

[1] "*Calidris tenuirostris* — Great Knot — Glossary — SPRAT Profile — For information to assist regulatory considerations, refer to Policy Statements and Guidelines, the Conservation Advice, the Listing Advice and/or the Recovery Plan. EPBC Legal Status and Documents — Top — EPBC Act Listing Status — Listed as Critically Endangered (Date effective 05-May-2016) — Listed marine — Listed migratory — EPBC Act, Bonn, CAMBA, JAMBA, ROKAMBA — Under threatened listing assessment, due 30-Oct-2022. Approved Conservation Advice — Threatened Species Scientific Committee (2016). Conservation Advice *Calidris tenuirostris* Great knot. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/862-conservation-advice-05052016.pdf>. In effect under the EPBC Act from 05-May-2016. Listing Advice — Listing assessment information may be available in the approved Conservation Advice — Recovery Plan Decision — Recovery Plan not required, approved conservation advice provides sufficient direction to implement priority actions and mitigate against key threats. Significant management and research is being undertaken at international, national, state and local levels (2/05/2016). Adopted/Made Recovery Plans — There is no adopted or made Recovery Plan for this species — Adopted/Made Threat Abatement Plans — No Threat Abatement Plan has been identified as being relevant for this species — Wildlife Conservation Plans — Commonwealth of Australia (2015). Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/publications/wildlife-conservation-plan-migratory-shorebirds-2016>. In effect under the EPBC Act from 15-Jan-2016. Marine Bioregional Plans — Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). Marine bioregional plan for the North-west Marine Region. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Available from: <http://www.environment.gov.au/topics/marine/marine-bioregional-plans/north-west>. In effect under the EPBC Act from 27-Aug-2012. Other Commonwealth Documents — Other EPBC Act Plans — EPBC Act Policy Statement 3.21 - Industry Guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment, 2015) [Admin Guideline]. National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (Department of the Environment and Energy, 2020) [Admin Guideline]. Shorebirds - A Vulnerability Assessment for the Great Barrier Reef (Great Barrier Reef Marine Park Authority (GBRMPA), 2011) [Admin Guideline]. Information Sheets — Migratory Shorebirds of the East Asian - Australasian Flyway: Population estimates and internationally important sites (Bamford M., D. Watkins, W. Bancroft, G. Tischler & J. Wahl, 2008) [Information Sheet]. Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species (Hansen, B.D., R.A. Fuller, D. Watkins, D.I. Rogers, R.S. Clemens, M. Newman, E.J. Woehler & D.R. Weller, 2016) In effect under the EPBC Act from 29-May-2017. [Information Sheet]. Federal Register of Legislative Instruments — Marine: Declaration under section 248 of the Environment Protection and Biodiversity Conservation Act 1999 - List of Marine Species (Commonwealth of Australia, 2000c) [Legislative Instrument] Migratory: List of Migratory Species (13/07/2000) (Commonwealth of Australia, 2000b) [Legislative Instrument] Threatened: Amendment to the lists of threatened species, threatened ecological communities and key threatening processes under sections 178, 181 and 183 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (188) (02/05/2016) (Commonwealth of Australia, 2016g) [Legislative Instrument] Wildlife Conservation Plan: Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2006r) [Legislative Instrument] Wildlife Conservation Plan: Environment Protection and Biodiversity Conservation Act 1999 - Section 285 - Instrument revoking and making a wildlife conservation plan (Commonwealth of Australia, 2016) [Legislative Instrument] — State

