determine how habitat conditions and land use practices within the ERW influence benthic macroinvertebrate communities, and (2) evaluate seasonal variation in benthic communities at select locations.

Samples were collected at 56 sites throughout the ERW using semi-quantitative riffle kick (SQKICK) techniques. Biotic index scores were determined for all sites. Eight additional sites were similarly sampled on a quarterly basis, and data were analyzed using ANOSIM (Analysis of Similarity) and SIMPER (Similarity Percentages) routines within PRIMER software to identify variation in communities by site and/or time. In addition, habitat variables were evaluated using multiple linear regression to determine their influence on benthic communities among all 56 samples. Land use data also were evaluated using regression analysis to determine land use influences on benthic communities.

Quality of macroinvertebrate communities varied within the ERW. However, 47 of 56 sites had biotic scores indicative of healthy benthic communities ( $\geq 32$ ). Community variation existed among seasons ( $p = 0.10$ ); life history stages of three taxa (*Oemopteryx*, *Perlesta*, and *Isoperla*) influenced this variation. Macroinvertebrate community composition was influenced by conductivity ( $\mu\text{S}$ ), dissolved oxygen ( $\text{mg/l}$ ), and turbidity (NTU). Community structure also was influenced by forest (% forest) and stream/lake (% stream/lake) land coverage within the ERW.