

Order CHARADRIIFORMES

A large, diverse assemblage of small to medium-large (12–75 cm long) limicoline, pratincoline, aquatic or terrestrial birds. Cosmopolitan from Arctic to Antarctic regions; in all sorts of maritime, freshwater and open terrestrial habitats (including deserts) with a few (woodcocks and snipes) even using dense forests. Once known as Limicolae or Laro-limicolae (e.g. Mayr & Amadon 1951); colloquially, the assemblage (excluding alcids, skuas, gulls, terns and skimmers) is often referred to as waders (especially in Britain) or shorebirds (especially in North America).

About 350 species in 19 families, though taxonomic treatments vary. Following families recognized (mostly based on recent reviews of Order [Sibley *et al.* 1988; Sibley & Ahlquist 1990; Sibley & Monroe 1990]):

Thinocoridae	seedsnipes; four species, S. America.
Pedionomidae	Plains-wanderer; monotypic, Aust.
Scolopacidae	sandpipers, snipes and allies; c. 85 species, cosmopolitan.
Rostratulidae	painted snipes; two species, s. America and Old World.
Jacaniidae	jacanas; seven species, pantropical.
Chionididae	sheathbills; two species, Antarctica and subantarctic islands.
Burhinidae	thick-knees, stone-curlews; nine species, widespread in Old World and two in Neotropics.
Haematopodidae	oystercatchers; c. 11 species, worldwide in tropics and temperate regions.
Recurvirostridae	avocets and stilts; about seven species, worldwide in tropical and temperate regions.
Ibidorhynchidae	Ibisbill; monotypic, central Asia.
Charadriidae	plovers and lapwings; c. 60 species, cosmopolitan.
Pluvianellidae	Magellanic Plover; monotypic, S. America.
Dromadidae	Crab Plover; monotypic, Arabian region.
Glareolidae	pratinoles, coursers, and Egyptian Plover; c. 15 species, widespread in Old World.
Stercorariidae	skuas and jaegers; about seven species, mostly in Arctic and Antarctic regions.
Rhynchopidae	skimmers; three species, pantropical.
Laridae	gulls; c. 47 species, cosmopolitan.
Sternidae	terns; c. 42 species, cosmopolitan.
Alcidae	auks; c. 20 species, Arctic and temperate regions of n. hemisphere.

Apparently monophyletic. Pteroclididae (sandgrouse) probably sister-group of Charadriiformes (e.g. Fjeldså 1976, 1977; Sibley & Ahlquist 1990; BWP), though whether best placed within Charadriiformes or in separate order is debated. Flamingoes (Phoenicopteridae) and divers (Gaviidae) have also been treated as Charadriiformes (Olson & Feduccia 1981; Fjeldså 1976, 1977) but DNA–DNA hybridization studies (Sibley & Ahlquist 1990) inconsistent with these theories. Affinities to other orders still controversial; DNA–DNA hybridization has suggested closest links are to large waterbirds, such as storks, herons and allies, Pelicaniformes, Procellariiformes, penguins, grebes, divers (Gaviidae) and also Falconiformes. All these were combined in huge order Ciconiiformes by Sibley & Ahlquist (1990).

Taxonomy and relationships reviewed in Sibley & Ahlquist (1990), Christian *et al.* (1992) and BWP (and references therein). Recent reviews have included: patterning of downy young (Jehl 1968; Fjeldså 1976, 1977), osteology (Strauch 1978; Mickevitch & Parenti 1980; Olson & Steadman 1981), DNA–DNA hybridization (Sibley *et al.* 1988, Sibley & Ahlquist 1990) and electrophoresis of tissue proteins (Christian *et al.* 1992). The studies of allozymes, DNA–DNA hybridization and the most recent osteological study of the entire order (Strauch 1978) have agreed in finding two or three well-knit, monophyletic assemblages within the Charadriiformes: scolopacids and allies (Thinocoridae, Pedionomidae, Scolopacidae, Rostratulidae, Jacaniidae) and charadriids and allies (Chionididae, Burhinidae, Haematopodidae, Recurvirostridae, Ibidorhynchidae, Charadriidae, Pluvianellidae, Dromadidae, Glareolidae, Stercorariidae, Rhynchopidae, Laridae, Sternidae, Alcidae); Strauch (1978) treated Alcidae as separate lineage, but skeletons may be so highly modified for foot-propelled diving that they do not reflect relations well (Sibley & Ahlquist 1990); gulls and allies have also been regarded as a separate lineage (Christian *et al.* 1992) or as allied to charadriids (e.g. Sibley & Ahlquist 1990). Further relationships within the Order discussed in introductions to families.

Because the Order comprises so many species and adaptations are so diverse, few characters shared by all species; those that are shared are mostly anatomical features of the skull, e.g. most or all have schizorhinal nostrils, schizognathous palates, well-developed vomer, lachrymals fused with ectethemoid and pre-frontal bones, well-developed supra-orbital grooves; see Olson & Steadman (1981) for more information on osteological characters. Wings usually have 11 primaries, with p10 longest and p11 minute; 15–24 secondaries; diastataxic except in *Scolopax minor*, as far as is known. Usually 12 tail-feathers. Necks usually rather long with 15–16 cervical vertebrae. Oil-gland bilobed and tufted. Syrinx, tracheo-bronchial; two carotids (type A-1 of Glenny 1955); caeca present. Legs usually rather long; hind toe small or lacking in most but all toes greatly elongated in Jacaniidae. Feathers with small thin afterfeathers. Normally two moults annually: complete post-

breeding and partial pre-breeding; some jacanas and alcids have flightless periods when moulting remiges. Young, downy, usually with intricate cryptic patterns on upperparts of three chief types: pebbly, spotted and striped, matching characters of habitat (Fjeldså 1976, 1977): precocial, nidifugous usually, self-feeding or not depending greatly on parents.

Thirteen families recorded in HANZAB region, with 54 species breeding, 41 occurring as regular non-breeding migrants and c. 38 as accidentals or probable accidentals. Scolopacidae, Stercorariidae, Laridae and Sternidae will be dealt with in Volume 3 of HANZAB.

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Family CHARADRIIDAE plovers and lapwings

Small to medium-sized, mostly terrestrial, waders of open habitats. About 65 species, placed in varying number of genera. Evidently monophyletic by behaviour and structural characters. Distributed worldwide and separable into two distinct sub-families: Charadriinae (plovers) and Vanellinae (lapwings), both of which are represented in HANZAB region and are discussed in more detail below. Most closely related to Recurvirostridae, Haematopodidae and possibly Burhinidae (Sibley & Ahlquist 1990; Christian *et al.* 1992).