Government Documents and Websites\ NSW:Great Knot - profile (NSW Department of Environment, Climate Change and Water (NSW DECCW), 2005nw) [Internet].NSW:Department of Environment and Conservation Threatened migratory shorebird habitat mapping project (NSW Department of Environment, Climate Change and Water (NSW DECCW), 2006a) [Report].NSW:Great Knot Threatened Species Information (NSW National Parks and Wildlife Service (NSW NPWS), 1999cd) [Information Sheet].NT:Threatened Species of the Northern Territory - Great Knot, *Calidris tenuirostris* (Ward, S., 2012c) [Information Sheet].QLD:Shorebirds (Department of Environment and Heritage Protection (DEHP), 2013bi) [Internet].\ State Listing Status\ \ NSW:\ Listed as Vulnerable\ (Biodiversity Conservation Act 2016 (New South Wales): February 2021 list)\ \ NT:\ Listed as Vulnerable\ (Territory Parks and Wildlife Conservation Act 2000 (Northern Territory): 2012 list)\ \ QLD:\ Listed as Critically Endangered\ (Nature Conservation (Animals) Regulation 2020 (Queensland): August 2020 list)\ \ SA:\ Listed as Endangered\ (National Parks and Wildlife Act 1972 (South Australia): January 2020 list)\ \ VIC:\ Listed as Threatened\ (Flora and Fauna Guarantee Act 1988 (Victoria): January 2021 list)\ \ WA:\ Listed as Critically Endangered\ (Biodiversity Conservation Act 2016 (Western Australia): September 2018 list)\ \ Non-statutory Listing Status\ \ IUCN:\ Listed as Endangered\ (Global Status: IUCN Red List of Threatened Species: 2020.2 list)\ \ VIC:\ Listed as Endangered\ (Advisory List of Threatened Vertebrate Fauna in Victoria: 2013 list)\ \ NGO:\ Listed as Vulnerable\ (The Action Plan for Australian Birds 2010)\ \ \ Naming\ \ Top\ \ Scientific name\ \ *Calidris tenuirostris* [862]\ \ Family\ \ Scolopacidae:Charadriiformes:Aves:Chordata:Animalia\ \ Species author\ \ (Horsfield,1821)\ \ Infraspecies author\ \ Reference\ \ Distribution Map\ \ Top\ \ Distribution map\ \ The distribution shown is generalised from the Departments Species of National Environmental Significance dataset. This is an indicative distribution map of the present distribution of the species based on best available knowledge. Some species information is withheld in line with sensitive species policies. See map caveat for more information.\ \ Illustrations\ \ Top\ \ Illustrations\ \ Google Images\ \ Other Links, Including Superseded Commonwealth Documents\ \ Top\ \ Australian Government Department of the Environment and Heritage (AGDEH) (2006f). Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Department of the Environment and Heritage. Available from: <http://www.environment.gov.au/biodiversity/migratory/publications/shorebird-plan.html>. In effect under the EPBC Act from 25-Feb-2006. Ceased to be in effect under the EPBC Act from 15-Jan-2016.\ \ Commonwealth of Australia (2000b). List of Migratory Species (13/07/2000). F2007B00750. Canberra: Federal Register of Legislative Instruments. Available from: <http://www.comlaw.gov.au/Details/F2007B00750>.\ \ Commonwealth of Australia (2000c). Declaration under section 248 of the Environment Protection and Biodiversity Conservation Act 1999 - List of Marine Species. F2008B00465. Canberra: Federal Register of Legislative Instruments. Available from: <http://www.comlaw.gov.au/Details/F2008B00465>.\ \ Commonwealth of Australia (2007h). Environment Protection and Biodiversity Conservation Act 1999 - Listed Migratory Species - Approval of an International Agreement. F2007L02641. Canberra: Federal Register of Legislative Instruments. Available from: <http://www.comlaw.gov.au/Details/F2007L02641>.\ \ Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009aj). Draft Significant impact guidelines for 36 migratory shorebirds Draft EPBC Act Policy Statement 3.21. Canberra, ACT: Commonwealth of Australia. Available from: <http://www.environment.gov.au/epbc/publications/migratory-shorebirds.html>.\ \ Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009bc). Draft background paper to EPBC Act policy statement 3.21. Canberra, DEWHA. Available from: <http://www.environment.gov.au/epbc/publications/migratory-shorebirds.html>.\ \ Garnett, S., J. Szabo & G. Dutson (2011). The Action Plan for Australian Birds 2010. CSIRO Publishing. Available from: <http://birdsindanger.net/taxatable>.\ \ Newsletters\ \ Top\ \ EPBC Act email updates can be received via the Communities for Communities newsletter and the EPBC Act newsletter.\ \ Caveat\ \ Top\ \ This database is designed to provide statutory, biological and ecological information on

species and ecological communities, migratory species, marine species, and species and species products subject to international trade and noncommercial use protected under the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act). It has been compiled from a range of sources including listing advice, recovery plans, published literature and individual experts. While reasonable efforts have been made to ensure the accuracy of the information, no guarantee is given, nor responsibility taken, by the Commonwealth for its accuracy, currency or completeness. The Commonwealth does not accept any responsibility for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the information contained in this database. The information contained in this database does not necessarily represent the views of the Commonwealth. This database is not intended to be a complete source of information on the matters it deals with. Individuals and organisations should consider all the available information, including that available from other sources, in deciding whether there is a need to make a referral or apply for a permit or exemption under the EPBC Act.

Citation: Department of the Environment (2022). *Calidris tenuirostris* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <https://www.environment.gov.au/sprat>. Accessed Tue, 18 Jan 2022 20:38:40 +1100. Where available the sections below provide a biological profile for the species. Biological profiles vary in age and content across species, some are no longer being updated and are retained as archival content. These profiles are still displayed as they contain valuable information for many species. The Profile Update section below indicates when the biological profile was last updated for some species. For information to assist regulatory considerations, please refer to Conservation Advice, the Recovery Plan, Policy Statements and Guidelines.

Taxonomy Top Other names: Slender-billed Knot; Stripe-crowned Knot; Eastern Knot; Large Sandpiper; Great Sandpiper (Higgins & Davies 1996).

