

[1] "*Pluvialis squatarola* — Grey Plover
Glossary SPRAT Profile
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 Listed migratory - EPBC Act, Bonn, CAMBA, JAMBA, ROKAMBA Under threatened listing assessment, due 30-Oct-2022. 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] Migratory: List of Migratory Species (13/07/2000) (Commonwealth of Australia, 2000b) [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 QLD: Shorebirds (Department of Environment and Heritage Protection (DEHP), 2013bi) [Internet]. Non-statutory Listing Status IUCN: Listed as Least Concern (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 Near Threatened (The Action Plan for Australian Birds 2010 - non-threatened) Naming Top Scientific name *Pluvialis squatarola* [865] Family Charadriidae: Charadriiformes: Aves: Chordata: Animalia Species author (Linnaeus, 1758) 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.

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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) (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>.

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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](#)
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Scientific Name: *Pluvialis squatarola*
Common Name: Grey Plover
Other Names: Black-bellied Plover; Grey Sandpiper (Dement'ev & Gladkov 1951; Marchant & Higgins 1993).
The Grey Plover is a conventionally accepted species (Christidis & Boles 1994, 2008; Marchant & Higgins 1993).

[Description](#)
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The Grey Plover is a medium-sized (length: 270-310 mm; weight: 250 g) plover with long legs and a short, stout bill. Sexes sometimes differ when in breeding plumage, but are inseparable when in non-breeding plumage; juveniles are separable from adults. In breeding plumage, the male has a pale whitish crown and nape with fine black streaks or mottling; the hindneck is mostly white; and the rest of the upperparts are black with silvery-white blotches except for the rump, which is white, and the

uppertail, which is white with black or dark-brown barring. The face is black except for a white forehead and supercilium which curves behind the ear coverts and down the sides of the neck. The underparts are black except for the vent and undertail coverts, which are white. In flight the upperwing is black with whitish mottling except for the flight feathers and primary coverts, which are black with a white wing-bar; the underwing is mostly whitish with black feathering in the 'arm pit'. The bill is black, the eyes are dark brown, and the legs and feet are dark grey or blackish. The female in breeding plumage appears similar to the male, but the areas which are black on the male may appear brown, and the underparts may have a little white flecking (Marchant & Higgins 1993; Stewart et al. 2007).

In non-breeding plumage, both sexes have a brown crown and nape with fine white streaking. The rest of the upperparts are pale brownish-grey with white fringes to the feathers, giving a slightly mottled appearance, except for the rump and uppertail coverts, which are white. The forehead and lores are whitish, and there is an off-white supercilium with brown streaking above a brown eye-stripe. The rest of the face is whitish with fine grey-brown streaks. The chin and throat are white; the neck, breast and flanks are white with pale mottling and streaking, and the rest of the underparts are white. When in non-breeding plumage they retain the white wing-bar and black 'arm pit' (Marchant & Higgins 1993; Stewart et al. 2007).

Juveniles are similar to non-breeding adults, but have distinct dusky-brown streaking on the face, throat and breast, and pale areas have a distinct pale-gold or yellow-buff tinge, including the spangling on the upperwings (Marchant & Higgins 1993; Stewart et al. 2007).

Grey Plovers are usually solitary or occur in small flocks. They do form large flocks at communal roosts, often with other waders such as Pacific Golden Plovers (*Pluvialis fulva*), Black-winged Stilts (*Himantopus himantopus*), knots and godwits (Marchant & Higgins 1993).

Australian Distribution

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In Australia, the Grey Plover has been recorded in all states, where it is found along the coasts, and it especially abundant on the western and southern coastlines, mainly between The Coorong and western beaches of the Eyre Peninsula in South Australia, and the coast of Western Australia between Albany and the northern Kimberley coast (Barrett et al. 2003; Blakers et al. 1984; Lane 1987). In the Northern Territory, small numbers of Grey Plovers are regularly recorded in the Top End, and in Queensland, large numbers have been recorded in the south-eastern Gulf of Carpentaria, but records elsewhere are at sparsely scattered sites along the east coast. The species is only occasionally recorded along the coast of NSW. Most records in Victoria are from three distinct areas (1) around Jack Smith Lake and Corner Inlet, (2) in Westernport and Port Phillip Bays, and (3) along the western coast, between Warrnambool and the South Australian border. Most of the few Tasmanian records are from the northern and eastern coasts (Barrett et al. 2003; Blakers et al. 1984; Emison et al. 1987; Garnett 1989; Goodfellow 2001; Lane 1987; Morris et al. 1981). There are also a few records of Grey Plovers at inland sites (Blakers et al. 1984; Cox 1991; Morris et al. 1981). The species is also occasionally recorded on outlying islands, such as Lord Howe Island (McAllan et al. 2004) and Macquarie Island (Simpson 1965). Internationally important sites in Australia and maximum counts (in brackets) include: Eighty Mile Beach, Western Australia, (1650) south-eastern Gulf of Carpentaria, Queensland, (1550) Roebuck Bay, Western Australia, (1300) Corner and Shallow Inlets, Victoria, (900) Spencer Gulf, South Australia, (740) Peel Inlet, Western Australia, (600) Swan Bay - Mud Islands, Port Phillip Bay, Victoria, (570) Clinton Conservation Park, South Australia, (500) Baird Bay, South Australia, (444) Price Saltfields, South Australia, (444) Nuytsland Nature Reserve, Western Australia, (409) Coffin Bay, South Australia, (400) Streaky Bay, South Australia, (325) Tourville Bay, South Australia, (310) Great Sandy Point-Parham, South Australia, (289) Great Sandy Strait, Queensland, (260) Port Prime, South Australia, (250) Sandy Point-Port Arthur, South Australia, (187) Boucaut Bay, Northern Territory, (169) Darwin area, Northern Territory, (164) (Watkins 1993).