Bodies, compact. Size differences between sexes negligible; sometimes males and sometimes females slightly larger. Necks, short and thick; 15 cervical vertebrae. Wings, long and usually pointed but rounded in some lapwings; 11 primaries, p11 minute; 14–19 secondaries. Tails, short to medium-long, square or rounded; 12 feathers. Bill, short, somewhat swollen at tip and narrower centrally; no sensitive nerve-endings at tip and prey located by sight rather than touch. Nostrils, holorrhinal, impervious, slit-like. Head, rounded; forehead steep and broad. Legs, fairly short or medium in length; bare part of tibia short; tarsi, reticulated, rarely with some transverse scutes. Usually three, rather short toes, slightly webbed at base in some plovers; no hind toe in most plovers and in some lapwings; hallux, short and vestigial if retained. No crop. Caeca present. Eyes large. Supraorbital salt-glands, often large; size related to salinity of habitat and influences structure of skull and appearance of head. Plane of *foramen magnum* of occiput nearly horizontal.

Plumages generally boldly patterned in brown, olive-grey, black and white; markings often have cryptic disruptive effect. Bill, bicoloured in some species, especially plovers. Stance erect with head held high. Fast runners for good distances but often proceed in short bursts with halts, especially when feeding. Post-breeding moult complete; primaries outwards; pre-breeding moult varies considerably. Young, precocial, nidifugous and always feed themselves; down of pebbly-pattern type (Fjeldså 1977).

See accounts of sub-families (below) for additional details.

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Sub-family CHARADRIINAE plovers

Generally small birds, usually smaller than lapwings (Vanellinae). Apparently a monophyletic assemblage. About 40 species in five (Voous 1973; Strauch 1978; BWP) to 10 genera (Sibley & Ahlquist 1990; Sibley & Monroe 1990; Christian *et al.* 1992), with most species in two genera, *Pluvialis* and *Charadrius*, and varying number of genera composed of only one or a few species (e.g. *Anarhynchus*, *Phegornis*, *Thinornis*, *Eelseyornis*). The affinities of *Phegornis* (Diademed Sandpiper-plover of South America) have not been resolved (Sibley & Monroe 1990). Recent studies of allozymes of Aust. plovers and lapwings (Christian *et al.* 1992) indicate that Red-kneed Dotterel *Erythrogonys cinctus* is a lapwing (Vanellinae; q.v.).

We recognize the following genera within the Charadriinae in HANZAB region:

Pluvialis. Two regular non-breeding migrants (*fulva*, *squatarola*), two doubtfully recorded (*dominica*, *apricaria*). We follow Connors *et al.* (1983, 1993) and treat *fulva* and *dominica* as full species.

Charadrius. Four breeding species (*obscurus*, *ruficapillus*, *bicinctus*, *australis*), six non-breeding migrants (*hiaticula*, *dubius*, *mongolus*, *leschenaultii*, *asiaticus*, *veredus*), one accidental (*tricoloris*); one doubtfully recorded (*alexandrinus*). Inland Dotterel *C. australis* is a typical *Charadrius* plover (Maclean 1976; Christian *et al.* 1992 *contra* Jehl 1968); we follow NZCL in placing New Zealand Dotterel in *Charadrius*.

Thinornis. Two endemic species: *novaeseelandiae* and *rubricollis*.

Allozymes of *rubricollis* form a cluster (with *Eelseyornis melanops*) well separated from those of typical *Charadrius*; placed in *Thinornis* on basis of similarities in morphology (Christian *et al.* 1992) and behaviour (Phillips 1980).

Eelseyornis. Single species *melanops*, endemic to Aust. Allozymes, with those of *Thinornis rubricollis*, well separated from *Charadrius* (Christian *et al.* 1992).

Anarhynchus. Single species *frontalis*, endemic to NZ.

Thus, in HANZAB region, eight breeding species, eight non-breeding migrants, and four accidental or not acceptably recorded.

General features of the sub-family are outlined under Charadriidae. The plumages of *Pluvialis* are spangled in white or gold and black above, black below when breeding, and never with white band across nape; plumages of *Charadrius* and other genera in general plain brownish above and white below, boldly marked with black on face and head, at least when breeding;

usually with one or two black or chestnut bands across breast and often with white band across nape. Two moults per cycle: complete post-breeding moult, primaries outwards; and partial pre-breeding moult, which often brings in much brighter breeding plumage; supplemental plumage occurs in at least one species (Eurasian Golden Plover *Pluvialis apricaria*). Down of pebbled pattern (Jehl 1968; Fjeldså 1977, 1988; BWP). Juvenile plumage duller than adults in most species, with pale dorsal scalloping. Adult plumage attained at 1–2 years. Most probably first breed at 1–2 years, maturity perhaps delayed further in some migratory species (e.g. Gréy Plover *Pluvialis squatarola*).

Inhabit open places; when not breeding, many are typically birds of ocean beaches, coastal mudflats and estuaries; others use rivers and freshwater wetlands, often ephemeral; still others characteristic of dry habitats, including gibber plains, grasslands and steppes. Breeding may occur in any of these habitats, or in tundra or high-altitude moorlands. Most species probably migrate to some extent; about 15 species are long-distance transequatorial migrants. Diet consists of terrestrial and coastal invertebrates. When foraging, tend to spread out and feed separately over wide area, rather than feeding in flocks as do many scolopacids. In general, gregarious but less so than many scolopacids. Roost communally. Usually territorial when breeding; some species may defend feeding territories in wintering areas. Various mating systems recorded in different species: monogamy, polyandry (associated with sexual reversals), polygyny and polygamy. While breeding, generally rather aggressive, defending and advertising territories with displays on the ground and in the air, often with butterfly-like flights and song (long melodious trills). Courtship and mating behaviour often complex or stereotyped. Anti-predator strategies, injury-feigning and distraction displays generally elaborate and well developed. Most vocal during breeding season with variety of peeps, trills and mellow or liquid whistles.

Breed seasonally. Nest, a simple scrape on the ground, sparsely lined with plant stems, grasses and other objects; in open, often unvegetated places. Several scrapes may be prepared by male and one then selected by female. Eggs, oval, short oval or even somewhat pyriform; smooth, not glossy; ground-colour, buff, brown or grey, heavily blotched and spotted dark, well camouflaged. Clutch-size, 2–4, often consistently of one size in a species (e.g. two in *C. ruficapillus*). Laying at intervals of 24–60 h. Replacement laying, up to several times. Incubation by both sexes in monogamous species but share varies and is by male alone in Eurasian Dotterel *Eudromias morinellus*, the only plover in which female more brightly coloured than male. Incubation period, 24–31 days. Young hatched in natal down; precocial, nidifugous. Usually tended by both parents but feed themselves from hatching. Fledge in 3 (smaller species) to 5 (larger species) weeks.

