COMPARING SURVEY AND MULTIPLE RECRUITMENT-MORTALITY MODELS TO ASSESS GROWTH RATES AND POPULATION PROJECTIONS[1]

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ABSTRACT

Estimation of population trends and demographic parameters is important for fundamental ecology and species management, yet these data are often difficult to obtain. The northeastern Minnesota moose (*Alces alces* Linnaeus, 1758) population declined 58% during 2006–2017, yet aerial surveys indicated stability during 2012–2017. In response to the decline, the Minnesota Department of Natural Resources (MNDNR) initiated studies of adult and calf survival. We estimated population growth rate (λ) using adult survival and calf recruitment data from demographic studies and the Recruitment-Mortality (R-M) Equation, and compared these estimates to those calculated using data from aerial surveys. We then projected population dynamics 50 years using each resulting λ, and used a stochastic model to project population dynamics 30 years using data from the MNDNR's studies. Calculations of λ derived from 2012−2017 survey data and the R-M Equation indicated growth (1.02 ± 0.16 [SE] and 1.01 ± 0.04, respectively). However, the stochastic model indicated a decline in the population over the next 30 years (λ = 0.91 ± 0.004). The R-M Equation has utility, but supporting information from demographic collaring studies helps to address management questions. Furthermore, estimates of λ calculated using collaring data were less uncertain and more reflective of current conditions. Long-term monitoring using collars would better inform population performance predictions and demographic responses to environmental variability.

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