

Conservation of Southeastern Mussels

Overview

Freshwater mussels are an integral component of aquatic ecosystems and are indicator species for assessing the health of freshwater systems. Approximately 90% of the 300 species of mussels found in the United States occur in the southeastern states. During the past 30 years, freshwater mussels have experienced dramatic decline. Extinction rates for freshwater mussels are orders of magnitude higher than expected background levels. Attempts to address causal factors of mussel declines are hampered by the lack of knowledge of even basic aspects of their life history (e.g., host fish) and habitat requirements.

Beginning in the early 1990s, FCSC researchers initiated inventory and monitoring projects for southeastern freshwater mussels. Simultaneously, studies were undertaken to examine the zoogeography, taxonomy, life history, ecology, and population biology of endangered and at-risk species. In addition, investigators examined the relationship between native mussels and the nonindigenous Asian clam, sedimentation processes, and fish community structure in southeastern rivers to better understand the potential causes of freshwater mussel declines.

Research conducted by FCSC scientists was instrumental in the recent federal listing of seven freshwater mussel species from eastern Gulf of Mexico drainages as threatened or endangered and in the development of recovery strategies for those species. Current FCSC projects will provide mussel data to state and federal

agencies, natural resource managers, as well as private organizations in Alabama, Florida, and Georgia that will aid in the protection and recovery of freshwater mussel populations.

Program Goals

- ◆ To determine the causal factors of decline in freshwater mussels.
- ◆ To support objectives outlined in the “National Strategy for the Conservation of Native Freshwater Mussels” by conducting sound scientific research on the distribution, conservation status, and ecology of freshwater mussels, especially those that are endangered or at-risk species.
- ◆ To provide biological and ecological data to natural resource management agencies to aid in the protection, recovery, and management of native freshwater mussels.

Projects

Effects of urban growth in the Atlanta metro area on freshwater mussels in the Line Creek watershed

Line Creek, a major tributary of the upper Flint River drainage, has its headwaters in Fulton County, southwest of Atlanta. Historically, Line Creek harbored a diverse mussel fauna that included at least 14 species, including three currently federally listed as endangered, as well as a fourth species now considered extinct. Unprecedented urban growth in the Atlanta area is often cited as a factor in the decline of aquatic species in the

upper Flint River system, but empirical data are lacking. In this study, a multidisciplinary approach was used to correlate changes in land use, vegetation cover, stream channel geomorphology, and hydrology to the decline of aquatic species in Line Creek over the past 30 years. FCSC collaborated with scientists from the University of Florida, Utah State University, and UC Berkeley to investigate how land use changes and urbanization in the Line Creek watershed are linked to the imperilment of aquatic faunas in the Atlanta area.



Endangered species: *Pleurobema decisum*

Examination of the federally endangered *Pleurobema decisum*, within the Old Channel of the Coosa River, Alabama

The endangered southern clubshell historically occurred throughout the Mobile Bay drainage of Alabama, Georgia, Mississippi, and Tennessee. Today, there are only three isolated populations known to exist. One of these populations is in a short reach (about 6 miles) of the Coosa River below Weiss Dam in east Alabama. The objectives of this study are to determine the range and density of this population of *Pleurobema decisum* and to quantify the size structure and

variation. The health of this population will also be assessed through glycogen analysis using a surrogate mussel species.

An empirical evaluation of model-based approach for estimating the abundance of mussels in the New River, Florida

Novel sampling designs and methods of statistical analysis must be explored to determine ways to obtain useful sets of quantitative observations of mussel populations within reasonable levels of search effort. In this study, mussel populations in selected reaches of the New River were censused using quadrats to examine the entire river bottom. Alternative sampling strategies were evaluated by drawing samples of various sizes from the population and fitting models of mussel density to the number of mussels observed in each sample unit. Different models were used to make inferences about abundance of mussels in each reach of the river.



Quantitative sampling for freshwater mussels

Relationships between freshwater mussels, substrate composition, and fish community structure in Coastal Plain streams

The biotic and abiotic attributes that define suitable habitats of individual mussel species are poorly understood. In this study quantitative methods were used to evaluate the relative importance of fish and abiotic characteristics on mussel community structure in 30 Coastal Plain streams. Over 2,500 mussels, 7,200 fish, and 2,600 sediment cores were sampled. Significant relationships were detected between

mussel and fish assemblage structure and macro- and microhabitat descriptors. In the face of current mussel declines, these types of data can be used to gain a better understanding of how such ecological factors structure mussel communities, especially because resource managers must increasingly delineate suitable habitat in recovery plans for imperiled mussel species.

Conservation status of the freshwater mussels of the Escambia, Yellow, and Choctawhatchee river drainages of Alabama and Florida

This study will provide historic and current distributional data for the mussels in these three drainages. This information will be used by the U.S. Fish and Wildlife Service and the states of Alabama and Florida to assess conservation status. Of the thirty-seven species known to occur in these drainages, 14 are endemic. One of the 14 species appears to be extinct. Four species represent recent introductions from the adjacent Mobile Bay drainage in Alabama. Information on current distribution, habitat, biology, and life history of each species is being compiled.

Historic and current distribution of the freshwater mussels (Margaritiferidae and Unionidae) in Alabama and the Mobile basin in Georgia, Mississippi, and Tennessee

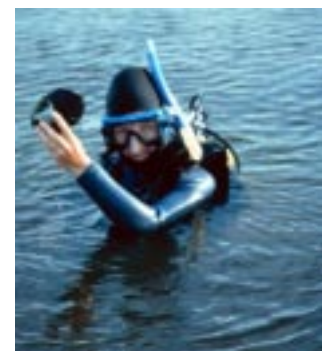
The purpose of this study is to provide current conservation assessments for the 178 species of unionid mussels in Alabama and the Mobile basin. This represents the highest mussel diversity of any state in the United States. Of the 178 species, approximately 40% are endemic to the area. Distributional data for the freshwater mussels from this area were compiled from museum collections and published and unpublished sources. Factors that affect the distribution of unionid mussels in these drainages were also determined. Analysis of distributional data from this project will assist resource managers in evaluating impacts of the proposed Tristate Water Project.



Collecting sediment samples

Unionid mollusks of the Apalachicola River basin in Alabama, Georgia, and Florida

The Apalachicola, Chattahoochee, and Flint (ACF) rivers form the largest drainage basin in the eastern Gulf of Mexico. Historically, the ACF rivers were known for their diverse mussel populations; however, a comprehensive study of the mussels of these rivers and their tributaries had not been done. In 1991, a comprehensive study began to determine the status of the 33 species known from the basin. Collections were made at over 300 sites in the channels and tributaries of the three rivers. More than 2,500 historical records were obtained from eight museums and other sources. Based on the results of this survey, six ACF mussel species were listed as federally endangered or threatened and two were determined to be extinct. In addition to status and trends data, systematic, habitat, life history, taxonomy, zoogeography, and conservation data were compiled for each species to aid in recovery and management efforts.



Collecting freshwater mussels by SCUBA, Flint River