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An integrated approach for predicting the fate of reintroduced populations

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Abstract

I provide a comprehensive account of the fate of a reintroduced population of North Island robins (*Petroica longipes*) at Tawharanui Regional Park, a predator-free peninsular site in the Auckland Region. All factors affecting the success of reintroductions do so through survival, reproduction, or dispersal. I use an integrated Bayesian approach to assess the impact these factors have on population persistence. I estimated population growth by combining vital rates (survival and reproduction) using 9 years of post-release monitoring data. There was no change to estimates when informative priors that accounted for site-to-site variation were included. I determined that despite low recruitment, the population will persist under current circumstances. I then focused on what was causing low recruitment by distinguishing juvenile survival from permanent natal dispersal. Habitat fragmentation prevented juvenile dispersal out of the park, and juvenile survival was low with most mortality occurring within four months of fledging. It is low juvenile survival that is causing low recruitment, indicating the habitat quality is marginal. Despite this, current habitat quality and connectivity is sufficient to maintain a population, but there may be implications for management if connectivity is increased in the future. Finally, I assessed whether it would be sensible to harvest this population as their location makes them a convenient source for future reintroductions. I projected population dynamics 10 years into the future and examined the implications of a one-off harvest on population persistence. Whilst there was negligible chance that the population would go extinct, a harvest at any level reduced the number of females in the population throughout the 10 years, with larger harvests causing a greater reduction. My results can be used within a decision analysis framework to facilitate the decision of whether Tawharanui would be a suitable source population for future reintroductions.

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