

SHOREBIRDS IN NEW ZEALAND

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New Zealand's coast supports up to 166,000 northern hemisphere breeding waders, including internationally important populations of Bar-tailed Godwit and Red Knot, during the austral summer. Some 163,000 local breeding waders occur on the coast during winter. Most taxa of endemic waders are threatened, the Black Stilt being critically endangered. Habitat loss and predation by introduced mammals are the greatest threats.

INTRODUCTION

New Zealand, with a land area of 270,500 km², is situated at the southernmost point of the East Asian-Australasian Flyway, between 33° and 47°S. The coastline is some 15,134 km long (Anon 2006); two-thirds of it is hard rocky shore, the remaining third being soft sand, silt and gravel (Taylor & Smith 1997). An introduction to coastal environments in New Zealand is given by Morton & Miller (1973) and Morton (2004).

Nationwide counts of waders co-ordinated by the Ornithological Society of New Zealand were made in summer and winter from 1983 to 1994. Endemic waders breed on coasts (Northern New Zealand Dotterel, Variable Oystercatcher), on braided river beds (Wrybill, Black Stilt), subalpine mountain tops (Southern New Zealand Dotterel) and densely vegetated subantarctic islands (snipe); population estimates of these species were derived from winter counts, whereas estimates for northern hemisphere breeders were made from summer counts. These counts showed that New Zealand's coast supported some 166,000 northern hemisphere breeding waders during the austral summer and about 163,000 New Zealand breeding waders in winter (Sagar *et al.* 1999).

The first human arrival, of Polynesians some 2000 years ago (Worthy & Holdaway 2002), is thought to have set in train the first wave of bird extinctions due to introduced mammalian predators (notably Pacific Rat [kiore] *Rattus exulans*). Subsequent introductions by European settlers caused further waves of extinction with impacts continuing to the present day (see below).

Habitat changes following human settlement also have had marked impacts on some wader species. The felling of forests and the opening of pasture lands opened the way for colonisation of power schemes and the spread of exotic plants in riverbeds has resulted in less breeding habitat for species such as Black-fronted Terns and Wrybills.

Mangroves *Avicennia resinifera* occur in the northern part of the North Island, south to about 38° (Wardle 1991) and currently cover some 22,500 ha (MAF 2006). In recent years encroachment of tidal areas by mangrove has increased, apparently due to increased sediment and nutrient runoff, and is becoming a topic of public debate (Green *et al.* 2003), with concern about the loss of high-tide wader roosts in the Firth of Thames (Woodley 2005).

ENDEMIC WADERS

Eighteen taxa representing at least 13 species of wader breed in New Zealand, of which 10 are endemic. Population estimates are given in Table 1. Information on the distribution and movements of endemic waders in New Zealand has recently been summarised by Dowding & Moore (2006) and is not considered further here.

ARCTIC-BREEDING MIGRANT WADERS

New Zealand lies at the South-eastern extremity of the East Asian-Australasian Flyway and receives relatively few migrant Arctic-breeding shorebirds, especially when compared with Australia. A total of 47 species has been recorded (Tables 2 and 3) but of these only three occur in internationally significant numbers – Bar-tailed Godwit, Red Knot and Ruddy Turnstone.

Coastal wader surveys have been conducted at some sites by members of the Ornithological Society of New Zealand (OSNZ) since the 1950s. A national wader census project between 1983 and 1994 resulted in coverage of all main wader sites throughout the country with winter (June/early July) and summer (November/early December) counts (Sagar *et al.* 1999). Wader counts continued, but on a less formal basis, between 1994 and 2003 (Southey in prep.), and since 2003 have been reinstated as an official OSNZ project, with support from the Department of Conservation (OSNZ unpubl.). Population estimates of the more regularly occurring species are given in Table 2; vagrant species are listed in Table 3. Note that the estimates based on Sagar *et al.* (1999) were derived from censuses from 1984–1994 and may be out of date; updated national estimates are not yet available.