Conventionally accepted as *Calidris tenuirostris* (Christidis & Boles 2008).  
Description Top The Great Knot is the largest of the calidrid birds and grows to 26–28 cm long, with a wingspan of approximately 58 cm. Females are slightly larger than males. The bill is black, and slightly downward curved and tinged green at the tip. The eye is brown, legs and feet dark greenish-grey. The bird has noticeable breeding, non-breeding and juvenile plumages (Higgins & Davies 1996).  
Breeding plumage  
When breeding, the head and neck feathers are blackish-brown in the centre, giving a streaked pattern over a whitish background. The cap is dark, supercillum (area above eye) poorly marked and lores (area below eye) are white above with a diffuse area of brown. The chin, throat, belly, vent area and underwing are white; breast and flanks are white with a central band of black at each feather end forming an almost solid black centre to the breast. The flanks and undertail can show heart-shaped black spots. The back is blackish-brown with pale grey tips. Across the scapular feathers, central feathers have large chestnut ovals forming a chestnut band across the wings when folded. Covert feathers over primary wing feathers are grey with dark streaks and whitish fringes. The rump and upper tail coverts are white and sparsely marked with black and the tail is dark grey (Hayman et al. 1986; Higgins & Davies 1996).  
Non-breeding plumage  
During the non-breeding season, the Great Knot is paler and greyer above and on the breast. The breast is more finely streaked than spotted, flanks become sparsely streaked and the undertail is white. The head and upper parts have clear streaks of blackish-grey; most evident on crown and hindneck. Scapulars, wing coverts and mantle feathers are grey-brown with black-brown shaft streaks and edged in white giving a scalloped appearance (Geering et al. 2007; Hayman et al. 1986; Higgins & Davies 1996).  
Juvenile plumage  
Juveniles are darker and more brown than non-breeding adults; the mantle and scapulars being darkish brown with narrow whitish-buff fringes, giving a scalloped pattern similar to non-breeding adults. Coverts and tertial feathers are paler brown, with whitish-buff fringes and dark brown subterminal bands on the larger feathers. The crown is darker forming a distinct cap. There is no clear supercillum, and the breast is washed buff-brownish and streaked and spotted dark brown (Geering et al. 2007; Hayman et al. 1986; Higgins & Davies 1996).

Australian Distribution Top The Great Knot has been recorded around the entirety of the Australian coast, with a few scattered records inland. It is now absent from some sites along the south coast where it used to be a regular visitor (Garnett et al. 2011). The greatest numbers are found in northern Australia; where the species is common on the coasts of the Pilbara and Kimberley, from the Dampier Archipelago to the Northern Territory border, and in the Northern Territory from Darwin and Melville Island, through Arnhem Land to the south-east Gulf of Carpentaria. Other important sites include the Broad Sound-Shoalwater Bay area, the Mackay region and Moreton Bay in Queensland. The species is much less common in south-west Australia, South Australia, Victoria and Tasmania (Higgins & Davies 1996). Sites of significance within Australia include (Bamford et al. 2008; Minton