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Charadrius veredus Oriental Plover

COLOUR PLATE FACING PAGE 841

Charadrius veredus Gould, 1848, *Proc. zool. Soc. Lond.* (1848): 38 — northern Australia.The Latin *veredus* means a 'swift horse', i.e. 'fast-running'.

OTHER ENGLISH NAMES Asiatic, Eastern or Oriental Dotterel or Dottrel; Eastern Sandplover.

MONOTYPIC

FIELD IDENTIFICATION Length: 21–25 cm; wingspan: 46–53 cm; weight: 95 g. Medium-sized, long-legged plover with elegant silhouette and carriage; similar in size to Pacific Golden Plover *Pluvialis fulva*; slightly larger than Large Sand *Charadrius leschenaultii* and Mongolian *C. mongolus* Plovers. Large size, rakish shape and proportions, no clear wing-bar, and all-dark underwing, distinctive. Sexes differ in breeding plumage. Marked seasonal variation in male. Juvenile distinct; immatures separable.

Description Adult male breeding Head and neck, creamy or whitish except for brown rear-crown; pale nape and hindneck contrast with dark-brown mantle, back and scapulars. Rest of upperparts and inner wing-coverts, dark brown, with narrow rufous or buff fringes to scapulars, coverts and tertials when fresh. In flight, dark-brown above, with thin white line across tips of greater coverts, and white shaft of outermost primary; rump and tail, dark brown, with narrow white sides, white tip to tail and slightly darker subterminal tail-band. Underbody, white, with broad chestnut breast-band with black lower border, sharply demarcated from white belly. In flight from below, distinctive, with uniform dark-brown underwing, chestnut breast-band and white belly and white shaft of outermost primary. Bill, black. Iris, brown. Legs and feet, yellow to orange, tinged fleshy or greenish, often with darker toes and joints. **Adult female breeding** As adult male breeding except head, neck and breast similar to adult non-breeding: crown, nape and broad patch from in front of eye to ear-coverts, dark-brown, contrasting with whitish forehead, supercilium, anterior half of lores, cheeks, chin and throat; hindneck, pale brown; foreneck, pale buff, grading to darker brownish-buff on lower breast and sides of neck; no black lower border to breast-band. **Adult non-breeding** Similar to adult female breeding except: face and sides of neck more suffused buff or pale brown, and whitish underparts marked with broad diffuse brownish breast-band. **Juvenile** As adult non-breeding except: upperparts and wing-coverts scaled with larger, bolder and paler buff fringing; breast-band, buff, mottled dark brown. **First immature** Like adult non-breeding but retain some juvenile inner wing-coverts, fringed pale-buff, that contrast with richer chestnut fringes of feathers of upperparts and some inner wing-coverts. **Second immature** Similar to adult non-breeding but a few pale-fringed juvenile inner wing-coverts sometimes still present, and male usually attains dull pale chestnut buff-fringed breast-band (difficult to distinguish from adult female); primaries more worn.

Similar species Adult male in breeding plumage distinctive: mostly whitish head and neck and broad chestnut breast-band with black lower border, diagnostic. In all other plumages, combination of size; rakish build; fine bill; long pale legs; no clear wing-bar above; broad brownish or buff breast-band; and all-dark underwing distinguish from all other similar plovers. **Large Sand Plover** and **Mongolian Plover** have similar juvenile and non-breeding plumages, but are distinctly smaller and more compact, with differently shaped bills (thicker and heavier in Large Sand;

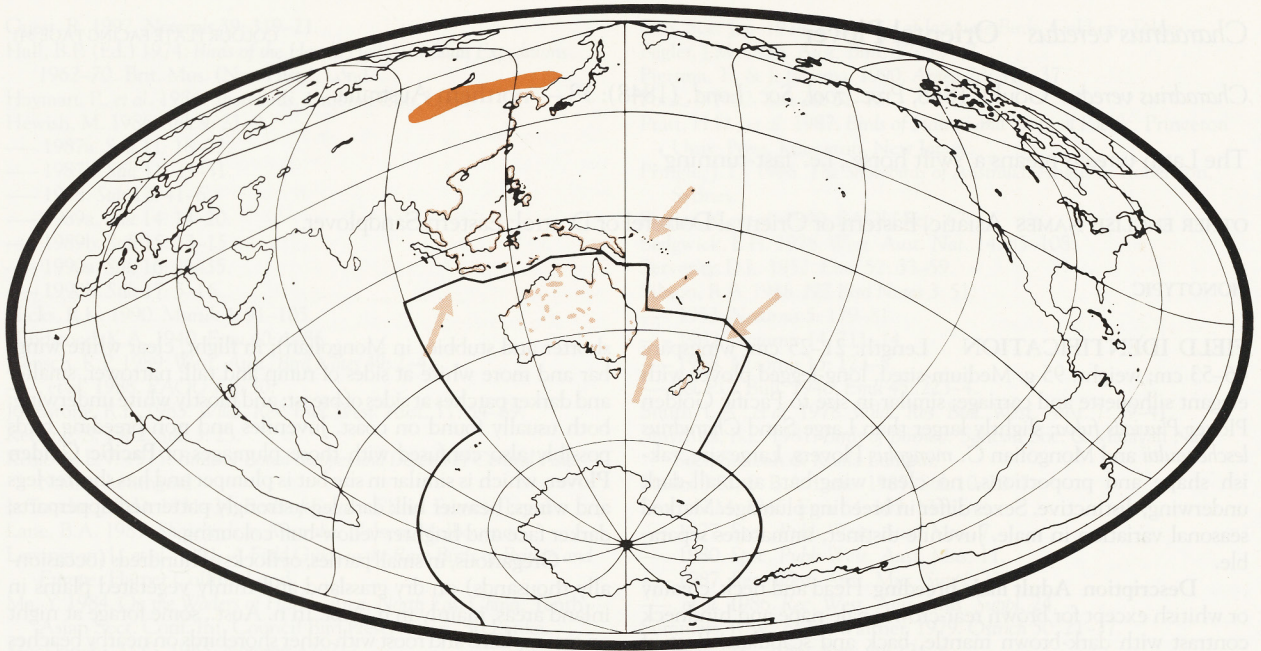
shorter and stubbier in Mongolian); in flight, clear white wing-bar and more white at sides of rump and tail; narrower, smaller and darker patches at sides of breast; and mostly white underwing; both usually found on coast. Juveniles and non-breeding birds possibly also confused with those plumages of **Pacific Golden Plover**, which is similar in size but is plumper and has shorter legs and wings; heavier bill; dark legs; strongly patterned upperparts; darker face and brighter yellow-buff colouring.