Count data at a national level are too few to allow detailed analysis of national population trends. However, medium- to long-term data sets exist for certain major sites, particularly the Manukau Harbour and Firth of Thames (continuous since 1960/1961; Battle *et al.* 2007) and Farewell Spit (periodic since 1961, continuous since 1983; Schuckard 2002). These reveal that there have been substantial changes in numbers of Bar-tailed Godwits and Red Knots at these sites. Godwits showed two general population peaks in the Manukau Harbour and Firth of Thames – one in the mid-1960s and one in the early-mid 1990s. Over a shorter time scale, numbers of godwits at four

Table 1. Population estimates of waders breeding in New Zealand After Dowding and Moore (2006) if not otherwise indicated.

Species	Population estimate	Comments
New Zealand Pied Oystercatcher <i>Haematopus finschi</i>	130,000	Population increasing
Variable Oystercatcher <i>Haematopus unicolor</i>	4,500	Population increasing
Chatham Island Oystercatcher <i>Haematopus chathamensis</i>	c. 170 mature individuals	Subject to ongoing management
Pied Stilt <i>Himantopus himantopus leucocephalus</i>	30,000	Population trend not known
Black Stilt <i>Himantopus novaeseelandiae</i>	c. 50	Population declining due to predation and interbreeding with Pied Stilt
Southern New Zealand Dotterel <i>Charadrius obscurus obscurus</i>	c. 250	Increased from a low of 62 in 1992 due to intensive management
Northern New Zealand Dotterel <i>Charadrius obscurus aquilonius</i>	c. 1,700	Population declining
Banded Dotterel <i>Charadrius bicinctus bicinctus</i>	50,000	Population declining
Auckland Island Banded Dotterel <i>Charadrius bicinctus exilis</i>	730	Population trend not known
Black-fronted Dotterel <i>Charadrius melanops</i>	1,700	Colonised in 1950s
Spur-winged Plover <i>Vanellus miles</i>	abundant	Colonised in 1930s
New Zealand Shore Plover <i>Thinornis novaeseelandiae</i>	c. 120 mature individuals	Largely confined to 2 islands in the Chathams group
Wrybill <i>Charadrius (Anarhynchus) frontalis</i>	4,500-5,000	Population declining
New Zealand Snipe <i>Coenocorypha aucklandica</i>	20,000 ²	Population trend not known
Chatham Island Snipe <i>Coenocorypha pusilla</i>	At least 1,000 pairs	Confined to 4 islands in the Chathams group
Snares Island Snipe <i>Coenocorypha [aucklandica] huegeli</i>	1,100 ¹	Population trend not known
Antipodes Island Snipe <i>Coenocorypha [aucklandica] meinertzhagenae</i>	8,000 ¹	Population trend not known
Campbell Island Snipe <i>Coenocorypha</i> undescribed taxon	<50 ²	Population now expanding from Jacquemart Island to Campbell Island (Miskelly and Fraser 2006)

Notes: ¹After Wetlands International (2006). ²After Barker *et al.* (2005).

Table 2. Population estimates of arctic-breeding shorebirds occurring regularly in New Zealand after Sagar *et al.* (1999).

Species	Population estimate
Greater Sand Plover <i>Charadrius leschenaultii</i>	<10
Lesser Sand Plover <i>Charadrius mongolus</i>	<10
Pacific Golden Plover <i>Pluvialis fulva</i>	649
Grey Plover <i>Pluvialis squatarola</i>	<10
Ruddy Turnstone <i>Arenaria interpres</i>	5,069
Red Knot <i>Calidris canutus</i>	58,637
Sanderling <i>Calidris alba</i>	<10
Curlew Sandpiper <i>Calidris ferruginea</i>	86
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	81
Pectoral Sandpiper <i>Calidris melanotos</i>	<10
Red-necked Stint <i>Calidris ruficollis</i>	175
Eastern Curlew <i>Numenius madagascariensis</i>	34
Whimbrel <i>Numenius phaeopus</i>	117
Bar-tailed Godwit <i>Limosa lapponica</i>	101,698
Black-tailed Godwit <i>Limosa limosa</i>	<10
Hudsonian Godwit <i>Limosa haemastica</i>	<10
Grey-tailed Tattler <i>Tringa brevipes</i>	<10
Greenshank <i>Tringa nebularia</i>	<10
Marsh Sandpiper <i>Tringa stagnatilis</i>	<10
Terek Sandpiper <i>Tringa terek</i>	<10

of the most important sites in New Zealand (Kaipara and Manukau Harbours, Firth of Thames, Farewell Spit) declined substantially from the mid-1990s to mid-2000s, with a decrease of almost over 20,000 birds (Figure 1). The national population may currently be considerably lower than the 101,000 estimated by Sagar *et al.* (1999).

