

Demography and population dynamics of the mouse opossum (*Thylamys elegans*) in semi-arid Chile: seasonality, feedback structure and climate

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Abstract

Here we present, to the authors' knowledge for the very first time for a small marsupial, a thorough analysis of the demography and population dynamics of the mouse opossum (*Thylamys elegans*) in western South America. We test the relative importance of feedback structure and climatic factors (rainfall and the Southern Oscillation Index) in explaining the temporal variation in the demography of the mouse opossum. The demographic information was incorporated into a stage-structured population dynamics model and the model's predictions were compared with observed patterns. The mouse opossum's capture rates showed seasonal (within-year) and between-year variability, with individuals having higher capture rates during late summer and autumn and lower capture rates during winter and spring. There was also a strong between-year effect on capture probabilities. The reproductive (the fraction of reproductively active individuals) and recruitment rates showed a clear seasonal and a between-year pattern of variation with the peak of reproductive activity occurring during winter and early spring. In addition, the fraction of reproductive individuals was positively related to annual rainfall, while population density and annual rainfall positively influenced the recruitment rate. The survival rates were negatively related to annual rainfall. The average finite population growth rate during the study period was estimated to be 1.011 ± 0.0019 from capture-recapture estimates. While the annual growth rate estimated from the seasonal linear matrix models was 1.026, the subadult and adult survival and maturation rates represent between 54% (winter) and 81% (summer) of the impact on the annual growth rate.