There are no published estimates of the extent of occurrence of the Grey Plover in Australia. The estimated global extent of occurrence is 1 000 000–10 000 000 km² (Birdlife International 2007m).

The area of occupancy of the Grey Plover in Australia has been estimated at 35 700 km². The species occurs at numerous and widespread sites in Australia, especially along the southern and western coasts. There are no current captive populations of this species and none have been reintroduced into the wild.

Global Distribution

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Breeding distribution

Grey Plovers breed north of 65° N in the Northern Hemisphere, in northern Siberia, from the White Sea east to the Gulf of Anadyr, and in Alaska and northern Canada from the shores of the Bering Sea east to Baffin Island (AOU 1983; Bent 1962; Cramp & Simmons 1983).

On passage

The species is widespread when on passage. In the East Asian-Australasian Flyway it occurs as a transient throughout China, the Korean Peninsula and Japan, and South-East Asia (Chalmers 1986; de Schauensee 1984; Glenister 1974; Gore & Won 1971; Orn. Soc. Japan 2000; Smythies 1981). Elsewhere it is recorded on passage across the Indian subcontinent (Grimmett et al. 1999b), Western Palearctic and Africa (including across the Sahara Desert) (Cramp & Simmons 1983; Urban

et al. 1986), coastal North America (as well as through inland areas along major river systems) (AOU 1983; Bent 1962), islands in the Caribbean Sea, and Central and South America (Blake 1977; French 1976; Latta et al. 2006; Ridgely 1976).

Non-breeding distribution
During the non-breeding season, the species is widespread on the coasts of North and South America, western and southern Europe, Africa, western, southern, south-eastern and eastern Asia, and Australia (AOU 1983; Bent 1962; Cramp & Simmons 1983; de Schauensee 1970, 1984; Grimmett et al. 1999b; Marchant & Higgins 1993; Orn. Soc. Japan 2000; Urban et al. 1986; van Marle & Voous 1988; White & Bruce 1986; Wiersma 1996). The species also occurs in small numbers on islands in the south-western Pacific Ocean, such as Micronesia, New Guinea and New Zealand (Coates 1985; Dutton 2001; Marchant & Higgins 1993; Pratt et al. 1987).

The Grey Plover is not considered to be globally threatened (Wiersma 1996) and is classified as being of least concern (Birdlife International 2007m). Long-term trends for the species are unknown (Cramp & Simmons 1983). However, the number of birds spending the non-breeding season in the Western Palearctic has increased. For example, the wintering population in Britain increased greatly since the 1930s, especially in the 1970s (Cramp & Simmons 1983; Wiersma 1996), and numbers of Grey Plovers recorded in the Wadden Sea, an important staging area for birds wintering in Europe, also increased (Wiersma 1996). In contrast, numbers of birds recorded at a staging site in Texas have declined by 80%, reflecting a decreasing trend (Wiersma 1996). In Australia, there has been a slight decline in the number of birds recorded in the Summer Population Monitoring Counts, though there was no change in area of occupancy detected by Atlas surveys between the late 1970s-early 1980s and the late 1990s-early 2000s (Barrett et al. 2003). Between 1986 and 1991 there was a strong downward trend in the number of birds recorded in these surveys (from 2127 to 815), but since 1996 the trend has been one of a slight increase (Harris 1994, 1994a, 1995, 1996, 1997, 1999b, 2000; Hewish 1986, 1987a, 1990, 1992; Skewes 2002, 2003, 2004, 2005, 2007; Wilson 2001c).

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 co-ordinated counts. These surveys began in 1981.

Population Information
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The world population of Grey Plovers has been estimated at about 325 000–690 000 birds (Birdlife International 2007m; Rose & Scott 1997; Wiersma 1996). Of these, it is variously estimated that 16 000 (Watkins 1993), 25 000–100 000 (Wiersma 1996), 125 000 (Bamford et al. 2006; Stewart et al. 2007) or 80 000 (Hansen et al. 2016) birds occur in the East Asian-Australasian Flyway. The species does not occur as a number of smaller populations when present in Australia.

Global population trends
have not been quantified. Different trends have been detected in different regions. Within Australia the species showed an overall decline since 1986 (Harris 1994, 1994a, 1995, 1996, 1997, 1999b, 2000; Hewish 1986, 1987a, 1990, 1992; Skewes 2002, 2003, 2004, 2005, 2007; Wilson 2001c).

The number of Grey Plovers recorded in Australia can vary significantly between years. Numbers of Grey Plovers recorded during annual summer surveys ranged from a maximum of 2888 in 1995 to a minimum of 620 in 1997 (Harris 1995, 1997). Fluctuations in populations that are detected in Australia probably reflect factors in the breeding grounds rather than in Australia, such as 'lemming cycles' which affects the level of predation of waders' nests and the number of young birds that subsequently arrive in the non-breeding areas (Rogers et al. 2005).

There is no published information on the generation length of the Grey Plover, but they probably first breed when two to three years old, and the oldest bird recorded was at least 20 years and 4 months old (Wiersma 1996).

The key population (with respect to Australia) is probably the one which breeds north of the Arctic Circle in northern Siberia, as it is this population that is most likely to occur in Australia during the non-breeding season. Within Australia, two of the major staging areas are Eighty Mile Beach and Roebuck Bay, both near Broome, where large numbers of birds pass through on their arrival/departure in Australia. The maintenance of these sites would appear critical for the survival of the species.