Red Knots increased in the Manukau Harbour from less than a thousand birds in the early 1960s to 10-20,000 birds in the 1980s (Battley *et al.* 2007). This increase overlapped

with a long-term decline in knot numbers on Farewell Spit (from 27,000 in 1961 to 6800 in 2001; Schuckard 2002) but the timing of the changes do not mean there has been a simple redistribution of birds between these sites (the steepest decline on Farewell Spit was when numbers in the Manukau Harbour were fairly stable). It is evident that factors affecting Arctic shorebird populations in New Zealand are not constant among sites. Preliminary analyses of numbers of Arctic waders in the Manukau Harbour and

Table 3. Vagrant waders recorded in New Zealand after Sagar *et al.* (1999), Turbott (1990), Heather and Robertson (1996), Hill (2006), Petch *et al.* (2002).

Species
Painted Snipe <i>Rostratula benghalensis</i>
Oriental Pratincole <i>Glareola maldivarum</i>
Red-capped Dotterel <i>Charadrius ruficapillus</i>
Ringed/Semipalmated Plover <i>Charadrius hiaticula/semipalmatus</i>
Red-kneed Dotterel <i>Erythrogonys cinctus</i>
Oriental Plover <i>Charadrius veredus</i>
Japanese Snipe <i>Gallinago hardwickii</i>
Great Knot <i>Calidris tenuirostris</i>
Dunlin <i>Calidris alpina</i>
Baird's Sandpiper <i>Calidris bairdii</i>
White-rumped Sandpiper <i>Calidris fuscicollis</i>
Little Stint <i>Calidris minuta</i>
Western Sandpiper <i>Calidris mauri</i>
Long-toed Stint <i>Calidris subminuta</i>
Broad-billed Sandpiper <i>Limicola falcinellus</i>
Stilt Sandpiper <i>Micropalama himantopus</i>
Ruff <i>Philomachus pugnax</i>
Asiatic Dowitcher <i>Limnodromus semipalmatus</i>
Little Whimbrel <i>Numenius minutus</i>
Bristle-thighed Curlew <i>Numenius tahitiensis</i>
Upland Sandpiper <i>Bartramia longicauda</i>
Wandering Tattler <i>Tringa incana</i>
Common Sandpiper <i>Tringa hypoleucos</i>
Lesser Yellowlegs <i>Tringa flavipes</i>
Red-necked Phalarope <i>Phalaropus lobatus</i>
Grey Phalarope <i>Phalaropus fulicarius</i>
Wilson's Phalarope <i>Phalaropus tricolor</i>

Firth of Thames indicate that while for some for species changes in productivity are at least partly behind their population changes (peaks in total numbers coincide with increases in overwintering immature birds), habitat changes have affected the distribution and numbers of other species at a local scale.

WETLANDS OF INTERNATIONAL IMPORTANCE FOR WADERS

Cromarty & Scott (1996) reviewed wetlands throughout New Zealand and listed sites of international importance according to the Ramsar criteria then current. Among the 73 sites listed, there were 19 which were identified as having particular wader values.

The only population estimates for Northern Hemisphere waders in New Zealand currently available are those given by Sagar *et al.* (1999). The Ramsar criteria for identifying sites of 'international' importance based on waterbird numbers are:

Criterion 5. A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds

Criterion 6. A wetland should be considered internationally important if it regularly supports 1% of the individuals of a population of one species or subspecies of a waterbird (based on Wetlands International 2006)

Taking the results of the 1983-1994 censuses (Sagar *et al.* 1999), and current total population figures (Wetlands International 2006) there are 15 sites which should be considered as internationally important for Arctic-breeding waders (Table 4).

