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**The roles of morphology, individuality and arrival
from migration in the foraging ecology of
Bar-tailed Godwits at the Manawatū River
Estuary**

A thesis presented in partial fulfilment of the requirements for the
degree of

Master of Science
in Zoology

at Massey University, Manawatū, New Zealand

Tobias Alexander Ross

2019



Abstract

Bar-tailed Godwits (*Limosa lapponica baueri*) are a hugely size-variable shorebird exhibiting reverse sexual dimorphism as well as substantial variation within the sexes. This variation is especially pronounced in bill lengths, and differences in bill size could result in dietary differences between individuals. I studied the foraging ecology of individually-marked godwits at the Manawatū River Estuary in New Zealand, a small site amenable to making repeated observations of birds by videography. Specifically, I investigated the effects of bill size variation on intake rates and diet composition of godwits and tested for individual specialisation. Birds were found to use prey-specific foraging modes, the effect of which far outstripped that of any morphological or environmental factor. I found that shorter-billed birds (males) had slightly higher and less variable intake rates than their longer-billed (female) counterparts. The shorter-billed birds focused their efforts on catching small surface prey such as *Potamopyrgus*, to the extent where around half of the males specialised on these small snails. In comparison, longer-billed birds ate a more diverse array of prey items, notably consuming more worms which were buried deeply in the sediment. In addition to some birds specialising on certain prey, other prey were taken preferentially by only certain individuals across the size spectrum. This suggests that the diets of godwits are not only influenced by morphology but also by individual preferences of the birds themselves.

I also tested for a carry-over effect of prolonged flight on foraging performance of godwits. The 8–10-day post-breeding migratory flight of godwits direct from Alaska to New Zealand is the longest known endurance flight of any land-bird. This flight has many expected physiological impacts, including a reduction in digestive tract mass that could lead to lower functionality of the digestive tract and therefore limit intake rates after arrival. By monitoring the daily occurrence of marked birds I determined when birds arrived on migration, and tested whether intake rates and diet choice changed in the fortnight after birds arrived. I found that intake rates were slightly higher and less variable with time since arrival. Furthermore, there was an increase in the consumption of the hard-shelled mud snail *Amphibola crenata* with time, suggesting a recovery of gizzard mass. Given the scale of the migration, however, these effects were surprisingly small and imply that diet choice and energy intake are affected only slightly by a physiological carry-over effect from migration.

Acknowledgements

First, I want to thank those without whom this study would never have occurred: my supervisors Phil Battley and Murray Potter. I am extremely grateful for all the time you spent providing me help throughout this thesis, especially given how often I had to knock on Phil's door with questions or updates! Were it not for your input I would probably still be sifting mud out at the beach, and definitely would not have completed this thesis. You've both been great for talking me back into loving my thesis even at the times I've struggled to enjoy it, and I appreciate all your passion and knowledge that you've provided in guiding my work.

I would also like to thank Chris Hopkins for allowing me to stay at her beach house out at Foxton Beach. Thanks to your kindness and generosity, my fieldwork was substantially more efficient as I could monitor the godwits at any point throughout the day. Being able to simply walk out the door to film them rather than driving from Palmerston North daily was invaluable. Without your hospitality my data would not have been anywhere near as thorough.

Many people visited me throughout my fieldwork at Foxton, all of whom I appreciated as it gave me some valuable human interaction while out there! Several of you, including Tyler Baxter and Tim Stanton, additionally aided in my data collection on the mudflats for which I'm very grateful. In particular, no one contributed more time or help to me on the mudflats than Tyler Berry. Invertebrate data collecting would have taken more than twice as long had you not volunteered so much of your time. Thanks to your immeasurable efforts assisting me in fieldwork, we managed both rounds of benthos sampling far faster than I would have ever managed alone, allowing me more time filming the birds returning from migration. Your help both in the field and as a friend and flatmate made everything much easier, not to mention the fact you're great company!

Data analysis for this study was particularly complicated, and at many points it looked like I'd never get it finished in time to write this thesis! I spent a long time stumbling along trying to figure out the analyses to use. For his help during this time, I'd like to thank Ian Henderson for putting up with me while I kept popping into his office with statistical questions! I'd additionally like to thank Luke Eberhart-Phillips for the afternoon during which he gave me a bit of a crash course in data manipulation in R - it proved invaluable. Most of all though, I'd like to thank both Dave Hodgson and Matt Silk at the University of Exeter for coming to the rescue and being our statistical/spiritual guides for the analyses in the study. You've both saved me during the thesis analysis and thank you for agreeing to be co-authors to my papers!

Lastly, I would like to thank all my family and friends who have supported and/or tolerated me throughout this whole Masters process. It's been the hardest thing I've ever done in my life and

without the help you all provided in your own way I would not have got through it all. To both my parents, Sarah and Gavin Ross, it's thanks to you both that I have the love of birds and wildlife that sustains me today. Without your belief in me I doubt I'd have pushed myself through this whole thing so thank you! To all my friends I've met whether through university or elsewhere, thank you for seeing me through it all – you've kept me going, and I'm looking forward to seeing where we all go next!

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