The Grey Plover is not known to hybridize with other species in the wild.

Land Tenure of Populations
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Only three of the 20 internationally important sites in Australia were fully within conservation reserves: Corner and Shallow Inlets, Victoria Clinton Conservation Park, South Australia Nuytsland Nature Reserve, Western Australia (Watkins 1993).

Habitat
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In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (Marchant & Higgins 1993 and references therein). On their breeding

grounds they inhabit tundra (Dement'ev & Gladkov 1951).

Feeding habitat
 Grey Plovers usually forage on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. They also occasionally feed in pasture and at the muddy margins of inland wetlands such as lakes, swamps and bays (Marchant & Higgins 1993).

Roosting habitat
 They usually roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches or other sheltered environments such as estuaries or lagoons (Jaensch et al. 1988; Pegler 1983). In Port Phillip Bay, they roost on artificial sand islands created by dredge spoil (Marchant & Higgins 1993). They less often roost on the muddy edges of estuaries or water storages such as reservoirs (Bravery 1964; Jaensch et al. 1988) and salt-lakes (Storr 1964b). The species has also been recorded roosting in claypans 2 km from the sea (Collins et al. 2001).

Breeding habitat
 Grey Plovers breed in tundra, often at higher elevations (up to the tree-line), and generally in dry positions, such as on low ridges or bluffs, in areas vegetated with sedges, moss, lichen and stunted trees, and interspersed with large wetlands and patches of snow and unmelted ice. They may avoid moist areas, though they have been recorded breeding in the deltas of large rivers and in other lowland or coastal areas (Cramp & Simmons 1983; Dement'ev & Gladkov 1951; Wiersma 1996).

The species does not rely on a listed threatened ecological community.

Life Cycle

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This species does not breed in Australia (Marchant & Higgins 1993). Grey Plovers lay their eggs between late May and early July (Dement'ev & Gladkov 1951; Wiersma 1996) and possibly into August (Hayman et al. 1986). The nest is a shallow scrape in the soil, lined with stems, moss, lichen and other plant material (Dement'ev & Gladkov 1951) and possibly a few small stones (Wiersma 1996). Clutches usually comprise four eggs, though sometimes three, which are incubated by both sexes for 26 or 27 days (Dement'ev & Gladkov 1951; Wiersma 1996). Hatching success has been estimated at about 80% in Alaska and 67% in Canada (Wiersma 1996). Chicks are tended by both parents for two to three weeks, after which the female usually leaves. Young birds fledge after about 23 days, with on average 2.7 fledglings produced per pair (Wiersma 1996). Grey Plovers, like many other shorebirds which breed on the ground in the Siberian tundra and have precocial young, are vulnerable to predation by Arctic foxes and other predators on the breeding grounds (Tomkovich & Weston 2007).

Feeding

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During the non-breeding season, Grey Plovers mostly eat molluscs (especially gastropods), insects and their larvae, crustaceans (especially crabs) and polychaete worms. Vegetation is very occasionally found in their stomachs (Barker & Vestjens 1989; Boehm 1964; Lea & Gray 1935a; Marchant & Higgins 1993; Rogers 1999a). During the breeding season, they eat mostly insects, but may occasionally eat vegetation (Dement'ev & Gladkov 1951).

The Grey Plover usually forages during the day (Cramp & Simmons 1983), but sometimes also feeds at night (Cramp & Simmons 1983; Goodfellow 2001), when up to 40% of food may be obtained (Turpie & Hockey 1993). They usually locate prey by sight, with cues used including movement of water, sand or casts from the burrows of polychaete worms (Cramp & Simmons 1983; Marchant & Higgins 1993). They feed with a running, stopping and pecking action typical of many species of plovers, gleaning and probing the substrate (Cramp & Simmons 1983; Marchant & Higgins 1993). Bivalves are seized by the siphon and torn from the shell, while crabs are pecked apart (Bent 1962). They have been recorded washing their prey (Cramp & Simmons 1983). Grey Plovers have also been recorded stealing food from Whimbrels (*Numenius phaeopus*) and oystercatchers (*Haematopus* spp.) (Zwarts et al. 1990).

Movement Patterns

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The Grey Plover is a migratory species, breeding in the Northern Hemisphere and flying south for the boreal winter (Bent 1962; Cramp & Simmons 1983; Dement'ev & Gladkov 1951; Lane 1987; Marchant & Higgins 1993; Urban et al. 1986).

Departure from breeding grounds
 The species usually leaves its breeding grounds in northern Siberia between mid-September and mid-October, but some leave as early as mid-August (Dement'ev & Gladkov 1951). Breeding grounds in Alaska are mostly left in August and September (Bent 1962). When departing breeding grounds they apparently move on a wide front, and at least some migration is overland (Cramp & Simmons 1983; Dement'ev & Gladkov 1951; Urban et al. 1986).

Southern passage
 In the East Asian-Australasian Flyway, Grey Plovers are recorded on passage through the Russian Maritime Territories between late September and late October, though sometimes in August or occasionally even in late July (Dement'ev & Gladkov 1951; Gerasimov 2003, 2004, 2005). They have been recorded in Mongolia in late August (Dement'ev & Gladkov 1951), Hong Kong from mid-August onwards (Chalmers 1986), the Korean Peninsula between August and October (Barter 2002; Gore & Won 1971), Japan in September (Dement'ev & Gladkov 1951), the Philippines from August to November (Dickinson et al. 1991) and Indonesia in September and October (Strange 2001). In the Western-Southern Asian Flyway they have been recorded between August and early October (Dement'ev & Gladkov 1951; Grimmett et al. 1999b); and in the the European-African Flyway mostly in August and September (Cramp & Simmons 1983; Urban et al. 1986). They are recorded in the American

Flyway, passing through Canada and the United States between July and August, and Central America between August and October (Bent 1962; French 1976).

