Dispersal: the effects of phenotype and habitat selection in reintroduced populations

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Abstract

Dispersal is a complex behaviour, recognised as the primary mechanism by which gene flow occurs. In the field of reintroduction biology, dispersal can influence reintroduction success both positively and negatively, yet the mechanisms underpinning dispersal in reintroduced populations are not well understood.

Extensive literature is now available on the proximate forces driving natal dispersal, and in this thesis I draw on this field to inform our understanding of dispersal processes in reintroduced populations. It is widely accepted that both internal state (phenotype) and the external environment have multi-causal effects on natal dispersal patterns across three recognised phases of movement (departure, exploration, settlement), but the relationship to post-release dispersal is less well understood. I use reintroduced populations of an endangered passerine, the hihi (stitchbird, *Notiomystis cincta*), to answer specific research questions regarding the proximate factors driving both post-release and natal dispersal in this species.

I first examine phenotypic variation in behavioural traits (personality) in my study species, in particular the effects of early natal nutrition on the expression of personality, and the influences on subsequent survival and dispersal. I find complex relationships between natal nutrition and personality that are sex-specific, and that “bold” individuals have higher survival probabilities. I find evidence for a relationship between personality and natal dispersal patterns in one study population, but not in another.

I then examine the influence of internal state (personality, early natal nutrition and

degree of inbreeding) on post-release dispersal of newly translocated hihi at two sites, and find that all of these factors affect dispersal behaviour in the initial post-release and exploration phases.

I then examine the role of the external environment on both natal and post-release dispersal using species distribution models. There is a strong social effect in habitat selection of natal dispersers, but no detectable social effect in habitat selection of post-release dispersers, and evidence for use of physical characteristics of the environment in habitat selection at both stages.

Finally, I discuss the wider implications of dispersal to reintroduction biology. I advocate for careful consideration of proposed release sites, and an integrated landscape approach within reintroduction planning.

This thesis is dedicated to the female hihi of Alberts 9 and MPD 1 – free (unbanded) spirits until the end.

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