Gregarious, in small parties, or flocks of hundreds (occasionally thousands) on dry grassland and thinly vegetated plains in inland areas, mainly in n. Aust. In n. Aust., some forage at night on grassy plains and roost with other shorebirds on nearby beaches during day. Often associate with pratincoles, and often seen far from water, sometimes with Inland Dotterels *Charadrius australis*. Rather wary; bob head in alarm; run fast with upright carriage or sometimes stealthily with legs flexed and carriage horizontal. Adopt characteristic upright stance when relaxed; often stand on one leg with other half-bent; often perch on clump of earth or other elevated point. Feed in typical stop-start plover fashion; dip to pick up prey. Flight powerful, usually fast and high, often with erratic turns; tips of toes clearly project beyond tip of tail in flight; in flock, birds said to change direction in unison. Usual flight call, repeated sharp whistled chip; also trilling call.

HABITAT Generally inland; open grasslands in arid and semi-arid zones; less often in estuarine or littoral environments. Prefer flat inland plains, sparsely vegetated with short grass, and with much hard bare ground, including claypans, playing fields, lawns and cattle camps (Boekel 1980; Fletcher 1980; Storr 1980, 1984; Pedler 1982; Treloar & Underwood 1982). At onset of wet season, may move to lightly wooded grasslands (Storr 1977). Also found in grassland, heathland, spinifex savanna and woodland that have been recently burnt; dry or flooded paddocks; bare sandy, rocky or muddy margins of terrestrial wetlands such as lakes, billabongs, dams and salt-fields; estuarine mudflats and sandbanks; ocean beaches, on sand, reefs or rocks (Carruthers 1966; Crawford 1972; Serventy & Whittell 1976; Storr 1977, 1980; Boekel 1980; Bigg 1981; Treloar & Underwood 1982; McCrie 1984; Bransbury 1985; Garnett 1986; Cox 1988; Murlis *et al.* 1988; NSW Bird Rep. 1976). Vagrants in saltmarsh (Pedler 1982; Park 1983; Patterson 1983).

Forage on hard stony bare ground or in short grassland (McCrie 1984); also on mudflats (Bigg 1981) and on kelp on beach (Treloar & Underwood 1982). Roost or loaf on soft deep wet mud and shallow (≤ 1 cm) water of beaches and tidal mudflats; often during hot weather (Serventy & Whittell 1976; Treloar & Underwood 1982; McCrie 1984; Bransbury 1985; Cox 1988); also open dry saltmarsh (Park 1983; Patterson 1983); unconfirmed records of roosting in paddocks frequented by lapwings *Vanellus* (McCrie 1984).

Use artificial grasslands with short or sparse grass-cover, such as airfields, playing fields, domestic lawns (Larkins & McGill

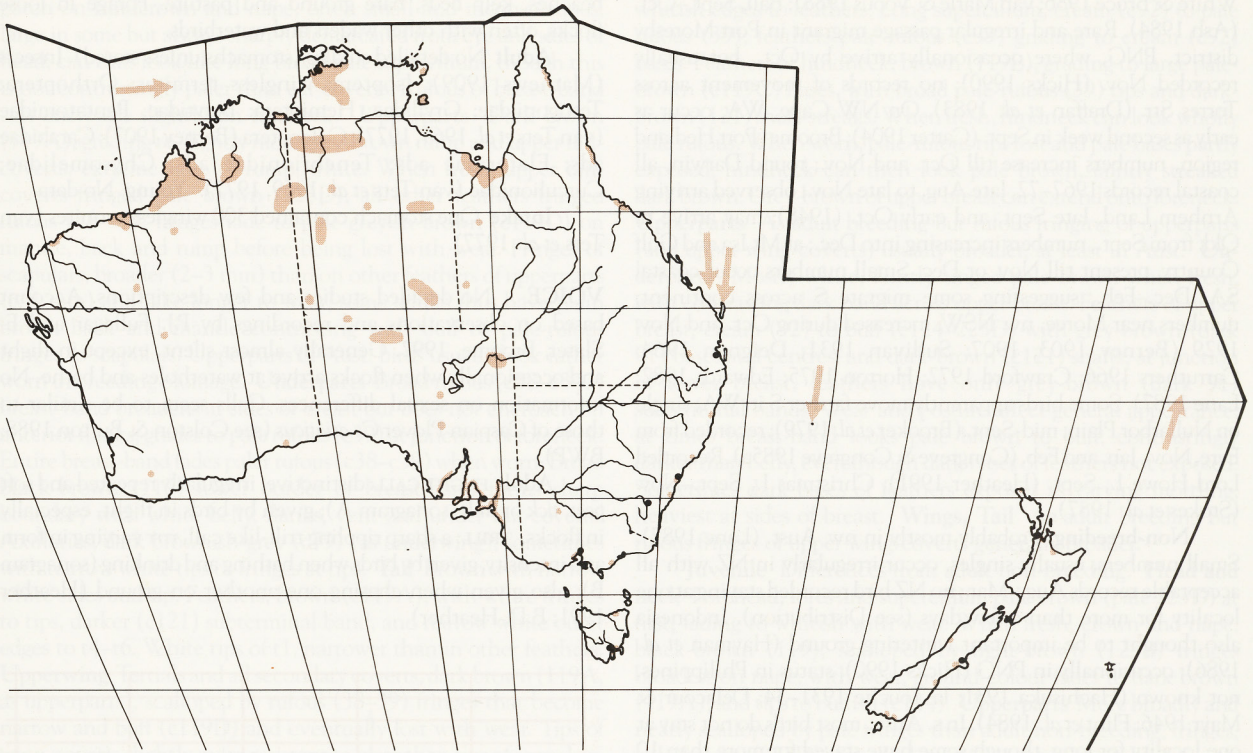


1978; Fletcher 1980; Storr 1984); also ploughed paddocks and cattle camps (Boekel 1980; Storr 1984); salt-fields, dams and reservoirs (Carruthers 1966; Treloar & Underwood 1982).

DISTRIBUTION AND POPULATION Breed w., n. and e. Mongolia, from Dzavhan Gol R. and Khangai Ras., E to Kerulen R., and S to e. Gobi Desert; also adjacent regions of nw. Manchuria and n. Inner Mongolia (Kozlova 1975; Mathews 1933; Vaurie 1964; Érchécopar & Hüe 1978). Irregular breeding records in Russia close to Mongolian border near Ubsunur L. and mouth of Uldza R. (P.S. Tomkovich). Passage migrant through e. China; main wintering grounds in n. and nw. Aust.; passage migrant or in small numbers to Korea, Japan, Hong Kong, Philippines, Micronesia and SE. Asia from Malay Pen. to Indonesia. Single record Andaman Is. Rare New Guinea (Heron 1978). Straggler to NZ.