Non-breeding season

Australia: Morphometric data suggests that Grey Plovers wintering in Australia originate from Siberian breeding grounds located east of the Lena River, with south-eastern Australia mainly supporting birds which bred on Wrangel Island (Minton & Serra 2001). They arrive in northern Australia in August and early September, and sometimes October (Noske & Brennan 2002). Many then move south, mainly in October (Lane 1987; Marchant & Higgins 1993). Some of these southerly movements are overland, as all inland records are from the period September to January, though others certainly follow the coast (Marchant & Higgins 1993). The species usually arrives at sites on the southern coast between October and November (Lane 1987; Marchant & Higgins 1993; Thomas 1970b), though some are recorded much earlier. For example, they are recorded on Rottnest Island, Western Australia, and at the Gulf St Vincent, South Australia, in late August (Alcorn et al. 1994; Emison et al. 1987; Storr 1964b), and the Swan River, Western Australia, and sites in Victoria in September (Serventy 1938). On the east coast, Grey Plovers arrive between August and December, but primarily during September (Alcorn et al. 1994; Amiet 1957; Marchant & Higgins 1993). It is suggested that many birds which arrive on the north coast may move to the south-western beaches and then eastwards towards Gulf St Vincent (Alcorn et al. 1994). They remain at southern non-breeding grounds until March-May (Alcorn et al. 1994). Birds move northwards along the east coast in March (Amiet 1957; Lane 1987); they leave south-western Australia in April (Lane 1987), and other birds pass through the area between March and May, possibly originating from the South Australian coast, travelling westward in the initial stages of their northward migration (Alcorn et al. 1994). Plovers which have remained along the northern coastline for the non-breeding season leave between February and April (Collins 1995; Lane 1987; Noske & Brennan 2002), but birds which have overwintered in southern Australia may not land in northern regions on their northward migration (Lane 1987; Marchant & Higgins 1993). It also appears that many birds at Port Hedland or Broome do not migrate north from these areas (Marchant & Higgins 1993). Many young birds do not migrate north, and remain in Australia during their first breeding season (Alcorn et al. 1994; Marchant & Higgins 1993). During this time Plovers have been recorded moving westward from Gulf St Vincent to western beaches of the Eyre Peninsula (Alcorn et al. 1994), while Plovers at other sites remain there for several months (Hindwood & Hoskin 1954; Thomas 1970b).

Other wintering grounds: The species also occurs during the non-breeding season in South America between September and April (de Schauensee 1970) and South Africa between August and February or March, though some stay till May (Maclean 1994; Urban et al. 1986).

Northern passage

Birds from eastern Australia are thought to migrate further east than those from western Australia, perhaps traveling through Japan (Barter 2002; Minton & Serra 2001). In the East Asian-Australasian Flyway, the species moves northwards through Indonesia mainly in March and April (Strange 2001), the Philippines between March and early May (Dickinson et al. 1991), Japan between early April and early June (Dement'ev & Gladkov 1951), the Korean Peninsula in April and May (Barter 2002; Gore & Won 1971), Hong Kong in April and early May (Chalmers 1986) and the Russian Maritime Territories in May and early June (Dement'ev & Gladkov 1951; Gerasimov & Huettman 2006). In other flyways, northward migration is recorded through the Indian subcontinent in April (Grimmett et al. 1999b); in southern Africa in February and March, and further north in April and May, Europe between March and June (Cramp & Simmons 1983; Urban et al. 1986); in Central America between March and mid-April, and the United States and Canada mostly between late April and mid-May (Bent 1962; Latta et al. 2006).

Arrival back at breeding grounds

They arrive back at breeding grounds in northern Siberia between mid-May and early June (Cramp & Simmons 1983; Dement'ev & Gladkov 1951) and probably arrive back in Alaska in about May (Bent 1962).

The Yellow Sea is a very important region for this species as it supports about 80% of the estimated combined populations of Grey Plovers in the East Asia-Australasian Flyway during their northern migration. Thirteen sites in this region are of international importance (seven in China and six in South Korea), with 12 of the sites important during northward migration, seven important during southward migration, and six (Shi Jiu Tuo, Yeong Jong Do, Namyang Man, Asan Man, Mangyeong Gang Hagu and Dongjin Gang Hagu) important during both northern and southern migration (Barter 2002).

Home ranges and territories are not maintained while the birds are in Australia.

Survey Guidelines

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When in Australia the species is in drab non-breeding plumage, and may be difficult to distinguish in large mixed-species flocks of shorebirds, especially from the superficially similar Pacific Golden Plover. Thus, to untrained observers, Grey Plovers may be difficult to detect in mixed flocks of shorebirds (Collins 1995).

The survey methods used successfully by the Australasian Wader Studies Group are twice-yearly counts of waders at 23 sites around Australia, undertaken in early February, when numbers are most stable during the non-breeding season, and again in June-July to establish the population remaining in Australia during the breeding season in the Northern

Hemisphere. Summer counts are the most useful, as they occur when the birds are present in Australia in their greatest numbers. Counts are usually conducted at high-tide, when the shorebirds are roosting. This is complemented by robust banding and leg-flagging programs (Barter 1993; Minton & Lane 1984).

