

[1] "*Calidris alba* — Sanderling — 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 marine as *Calidris alba* Listed migratory - EPBC Act as *Calidris alba*, Bonn as *Calidris alba*, CAMBA as *Calidris alba*, JAMBA as *Calidris alba*, ROKAMBA as *Calidris alba* Approved Conservation Advice There is no approved Conservation Advice for this species Listing Advice There is no Listing Advice for this species 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 Top Other EPBC Act Plans EPBC Act Policy Statement 3.21 - Industry Guidelines for avoiding, assessing and mitigating impacts on EBBC Act listed migratory shorebird species (Department of the Environment, 2015) [Admin Guideline]. Policy Statements and Guidelines 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] as *Calidris alba* Migratory: List of Migratory Species (13/07/2000) (Commonwealth of Australia, 2000b) [Legislative Instrument] as *Calidris alba* Migratory (name change): Environment Protection and Biodiversity Conservation Act 1999 - Update of the List of Migratory Species (12/03/2009) (Commonwealth of Australia, 2009q) [Legislative Instrument] as *Calidris alba* Wildlife Conservation Plan: Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2006r) [Legislative Instrument] as *Calidris alba* 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] as *Calidris alba* State Government Documents and Websites NSW: Sanderling - profile (NSW Department of Environment, Climate Change and Water (NSW DECCW), 2005nv) [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: Sanderling Threatened Species Information (NSW National Parks and Wildlife Service (NSW NPWS), 1999cc) [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) as *Calidris alba* Non-statutory Listing

Status IUCN: Listed as Least Concern (Global Status: IUCN Red List of Threatened Species: 2020.2 list) VIC: Listed as Near Threatened (Advisory List of Threatened Vertebrate Fauna in Victoria: 2013 list) NGO: Listed as Least Concern (The Action Plan for Australian Birds 2010 - non-threatened)

Top Naming Scientific name *Calidris alba* [875] Family Scolopacidae: Charadriiformes: Aves: Chordata: Animalia Species author (Pallas, 1764) Infraspecies author Reference Other names *Crocethia alba* [66531]

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>. Commonwealth of Australia (2009q). Environment Protection and Biodiversity Conservation Act 1999 - Update of the List of Migratory Species (12/03/2009). F2009L01064. Canberra: Federal Register of Legislative Instruments. Available from: <http://www.comlaw.gov.au/Details/F2009L01064>. 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>.

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 commercial 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 alba* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <https://www.environment.gov.au/sprat>. Accessed Tue, 18 Jan 2022 20:35:16 +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**

**Scientific name:** *Calidris alba*  
**Common Name:** Sanderling  
**Other names:** Beach-bird, Whitey

This species is taxonomically accepted as *Calidris alba* (Pallas, 1764), this species was previously known as *Crocthia alba* (AFD 2010; Christidis & Boles 2008).

**Description**

**Top**

An active, pale wader reaching 20 cm long, with a wingspan of approximately 40 cm and a weight of approximately 50 g. Females are slightly larger than males. The non-breeding adult is pale grey above and white below, with a black patch at the angle of the wing. It has a short, straight, broad-based black bill, blackish-brown wings with broad, white wing-stripes, and short, black legs that only have three toes (no hind toe as in other sandpipers). In flight, it shows the widest white wing-bar of any sandpiper, on a very dark wing. The forehead and eyebrows are white; iris is dark brown. The rump and tail have a brown centre and white sides. Elements of the rufous breeding plumage may be visible in some birds just after their spring arrival or before their autumn departure, and in some overwintering birds (Geering et al. 2007; Higgins & Davies 1996; NSW DECCW 2005; Pringle 1987).

When breeding, which occurs in the Northern Hemisphere, the Sanderling's plumage changes with a brick-red and grey-black pattern dominating the head, neck, back and wings of the bird (NSW NPWS 1999). Juveniles have similar plumage to non-breeding adults, though more pronounced streaking occurs on the crown and a buff fringing may be seen on wing coverts. The underparts and other areas of white can have a buff wash or creamy appearance (Geering et al. 2007).