Dowding & Moore (2006) list the 22 main sites of international importance for endemic waders (Table 5). It should be noted that due to the very small populations of species such as Chatham Island Oystercatcher and Black Stilt, sites regularly supporting one bird are considered to be internationally important under the Ramsar criteria; these sites are not listed in Table 5.

Four of the six listed Ramsar sites in New Zealand are of importance to waders (Table 6). None of these has a current management plan, although one for Farewell Spit is in preparation. The ecology of waders on Farewell Spit was studied by Battley (1996), and Battley *et al.* (2005a) detail the benthos of the Farewell Spit tidal flats. Rance & Cooper (1997). Thompson & Ryder (2003) provide information about Waituna Lagoon. Brownell (2004) provides information about the ecology of the Firth of Thames site and Battley & Brownell (2007) give more information on changes in numbers of waders and summarise relevant knowledge about wader foraging ecology. Information about the Manawatu estuary is available from the Ramsar Sites Information Service (<http://www.wetlands.org/rsis/>). A proposal to extend the Waituna Lagoon Ramsar Site to include Awarua Bay (Cromarty & Scott 1996) has yet to be implemented.

A review of rivers of national/international importance was undertaken by Chadderton *et al.* (2004); this includes a number of rivers with wader values.

THREATS TO WADERS

The arrival of humans (initially Polynesians, later Europeans) in New Zealand together with their attendant camp followers and deliberately introduced species (especially rats *Rattus exulans*, *R. norvegicus*, *R. rattus*., cats *Felis catus*, mustelids *Mustela erminea*, *M. nivalis*, *M. furo*, and European Hedgehogs *Erinaceus europaeus*), have had a marked impact on many shorebird species in New Zealand and predation by introduced mammals continues to seriously threaten a number of species (Dowding & Murphy 2001). Population recovery once predators have been removed can be spectacular (Miskelly & Fraser 2006).

Three endemic taxa are known to have become extinct (Table 7) – snipe possibly having become extinct on the North and South Islands by the time of European arrival (Worthy & Holdaway 2002, but see Tennyson & Martinson 2006). Ranges of some species have become severely restricted – for example, Shore Plovers used to occur at inland sites in the South Island, and fossils of New Zealand Dotterel have been found at high altitude in northwest Nelson (Worthy & Holdaway 2002). Hybridisation with Pied Stilt remains a serious threat to the Black Stilt (Greene 1999). Four species are currently considered to be nationally critical/globally endangered (Table 8).

Human impacts on coastal environments are increasing with habitat loss due to infilling/reclamation, subdivision for urban development adjacent to shores (with associated

