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Demography and distribution of the North Island robin (*Petroica longipes*) in a fragmented agricultural landscape of New Zealand

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North Island robin (*Petroica longipes*)

Abstract

Habitat loss and fragmentation are recognised worldwide as contributing to declines and extinctions of species. However, the biological factors underlying the effects of fragmentation are still often poorly understood, possibly due to the diversity of scales and approaches taken by researchers. I propose in this thesis an integrative approach that can be applied to any taxa and landscape, using a metapopulation of North Island robins (*Petroica longipes*) inhabiting forest patches of a fragmented agricultural landscape of New Zealand. In particular, I attempt to integrate the effects of habitat fragmentation on both habitat quality and the dispersal-driven broad scale dynamics of populations. I first analysed the distribution of robins based on presence-absence data, relating presence-absence to local habitat factors as well as size and isolation of forest patches (Chapter 2). Their distribution was found to be primarily limited by the isolation of forest patches, but was also related to some habitat factors. However, habitat fragmentation was not found to affect habitat quality, as the factors found to affect survival and productivity were unrelated to size and isolation, independent from the size or isolation of forest patches (Chapter 3). Based on the radio-tracking of juvenile robins, I applied a choice analysis technique to show that robins need woody vegetation for their natal dispersal and that they are unlikely to cross stretches of pasture greater than 150 m (Chapter 4). Juveniles dispersed a median Euclidean distance of 1129 m with a maximum of 11 km, whereas I predicted from the data that they would have dispersed a median distance of 3 km in continuous forest with a maximum of 20 km (Chapter 5). The consequences of this dispersal limitation and of variations in habitat quality were assessed using a spatially-explicit individual-based metapopulation model that incorporated realistic gap-limited dispersal behaviour of juvenile robins (Chapter 6). Whereas the movement of individuals between patches is commonly assumed to improve the persistence of populations, I found that a weaker gap-crossing ability, and therefore reduced landscape connectivity, increased the metapopulation size at equilibrium. This study highlights the complex effects of habitat loss and fragmentation on the distribution of species, but also the limits of excessive model simplification.

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