Threats

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Though there are no threats that apply specifically to Grey Plovers, there are a number of threats that will affect all migratory waders.

Australia Pollution, including industrial and discharge nutrient hyperenrichment, with subsequent eutrophication, adversely affects the number of micro-organisms which occur in the benthos of the littoral zone, which, in turn, affects the efficiency of feeding by species such as the Grey Plover (Harding et al. 2007; Straw 1992a). It may also affect the Plovers directly through heavy metals, insecticides, herbicides and similar pollutants accumulating in their tissues. Conversely, efforts to increase the efficiency of treating effluent before it is released into the greater environment may result in lower levels of bacteria and invertebrates and their larvae which constitute a major proportion of the diet of the Grey Plover.

With increasing tourist visitation around Broome, and subsequent development, increasing levels of disturbance from human recreation are likely (Rogers 1999a).

Residential or other development of saltworks or land adjacent to mudflats near the outskirts of built-up areas (for example in areas along the western shores of Port Phillip Bay) results in a reduction of suitable habitat for the species and increased levels of disturbance (Straw 1992a).

The spread of introduced plants, such as cord grass *Spartina*, can invade intertidal mudflats and reduce the amount of suitable areas to forage, as it has in other countries (Goss-Custard & Moser 1988).

Elsewhere There are a number of threats that affect migratory waders in the East Asian-Australasian Flyway. 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, 2005c; Ge et al. 2007; Huettmann & Gerasimov 2006; Moores 2006). In many suitable staging areas along the East Asian-Australasian 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, 2005c; Wei et al. 2006). 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; Barter et al. 1998; Melville 1997).

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).

Migratory shorebirds are also adversely affected by pollution, both on passage and in non-breeding areas (Harding et al. 2007; Huettmann & Gerasimov 2006; Melville 1997; Moores 2006; Wei et al. 2006).

Disturbance from human activities, including recreation, shellfish harvesting, fishing and aquaculture is likely to increase significantly in the future (Barter et al. 2005; Davidson & Rothwell 1993).

The biological characteristic of the species which poses a key threat to its survival is that it regularly flies for thousands of kilometres over some of the most densely populated areas of the world. The huge human population of East Asia places enormous pressure on natural resources, and manifests itself in activities such as the reclamation of mudflats, which has seriously detrimental effects on populations of migratory waders (Barter 2002, 2005c).

Threat Abatement and Recovery

Top

Five sites of International importance are identified within Australia for the Grey Plover. These are:

Chambers Bay
Ashmore Reef
Ceduna Bays
Roebuck Bays
south-east Gulf of Carpentaria (Bamford et al 2008).

Governments and conservation groups have undertaken a wide range of activities relating to migratory shorebird conservation (DEH 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\009697, the Australian Government has invested approximately \$5 000 000 of Natural Heritage Trust funding in projects contributing to migratory shorebird conservation (DEWHA 2007e). This funding has been distributed across a range of important projects, including the implementation of a nationally coordinated monitoring programme 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-ordinating 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; Harding et al. 1999; Straw 1992a, 1999).

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 implementing 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. Australia has 17 sites in the network:

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

Mitigation Approach

Top

There have been no mitigation measures developed specifically for this species.

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 Grey Plover 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 Grey Plover 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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Minton and Serra (2001) conducted a major study on Grey Plovers in Australia. There have also been a number of extensive studies of shorebirds in general, which include data on this species. Studies on the Grey Plover overseas, include Balachandran and colleagues (2000), Branson and Minton (1976), Chylarecki and Sikora (1990), Pearson and Serra (2002), Serra (1998), Serra and Rusticali (1998), and Serra and colleagues (1999, 2001) (Biometrics). Foraging studies include Dugan (1982), Durell and colleagues (1990), Kersten and Piersma (1984) Moreira (1996) and Turpie and Hockey (1996, 1997). Population studies include Moser (1988).

Management Documentation

Top

There is a detailed summary of all that is known of the species in Australasia in Marchant and Higgins (1993), and international summaries in Cramp and Simmons (1983) and Wiersma (1996). There are also general discussions and summaries of the ecology, conservation and threats of this species and other shorebirds in Geering and colleagues (2007), Barter (2002) and Watkins (1993).

The Department of the Environment, Water, Heritage and the Arts (DEWHA 2008b) have prepared a draft North-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North-West Marine Region that includes information on the Grey Plover.

The Department's Wildlife Conservation Plan for Migratory Shorebirds (AGDEH 2006f) and The Action Plan for Australian Birds (Garnett & Crowley 2000) also contains actions aimed at the conservation of migratory birds within Australia.

Species Profile References

Top

Alcorn, M., R. Alcorn & M. Fleming (1994). Wader Movements in Australia. RAOU Report Series. 94:1--135.

American Ornithologists Union (AOU) (1983). Check-list of North American Birds. Lawrence, Kansas: American Ornithologists Union.

Amiet, L. (1957). A wader survey of some Queensland coastal localities. Emu. 57:236-254.

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.

Balachandran, S., S.A. Hussein & L.G. Underhill (2000). Primary moult, biometrics, mass and age composition of Grey Plovers *Pluvialis squatarola* in southeastern India. *Bird Study*. 47:82-90.

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>.

Bamford, M., D. Watkins, W. Bancroft, G. Tischler & J. Wahl (2006). Migratory Shorebirds of the East Asian-Australasian Flyway. Population Estimates and Internationally Important Sites. *Wetlands International Wader Studies* 22. Wageningen, The Netherlands. Wetlands International.