2002 pers. comm.):  
 State Location Highest recorded number of birds  
 Western Australia Eighty Mile Beach 169 044  
 Roebuck Bay 22 600  
 Queensland South-east Gulf of Carpentaria 72 333  
 Shoal Bay 5500  
 Shoalwater Bay and Broad Sound 4200  
 Mackay town beach 4000  
 Northern Territory Roper River area 21 400  
 Fog Bay and adjacent islands 10 000  
 Boucat Bay 5500  
 Castlereagh Bay 4500  
 Global Distribution Top The Great Knot breeds in north-east Siberia but the breeding distribution is poorly known. The species has been recorded from the mouth of the Kolyma River and the Gorelovy Mountains (possibly from Verkhoyanskii Ranges), and from the eastern Anadyr and Koryatsky Ranges (Higgins & Davies 1996). Tomkovich (1997) identified the bays and estuaries of the north-east and north-west parts of the Sea of Okhotsk and northern Sakhalin Island (Russia) as important staging areas for the species southward migration. During migration common resting areas include east China, Korea and Japan. The Yellow Sea supports about 80% of the East Asian-Australasian Flyway (the Flyway) Great Knot population on its northward migration. Fifteen sites of international importance for the northward migration have been identified there, compared to nine for the southern migration. The area provides a rich feeding source for the birds prior to their flight to Russian breeding grounds which may be still covered in ice and snow making foraging difficult (Bamford et al. 2008). In addition, the Dongjin and Mangyeung estuaries (South Korea) are important during both north and south migrations (Barter 2002). Less common resting areas include the Philippines, Vietnam, Thailand, Malaysia, Indonesia and New Guinea (Higgins & Davies 1996; Barter 2002). The species is also a vagrant in New Zealand, the Arabian Peninsula, the islands of the Indian Ocean, Morocco, north-west Europe and Alaska. During the non-breeding season, most of the Great Knot population occurs in Australia; though small numbers are also known to winter from Burma and Bangladesh, west to the Bay of Bengal, and occasionally to the Persian Gulf. The extent of occurrence of the Great Knot is estimated to be in the order of 1 490 000 km<sup>2</sup> (Birdlife International 2009a).  
 Surveys Conducted Top Populations in Australia are regularly surveyed during the Population Monitoring Program that has been carried out by the Australasian Wader Studies Group since 1981. Under this program, sites that regularly support good numbers of shorebirds are surveyed twice a year (winter and summer) in coordinated counts (Skewes 2002; 2007).  
 Population Information Top The number utilising the East Asian-Australasian Flyway is approximately 425 000 (Hansen et al. 2016). A number of sites have exhibited Great Knot declines, including a 24% decline at Eighty-mile Beach between 2000–2008 (Garnett et al. 2011; Rogers et al. 2009), a 6% decline per year at Moreton Bay between 1998–2008 (Fuller et al. 2009; Garnett et al. 2011) and a 34% decline across 49 sites between 1983–2007 (AWSG database cited in Garnett et al. 2011). The numbers of birds present in Victoria has shown a marked decline from 810 to 167 birds. This may reflect patterns of the population that arriving in Australia, rather than habitat changes in Victoria (Wilson 2001a). It is now absent from some sites along the south coast where it used to be a regular visitor (Garnett et al. 2011).  
 Habitat Top Australasia In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, saltlakes and non-tidal lagoons. The Great Knot rarely occurs on inland lakes and swamps (Higgins & Davies 1996). Typically, the Great Knot roosts in large groups in open areas, often at the waters edge or in shallow water close to feeding grounds (Higgins & Davies 1996; Rogers 2001). It is known that in hot conditions, waders prefer to roost where a damp substrate lowers the local temperature (Rogers 1999b). A group of approximately 8610 birds have been recorded roosting at an inland claypan near Roebuck Bay in north-west Western Australia (Collins et al. 2001).  
 Europe The Great Knot breeds in alpine and sub-alpine vegetation in north-east Siberia and the far north-east of Russia. Nesting colonies are usually at or above upper tree lines, at altitudes below 1000 m above sea level (asl) in the east and usually above 1000 m asl in the western half of the breeding range (Tomkovich 1997).  
 Life Cycle Top Individuals can live to at least 17 years of age and first breed at approximately 2–3 years of age (Minton 2002 pers. comm.). The Great Knot shows a high fidelity to breeding sites (del Hoyo et al. 1996) and is monogamous (Battley et al. 2004). Nests are on flat to gently sloping ground of broken rocks, often lichen covered. Sites are usually highly exposed, with the only covering vegetation being sparse, dwarf shrubs (Snow & Perrins 1998). The Great Knot usually lays four eggs, though sometimes three, from late May to late June. Incubation takes around 21 days, and the female parent departs the breeding grounds after the eggs hatch, leaving the male to tend to the chicks (del Hoyo et al. 1996). Around 47%–57% of chicks survive to fledge,

and fledging takes approximately 20–25 days. Young are independent a few days after fledging. Around 2.3–2.8 fledglings are raised per brood (Tomkovich 1996).

### Movement Patterns

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The Great Knot is migratory, moving south from Russia to non-breeding areas in Australia. It is thought that most adults congregate in the western and southern Sea of Okhotsk, then fly direct to northern Australia, while some others move south to Korea before flying direct to Australia from there (Antonov & Huettmann 2004; Higgins & Davies 1996). Birds found on other Asian coasts are most likely juveniles (Minton 2002 pers. comm.). Birds show strong fidelity to non-breeding sites as well as breeding sites (Higgins & Davies 1996).

### Post-breeding departure

Post-breeding migration starts in late June and seems to occur in three waves up to early September. Birds fly towards the northern Sea of Okhotsk, though individuals have been recorded in inland Ussuriland, Russia. Non-breeders, failed breeders and females migrate southward first, followed by males which have bred successfully. The final wave consists of young birds.

### The Great Knot passes through south-east Siberia, and along the coasts of the Sea of Okhotsk, southern Ussuriland (from early August to early September), Sea of Japan, South Korea (late August to mid October), East China Sea (late July to late October, but mostly August to September), Taiwan (September–October) and Hong Kong (late August–November) (Barter 2002; Higgins & Davies 1996; Tomkovich 1997).

### Other stop-overs occur in Burma, Thailand, the Philippines, western Micronesia, Cambodia, Vietnam, Malaysia, Indonesia, Wallacea, Borneo, Bali, Timor and Papua New Guinea (Higgins & Davies 1996).

### Arrival in Australia

In Australia, large numbers arrive in the north-west in late August–early September (Lane 1987), though juveniles and many males may not arrive till October–November (Barter 1986). Some move through the Torres Strait (Draffan et al. 1983). Most birds stay in northern Australia (Lane 1987), though some move further south and birds occasionally reach New Zealand (Higgins & Davies 1996).