Aust. Seasonally common on blacksoil plains of n. WA, NT and Gulf Country of Qld; straggler to s. regions (Carruthers 1966; Thomas 1970; Aust. Atlas). **Qld** Mostly in nw. and w-central regions, from se. Gulf of Carpentaria, S to about Mt Isa and Richmond (Berney 1903, 1904; Carruthers 1966, 1968; Horton 1975; Garnett 1986, 1989; Aust. Atlas). Rarely in SW (Corben 1972; Roberts 1975; Qld Bird Rep. 1983). Scattered coastal records between Iron Ra. and Prosperine (Bravery 1970; Gill 1970; Qld Bird Reps 1983, 1984; Aust. Atlas). Also Capricorn Grp (Domm & Recher 1973). In SE, single, Fraser I., 19 Oct. 1980 (Sutton 1990), and 20 near Dalby, Darling Downs, 16 Mar. 1986 (Qld Bird Rep. 1986). **NSW** Straggler. Two specimens, 'Sydney', before 1865 (Gould); following records from McGill (1948): two specimens, Homebush, Mar. 1880; two specimens, Rose Bay, Sept. 1889; specimens from 'Sydney, Liverpool, Camden', before 1892; two specimens, Campbelltown, Sept. 1892; 13 specimens, Randwick, Sept.–Oct. 1892; two, specimens, Botany, 1892; two, specimens, from flock of c. 50, Kenmore, Goulburn, registered 17 Jan. 1896; single, specimen, Randwick, Jan. 1905; single, specimen, Randwick, 3 Apr. 1908. Other records: 80–100, 16 km S of Moree, from Oct. 1929 to Feb. 1930 (Morse 1930; Sullivan 1931); single, Botany Bay, 11–25 Jan. 1948 (McGill 1948); two, Red Rock, 19 Oct., 9 Nov. 1976 (NSW Bird Rep. 1976); single, Comerong I., 23 Nov. 1976 (NSW Bird Rep. 1976); six, Bankstown, early Nov. 1977 to late Jan. 1978 (Larkins

& McGill 1978; NSW Bird Reps 1977, 1978); single, near Richmond, Nov. 1980 (Bigg 1981); single, Kooragang I., 6 Dec. 1980 (NSW Bird Rep. 1980); 18, Stockton, 6 Jan. 1981 (Bigg 1981); single, Bonna Point, Kurnell, 8–11 Oct. 1982 (NSW Bird Rep. 1982); single, Nambucca Heads, 15–16 Oct. 1982 (NSW Bird Rep. 1982); two, Comerong I., 13 Mar. 1983 (NSW Bird Rep. 1983); single, Botany Bay, 12 Jan. to 3 Feb. 1985 (NSW Bird Rep. 1985). **Vic.** Vagrant. Unknown number, Corio Bay, 1902 (Hill 1903; Wheeler 1967); single, Warrnambool, 15 Apr. 1929 (Sullivan 1929); six, Warrnambool, Feb. 1954 (Condon 1961); unknown number, Laverton, 1954 (Wheeler 1967); four, Swan I., 19–20 Jan. 1960 (Austin 1961); single, St Mary's L., near Natimuk, Jan. 1979 (Vic. Atlas); single, Swan L. beach, Discovery Bay, 29 Sept. 1980 (Vic. Atlas); single, Kelly's L., near Mystic Park, 26 Jan. 1981 (Vic. Bird Rep. 1981); five, Kangaroo L., near Mystic Park, 15–23 Nov. 1982 (Vic. Bird Rep. 1982); 59, Jack Smith L., Feb. 1983 (Vic. Bird Rep. 1983); unknown number, Werribee Sewage farm, undated (Atlas Vic. Wildl.). **Tas.** Straggler. Three, Lauderdale, 16–22 Oct. 1966 (Thomas 1969); single, C. Portland, 24 Jan. 1967 (Thomas 1969); single, Clear Lagoon, Sandford, 28–29 Oct. 1967 (Thomas 1969); single, C. Portland, 2 Mar. 1969 (Thomas 1969); single, Sorell 1977–78 (precise date unrecorded) (Aust. Atlas); two, Orielton, 19 Feb. 1978 (Tas. Bird Rep. 8); 3–19 birds, Orielton Lagoon, 7 Oct.–18 Dec. 1982 (Patterson 1983); single, Barilla Bay, 14 Jan. 1989 (Tas. Bird Rep. 19). **SA** Straggler, but widespread records in NW, Eyre Pen., Lower N, Adelaide Plains, Murray-Mallee and se. regions (White 1913; Condon 1969; Boehm 1974; Close 1982; Pedler 1982; McCrie 1984; Bransbury 1985; Cox 1988, 1991; SA Bird Reps 1969–70, 1977–81). **WA** Common in Pilbara and Kimberley Divisions, mainly N of line connecting Pt Cloates, headwaters of Fortesque R., and ne. Great Sandy Desert (Carter 1907; Aust. Atlas). Several records from Nullarbor Plain (Brooker *et al.* 1979; Martindale 1980; Congreve & Congreve 1985a,b; Dymond 1988; Vervest & Jaensch 1988a,b; Hooper & Wells 1989a). Vagrant to SW: c. 100 (four specimens taken), near Tambellup, Nov. 1924 (Serventy 1927b); single, specimen, L. Jandakot, 14 Jan. 1927 (Serventy 1927a); single, Toolibin L. NR, date unrecorded (between 1981 and 1985) (Jaensch *et al.* 1988). **NT** Common in n. half, from Barkly Tableland and Borrooloola, through Groote Eylandt, Gove Pen.



and Darwin, and S to Victoria R. Downs and Keep R. (Storr 1977; Boekel 1980; McKean 1985; Thompson & Goodfellow in prep.; Aust. Atlas). Rare but widespread elsewhere, in Tanami and Simpson Deserts and between Petermann and Musgrave Ras (Gibson 1986; Gibson & Cole 1988; Aust. Atlas).

Lord Howe I. Accidental; 53 birds, Sept. 1982 (Heather 1991); unusually large s. record.

Christmas I. (Ind.) Vagrant; recorded before 1974: van Tets (1974) listed the species as a rare migrant; <5, 21 Sept.–26 Nov. 1978; two, 8 Nov. 1984 (Stokes *et al.* 1987).