This species is gregarious, being typically found in small to large flocks. At favoured localities birds can be in the hundreds. They associate with other waders and may join mixed roosts, but often roost high on the beach in a tight monospecific flock. They tend to migrate in flocks of less than a thousand (Higgins & Davies 1996). The species is noted for the fact that it can build up fat reserves to 60% of its body weight, which assists the birds in the few long-distance flights they make between breeding and non-breeding foraging grounds (Pringle 1987).

**Australian Distribution**

**Top**

The Sanderling occurs in coastal areas around Australia. Inland records have occurred in most states of singles or small groups, birds probably on migration (Higgins & Davis 1996).

**Queensland:** They are occasional in the Gulf of Carpentaria and Torres Strait. Scattered records occur in mid-east and south-east Queensland from Townsville and Alva Beach, south to Fraser Island, and around Moreton Bay and Point Danger, including on offshore islands (Higgins & Davis 1996).

**NSW:** They occur from Hastings Point, in the Tweed area, south to Shoalhaven Heads and Comerong Island. Sanderlings have been recorded further south, though rarely. Records are known from Jervis Bay, Moruya, Tuross Head and Brou Lake.

**Victoria:** They are regular around Corner Inlet, Shallow Inlet and Wilson's Promontory, and on the southwest coast between Killarney and Nelson. In eastern Victoria they have been recorded at Mallacoota, Lakes Entrance and Kalimna. Widespread records occur between Venus Bay and the southern Bellarine Peninsula, west to Breamlea, with a few isolated records from further west at Anglesea and Apollo Bay.

**Tasmania:** They are a regular, though scarce visitor. They occur on all coasts except the northern coast between Marrawah and Cape Naturaliste, and occur on King Island and the Furneaux Group of islands.

**South Australia** In South Australia they are widespread between the Victorian border and Kingston, and also occur on The Coorong, the mouth of the Murray River, then west and northwest to Kangaroo Island, Yorke and Eyre Peninsulas to Streaky Bay.

**Western Australia:** They occur on most of the coast from Eyre to Derby, and also around Wyndham. They are more often recorded on the south and southwest coasts, north to around southern Shark Bay, with more sparsely scattered records further north in Gascoyne and Pilbara Regions and the Kimberley Division.

**Northern Territory:** They occur around Darwin, and possibly elsewhere on the northwest coast, also on Melville Island, shores of Van Diemen Gulf and Groote Eylandt.

**Important sites in Australia:** Important sites and maximum counts at these sites are (Bamford et al. 2008):

- Eighty Mile Beach (2230)
- Roebuck Bay (1510)
- Ashmore Reef (1132)
- Rivoli Bay (1108)
- Brown Bay (Green Pt) (1106)
- The Coorong and Coorong National Park (930)
- Shallow Inlet/Sandy Point (769)
- Coffin Bay National Park (570)
- Discovery Bay Conservation Park (560)
- Port Fairy to Warrnambool Coast (550)
- Yokinup Bay, Cape Arid National Park (550)
- Garden Island (485)
- Ocean Beach, Strahan (450)
- Esperence Bay (368)
- Canunda National Park (360)
- Beachport National Park (293)
- Blanche Point (266).

Two sites in the extreme south of the Sanderling's non-breeding range, Green Point and Rivoli Bay in South Australia, were also identified as important for non-breeding Sanderling during the breeding period (Bamford et al. 2008).

The estimated extent of occurrence for the Sanderling is 1 260 000 km<sup>2</sup> (Birdlife International 2010).

**Global Distribution**

**Top**

**Circumpolar Breeding Distribution**

This species has a circumpolar breeding distribution, migrating south to spend the

non-breeding season predominantly on sandy coastal shores of all continents except Antarctica. This includes along the Pacific, Atlantic and Caribbean coasts of North and South America, around coasts of Europe from Denmark to France and the British Isles, and the coasts of the Mediterranean, Aegean, Black and Caspian Seas. In Africa, they occur along the entire coastline, but less often on the coasts of the Mediterranean and Red Sea and occasionally birds are found inland of these sites. They occur from the Arabian Peninsula and the Persian Gulf, east to Pakistan and western India (Higgins & Davies 1996).