### After arriving in Australia, most birds probably remain at or close to their arrival destinations throughout the non-breeding season, and those few that move to southern Australia probably do so in a single flight from northern Australia (Minton 2002 pers. comm.). Some birds do move from north-west Australia by November with some arriving at the Gulf of Carpentaria in September–December and some arriving on the east coast September–November. A few birds may move through inland Queensland, NSW and Victoria from September–February (Higgins & Davies 1996). Usually Great Knots arrive in South Australia, Victoria and Tasmania from October–November (Lane 1987; Thomas 1970b). Some appear to move from north-west to south-west Australia along the western coast, sometimes moving into south-west Australia in October. At Eyre Bird Observatory, the Great Knot generally arrives late August–December.

### In New Zealand, the species has been recorded from September to April (Brown 1980).

### Return to breeding grounds

Most birds leave Australia directly from the north coast in March–April (Lane 1987) with some moving through the Torres Strait (Draffan et al. 1983). However, most probably fly directly to the Yellow Sea region of China and Korea, with a few to Japan (Minton 2002 pers. comm.).

### Smaller numbers leave southern Australia from February and may move through South Australia and eastern Queensland (Higgins & Davies 1996). Thousands have been recorded in south-east Irian Jaya in February–April. The Great Knot is also recorded from Bali in March; Sumatra in March–April; and Olango Island, Philippines in February–May. Some also move through Vietnam, Hong Kong and Taiwan (Higgins & Davies 1996). Many move through the Kamchatka Peninsula, eastern Siberia, on the northern migration (Gerasimov & Gerasimov 2000).

### Birds arrive in the breeding grounds from late May with males arriving before females (Tomkovich 1996).

### First-year birds generally remain in the non-breeding range (Hayman et al. 1986) and have been recorded in Borneo, Java, Papua New Guinea and in Australia (Higgins & Davies 1996). At the Gulf St Vincent, South Australia, there is sometimes an influx of birds in March–April that remain for several months (Close & McCrie 1986).

### Survey Guidelines

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The Great Knot is similar to the Red Knot (*Calidris canutus*), but with markedly different breeding plumage and is larger and bulkier with a longer bill. The Great Knot is known to roost in dense flocks of thousands in association with other waders including the Red Knot and godwits (*Limosa* spp.) (Higgins & Davies 1996).

### Threats

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There are a number of threats that affect all migratory waders, including the Great Knot, that occur in the East Asian–Australasian Flyway.

### Reclamation and development

The greatest threat facing waders is habitat loss, both direct and indirect (Melville 1997). Staging areas used during migration through eastern Asia are being lost and degraded by activities which are reclaiming the mudflats for future development (Barter 2002, 2005b, 2005c; Ge et al. 2007; Moores 2006; Rogers et al. 2006; Round 2006). In many suitable staging areas along the East Asia Flyway many intertidal areas have been reclaimed, and the process is continuing at a rapid rate and may accelerate in the near future (Barter 2002, 2005b, 2005c). Twenty-eight percent of Yellow Sea tidal flats existing in the 1980s had disappeared by the late 2000s (1.2% annually) (Murray et al. 2014). Moreover, reference to historical maps suggests that up to 65% of

tidal flats were lost since the 1960s (Murray et al. 2014). The Great Knot is probably more vulnerable to reclamation activities than most other waders, due to the very specific species and sizes of shellfish that they eat (Minton 2002 pers. comm.). Wetland degradation in the Yellow Sea is a particular threat as 80% of the population stages on the northward migration (Garnett et al. 2011). About 90 000 individuals disappeared following the reclamation of tidal flats in the South Korean Yellow Sea in 2006 (Garnett et al. 2011; Moores et al. 2008). In addition to that noted above, intensive oil exploration, water regulation and diversion infrastructure in the major tributaries have resulted in the reduction of water and sediment flows, which compound the problem of habitat loss (Barter 2002, 2005b; Barter et al. 1998; Melville 1997). Climate change and associated changes in sea level are likely to have a long-term impact on the breeding, staging and non-breeding grounds of migratory waders (Harding et al. 2007; Melville 1997). Iwamura and colleagues (2013) found that rises in sea level could cause a dramatic collapse of population flow of this species caused by intertidal habitat loss. Taking into account upshore movements of intertidal habitat, their modelling indicates that this species population flow could reduce by 35% with a 200 cm sea level rise (Iwamura et al. 2013).

Human activities

Disturbance from construction, recreation, shellfish harvesting, fishing and aquaculture is likely to increase significantly in the future (Barter 2005b; Barter et al. 2005; Davidson & Rothwell 1993; Rogers 2001). Hunting is still a very serious problem for waders in China, and the Great Knot is sometimes caught (Ming et al. 1998).