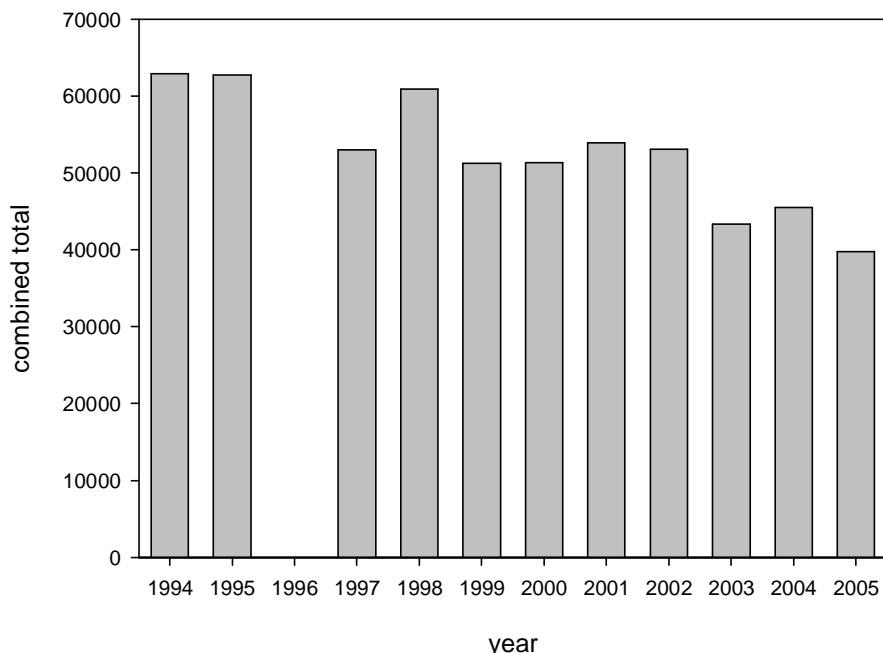


Figure 1. Decrease in numbers of Bar-tailed Godwits in the Kaipara and Manukau Harbours, Firth of Thames and Farewell Spit. Counts are from OSNZ censuses conducted in November/December (first three sites) or are the higher of censuses in November or February (Farewell Spit).

Table 4. Coastal wetlands in New Zealand of international importance for Arctic-breeding waders.

Site	Criteria			
	20,000 waterbirds	Bar-tailed Godwit	Red Knot	Ruddy Turnstone
Parengarenga, Far North	.	+	+	+
Houhora Harbour, Far North	.	.	+	.
Rangaunu Bay, Far North	.	+	+	.
Whangarei Harbour, Northland	.	+	+	.
Kaipara Harbour, North Auckland	+	+	+	.
Manukau Harbour, Auckland	+	+	+	.
Firth of Thames, South Auckland	+	+	+	.
Tauranga Harbour, Bay of Plenty	.	+	.	.
Ohope Spit, Ohiwa Harbour, Bay of Plenty	.	+	.	.
Kawhia Harbour, Waikato	.	+	.	.
Farewell Spit, Northwest Nelson	+	+	+	.
Motueka Estuary, Tasman Bay	.	+	.	.
Waimea Inlet, Tasman Bay	.	+	.	.
Avon-Heathcote Estuary, Canterbury	.	+	.	.
Invercargill Estuary, Southland	.	+	.	.

disturbance and pet animals), mangrove encroachment in the northern harbours, shellfisheries, aquaculture and sea level rise. The introduction of exotic organisms, both deliberate, e.g. the cord-grass *Spartina* (Partridge 1987) and accidental, e.g. the oyster *Crassostrea gigas* (Dinamani 1971), has resulted in widespread impacts in many coastal areas. Green (2006) provides an introduction to current estuarine management issues.

Loss of shorebird nesting habitat in braided rivers is occurring as a result of encroachment by vegetation (mostly

exotic), which often is exacerbated by changing flow regimes due to water abstraction for irrigation and hydroelectric schemes (O’Donnell 2004).

Recovery plans have been prepared by the New Zealand Department of Conservation for New Zealand Dotterel (Dowding 1993, Dowding & Davis 2007), Chatham Island Oystercatcher (Anon. 2001), Chatham Island Snipe (Aikman *et al.* 2001), and Black Stilt (Maloney & Murray 2002).

Table 5. Sites of international importance for endemic waders in New Zealand after Dowding and Moore (2006).

Site	Pied Oyster-catcher	Variable Oyster-catcher	Pied Stilt	Black Stilt	New Zealand Dotterel	Banded Dotterel	Wrybill
Sites of international importance for two or more taxa							
Parengarenga Harbour, Far North	.	+	+	.	+	+	+
Houhora Harbour, Far North	.	+	+	.	+	+	+
Rangaunu Harbour, Far North	.	+	+	.	+	.	.
Whangarei Harbour, Northland	+	+	+	.	+	+	+
Mangawhai Estuary, Northland	.	+	.	.	+	.	.
Kaipara Harbour, North Auckland	+	?	+	+	+	+	+
Manukau Harbour, Auckland	+	.	+	+	+	+	+
Firth of Thames, South Auckland	+	.	+	+	+	.	+
Aotea Harbour, Waikato	+	.	+	.	.	+	.
Kawhia Harbour, Waikato	+	.	+	+	.	+	.
Matarangi Spit, Coromandel	.	+	.	.	+	+	.
Tauranga Harbour, Bay of Plenty	+	+	+	+	+	+	+
Ohiwa Harbour, Bay of Plenty	.	+	.	.	+	+	.
Farewell Spit, Northwest Nelson	+	+	+	+	+	+	.
Tasman Bay	+	+	+	+	.	.	.
Avon-Heathcote Estuary, Canterbury	+	+	.	+	.	.	.
Lake Ellesmere, Canterbury	.	.	+	+	.	+	+
Wainono Lagoon, Southland	.	.	+	+	.	+	.
Awarua Bay, Southland	.	+	.	.	+	+	.
Sites of critical importance for single taxa							
Upper Waitaki Basin, central South Island	.	.	.	+	.	.	.
Paterson Inlet, Stewart Island	+	.	.
Auckland Islands	+	.

