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Waterbirds around the world

A global overview of the conservation,
management and research of the
world's waterbird flyways

Edited by G.C. Boere, C.A. Galbraith and D.A. Stroud

*Assisted by L.K. Bridge, I. Colquhoun, D.A. Scott,
D.B.A. Thompson and L.G. Underhill*



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Cover photography: Whooper Swans *Cygnus cygnus* arriving at Martin Mere, England. Photo: Paul Marshall.
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4.4 Migration ecology. Workshop Introduction

Theunis Piersma¹ & Nils Warnock²

¹Department of Marine Ecology & Evolution, Royal Netherlands Institute for Sea Research (NIOZ), PO Box 59, 1790 AB Den Burg, Texel, The Netherlands; and: Animal Ecology Group, Centre for Ecological and Evolutionary Studies, University of Groningen, PO Box 14, 9750 AA Haren, The Netherlands.

²PRBO Conservation Science, 4990 Shoreline Hwy, Stinson Beach, CA 94970, USA.

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Greenland White-fronted Geese *Anser albifrons flavirostris* flying to staging areas in western Iceland. Recent research, including the use of satellite telemetry, has given a clearer understanding of the energetic implications of the lengthy two-stage migration undertaken by these geese. Photo: Chris Wilson.

Over the last decade many research projects have been undertaken to investigate the ways by which migratory birds handle their energetic needs in relation to flight ranges (including individual decisions of birds regarding these routes), the selection of stopover or staging areas, and the use of available food resources.

The aim of the workshop was to identify the conservation consequences of the many different ecological and life-history strategies that waterbird species use during their annual cycle; to identify and discuss the value of modern research techniques (stable isotopes, geo-locators, satellite tracking); and to formulate priorities for further research.

The advent of satellite tracking has revolutionised understanding of the migration systems of waterbirds, providing near real-time information to be gathered on the location of individual birds. Recent studies of the movements of East Canadian High Arctic Light-bellied Brent Geese *Branta bernicla hrota* are summarised by Robinson *et al.* This technology will probably always be relatively expensive and thus applicable only to small

numbers of individuals. In contrast, new techniques such as genetic analysis (as presented by Svazas for Common Snipe *Gallinago gallinago*) and the use of stable isotopes (as summarised by Atkinson *et al.* for determining population structures of Nearctic Red Knot *Calidris canutus rufa*) have significant potential to help elucidate flyways, and thus assist conservation managers. Although not a waterbird, using the example of the Redwing *Turdus iliacus*, Coiffait *et al.* show how that combined use of stable isotope and DNS analysis can be an effective tool in clarifying population identity – with potential implications for population studies of waterbirds.

The extent of migration can be very considerable. Gill *et al.* present evidence of one of the most extreme: an 11 000 km non-stop flight by Bar-tailed Godwits *Limosa lapponica* from Alaska to New Zealand and eastern Australia. Understanding the eco-physiological constraints of such flights, focuses attention on the critical importance of adequate feeding (re-fuelling) possibilities at the termini of such flights (and on intermediate staging areas where these are used.