NZ Straggler. **NI** Singles, Parengarenga Harbour, Feb. 1955 (Sibson & Rutherford 1956), Mar. 1968 (Edgar 1968), Aug. 1969 (Edgar *et al.* 1969); ten, Miranda, Firth of Thames, Dec. 1954 (McKenzie 1956); single, Karaka, Manukau Harbour, Feb. 1975 (CSN 22). **SI** Singles, Greymouth, Sept.–Oct. 1982 (CSN 31), Oct. 1987 (CSN 36); single, L. Ellesmere, Feb.–Mar. 1989 (CSN 37); singles, L. Wainono, Jan. 1977 (CSN 24), 1983 (NZRBC); single, Waituna Lagoon, Feb. 1988 (CSN 36); single, Invercargill estuary, Feb. 1988 (CSN 36). Unacceptable records, through inadequate evidence: Ruakaka, 1946 (McKenzie 1947); Kaiua, Firth of Thames, 1953 (McKenzie 1956); Ninety Mile Beach, 1972 (CSN 19); Waipu Cove, 1971 (CSN 19); Taporā, Kaipara Harbour, 1975 (CSN 22); Southland, 1969 (Muller 1969); Rangauu Harbour, 1981 (NZRBC).

Kermadec Is Single (specimen), Raoul I., 22 Apr. 1908 (Oliver).

Influx into NSW in 1892 (McGill 1948). Hundreds recorded congregating on beaches round NW Cape during heatwave in Dec. 1895 (Carter 1904). Unusually large s. congregation at Jack Smith L. during drought in Feb. 1983 (Vic. Bird Rep. 1983). Birds abruptly left Mt Isa district in Dec. 1967 after heavy rain (Carruthers 1968). Noted congregating in 'great flocks' at NW Cape in 1892, preparing for migration; 14,000 counted on

12.5km 80 Mile Beach, 7 Mar. 1993 (Carter 1902, 1904; C.D.T. Minton).

Populations Aust. population estimated c. 40,000 (D. Watkins). Sites of significance and maximum numbers from summer and winter counts round Aust. (1981–85) were: Port Hedland Saltworks, WA, 29,900; Eighty Mile Beach, WA, 18,400; Roebuck Bay, WA, 8700; Dampier Saltworks, WA, 1830 (Lane 1987). In Nov. 1982, 21,000+ recorded between Broome and Port Hedland (AWSG).

In Aust., mostly in sparsely settled areas, and no immediate threats to its survival (Lane 1987; Garnett 1989). Two road fatalities recorded (Vervest & Jaensch 1987; Heather 1991).

MOVEMENTS Migratory; move S from breeding grounds to spend n. winter in Indonesia, Aust. and sometimes NZ (de Schauensee 1984; Hayman *et al.* 1986). Lack of records between breeding and non-breeding areas (for both s. and n. migrations), timing of occurrence in se. China and of movement through Wallacea and timing of arrival in nw. Aust. suggest many birds may migrate between China and Aust. without stopping (Lane 1987). Once in Aust., dispersive, possibly moving in response to weather conditions.

Breeding Apr.–July in n., e. and w. Mongolia and adjacent parts of e. China (Hayman *et al.* 1986). Few remain in Aust. during this period; reporting rates 0.11% in Aust. summer and 0.04% in winter (Aust. Atlas). Not recorded NZ during this period, though one record, Aug. 1969, either early arrival or bird that had remained over winter (Edgar *et al.* 1969).

Departure Migrate S through e. China; numbers peaking in Jiangsu Province, mid-Aug. 1991 (Hui 1992); abundant Yangtze Valley, Sept. (la Touche 1931–34; Cheng 1976). Small numbers regularly in Borneo from Sept. onwards (Gore 1968; Smith 1977; Smythies 1981). Records Wallacea, Sept.–Dec. (White 1975;

White & Bruce 1986; van Marle & Voous 1988); Bali, Sept.–Oct. (Ash 1984). Rare and irregular passage migrant in Port Moresby district, PNG, where occasionally arrive by Oct., but usually recorded Nov. (Hicks 1990); no records of movement across Torres Str. (Druffan *et al.* 1983). On NW Cape, WA, occur as early as second week in Sept. (Carter 1904); Broome–Port Hedland region, numbers increase till Oct. and Nov.; round Darwin, all coastal records 1967–72, late Aug. to late Nov.; observed arriving Arnhem Land, late Sept. and early Oct. (1948); may arrive n. Qld. from Sept., numbers increasing into Dec.; at Mt Isa and Gulf Country, present till Nov. or Dec. Small numbers occur coastal SA, Dec.–Feb., suggesting some migrate S across continent; numbers near Moree, nw. NSW, increased during Oct. and Nov. 1929 (Berney 1903, 1907; Sullivan 1931; Deignan 1964; Carruthers 1966; Crawford 1972; Horton 1975; Edwards 1982; Lane 1987). Some birds apparently move farther S in WA; single on Nullarbor Plain, mid-Sept. (Brooker *et al.* 1979); recorded from Eyre, Nov., Jan. and Feb. (Congreve & Congreve 1985a). Recorded Lord Howe I., Sept. (Heather 1991); Christmas I., Sept.–Nov. (Stokes *et al.* 1987).

Non-breeding Probably mostly in nw. Aust. (Lane 1987). Small numbers, usually singles, occur irregularly in NZ with all acceptable records Aug.–Mar.; no NZ bird recorded staying at one locality for more than a few days (see Distribution). Indonesia also thought to be important wintering ground (Hayman *et al.* 1986); occasionally in PNG (Hicks 1990); status in Philippines, not known (Hachisuka 1931; la Touche 1931–34; Delacour & Mayr 1946; Flint *et al.* 1984). In s. Aust., most birds do not stay at one locality for long, though some have stayed for more than 10 weeks (Larkins & McGill 1978; Close 1982).

Once in Aust., apparently move in response to rainfall and temperature (Lane 1987); in Qld, birds may disperse in wet conditions, possibly moving after rain when birds appear in some areas and disappear from others (Carruthers 1968; Corben 1972; Roberts 1975; Larkins & McGill 1978); occurrence of birds, often in large numbers, in coastal areas often associated with droughts or heatwaves (Carter 1904; McCrie 1984; Dymond 1988; Campbell; Vic. Atlas). Occur irregularly in some districts, such as Sydney, Qld coast (Hindwood & Hoskin 1954; Amiet 1957), though regular visitor to some inland areas, such as mid-Murray Valley (Vic. Atlas).