Pollution

Migratory shorebirds are adversely affected by pollution, such as organochlorines or heavy metals discharged into the sea from industrial or urban sources, both on passage and in non-breeding areas (Barter 2005b; Blomqvist et al. 1987; Harding et al. 2007; Huettmann & Gerasimov 2006; Melville 1997; Schick et al. 1987).

Roebuck Bay

Causes of disturbance in Roebuck Bay included birds of prey (39%), people or vehicles (18%) and false alarms (10%, i.e. no cause for disturbance), with the remaining disturbance (33%) being from unknown causes (Rogers 2001).

Threat Abatement and Recovery

Top Governments and conservation groups have undertaken a wide range of activities relating to migratory shorebird conservation (AGDEH 2005c) both in Australia and in cooperation with other countries associated with the East Asian-Australasian Flyway.

Australia

The Wildlife Conservation Plan for Migratory Shorebirds (AGDEH 2006f) outlines national activities to support flyway shorebird conservation initiatives and provides a strategic framework to ensure these activities and future research and management actions are integrated and remain focused on the long-term survival of migratory shorebird populations and their habitats. Since 1996–97, the Australian Government has invested approximately \$5 000 000 of Natural Heritage Trust (NHT) funding in projects contributing to migratory shorebird conservation (DEWHA 2007g). This funding has been distributed across a range of important projects, including the implementation of a nationally coordinated monitoring program that will produce robust, long-term population data able to support the conservation and effective management of shorebirds and their habitat; migration studies using colour bands and leg flags; and development of a shorebird conservation toolkit to assist users to develop and implement shorebird conservation projects.

Birds

Australia is currently co-coordinating the Shorebirds 2020 project, which aims to monitor shorebird populations at important sites throughout Australia; and Birdlife International is identifying sites and regions which are important to various species of birds, including shorebirds, and the processes that are affecting them. The aim is to inform decisions on the management of shorebird habitat. It may be possible to rehabilitate some degraded wetlands or to create artificial wader feeding or roosting sites to replace those destroyed by development, such as by creating artificial sandflats and sand islands from dredge spoil and by building breakwaters (Denning 2005; Straw 1992a, 1999).

The Draft Significant impact guidelines for 36 migratory shorebirds provides guidelines for determining the impacts of proposed actions on migratory shorebirds. The policy statement also provides mitigation strategies to reduce the level and extent of those impacts. The policy aims to promote ecologically sustainable development that allows for the continued ecological function of important habitat for migratory shorebirds (DEWHA 2009aj).

International

Australia has played an important role in building international cooperation to conserve migratory birds. In addition to being party to international agreements on migratory species, Australia is also a member of the Partnership for the Conservation of Migratory Waterbirds and the Sustainable Use of their Habitats in the East Asian-Australasian Flyway (Flyway Partnership), which was launched in Bogor, Indonesia on 6 November 2006. Prior to this agreement, Australia was party to the Asia-Pacific Migratory Waterbird Conservation Strategy and the Action Plan for the Conservation of Migratory Shorebirds in the East Asian-Australasian Flyway and the East Asian-Australasian Shorebird Site Network. The East Asian-Australasian Flyway Site Network, which is part of the broader Flyway Partnership, promotes the identification and protection of key sites for migratory shorebirds. It may be possible to rehabilitate some degraded wetlands (Morris 2002) and it may also be possible to create artificial wader feeding or roosting sites to replace those destroyed by

development (Harding et al. 1999; Straw 1999). However, it may not be possible to create feeding habitat for the Great Knot, due to the very specific species and sizes of shellfish they require (Minton 2002 pers. comm.).

Marine Bioregional Plans

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Marine bioregional plans have been developed for four of Australia's marine regions - South-west, North-west, North and Temperate East. Marine Bioregional Plans will help improve the way decisions are made under the EPBC Act, particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries. Marine Bioregional Plans improve our understanding of Australia's oceans by presenting a consolidated picture of the biophysical characteristics and diversity of marine life. They describe the marine environment and conservation values of each marine region, set out broad biodiversity objectives, identify regional priorities and outline strategies and actions to address these priorities. Click here for more information about marine bioregional plans.

The Great Knot has been identified as a conservation value in the North-west (DSEWPaC 2012y) Marine Region. See Schedule 2 of the North-west Marine Bioregional Plan (DSEWPaC 2012y) for regional advice. Maps of Biologically Important Areas have been developed for great knot in the North-west (DSEWPaC 2012y) Marine Region and may provide additional relevant information. Go to the conservation values atlas to view the locations of these Biologically Important Areas. The "species group report card - seabirds & migratory shorebirds" for the North-west (DSEWPaC 2012y) Marine Region provides additional information.

Major Studies

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There is a detailed summary of all that is known of the Great Knot in Higgins and Davies (1996), and international summaries in del Hoyo and colleagues (1996). There are also general discussions and summaries of the ecology, conservation and threats of this species and other shorebirds in Barter (2002) and Watkins (1993).

