

# Causes and Consequences of Variation in Dispersal Strategy in An Arctic Migrant

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## Abstract

Improving our understanding of the factors that shape the demography of populations now requires that we consider no event in isolation, and instead express current performance as a product of previous events and processes. Patterns of site choice and dispersal likely underpin a large proportion of the variation in reproductive success among individuals, but the consequences of dispersal decisions may only become apparent many months later at a separate stage of the annual cycle. Only by studying the interactions among seasons can we determine how differences in annual routine translate into asymmetries in fitness, and subsequently apply this understanding to processes occurring at the population level.

This thesis begins with a review of the phenomena known as carry-over effects (COEs; Chapter 2), where I find evidence to support their occurrence in a multitude of taxa and identify previously unconsidered drivers of carry-over effects that could potentially explain their widespread nature. The remainder of this thesis comprises empirical work using light-bellied Brent geese (*Branta bernicla hrota*) as a model system to study these processes. In Chapter 3 I show evidence of a COE in Brent geese mediated by body condition, but in addition demonstrate how the strength of this effect is moderated by downstream climatic conditions operating in a density-independent fashion. Chapter 4 describes the development of novel polymorphic microsatellite loci to be used in population genetic and parentage studies. In Chapter 5 I show that light-bellied Brent geese are highly site faithful and that this fidelity has a cultural basis. Finally in Chapter 6 I characterize patterns of mate choice, and investigate potential consequences of this pattern in light of the observed site fidelity, in terms of risk of inbreeding.

Collectively my results demonstrate the utility of combining long-term datasets with genetic pedigrees to investigate patterns of dispersal in a migratory species. Moreover they highlight the necessity to study individual performance in the context of the entire annual cycle in order to fully characterize the nature and strength of fitness determinants operating at multiple stages in a migratory species.

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