Table 6. Designated Ramsar Sites in New Zealand which are important for waders.

Site	Date listed	Area (ha)
Farewell Spit, Northwest Nelson	13 August 1976	~ 11,388
Waituna Lagoon, Southland	13 August 1976	~ 5,923
Firth of Thames, South Auckland	29 January 1990	~ 7,800
Manawatu river mouth and estuary, Manawatu	27 July 2005	~ 200

Table 7. Extinct wader species in New Zealand. Taxonomy follows Holdaway *et al.* (2001). Probable cause of extinction follows Tennyson and Martinson (2006).

Species	Probable cause of extinction
Forbes' Snipe <i>Coenocorypha chathamica</i>	Pacific Rat <i>Rattus exulans</i> , cat <i>Felis catus</i>
South Island Snipe <i>Coenocorypha iredalei</i>	Weka <i>Gallirallus australis</i> , Pacific Rat, Ship Rat <i>Rattus rattus</i> , cat
North Island Snipe <i>Coenocorypha barrierensis</i>	Pacific Rat, cat

RESEARCH

Until recently research on waders in New Zealand has been largely focused on the biology of threatened endemic species, viz.: Chatham Island Oystercatcher (Schmechel 2001), Black Stilt (Pierce 1996), Wrybill (Davies 1991, 1997; Hay 1984; Riegen & Dowding 2003), New Zealand Shore Plover (Davis 1994a, 1994b), New Zealand Dotterel (Dowding 1994, 1999, Dowding & Chamberlain 1991, Dowding & Murphy 1993), and snipe species (Miskelly 1999a, 1999b, Miskelly & de Lange 2006). Studies of other native species include Pied Oystercatcher (Baker 1973, 1975, Sagar & Geddes 1999, Sagar *et al.* 2000, Sagar *et al.* 2002), Variable Oystercatcher (Baker 1973, Crossland 2001), and Banded Dotterel (Pierce 1989, 1999). Remarkably, a new population of Shore Plover was

discovered as recently as 1999 (Bell & Bell 2000), although this is now thought extinct (Dowding *et al.* 2005), and a possible new snipe taxon discovered (Barker *et al.* 2005).

Research on migratory, arctic-breeding waders has included banding and migration studies (Battley 1997, 1999, Riegen 1999, Battley & Piersma 2005, Riegen *et al.* 2005), as well as counts (see above). Individual colour banding of Bar-tailed Godwit, Red Knot and Ruddy Turnstone started in 2003 to investigate movements within New Zealand and this has already provided extensive information within New Zealand as well as overseas (P.F. Battley, D.S. Melville, and R. Schuckard unpubl.), and has allowed elucidation of other aspects of the ecology of Bar-tailed Godwits (Battley 2006a, 2006b).

Table 8. Threat status of New Zealand waders.