Barker, R.D. & W.J.M. Vestjens (1989). The Food of Australian Birds. 1 Non-Passerines. Lyneham, ACT: CSIRO.

Barrett, G., A. Silcocks, S. Barry, R. Cunningham & R. Poulter (2003). The New Atlas of Australian Birds. Melbourne, Victoria: Birds Australia.

Barter, M.A. (1993). Population monitoring of waders in Australia: why is it so important, how is it best done and what can we do?. *Stilt*. 22:13-15.

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. (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.

Bent, A.C. (1962). Life Histories of North American Shorebirds. New York: Dover Publications.

Birdlife International (2007m). Species factsheet: *Pluvialis squatarola*. Viewed on 11 April 2008. Available from: <http://www.birdlife.org>.

Blake, E.R. (1977). Manual of Neotropical Birds. Volume 1. Spheniscidae (Penguins) to Laridae (Gulls and Allies). Chicago: University of Chicago Press.

Blakers, M., S.J.J.F. Davies & P.N. Reilly (1984). The Atlas of Australian Birds. Melbourne, Victoria: Melbourne University Press.

Boehm, E.F. (1964). Notes on some South Australian waders. Part II. *Emu*. 63:276-82.

Branson, N.J.B.A. & C.D.T. Minton (1976). Molt, measurements and migrations of the Grey Plover. *Bird Study*. 23:257-266.

Bravery, J.A. (1964). Waders of Tinaroo Dam, north Queensland. *Emu*. 64:61-4.

Chalmers, M.L. (1986). Birds of Hong Kong. Hong Kong: Hong Kong Bird Watching Society.

Christidis, L. & W.E. Boles (1994). The Taxonomy and Species of Birds of Australia and its Territories. Royal Australasian Ornithologists Union Monograph 2. Melbourne, Victoria: Royal Australasian Ornithologists Union.

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

Chylarecki, P. & A. Sikora (1990). Sexual differences in biometrics and moult of Grey Plovers breeding in western Siberia. *Wader Study Group Bulletin*. 59:7.

Coates, B.J. (1985). The Birds of Papua New Guinea. Volume 1. Alderley, Queensland: Dove Publications.

Collins, P. (1995). The Birds of Broome. Broome, Western Australia: Broome Bird Observatory.

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.

Cox, J.B. (1991). Interesting wader records from the interior. *South Australian Ornithologist*. 31:76-77.

Cramp, S. & K.E.L. Simmons, eds. (1983). Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic. Volume 3, Waders to Gulls. Oxford: Oxford University Press.

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

de Schauensee, R.M. (1970). A Guide to the Birds of South America. Livingston Publishing Company, Wynnewood, Pennsylvania.

de Schauensee, R.M. (1984). The Birds of China. Oxford, UK: Oxford University Press.

Dement'ev, G.P. & N.A. Gladkov (Eds) (1951). Birds of the Soviet

Union, Volume 3. Jerusalem: Israel Program for Scientific Translations.

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 the Environment, Water, Heritage and the Arts (DEWHA) (2007e). 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) (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>.

Dickinson, E.C., R.S. Kennedy & K.C. Parkes (1991). The birds of the Philippines. B.O.U Check-list. 12. Tring, Hertfordshire: British Ornithologists Union.

Dugan, P.J. (1982). Seasonal changes in patch use by a territorial Grey Plover: weather-dependent adjustments in foraging behaviour. *Journal of Animal Ecology*. 51:849-857.

Durell, S.E.A. Le V.Dit & C.P. Kelly (1990). Diets of Dunlin *Calidris alpina* and Grey Plover *Pluvialis squatarola* on the Wash as determined by dropping analysis. *Bird Study*. 37:44-47.

Dutson, G. (2001). New distributional ranges for Melanesian birds. *Emu*. 101:237-248.

Emission, W.B., C.M. Beardsell, F.I. Norman, R.H. Loyn & S.C. Bennett (1987). Atlas of Victorian Birds. Melbourne: Department of Conservation (Forest & Lands) & Royal Australian Ornithological Union.

French, R. (1976). A Guide to the Birds of Trinidad and Tobago. Valley Forge, Pennsylvania, Harrowood Books.

Garnett, S.T. (1989). Wading Bird Abundance and Distribution - South-eastern Coast of the Gulf of Carpentaria. RAOU Report Series. 58:1-39.

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.

Gerasimov, Y. (2003). Shorebird studies in north Kamchatka from July 5-August 12 2002. *Stilt*. 44:19-28.

Gerasimov, Y. (2004). Southward migration in 2003 of shorebirds at the Penzhina River mouth, Kamchatka, Russia. *Stilt*. 45:33-38.

Gerasimov, Y. (2005). The Penzhina River estuary, Kamchatka, Russia - a very important shorebird site during southward migration. 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) 161-167. Sydney: Wetlands International Global Series 18, International Wader Studies 17.

Gerasimov, Y.N. & F. Huettmann (2006). Shorebirds of the Sea of Okhotsk: status and overview. *Stilt*. 50:15-22.

Glenister, A.G. (1974). The Birds of the Malay Peninsula, Singapore and Penang. Kuala Lumpur: Oxford University Press.

Goodfellow, D.L. (2001). Birds of Australia's Top End. Sydney: Reed New Holland.

Gore, M.E.J. & P.-O. Won (1971). The Birds of Korea. Seoul, Korea: Taewon Publishing.

Goss-Custard, J.D. & M.E. Moser (1988). Rates of change in the numbers of Dunlin, *Calidris alpina*, wintering in British estuaries in relation to the spread of *Spartina anglica*. *Journal of Applied Ecology*. 25:95-109.