Return Pre-migratory flocking noted mid-Mar. at Pt Cloates, WA (Carter 1902), though large flocks observed throughout non-breeding period (Sullivan 1931; Carruthers 1966); in Broome, small flocks observed just before probable departure (Hooper & Wells 1989b). Few records from coastal n. Aust., Mar.–Apr. and fewer in Broome–Port Hedland area at this time; birds may leave directly from inland areas to Asia (Lane & Jessop 1985; Lane 1987). Generally leave nw. Aust., Feb.–Apr., perhaps mostly mid-Mar. (Carter 1904; Serventy & Whittell 1976; Lane & Jessop 1985; Hooper & Wells 1989b). Said to leave Richmond R. district, n. Qld., during Mar. or early Apr. (Berney 1903, 1904, 1907). Usually leave Port Moresby region, Jan. (Hicks 1990) but, elsewhere in PNG, may stay till Feb. (Heron 1978). One seen Sumatra, 11 Apr. 1986 (van Marle & Voous 1988); no other records from Wallacea or Bali to indicate n. passage (White 1975; Ash 1984). Scarce passage migrant mid-Mar. to early June in Hong Kong (Chalmers 1986). Move through se. China, Mar. and Apr., occurring as far N as Peking by 9 Apr. (Wilder & Hubbard 1924; la Touche 1931–34). By late Apr., present in central Mongolia, just S of breeding grounds (Kitson 1979).

FOOD Only recorded taking insects. **Behaviour** Feed in typical run-stop-peck manner of plovers, gleaning prey from mudflats,

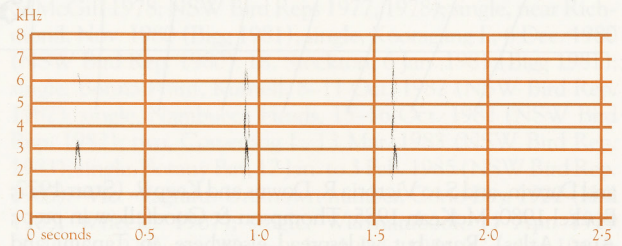
beaches, kelp beds, bare ground and pasture. Forage in loose flocks, often with other waders and waterbirds.

Adult No detailed studies (stomachs unless stated). Insects (Mathews 1909): Isoptera: wingless termites; Orthoptera: Tettigoniidae; Gryllidae; Hemiptera: Berytidae; Pentatomidae (van Tets *et al.* 1969, 1977); Coleoptera (Berney 1907): Carabidae ads; Elateridae ads; Tenebrionidae ads; Chysomelidae; Curculionidae (van Tets *et al.* 1969, 1977). **Young** No data.

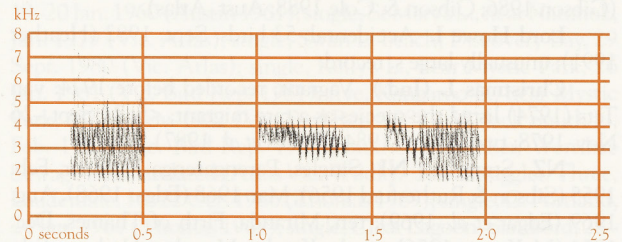
Intake One stomach contained 300 wingless termites (van Tets *et al.* 1977).

VOICE No detailed studies and few descriptions. Account based on observations and recordings by P.J. Fullagar and E. Slater, Broome, 1992. Generally almost silent, except in flight and occasionally when flocks arrive at waterholes and bathe. No information on sexual differences. Calls seem to be similar to those of Caspian Plover *C. asiaticus* (see Colston & Burton 1988; BWP).

Adult FLIGHT CALL: distinctive, irregularly repeated and soft *peet*, *tick* or *tink* (sonagram A); given by birds in flight, especially in flocks. **TRILL:** a sharp rippling trill-like call, *rrr* varying in form and intensity, given by birds when bathing and drinking (sonagram B); also given when chasing one another on ground (Heather 1991; B.D. Heather).



A E. Slater & P.J. Fullagar; Broome, WA, Oct. 1992; X150



B E. Slater & P.J. Fullagar; Broome, WA, Oct. 1992; X150

PLUMAGES Prepared by D.I. Rogers. Hatch in natal down, which is replaced by juvenile plumage. Partial post-juvenile moult begins soon after fledging; on arrival in Aust., most are in first-basic plumage with some retained juvenile feathers; juvenile remiges retained until end of first Aust. summer. First pre-alternate moult occurs in n. hemisphere; some breeding plumage develops on head and breast and some individuals moult outer primaries. Thereafter, moults and plumages similar to adults, except that retained outer primaries can be used as ageing character in second Aust. spring. Adults have complete pre-basic moult to non-breeding body-plumage and suspended primary-moult; and partial pre-alternate body-moults to breeding plumage in about Feb.–Mar., just before leaving Aust.

Adult male breeding Second and subsequent alternate plumages; first attained about Feb.–Mar. of second year. **Head and neck** Ground-colour, from pale cream-buff (c92) to pure white, always with white chin and throat. Varying brown (119A–119B)

patch on hindcrown and nape, often small and inconspicuous; large in some but always sharply demarcated from eye and sides of head; can thus look like long broad pale supercilium, though this is not contrastingly paler than ear-coverts. Rufous of breast-band can encroach slightly on foreneck. **Upperparts** Dark brown (119A), grading to slightly more grey-brown rump and upper tail-coverts; extreme sides of rump, white. When fresh, upper tail-coverts fringed pale brown (223D); all other feathers fringed rufous (38–39); fringes fade to pale greyish-brown (c119D) on mantle, back and rump before being lost with wear. Fringes of scapulars, broader (2–3 mm) than on other feathers of upperparts (c. 1 mm) and take longer to wear; some adults thus have plain brown back and mantle contrasting with buff or pale-rufous fringes to scapulars. Upperparts of Aust. birds usually look rather worn in breeding plumage. **Underparts** Broad rufous (c38–c340) breast-band broadens at sides of breast but does not encroach on anterior flanks; grades to pale rufous (c39) at junction of foreneck. Entire breast-band fades paler rufous (c38–c39) when worn. Broad black-brown (119) lower border of breast-band forms sharp boundary with white belly, flanks, vent and under tail-coverts. Axillaries, dark brownish-grey (c79) (as underwing), sometimes with narrow white tips or fringes at tips. **Tail** Brown with narrow white sides and tip. Feathers, brown (c119A), with white fringes to tips, darker (c121) subterminal band, and narrow white outer edges to t4–t6. White tips of t1, narrower than in other feathers. **Upperwing** Tertiaries and all secondary coverts, dark brown (119A, as upperparts), scalloped by rufous (38–39) fringes that become narrow and buff (c119D) and eventually lost with wear. Tips of wing-coverts slightly more resistant to wear than tips of scapulars. Outer greater secondary coverts can be narrowly tipped white when fresh. Primary coverts and alula, slightly darker brown (119–121) than other coverts, sometimes narrowly tipped pale brown (c119D) to whitish. Remiges, dark brown (121) to blackish brown (119); secondaries have narrow white tips and white bases that are concealed at all times. P10 has white shaft, and white bases to shafts of other outer primaries can be varyingly exposed. One bird examined had white bases to outer webs of p2–p5, forming wing-bar similar to that of *C. asiaticus*; two others had small white blotches on outer web of p4 and eight had no white on inner primaries. **Underwing** Dark brownish-grey (c79). Secondaries are narrowly tipped white when fresh. All coverts have white fringes, mostly very narrow but sometimes 2–3 mm wide on smaller coverts outside carpal; in all underwing and axillaries look uniformly dark if seen at distance.