Species	Hitchmough <i>et al.</i> (2005)	IUCN (2006)
Black Stilt <i>Himantopus novaeseelandiae</i>	Nationally critical	Critically endangered
Chatham Island Oystercatcher <i>Haematopus chathamensis</i>	Nationally critical	Endangered
New Zealand Shore Plover <i>Thinornis novaeseelandiae</i>	Nationally critical	Endangered
Southern New Zealand Dotterel <i>Charadrius obscurus obscurus</i>	Nationally critical	Endangered
Wrybill <i>Charadrius frontalis</i>	Nationally vulnerable	Vulnerable
Banded Dotterel <i>Charadrius bicinctus</i>	Gradual decline	Lower risk/Least concern
Northern New Zealand Dotterel <i>Charadrius obscurus aquilonius</i>	Sparse	Endangered
Chatham Island Snipe <i>Coenocorypha pusilla</i>	Range restricted	Vulnerable
Auckland Island Banded Dotterel <i>Charadrius bicinctus exilis</i>	Range restricted	
Auckland Island Snipe <i>Coenocorypha [aucklandica] aucklandica</i>	Range restricted	Near threatened
Snares Island Snipe <i>Coenocorypha [aucklandica] huegeli</i>	Range restricted	
Antipodes Island Snipe <i>Coenocorypha [aucklandica] meinertzhagenae</i>	Range restricted	

Surveillance studies for avian influenza A virus, which are ongoing, have principally sampled Red Knot and Wrybill.

THE FUTURE

Endemic species

The taxonomy of the New Zealand snipe requires elucidation to ensure that all taxa are adequately protected and managed. Work is in progress to determine the taxonomic status of New Zealand oystercatchers. Predator control will be a continuing management requirement for species such as Black Stilt, New Zealand Dotterel, and increasingly Wrybill.

Arctic-breeding species

The migration routes and use of stopover sites used by waders between New Zealand and their breeding grounds remain poorly known. Some Red Knots use northern Australia on northward migration but there is no detailed information on how many do so, how predictably, and whether those that do not stop there migrate direct to the Yellow Sea area or have other stopover sites. A further complication is if New Zealand hosts a mix of knots of the subspecies *rogersi* and *piersmai* (Tomkovich & Riegen 2000) that may have different migration schedules (Battley *et al.* 2005b). Locating the staging areas of Red Knots in the Yellow Sea on northward migration, and all southward migration staging sites, is a high priority. Whether Bar-tailed Godwits migrate direct to Asia from New Zealand is unknown (Battley & Piersma 2005). Resightings of colour-banded birds in Asia 11 days after last being seen in New Zealand (P.F. Battley unpubl.) indicates a quick migration of some individuals but does not rule out the possibility of a short stopover *en route*. The bulk of the population seems to reach Asia many weeks after migration starts in New Zealand, suggesting that some birds may make stopovers on their way north. Satellite telemetry studies of Bar-tailed Godwits during the northward migration in 2007 should allow the identification of any stopover area(s) used by birds that do not migrate directly to the Yellow Sea region. Global climate change is likely to affect weather patterns over the Pacific (Vecchi *et al.* 2006) and if wind patterns change this could seriously impact southward migrating Bar-tailed Godwits which are thought to make the 11,000 km journey

non-stop with considerable wind assistance (Gill *et al.* 2005). The breeding grounds of Ruddy Turnstones visiting New Zealand are unknown and further work is required.

Censuses of non-breeding arctic shorebirds in New Zealand and Australia are the only practical way to determine population trends for a number of taxa. ‘Implementation of statistically robust methodologies to monitor shorebird populations in priority countries’ (including New Zealand and Australia) was a priority action in the *Action Plan for the Conservation of migratory shorebirds in the East Asian-Australasian Flyway: 2001-2005*. The timing of counts requires further consideration to ensure that these are undertaken at a time when populations are as stable as possible, and they should be coordinated in both countries (Wilson 2001). The ability to assess the proportions of juveniles in populations to measure breeding success (Minton *et al.* 2005) is limited in New Zealand due to relatively low catching activity and the tendency of young knots at least to occur predominantly in Australia, but the field identification of juvenile Bar-tailed Godwits is possible (<http://osnz.org.nz/nzwaderstudy.htm#juv>) and should be encouraged.

There is increasing demand for coastal and estuarine monitoring by local authorities to meet their obligations under the Local Government Act and the amended Resource Management Act. At present this usually relates to physico-chemical properties, but a wider ecological approach is being encouraged (Robertson *et al.* 2002). Understanding of the distribution of waders in relation to environmental variables is at an early stage (Whelan *et al.* 2003) but there is potential for including shorebirds in local authority ‘state of the environment’ monitoring.

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