Grimmett, R., C. Inskipp & T. Inskipp (1999b). A Guide to the Birds of India, Pakistan, Nepal, Bangladesh, Bhutan, Sri Lanka, and the Maldives. Princeton, New Jersey: Princeton University Press.

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.

Harris, K.A. (1994). Population Monitoring Counts. *Stilt*. 25:12-19.

Harris, K.A. (1994a). Population monitoring counts. *Stilt*. 24:11.

Harris, K.A. (1995). Report on population monitoring counts: summer 1995. *Stilt*. 27:27-29.

Harris, K.A. (1996). Report on population monitoring counts: a report on the winter 1995 and summer 1996 counts. *Stilt*. 29:43-47.

Harris, K.A. (1997). Report on population monitoring counts, 1996 and 1997. *Stilt*. 31:56-62.

Harris, K.A. (1999b). Report on population monitoring counts, 1998. *Stilt*. 34:51-54.

Harris, K.A. (2000). Report on population monitoring counts - summer 1999. *Stilt*. 36:45-46.

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

Hewish, M.J. (1986). The AWSG population monitoring project: report on the summer

1986 wader count. *Stilt*. 9:21-29. Hewish, M.J. (1987a). The summer 1987 population monitoring count: rarities and the wader counts. *Stilt*. 11:23-31. Hewish, M.J. (1990). The summer 1989 population monitoring count: increasing numbers of Bar-tailed Godwits at monitored sites in eastern Australia, 1982-1989. *Stilt*. 16:23-35. Hewish, M.J. (1992). The 1990 summer and winter population monitoring counts. *Stilt*. 20:33-37. Hindwood, K.A. & E.S. Hoskin (1954). The waders of Sydney (County of Cumberland), New South Wales. *Emu*. 54:217-255. 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. Jaensch, R.P., R.M. Vervest & M.J. Hewish (1988). Waterbirds in nature reserves of south-western Australia 1981-1985: reserve accounts. RAOU Report Series. 30. Kersten, M. & T. Piersma (1984). Prey choice and food intake of Grey Plovers (*Pluvialis squatarola*) in the Wadden Sea during spring and autumn migration. *Limosa*. 57:105-111. Lane, B.A. (1987). Shorebirds in Australia. Sydney, NSW: Reed. Latta, S., C. Rimmer, A. Keith, J. Wiley, H. Raffaele, K. McFarland & E. Fernandez (2006). Birds of the Dominican Republic and Haiti. Princeton, New Jersey, Princeton University Press. Lea, A.M. & J.T. Gray (1935a). The food of Australian birds. *Emu*. 34:275-292. Maclean, G.L. (1994). Roberts' Birds of Southern Africa. John Voelcker Bird Book Fund, Cape Town. Marchant, S. & P.J. Higgins, eds. (1993). Handbook of Australian, New Zealand and Antarctic Birds. Volume 2 - Raptors to Lapwings. Melbourne, Victoria: Oxford University Press. McAllan, I.A.W., B.R. Curtis, I. Hutton & R.M. Cooper (2004). The birds of the Lord Howe Island Group: a review of records. *Australian Field Ornithology*. 21:1-82. 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. Minton, C.D.T. & B.A. Lane (1984). Counting and banding waders in Australasia. In: Davies, S.J.J.F., ed. Methods of Censusing Birds in Australia. Royal Australasian Ornithologists Union (RAOU) Report 7. Page(s) 43-54. Minton, C.D.T. & L. Serra (2001). Biometrics and moult of Grey Plovers, *Pluvialis squatarola*, in Australia. *Emu*. 101:13-18. Moores, N. (2006). South Korea's shorebirds: a review of abundance, distribution, threats and conservation status. *Stilt*. 50:62-72. Moreira, F. (1996). Diet and feeding behaviour of Grey Plovers, *Pluvialis squatarola*, and Redshanks, *Tringa totanus*, in a southern European estuary. *Ardeola*. 43:145-156. Morris, A.K., A.R. McGill & G. Holmes (1981). Handlist of Birds in New South Wales. Sydney: NSW Field Ornithologists Club. Moser, M.E. (1988). Limits to the numbers of Grey Plovers, *Pluvialis squatarola*, wintering on British estuaries: an analysis of long-term population trends. *Journal of Applied Ecology*. 25:473-485. Noske, R.A. & G.P. Brennan (2002). The Birds of Groote Eylandt. Darwin: Northern Territory University Press. Ornithological Society of Japan (Orn. Soc. Japan) (2000). Check-List of Japanese Birds. Tokyo, Japan: Orn. Soc. Japan. Pearson, D.J. & L. Serra (2002). Biometrics, moult and migration of Grey Plovers, *Pluvialis squatarola*, at Mida Creek, Kenya. *Ostrich*. 73:143-146. Pegler, J.M. (1983). A brief survey of the water birds in the Shoalhaven-Crookhaven estuary. *Australian Birds*. 17:38-42. Pratt, H.D., P.L. Bruner & D.G. Berrett (1987). A Field Guide to the Birds of Hawaii and the Tropical Pacific. Princeton, New Jersey: Princeton University Press. Ridgely, R.S. (1976). A Guide to the Birds of Panama. Princeton, New Jersey, Princeton University Press. Rogers, D. (1999b). Roost choice in the waders of Roebuck Bay: is avoiding heat stress their main consideration?. *Stilt*. 35:65. Rogers, D.I. (1999a). What determines shorebird feeding distribution in Roebuck Bay?. In: Pepping M., T. Piersma, G. Pearson & M. Lavaleye, eds. Intertidal Sediments and Benthic Animals of Roebuck Bay, Western Australia. Page(s) 145-174. Perth, Western Australia: Netherlands Institute for Sea Research, WA CALM, Curtin University for Technology. Rogers, D.I., K.G. Rogers & M.A. Barter (2005). Measuring recruitment of shorebirds with telescopes: a pilot study of age proportions on Australian non-breeding grounds. 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) 63-72. Sydney: Wetlands International Global Series 18, International Wader Studies 17. Rose, P.M. & D.A. Scott (1997). Waterfowl population estimates, 2nd edition. Wetlands International Publication No. 44. Wageningen, The Netherlands: Wetlands International. Serra, L. (1998). The adaption of primary moult to migration and wintering in the Grey Plover (*Pluvialis squatarola*): a preliminary outlook. *Biologia e Conservazione Fauna*. 102:123-127. Serra, L. & R. Rusticali (1998). Biometrics and moult of Grey Plover (*Pluvialis squatarola*) in northeastern Italy. *Vogelwarte*. 39:281-292. Serra, L., D.A. Whitelaw, A.J. Tree & L.G. Underhill (1999). Moult and migration of Grey Plovers *Pluvialis squatarola* wintering in South Africa. *Ardea*. 87:71-81. Serra, L., D.A. Whitelaw, A.J. Tree & L.G. Underhill (2001). Biometrics, possible breeding origins and migration routes of

