



Drivers of survival in a small mammal of conservation concern: An assessment using extensive genetic non-invasive sampling in fragmented farmland



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ABSTRACT

Although important to guide conservation management, detailed demographic studies on rare or elusive species inhabiting fragmented, human-dominated landscapes are often hampered by the species' low densities, and the logistic and ethical constraints in obtaining reliable information covering large areas. Genetic non-invasive sampling (gNIS) provides cost-effective access to demographic information, though its application to small mammals is still scarce. We used gNIS to infer on the demography of an endemic small mammal, the Cabrera vole (*Microtus cabreræ*), occurring as a spatially-structured population in a 462-ha Mediterranean farmland landscape. We intensively sampled fresh vole feces in four seasons, extracted the DNA, and performed individual identification based on genotypes built using nine microsatellites. We then estimated population size and individual survival relative to environmental variables, controlling for heterogeneity in capture probabilities using capture-mark-recapture modelling. Population size increased during the wet season and decreased during the dry season, while survival remained constant across the study period. Individuals captured along road-verges and around water-bodies survived longer than those captured near agricultural fields. The use of gNIS on a heterogeneous landscape such as our study area allowed us to demonstrate that human land-use activities affect Cabrera vole demographic parameters in Mediterranean farmland, with implications for conservation planning towards its long-term persistence. Our approach can be widely applied to other elusive small mammals of conservation concern, but for which informative demographic data are still scarce.

1. Introduction

Estimating large-scale demographic patterns (e.g. abundance, population growth, survival) of animal species in relation to both individual traits (e.g. sex, age, weight) and environmental factors (e.g.

climate or land-use change) is a difficult but necessary goal to understand species ecology and sustain conservation policies (Smallwood and Schonewald, 1998; Williams et al., 2002). This is particularly true for species occurring in agricultural landscapes where major declines in biodiversity due to agricultural intensification have been reported

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