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Can camera traps be used to estimate small mammal population size?

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Abstract

Accurate estimates of population size, such as those determined from conventional mark–recapture approaches, are central to the study of wildlife dynamics, but are often expensive and time consuming to collect. Indirect indices of abundance, such as those derived from camera traps, are increasingly being used as surrogates for direct measures in the study of large mammals. However, the specific effectiveness of indices in estimating small mammal population size is unknown. Here we test the reliability of camera traps to detect visitation to baited stations by alien black rats (*Rattus rattus*) and examine the relationship between camera trap indices and trapping-based estimates of population size. In the first trial we used ScoutGuard™ 550v.3 cameras, which were originally designed for large game, to determine their reliability in detecting visitation by black rats and to estimate the passive infrared trigger delay by comparing the timing of records to those detected from streaming video recording cameras. In a second trial, black rat visitation rates detected from ScoutGuard cameras were recorded for 2 days and correlated against the sizes of 16 black rat populations derived from live trapping. A third trial examined longer term visitation rates to examine temporal patterns in visitation. The camera traps picked up 100% of black rat visits although trigger delay was highly variable and sometimes exceeded 10 seconds. Black rat visitation rates showed a logarithmic relationship to known black rat population size, with night 1 visitation rates showing the strongest relationship ($r^2 = 0.26$). However, cameras were relatively insensitive to variation in population size at medium to high densities. Analysis of longer term visitation patterns showed that peaks in initial interest in the lure only lasted a day or so and were followed by prolonged periods of low activity until lures were refreshed. Together these results show that cameras appear to be able to reliably detect small mammal presence and broad categories of density (low, medium and high), but may not be suited to provide continuous indices of small mammal abundance.

Introduction

Camera trapping is increasing in popularity as a tool to survey for cryptic wildlife. It is most commonly used in the detection of larger game animals (Lyra-Jorge *et al*. 2008; Tobler *et al*. 2008),