**Migration**  
On migration the Sanderling has been recorded from Thailand, Malaysia, east through Indochina and coastal eastern China to the Philippines, Japan and the Korean Peninsula, and south to coastal New Guinea and Indonesia. In the south-west Pacific Ocean, they are recorded from western Polynesia to Kiribati and Samoa. They a widespread non-breeding visitor to coastal Australia and a regular visitor to New Zealand in small numbers (Higgins & Davies 1996).

**Breeding**  
They breed at scattered localities from northern North America to northern Russia and islands in the Arctic Ocean (Higgins & Davies 1996).

**Surveys Conducted**  
Top  
Populations in Australia are regularly surveyed during the Population Monitoring Program carried out by the Australasian Wader Studies Group, in which sites that regularly support good numbers of shorebirds are surveyed twice a year (winter and summer) in coordinated counts; these surveys began in 1981 (Skewes 2002, 2007).

**Population Information**  
Top  
The worldwide population estimate for the Sanderling is 620 000 - 700 000 (Birdlife International 2010). The number that spend the non-breeding time in Australia is estimated to be 10 000 (Bamford et al. 2008; Geering et al. 2007), approximately a third of the estimated East-Asian Flyway population of 30 000 (Hansen et al. 2016). The species showed no significant regional variation in numbers in bird surveys for the Australian Atlas from 1977 - 81 to 1998-2001 (Barrett et al. 2002). In South Australia, the total population was estimated to have increased by 23% in 2000 (1897) from 1981 (1540) (Wilson 2000a). The global trend for the species is unknown (Birdlife International 2010).

**Habitat**  
Top  
In Australia, the species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. Sanderlings also occur on beaches that may contain wave-washed rocky outcrops. Less often the species occurs on more sheltered sandy shorelines of estuaries, inlets and harbours. Rarely, they are recorded in near-coastal wetlands, such as lagoons, hypersaline lakes, saltponds and samphire flats. There are rare inland records from sandy shores of ephemeral brackish lakes and brackish river-pools (Higgins & Davies 1996).

**They roost on/behind:**  
bare sand high on the beach  
clumps of washed-up kelp  
coastal dunes  
rocky reefs and ledges (Higgins & Davies 1996). Breeding habitat is usually open ground, sometimes on raised hummocks or ridges, in the Arctic tundra of Greenland, Canada and Siberia (Cramp 1985; Pringle 1987).

**In south-east Queensland, they are occasionally recorded sheltering on tidal flats during storms** (Roberts 1979).

**Life Cycle**  
Top  
The oldest known bird was approximately ten years old (C.D.T. Minton 2002, pers. comm.). The Sanderling breeds from June to August, with a clutch size of three to four eggs, and raises one or two broods per season with both parents incubating and tending to chick provisioning. In Canada, females have been noted to lay two clutches successively with each incubated separately by the female and male (Pringle 1987). The age at first breeding is unknown but is estimated to be two years old (Cramp 1985; Johnsgard 1981). Nests are usually a shallow depression constructed on open ground, sometimes on raised hummocks or ridges, and generally unlined; though a few leaves are sometimes present (Cramp 1985). Incubation takes approximately 24 days and chicks fledge in 17 days. Chicks are precocial (covered with down but able to move about) and nidifugous (taking leave of the nest almost immediately after hatching) (Pringle 1987).

**Feeding**  
Top  
The Sanderling is omnivorous, foraging on plants, seeds, worms, crustaceans, spiders, insects, and occasionally on medusae, fish and larger molluscs and crustaceans taken as carrion. Birds are very active when foraging, often in tightly synchronised flocks, darting onto moist sand between breaking waves picking up food items from the surface of the wet beach (Higgins & Davies 1996). Foraging may also occur at the edges of shallow pools on sandspits and on nearby mudflats (NSW NPWS 1999cc). Individuals may also defend a feeding territory during the non-breeding period (Higgins & Davies 1996).

**Movement Patterns**  
Top  
The Sanderling breeds in the holarctic region, and moves south to broad non-breeding areas. They tend to migrate in long flights, overflying large areas, typically in small flocks of less than a thousand (Anon. 2001a; Higgins & Davies 1996; Minton et al. 2001b, c, d).

