Effects of food availability and predation on reproductive success and behaviour of *Petroica longipes* in a fragmented landscape

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ABSTRACT

Declines of avian populations in fragmented landscapes are well documented. However, the underlying factors causing these declines are often poorly understood. Two key habitat variables that negatively impact species persistence in small forest fragments are predator abundance and food availability, both crucial determinants of avian reproductive success. I examined the effect of fragment size, isolation and disturbance on these two habitat variables, and the influence of these habitat variables on reproductive success and behaviour of North Island robins (*Petroica longipes*). The study was carried out in 15 forest fragments (1.6 – 1625 ha) in an agricultural forestry landscape in the central North Island of New Zealand from 2002 to 2005.

I found no association between a measure of relative predator abundance (proportion of tunnels tracked by *Rattus rattus*) and either fragment size or isolation. Domestic livestock grazing appeared to have a negative impact on rat abundance. However, the lack of a relationship between rat tracking rate and robin nest survival suggests that rat tracking rates may not be well correlated with predator abundance in small fragments. Nest survival increased with food availability (invertebrate biomass) as expected, but decreased with fragment size. Overall daily nest survival was 0.315 (*SE* 0.003).

I also determined whether food availability was associated with incubation behaviour or foraging efficiency. Female nest attentiveness was expected to increase with increasing frequency of male incubation feeding, which was in turn expected to increase with food availability. The rate of male incubation feeding did alter the female's incubation rhythm (shorter on- and off-bouts), but was negatively associated with the overall proportion of time females spent on their nests. Male incubation feeding rates were not significantly associated with food availability. In addition, measures of foraging efficiency (proportion of time spent foraging, prey capture rate) were not significantly associated with food availability in either males or females.

This study did not support recent predictions related to incubation behaviour or habitat fragmentation, and this may reflect current theory being largely based on results from north-temperate ecosystems. In particular, there was no evidence that the small or disturbed fragments had inferior habitat for robins. I recommend that conservation managers in New Zealand not overlook the value of small habitat fragments.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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