

# HABITAT SPECIFIC PRODUCTION OF A CAHABA RIVER SHOAL MACROINVERTEBRATE ASSEMBLAGE

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Fall Line shoals are extraordinary zones of geomorphic complexity within a river basin, and have been recognized as important sites of aquatic macroinvertebrate diversity and production. The free-flowing Cahaba River, in central Alabama, possesses the most significant remaining examples of this channel feature that was once common throughout many rivers of the southeastern United States prior to widespread river regulation. The goal of this dissertation is to examine how the major habitats of a Cahaba River shoal influence the distribution and secondary production of the macroinvertebrate assemblage. Chapter 2 quantifies the variety of habitat types across the shoal reach and examines the temporal biomass dynamics of the 2 most common in-stream macrophytes, *Justicia americana* and *Podostemum ceratophyllum*. Chapter 3 presents a new method for obtaining in situ growth rates of several species of the diverse pleurocerid snail assemblage. The results of this method were later used to estimate production for this important family. Chapter 4 describes the distribution, biomass, and production of the nonnative Asiatic clam, *Corbicula fluminea*, across the shoal reach, highlighting its dependence on *Justicia* habitat. Finally, Chapter 5 incorporates the preceding chapters into a study of the distribution of macroinvertebrate assemblage production across bare bedrock, *Justicia*, and *Podostemum* habitats, as well as the entire shoal reach. Total annual production (in g AFDM m<sup>-2</sup> y<sup>-1</sup>) of all macroinvertebrates was 59.1 in bedrock, 254.3 in *Podostemum*, and 191.8 in *Justicia* habitats. Total habitat-weighted production of the shoals reach was 93.3 g m<sup>-2</sup> y<sup>-1</sup>, with bedrock contributing 23.9%, *Podostemum* 22.6%, and *Justicia* 53.5% to this total. This study supports the hypotheses that Fall Line shoals are centers of habitat diversity and extraordinary production, and that the more complex habitats (e.g., those with macrophytes) enhance benthic invertebrate diversity and production. Also, the influence of a given habitat depends largely on its relative abundance, and the *Justicia* habitat was shown to be especially influential in this reach. This work advances our understanding of the roles of shoal habitats in maintaining the diversity and function of this endangered river channel feature.