

# Predictive Modeling of Freshwater Mussel Distributions in the Appalachians

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*Abstract:* The eastern United States contains the greatest diversity and the most imperiled species of freshwater mussels in the world. Conservation efforts are underway, yet little information is available on current and historical distributions for most species. Current knowledge of freshwater mussel species distributions is limited to data available from museum collections, small-scale studies, and Natural Heritage surveys. The accuracy and precision of these data vary considerably. We obtained the best available information on the range of freshwater mussel species to model the distribution of selected species within the Appalachians. We included in model development anthropogenic and environmental variables, such as slope, elevation, acid deposition, soil buffering capacity, flow accumulation, density of dams, density of roads, and density of zebra mussel occurrences, believed to influence freshwater ecosystems. For each species, we applied the models derived from known species occurrences to sites within the study area where the status of the species is unknown to create maps of predicted species distributions. Our study provides another example of the application of predictive modeling at a regional scale using the best available data. However, our study differs from similar regional studies in its focus on multiple species within a taxon rather than a single species. Knowledge of the predicted distribution of these species in a large portion of their range is an important consideration in regional conservation decisions. In addition, variables that were retained in the models for each species are those that may limit the distributions of freshwater mussels in particular areas of the Appalachians; therefore, these influences can be targeted in future studies and conservation efforts.

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