

**POPULATION PERFORMANCE CRITERIA TO EVALUATE REINTRODUCTION AND RECOVERY OF TWO
ENDANGERED MUSSEL SPECIES, *EPIOBLASMA BREVIDENS* AND *EPIOBLASMA CAPSAEFORMIS*
(BIVALVIA: UNIONIDAE)**

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ABSTRACT

Genetic and demographic modeling of two endangered mussel species, *Epioblasma brevidens* and *E. capsaeformis*, in the Clinch River, U.S.A., was conducted to determine quantitative criteria to evaluate performance of extant and reintroduced populations. Reintroduction modeling indicated that the initial population size created during a 5 y build-up phase greatly affected final population size at 25 y, being similar to the population size at the end of the build-up phase, especially when expected population growth rate was low (e.g., 1-2%). Excluding age-0 individuals, age-1 juveniles or recruits on average comprised approximately 11% and 15% of a stable population of each species, respectively. Age-class distribution of a stable or growing population was characterized by multiple cohorts, including juvenile recruits, sub-adults, and adults. Molecular genetic and demographic data indicated that the ratio of N_e/N_c was ~5% for both species. Based on this ratio and predicted declines of genetic variation at different population sizes, target total sizes for reintroduced or recovered populations of each species should be $\geq 10,000$ individuals ($N_e=500$), respectively, and ideally should be comprised of multiple smaller demes spread throughout a river. Because of current barriers to dispersal and the low dispersal capability of some mussel species, reintroductions will play a prominent role in restoring populations in the United States.

KEY WORDS Freshwater mussels, Endangered species, *Epioblasma brevidens*, *Epioblasma capsaeformis*, Genetic and demographic modeling, Population performance criteria