South African Grey Plovers, *Pluvialis squatarola*. Ostrich. 72:140-144.
Waders and other aquatic birds on the Swan River estuary, Western Australia. Emu. 38:18-29.
Simpson, K.G. (1965). First record of a Grey Plover at Macquarie Island. Emu. 65:77-78.
Skewes, J. (2002). Report on the 2001 population monitoring counts. Stilt. 41:55-61.
Skewes, J. (2003). Report on the population monitoring counts, 2002. Stilt. 44:56-62.
Skewes, J. (2004). Report on the population monitoring counts, 2003. Stilt. 46:86-92.
Skewes, J. (2005). Report on the population monitoring counts, 2004. Stilt. 48:54-60.
Skewes, J. (2007). Report on population monitoring counts, 2005 and 2006. Stilt. 52:20-32.
Smythies, B.E. (1981). The Birds of Borneo. Sabah, Kuala Lumpur: Sabah Society/Malayan Nature Society.
Stewart, D., A. Rogers & D.I. Rogers (2007). Species description. In: Geering, A., L. Agnew & S. Harding, eds. Shorebirds of Australia. Page(s) 75-196. Melbourne: CSIRO Publishing.
Storr, G.M. (1964b). The avifauna of Rottnest Island, Western Australia II. Lake and Littoral Birds. Emu. 64:105-13.
Strange, M. (2001). A Photographic Guide to the Birds of Indonesia. Hong Kong, Periplus.
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, D.J. (1970b). Wader migration across Australia. Emu. 70:145-54.
Tomkovich, P.S. & M.A. Weston (2007). Breeding ecology. Pp. 9-33. In: Geering, A., L. Agnew & S. Harding. (Eds) (2007). In: Shorebirds of Australia. Melbourne, CSIRO Publishing.
Turpie, J.K. & P.A.R. Hockey (1993). Comparative diurnal and nocturnal foraging behaviour and energy intake of premigratory Grey Plovers *Pluvialis squatarola* and Whimbrels *Numenius phaeopus* in South Africa. Ibis. 135:156-165.
Turpie, J.K. & P.A.R. Hockey (1996). Foraging ecology and seasonal energy budgets of estuarine Grey Plovers *Pluvialis squatarola* and Whimbrels *Numenius phaeopus* at the southern tip of Africa. Ardea. 84:57-74.
Turpie, J.K. & P.A.R. Hockey (1997). Adaptive variation in the foraging behaviour of Grey Plover *Pluvialis squatarola* and Whimbrel *Numenius phaeopus*. Ibis. 139:289-298.
Urban, E.K., C.H. Fry & S. Keith, eds. (1986). The Birds of Africa. Volume 2. Gamebirds to Pigeons. London: Academic Press.
van Marle, J.G. & K.H. Voous (1988). The birds of Sumatra. B.O.U Check-list. 10. Tring, Hertfordshire: British Ornithologists Union.
Watkins, D. (1993). A national plan for shorebird conservation in Australia. RAOU Report Series. 90.
Wei, D.L.Z., Y.C. Aik, L.K. Chye, K. Kumar, L.A. Tiah, Y. Chong & C.W. Mun (2006). Shorebird survey of the Malaysian coast November 2004-April 2005. Stilt. 49:7-18.
White, C.M.N. & M.D. Bruce (1986). The birds of Wallacea. B.O.U. Check-list. 7.
Wiersma, P. (1996). Charadriidae (Plovers) species accounts. In: del Hoyo, J., A. Elliott & J. Sargatal, eds. Handbook of the Birds of the World. Volume 3. Hoatzin to Auks. Page(s) 411-442. Barcelona: Lynx Edicions.
Wilson, J.R. (2001c). Population monitoring counts for winter 1999, summer 2000 and winter 2000. Stilt. 38:64-70.
Zwarts, L., A.-M. Blomert, B.J. Ens, R. Hupkes & T.M. van Spanje (1990). Why do waders reach high feeding densities on the intertidal flats of the Banc d'Arguin, Mauritania?. Ardea. 78:39-52.