Population rate of change in the leaf-eared mouse: The role of density-dependence, seasonality and rainfall

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Abstract

We analysed statistically the influence of density-dependent regulation, seasonality and precipitation on the realized population rate of change of the Neotropical rodent *Phyllotis darwini* (Waterhouse 1837) at an intra-annual time scale. We used four years of continuous live trapping at a semiarid locality of north central Chile. Results showed that density-dependence, seasonal effects and precipitation were important factors influencing population growth rates in this species. An empirical population model including a sine function for seasonal effects, a linear form for density-dependence, and precipitation was fitted to the full data set and to the data set with the first year removed (after an outbreak). The empirical model explained 33% and 48% of the variance in population growth. The natural rate of population increase, estimated from the empirical model, was r_{max} = 2.51 or 5.06 years^{-1}. These estimates indicate a great potential for population increase and may explain the capability of this species to undergo large irruptions. We propose that merging empirical and theoretical modelling with field research is the most promising avenue to understand the outbreaks experienced by some rodent species in western South America.