Optimising management strategies for invasive predator control: a modelling approach

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Abstract

(1) Invasive predators pose a serious threat to native biodiversity, with trapping being one of several methods developed to manage and monitor their populations. Many individuals in these predator populations have been found to display trap-shyness, which hinders eradication and results in inaccurate estimates of population size. Lures are used to help overcome trap-shyness by increasing the probability of interaction with the device but the extent of this behavioural trait in wild populations, and the best timing for the introduction of a new lure or combination of lures, are uncertain. A key challenge for wildlife managers is maximising the efficacy of invasive predator control, particularly in relation to baiting and trapping, so that pests are extirpated, or survivors are reduced to a minimum. (2) We first use a Bayesian estimation method to quantify the trap-shyness trait in a population of brushtail possum in a New Zealand forest; the resulting estimated parameters are then used to calibrate a stochastic, individual-based model simulating the outcomes of different luring scenarios. (3) We show that the brushtail possum (*Trichosurus vulpecula*) population analysed was likely split into a smaller, very trappable group, and a larger trap-shy group, with low mean nightly probability of interaction with traps of 28% [14%-56%]. (4) Synthesis and applications: Our results show that using multiple lures can result in a greater population knock-down than using a single lure, and that it is more efficient to use a combination of lures for the entire duration of a kill-trap operation than to switch from one lure to another.

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