USE OF OCCUPANCY MODELING TO ASSESS THE STATUS AND HABITAT RELATIONSHIPS OF FRESHWATER MUSSELS IN THE LOWER FLINT RIVER, GEORGIA, USA

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ABSTRACT

The Flint River in southwestern Georgia is known for its historically diverse mussel fauna, but the current status of the fauna is poorly known. The rediscovery of two presumed extirpated and extinct species in 2006 and 2008 exemplifies the need for a large-scale survey of the river. We used an occupancy modeling approach to estimate the presence of mussel species at 39 locations along a 119 km reach of the lower Flint River between Lake Seminole and Albany Dam. Twenty species were collected and evidence of recent reproduction was documented for 8 species. *Elliptio crassidens*, *E. fumata/pullata*, and *E. nigella* were the most abundant species and accounted for 43%, 40%, and 8% of the total mussels collected, respectively. Among species, mean detection probabilities averaged 0.25 and ranged from 0.01 to 0.69, whereas occupancy averaged 0.56 and ranged from 0.03 to 1. We fitted models relating site-level and sample-level habitat characteristics and site location to detection and occupancy for nine species. Detection probabilities varied among species, substrate, searcher experience, and distance from Albany Dam. Estimated occupancy varied by species and substrate composition indicating different substrate use by different species. Our modeling approach indicated that our sampling design was efficient for detecting most species with the exception of rare species. The Lower Flint River continues to harbor a widely distributed and diverse assemblage of freshwater mussels. The occupancy modeling approach used in our study was a useful and efficient method to assess the status, distribution, and habitat use of freshwater mussels in the Flint River while also providing a measure of sampling efficiency. Similar model-based study designs may be effective in other streams, particularly when sampling resources are limited.

KEY WORDS Occupancy, Detection, Flint River, Freshwater Mussels, *Elliptoideus sloatianus*, *Elliptio nigella*