Management Documentation

Top

Management documents relevant to the Great Knot are at the start of the profile.

Species Profile References

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Antonov, A. & F. Huettmann (2004). On the southward migration of Great Knot in the western sea of Okhotsk: Results and conclusions from coordinated surveys of Northern Sakhalin Island and Schastia Bay, 2002. *Stilt*. 45:14-20.

Australian Government Department of the Environment and Heritage (AGDEH) (2005c). Background Paper to the Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Department of the Environment and Heritage. Available from: <http://www.environment.gov.au/biodiversity/migratory/publications/pubs/shorebird-plan-background.pdf>.

Australian Government Department of the Environment and Heritage (AGDEH) (2006f). Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Department of the Environment and Heritage. Available from: <http://www.environment.gov.au/biodiversity/migratory/publications/shorebird-plan.html>. In effect under the EPBC Act from 25-Feb-2006. Ceased to be in effect under the EPBC Act from 15-Jan-2016.

Bamford M., D. Watkins, W. Bancroft, G. Tischler & J. Wahl (2008). Migratory Shorebirds of the East Asian - Australasian Flyway: Population estimates and internationally important sites. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts, Wetlands International-Oceania. Available from: <http://www.environment.gov.au/biodiversity/migratory/publications/shorebirds-east-asia.html>.

Barter, M. (1986). Great Knots partly undone. *Stilt*. 9:5-20.

Barter, M.A. (2002). Shorebirds of the Yellow Sea: Importance, Threats and Conservation Status. Wetlands International Global Series No. 8, International Wader Studies 12. Canberra, ACT: Wetlands International.

Barter, M.A. (2005b). Keeping the common shorebirds common: Action planning to save the Dunlin. In: Straw, P., ed. Status and Conservation of Shorebirds in the East Asian-Australasian Flyway. Proceedings of the Australasian Shorebirds Conference 13-15 December 2003, Canberra, Australia. Page(s) 183-187. Sydney: Wetlands International Global Series 18, International Wader Studies 17.

Barter, M.A. (2005c). Yellow Sea-driven priorities for Australian shorebird researchers. In: Straw, P., ed. Status and Conservation of Shorebirds in the East Asian-Australasian Flyway. Proceedings of the Australasian Shorebirds Conference 13-15 December 2003, Canberra, Australia. Sydney, NSW: Wetlands International Global Series 18, International Wader Studies 17.

Barter, M.A., D. Tonkinson, J.Z. Lu, S.Y. Zhu, Y. Kong, T.H. Wang, Z.W. Li & X.M. Meng (1998). Shorebird numbers in the Huang He (Yellow River) Delta during the 1997 northward migration. *Stilt*. 33:15-26.

Barter, M.A., K. Gosbell, L. Cao & Q. Xu (2005). Northward shorebird migration surveys in 2005 at four new Yellow Sea sites in Jiangsu and Liaoning Provinces. *Stilt*. 48:13-17.

Battley, P.F., T. Piersa, D.I. Rogers, A. Dekinga, B. Spaans & J.A. Van Gils (2004). Do body condition and plumage during fuelling predict northwards departure dates of Great Knots *Calidris tenuirostris* from north-west Australia?. *Ibis*. 146:46-60.

Birdlife International (2009a). Great Knot *Calidris tenuirostris* factsheet. Available from: <http://www.birdlife.org/datazone/species/index.html?action=SpcHTMDetails.asp&sid=3040&m=0>.

Blomqvist, S., A. Frank & L.R. Petersson (1987). Metals in liver and kidney tissues of autumn-migrating Dunlin *Calidris alpina* and Curlew Sandpiper *Calidris ferruginea* staging at the Baltic Sea. *Marine Ecology Progress Series*. 35:1-13.

Brown, B. (1980). A Great Knot in Manukau Harbour. *Notornis*. 27:91.

Christidis, L. & W.E. Boles (2008). *Systematics and Taxonomy of Australian Birds*. Collingwood, Victoria: CSIRO Publishing.

Close, D.H., & N. McCrie (1986). Seasonal fluctuation of waders in Gulf St Vincent, 1976-85. *Emu*. 86:145-54.

Collins, P., A. Boyle, C. Minton & R. Jessop (2001). The importance of inland claypans for waders in Roebuck Bay, Broome, NW Australia. *Stilt*. 38:4-8.

Davidson, N. & P. Rothwell (1993). Disturbance to waterfowl on estuaries. *Wader Study Group Bulletin*. 68.

del Hoyo, J., A. Elliott, D.A. Christie & J. Sargatal (1996). *Handbook of the Birds of the World: Hoatzin to Auks*. Barcelona: Lynx Edicions.