**Depart for the south**  
Adult birds depart breeding grounds during mid-July to mid-August, with juveniles departing in early August to early September. Most appear to move

west and south-west from Taymyr and down the east coast of Russia from the New Siberian Islands, though some move across the inland, apparently in a broad front. They have been recorded passing over the Caspian Sea in large numbers from August to October. On the Russian coast, birds pass Shantar Island in early September and appear in Ussuriland mainly during late August to late September (Higgins & Davies 1996).

**Peak of migration**

In coastal China, the peak of the southern migration at Beidaihe occurs during late August\u0096September. They are common during the southern migration in Japan and the Korean east coast during August\u0096September. They are a scarce passage migrant through Hong Kong, Vietnam, Cambodia and rarely in Burma, mostly being recorded in August\u0096November. Apparently only small numbers pass through Thailand during August\u0096November and through the east coast of Malaysia, Singapore, and Borneo during August\u0096December. They are recorded in Sulawesi, from September, with large numbers in October. They are apparently common in Indonesia and common in Bali, with maximum numbers during late July. Small numbers pass through the Philippines. Some passage occurs across the Pacific Ocean, where they are probably common throughout the tropics, mainly during November. They are a rare and irregular visitor to the Port Moresby district, Papua New Guinea, where they usually first arrive during October (Higgins & Davies 1996).

**Arrive in Australia**

They arrive in Australia during September, mostly occurring in north-western Australia. They move through Roebuck Bay, Darwin and Eyre during September-November and then cross the continent to the south Australia coast. Small numbers regularly arrive during late August and early September at Rottneest Island, south-west Western Australia. They arrive around Sydney area, New South Wales, from August (Higgins & Davies 1996).

They depart the non-breeding range in south-east Australia during March to May. They apparently move west along the south coast of Australia and across the continent before moving north, with at least some birds stopping on the north coast. A few birds, particular young birds, remain in Australia during winter and other non-breeding areas during the breeding season, though numbers may vary at a site between days indicating birds are nomadic during this time (Higgins & Davies 1996).

**Depart for the north**

They usually depart the Port Moresby district during March. They may pass through Fiji, and some pass through Phoenix and Line Islands during March and April. Small numbers move through Olango Island, Philippines and Brunei during February\u0096April. Very few are recorded during the northern migration in southern Thailand and Red River Delta, Vietnam and small numbers pass through Hong Kong, late March to late May and through Kuantu, Taiwan, in April and May.

They move along the coast of China during April and May, with some passing through Japan, and small numbers recorded in South Korea in April and May. They move through Ussuriland and Sakhalin Island during the second half of May and early June and arrive on Taymyr Peninsula and New Siberian Island in June (Higgins & Davies 1996).

Victorian banded birds have been recorded in Japan in August and September and one was recorded in China in April and Korea in August (Minton & Jessop 1999a; Minton et al. 2001c, d) and two have been recovered in Chaivo Bay, northeast Sakhalin Island, Russia (Minton et al. 2001c, d). A juvenile banded at Chany Lake, western Siberia, in September 1984, was recovered in Thailand, November 1984 (Starks 1987b). The longest distance travelled recorded is one that was banded in southern Victoria and recovered at Faddeyevsky Island, New Siberia Island, Russia, 12 623 km north (Anon. 2001a).

**Breeding**

Birds breeding in Canada and Alaska apparently move south to the Americas, birds breeding in Greenland and Siberia migrate to the western Palaearctic region, and some to Africa, and other Siberian populations move to the coasts of the Indian Ocean and probably the south-west Pacific. Birds banded in southeast Asia and Australia are recorded breeding in northern Siberia, on Faddeyevsky Island, New Siberia Island and on Sakhalin Island in eastern Siberia, with their passage occurring through the eastern edge of Asia, especially through Japan.

**Survey Guidelines**

**Top**

**Populations in Australia** are regularly surveyed during the Population Monitoring Program carried out by the Australasian Wader Studies Group, in which sites that regularly support good numbers of shorebirds are surveyed twice a year (winter and summer) in coordinated counts; these surveys began in 1981 (Skewes 2002, 2007).

**Threats**

**Top**

**Habitat loss**

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). In addition, water regulation and diversion infrastructure in the major tributaries have resulted in the reduction of water and sediment flows, which compound the problem (Barter 2002, 2005b; Barter et al. 1998; Melville 1997).

**Global warming**

Global warming 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). Recreation and disturbance  
The Sanderling is suggested to be sensitive to displacement by active recreation on beaches in south-east Australia, and in other areas of their range (Lane 1987; Thomas et al. 2003; Watkins 1993). They are noted to occur at less disturbed ocean beaches and to move to undisturbed refuges when disturbance becomes too intense. It is suggested that the most important beaches should be kept free from human disturbance by locating access points to the beach away from important sites (Lane 1987; Watkins 1993). Disturbance from human activities, such as recreational activities, shellfish harvesting, fishing and aquaculture in both Australia and other areas of the species range, is likely to increase significantly in the future (Barter 2005b; Barter et al. 2005; Davidson & Rothwell 1993).

Pollution and disease  
Migratory shorebirds are also 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). The Sanderling is also susceptible to avian influenza so may be threatened by future outbreaks of the virus (Melville & Shortridge 2006).

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.

Natural Heritage Trust  
Since 1996, 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  
Birds Australia is currently 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 (Dening 2005; Straw 1992a, 1999).

Environmental Protection and Biodiversity Conservation Act 1999  
The recent draft EPBC Act policy statement 3.21 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 2009bb).

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.

East Asian-Australasian Flyway 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. Australia has 17 sites in the network:

- Northern Territory
  - Kakadu National Park, Northern Territory (1 375 940 ha).
- Western Australia
  - Parry Lagoons, Western Australia (36 111 ha)
  - Thomsons Lake, Western Australia (213 ha).
- Queensland
  - Moreton Bay, Queensland (113 314 ha)
  - Bowling Green Bay, Queensland
  - Shoalwater Bay, Queensland
  - Great Sandy Strait, Queensland
  - Currawinya National Park, Queensland.
- New South Wales
  - Hunter Estuary, NSW (2916 ha).
- Victoria
  - Corner Inlet, Victoria (51 500 ha)
  - Port Phillip Bay (Western Shoreline) and Bellarine Peninsula, Victoria (16 540 ha)
  - Shallow Inlet Marine and Coastal Park, Victoria
  - Western Port, Victoria (59 297 ha)
  - Discovery Bay Coastal Park, Victoria.
- South Australia
  - The Coorong, Lake Alexandrina & Lake Albert, South Australia (140 500 ha).
- Tasmania
  - Orielton Lagoon, Tasmania (2920 ha)
  - Logan Lagoon, Tasmania (2320 ha).

NSW DECCW (2005n) has also listed the following abatement actions to assist protection of the species in

Australia:\nControl dogs on beaches and in estuaries. \n Raise visitor awareness of the presence of this and other threatened shorebird species and provide information on how visitors' actions will affect the species' survival. \n Conduct searches for the species in suitable habitat in proposed development areas. \n Manage estuaries and the surrounding landscape to maintain the natural hydrological regimes. \n Protect coastal areas from pollution. \n Protect foraging and roosting areas from disturbance or inappropriate development. \n Protect and maintain known or potential habitat and implement protection zones around recent records. \n Assess the importance of sites to the species' survival, including linkages provided between ecological resources across the broader landscape.\r\n\r\n\r\n\r\n Marine Bioregional Plans\r\n\r\n\r\n\r\n Top\r\n\r\n\r\n\r\n 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.\n\nThe Sanderling 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 Sanderling 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.\n\r\n\r\n\r\n\r\n Major Studies\r\n\r\n\r\n\r\n Top\r\n\r\n\r\n\r\n NSW DEC commissioned a study of known feeding and roosting habitat along coastal NSW (Avifauna Research 2006) to identify important habitat for the Sanderling and six other listed migratory shorebirds.