Dening, J. (2005). Roost management in south-East Queensland: building partnerships to replace lost habitat. In: Straw, P., ed. *Status and Conservation of Shorebirds in the East Asian-Australasian Flyway*. Proceedings of the Australasian Shorebirds Conference 13-15 December 2003. Page(s) 94-96. Sydney, NSW. *Wetlands International Global Series 18, International Wader Studies 17*.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012y). *Marine bioregional plan for the North-west Marine Region*. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Available from: <http://www.environment.gov.au/topics/marine/marine-bioregional-plans/north-west>. In effect under the EPBC Act from 27-Aug-2012.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2007g). *Migratory Waterbirds Information Page*, Departmental Website. Available from: <http://www.environment.gov.au/biodiversity/migratory/waterbirds/index.html#conservation>.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009aj). *Draft Significant impact guidelines for 36 migratory shorebirds Draft EPBC Act Policy Statement 3.21*. Canberra, ACT: Commonwealth of Australia. Available from: <http://www.environment.gov.au/epbc/publications/migratory-shorebirds.html>.

Draffan, R.D.W., S.T. Garnett & G.J. Malone (1983). *Birds of the Torres Strait: an annotated list and biogeographic analysis*. *Emu*. 83:207-234.

Fuller, R.A., H.B. Wilson, B.E. Kendall & H.P. Possingham (2009). *Monitoring shorebirds using counts by the Queensland Wader Study Group*. Report to the Queensland Wader Study Group and the Department of Environment and Resource Management.

Garnett, S., J. Szabo & G. Dutson (2011). *The Action Plan for Australian Birds 2010*. CSIRO Publishing. Available from: <http://birdsindanger.net/taxatable>.

Ge, Z.-M., T.-H. Wang, X. Zhou, K.-Y. Wang & W.-Y. Shi (2007). Changes in the spatial distribution of migratory shorebirds along the Shanghai shoreline, China, between 1984 and 2004. *Emu*. 107:19-27.

Geering, A., L. Agnew & S. Harding, eds. (2007). *Shorebirds of Australia*. Melbourne: CSIRO Publishing.

Gerasimov, Yu.N., & N.N. Gerasimov (2000). Information on the northward migration of Great Knot, *Calidris tenuirostris*, in Kamchatka, Russia. *Stilt*. 36:35-38.

Harding, J., S. Harding & P. Driscoll (1999). Empire Point Roost: a purpose built roost site for waders. *Stilt*. 34:46-50.

Harding, S.B., J.R. Wilson & D.W. Geering (2007). Threats to shorebirds and conservation actions. In: Geering, A., L. Agnew & S. Harding, eds. *Shorebirds of Australia*. Page(s) 197-213. Melbourne, Victoria: CSIRO Publishing.

Hayman, P., J. Marchant & T. Prater (1986). *Shorebirds. An identification guide to the waders of the world*. London & Sydney: Croom Helm.

Higgins, P.J. & S.J.J.F. Davies, eds (1996). *Handbook of Australian, New Zealand and Antarctic Birds*. Volume Three - Snipe to Pigeons. Melbourne, Victoria: Oxford University Press.

Huettmann, F. & Y.N. Gerasimov (2006). Conservation of migratory shorebirds and their habitats in the Sea of Okhotsk, Russian Far East, in the year 2006: state-of-the-art and an outlook. *Stilt*. 50:23-33.

Iwamura, T., H.P. Possingham, I. Chades, C. Minton, N.J. Murray, D.I. Rogers, E.A. Treml & R.A. Fuller (2013). *Migratory connectivity magnifies the consequences of habitat loss from sea-level rise for shorebird populations*. *Proceedings of the Royal Society B: Biological Sciences*.

Lane, B.A. (1987). *Shorebirds in Australia*. Sydney, NSW: Reed.

Melville, D.S. (1997). Threats to waders along the East Asian-Australasian Flyway. In: Straw, P., ed. *Shorebird conservation in the Asia-Pacific region*. Page(s) 15-34. Melbourne, Victoria: Birds Australia.

Ming, M., L. Jianjian, T. Chengjia, S. Pingyue & H. Wei (1998). The contribution of shorebirds to the catches of hunters in the Shanghai area, China, during 1997-1998. *Stilt*. 33:32-36.

Minton, C.D.T. (2002). Personal communication. Australasian Wader Studies Group.

Moore, N. (2006). South Korea's shorebirds: a review of abundance, distribution, threats and conservation status. *Stilt*. 50:62-72.

Moore, N., D.I. Rogers, R.-H. Kim, C. Hassell, K. Gosbell, S.-A. Kim & M.-N. Park (2008). *The 2006-2008 Saemangeum Shorebird Monitoring Program Report*. Birds Korea, Busan.

Murray, N.J., R.S. Clemens, S.R. Phinn, H.P. Possingham & R.A. Fuller (2014). *Tracking the rapid loss of tidal wetlands in the Yellow Sea*.