<http://www.environment.nsw.gov.au/resources/threatenedspecies/shorebirdMappingReportJuly06.pdf>.\n\r\n\r\n\r\n\r\n Management Documentation\r\n\r\n\r\n\r\n Top\r\n\r\n\r\n\r\n Management documents for the Sanderling include:\n\nThe Action Plan for Australian Birds 2000 (Garrett & Crowley 2000).\n\nBackground Paper to the Wildlife Conservation Plan for Migratory Shorebirds (AGDEH 2005c).\n\nWildlife Conservation Plan for Migratory Shorebirds (AGDEH 2006f).\n\nMigratory Waterbirds Information Page (DEHWA 2007g).\n\nThe North Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North Marine Region (DEHWA 2008).\n\nThe South-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the South-West Marine Region (DEHWA 2008a).\n\nNorth-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North-West Marine Region (DEHWA 2008b).\n\nThe East Marine Bioregional Plan, Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the East Marine Region (DEHWA 2009m).\n\nShorebirds (QLD DERM 2006).\n\nShorebird management strategy: Moreton Bay (QLD DERM 2010). \r\n\r\n\r\n\r\n\r\n\r\n\r\n\r\n Species Profile References\r\n\r\n\r\n\r\n Top\r\n\r\n\r\n\r\n\r\n\r\n\r\n\r\n Anonymous (Anon.) (2001a). Recovery round-up. Corella. 25:39-40.\r\n\r\n\r\n\r\n Australian Faunal Directory (AFD) (2010). Australian Faunal Directory. Available from:

<http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/home>. [Accessed: 30-May-2010].\n\r\n\r\n\r\n 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>.\n\r\n\r\n\r\n 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.\r\n\r\n\r\n Avifauna Research (2006). Threatened migratory shorebird habitat mapping project. Available from:

<http://www.environment.nsw.gov.au/resources/threatenedspecies/shorebirdMappingReportJuly06.pdf>.\n\r\n\r\n\r\n 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>.  
Barrett, G., A. Silcocks, R. Cunningham & R. Poulter (2002). Comparison of Atlas 1 (1977-1981) and Atlas 2 (1998-2001): Supplementary Report No. 1. Melbourne: Birds Australia, report for Natural Heritage Trust.  
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.  
BirdLife International (2010). Species factsheet- *Calidris alba*. Available on the Internet: <http://www.birdlife.org>. Available from: <http://www.birdlife.org>. [Accessed: 24-May-2010].  
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.  
Christidis, L. & W.E. Boles (2008). Systematics and Taxonomy of Australian Birds. Collingwood, Victoria: CSIRO Publishing.  
Cramp, S. (1985). Handbook of the Birds of Europe, the Middle East and North Africa: The Birds of the Western Palearctic. Volume 4. Oxford: Oxford University Press.  
Davidson, N. & P. Rothwell (1993). Disturbance to waterfowl on estuaries. *Wader Study Group Bulletin*. 68.  
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 Environment and Heritage Protection (DEHP) (2013bi). Shorebirds. Available from: <http://www.ehp.qld.gov.au/wildlife/threatened-species/shorebirds/index.html>.  
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) (2008). The North Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North Marine Region. Canberra: DEWHA. Available from: <http://www.environment.gov.au/resource/north-marine-bioregional-plan-bioregional-profile-description-ecosystems-conservation>.  
Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008a). The South-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the South-West Marine Region. Canberra: DEWHA. Available from: <http://www.environment.gov.au/resource/south-west-marine-bioregional-plan-bioregional-profile-description-ecosystems-conservation>.  
Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008b). North-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North-West Marine Region. Canberra: DEWHA. Available from: <http://www.environment.gov.au/coasts/mbp/publications/north-west/bioregional-profile.html>.  
Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009bb). Available from: <http://www.environment.gov.au/coasts/mbp/publications/east/bioregional-profile.html>.  
Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009m). The East Marine Bioregional Plan, Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the East Marine Region. Available from: <http://www.environment.gov.au/resource/east-marine-bioregional-plan-bioregional-profile-description-ecosystems-conservation-values>.  
Garnett, S.T. & G.M. Crowley (2000). The Action Plan for Australian Birds 2000. Canberra, ACT: Environment Australia and Birds Australia. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/action/birds2000/index.html>.  
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.  
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.

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.

International Union for Conservation of Nature (IUCN) (2010). IUCN Red List of Threatened Species. Version 2010.4. Available from: <http://www.iucnredlist.org>.

Johnsgard, P.A. (1981). The Plovers, Sandpipers and Snipes of the World. Lincoln: Nebraska Press.

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.

Melville, D.S. & K.F. Shortridge (2006). Spread of H5N1 avian influenza virus: an ecological conundrum. *Letters in Applied Microbiology*. 42:435-437.

Minton, C., & R. Jessop (1999a). Sightings of leg-flagged waders from Victoria, Australia. Report number 7. *Stilt*. 35:43-51.

Minton, C., R. Jessop, D. Graham & P. Collins (2001d). Sightings of waders leg-flagged in South Australia. Report number 1. *Victorian Wader Study Group Bulletin*. 24:50-53.

Minton, C., R. Jessop, D. Graham, P. Collins & I. Stewart (2001b). Recoveries of waders banded in South Australia. *Victorian Wader Study Group Bulletin*. 24:30-31.

Minton, C., R. Jessop, P. Collins & D. Graham (2001c). Sightings of waders leg-flagged in Victoria. Report number 8. *Victorian Wader Study Group Bulletin*. 24:32-39.

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

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

NSW Department of Environment, Climate Change and Water (NSW DECCW) (2005nv). Sanderling - profile. Available from: <http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10127>.

NSW National Parks and Wildlife Service (NSW NPWS) (1999cc). Sanderling Threatened Species Information. Available from: <http://www.environment.nsw.gov.au/resources/nature/tsprofileSanderling.pdf>.

Pringle, J.D. (1987). The Shorebirds of Australia. Sydney, NSW: Angus & Robertson.

Queensland Department of Environment and Resource Management (QLD DERM) (2010). Shorebird management strategy: Moreton Bay. Available from: [http://www.derm.qld.gov.au/services\\_resources/item\\_details.php?item\\_id=202999](http://www.derm.qld.gov.au/services_resources/item_details.php?item_id=202999).

Roberts, G.J. (1979). The Birds of South-East Queensland. Brisbane: Queensland Conservation Council.

Rogers, D.I., N. Moores & P.F. Battley (2006). Northwards migration of shorebirds through Saemangeum, The Geum estuary and Gomso Bay, South Korea in 2006. *Stilt*. 50:73-89.

Round, P.D. (2006). Shorebirds in the Inner Gulf of Thailand. *Stilt*. 50:96-102.

Schick, C.T., L.A. Brennan, J.B. Buchanan, M.A. Finger, T.M. Johnson & S.G. Herman (1987). Organochlorine contamination in shorebirds from Washington state and the significance for their falcon predators. *Environmental Monitoring and Assessment*. 9:115-131.

Skewes, J. (2002). Report on the 2001 population monitoring counts. *Stilt*. 41:55-61.

Skewes, J. (2007). Report on population monitoring counts, 2005 and 2006. *Stilt*. 52:20-32.

Starks, J. (1987b). Report on Interwader Shorebird Surveys in Thailand. *Interwader Publication*. 25. *Interwader*.

Straw, P. (1992a). Relocation of Shorebirds. A Feasibility Study and Management Options. Sydney, NSW: Unpublished report by the Royal Australasian Ornithologists Union for the Federal Airports Corporation.

Straw, P. (1999). Habitat remediation - a last resort?. *Stilt*. 35:66.

Thomas, K., R.G. Kvitek & C. Bretz (2003). Effects of human activity on the foraging behavior of sanderlings *Calidris alba*. *Biological Conservation*. 109:67-71.

Watkins, D. (1993). A national plan for shorebird conservation in Australia. *RAOU Report Series*. 90.

Wilson, J. (2000b). The macro environment for waders migrating long distances to the southern continents: an attempt to explain why they do it. *Stilt*. 37:52.

Wilson, J.R. (2000a). A survey of South Australian waders in early 2000. *Stilt*. 37:34-45.