Adult female breeding No Aust. skins available; following from photos in nw. Aust. in late Mar. (C. Sandbrink) and descriptions in Prater *et al.* (1977) and Hayman *et al.* (1986). Rather similar to adult non-breeding; both have brown cap and rather dark hindneck, contrasting little with mantle. Females in breeding plumage can have brown ear-coverts and rear-lobes but, in at least some, these areas are more suffused buff or pale brown than non-breeding. Breast-band, similar to adult non-breeding but sometimes attain rufous in this area; lack black lower border to breast-band.

Adult non-breeding Second and subsequent basic plumages; second-basic individuals can be distinguished from older birds until at least Nov. of second year on basis of retained juvenile or first alternate outer primaries. Sexes similar. **Head and neck** Forehead, chin, throat and front of lores, off-white; lores, forehead and sides of throat often tinged pale brown (c223D). Crown and nape, brown (c119A); scaled when fresh by pale-brown (c223D) fringes, broadest on forecrown. Pale fringes narrow and fade to cream (c92) with wear, and can be entirely lost. Ear-coverts and rear-lobes, brown (c119B), sometimes streaked by

whitish edges to feathers. Long supercilium, cream (c92) to pale rufous (39); feathers pale rufous (c39) grading to cream (c92) bases. Feathers of hindneck, brown (119B), grading to large pale-brown (c119C) bases, with broad pale-rufous (39) tips and dark-brown (121) shaft-streaks. When fresh, hindneck can look wholly pale rufous. When worn, pale-rufous tips lost and pale bases partly exposed; hindneck can then look pale brown, faintly streaked dark brown. Grey-brown of upper breast can extend onto foreneck. **Upperparts** As adult breeding but rufous fringing of upperparts (and upper wing-coverts) usually broader, at least in Aust. **Underparts** Mostly white, faintly tinged pale brown when fresh, with contrasting dark band across upper breast. Feathers of upper breast, cream (92) to buff (c124–223D) with grey-brown (dark 91) bases and centres, and dark-brown (c121) shafts; at junction of lower breast, feathers have only grey-brown (dark 91) subterminal bands. Wear and posture affect general appearance; at times breast-band looks pale brown to buff, contrastingly darker than belly, even though dark bases of feathers not exposed. Sometimes dark bases of feathers exposed as varying mottling, heaviest at sides of breast. **Wings, Tail** As adult breeding but rufous fringes of upper wing-coverts generally broader.

Juvenile Differences from adult non-breeding. **Head and neck** Forehead, lores and supercilium pale brown (pale 223D) at first, fading to whitish with wear. When fresh, crown and nape, black-brown (119), scalloped by light-brown (123B) fringes broadest on nape; with wear, ground-colour fades to dark brown (119A), and tips to buffish (c124). **Upperparts** More broadly and neatly scalloped by pale fringes than adult non-breeding; fringes, pale brown (223D), usually less rufous than in adults. Longest scapulars have broader pale fringes grading from cream (c54) at tips to light brown (39, 123A) on edges; pale tips partially bisected by dark-brown (119A) line round shafts that runs into dark centres of feather but does not meet tips. **Underparts** Breast-band looks paler and more buff than adult; mostly pale buffish-brown (223D), mottled by light greyish-brown (119C) centres to feathers. Mottling heavier on sides of breast, where feathers, brown (119B) with pale-brown (223D) fringes at tips. **Upperwing** Scalloping formed by fringes of coverts, paler and broader than in adults. Median secondary coverts, tertial coverts and longest 2–3 rows of lesser secondary coverts, as longer scapulars. Smaller lesser coverts have narrow pale-brown (119D) fringes. Greater secondary coverts have narrow white tips and distal inner edges; primary coverts have narrow white fringes at tips; these markings do not form distinct wing-bar. Tertiaries have pale-brown (223D) fringes, becoming more buff with wear. **Tail, Underwing** As adult.

First immature First basic. Very similar to adult non-breeding but reliably distinguished on moult of primaries and wear (see Ageing). Some juvenile upper wing-coverts retained, especially inner median coverts; their pale-buff fringes paler than rufous fringes of first-basic scapulars and outer median and lesser secondary coverts.

Second immature First alternate; not known if breeding can occur in this plumage. Similar to adult non-breeding but can be separated on primary-moult until late Nov. of second Aust. summer (see Ageing); some retain inner median coverts of upperwing. Males usually attain pinkish chestnut breast-band with the feathers fringed buff, and may be difficult to distinguish from adult females (Hayman *et al.* 1986).

BARE PARTS From photos (Coates 1985; Pringle 1986; D.W. Eades; C. Sandbrink) except where stated.

All plumages Bill, grey-black (82) to dark grey (83); pale-yellow base reported by Bigg (1981) apparently aberrant. Iris,

black-brown (119); hazel reported on one label (SAM). Legs and toes usually pale buffish-yellow (c92–c124) to orange-buff (c153), often with light bluish-grey (pale 88) or brownish-grey (79) tinge to tibio-tarsal joint and toes. Tarsus and tibia can be tinged orange-pink (6), especially inside tarsus, and tibio-tarsal joint can be tinged green (e.g. Pedler 1982). Greenish tinge to legs also reported by Hayman *et al.* (1986) but it seems uncommon; in most, legs look mainly buffish yellow.

MOULTS From Lane (in Rogers *et al.* 1990) and 22 adult and 15 younger Aust. skins.

Adult post-breeding Second and subsequent pre-basic moults; complete. Evidently begin moult of primaries early, while at breeding grounds or while staging on s. migration; on arrival in Aust. in Aug.–Sept., all adults have suspended outwards primary-moult after replacing 5–8 (usually 7) inner primaries. Some body-moult also occurs before arrival in Aust., most having replaced all breeding plumage of head and underparts; a few retain remnants of breeding plumage until at least mid-Oct. About half adults have resumed primary-moult by early Nov. One skin, collected 21 Jan., had yet to resume primary-moult, but this probably unusual as primary-moult apparently always completed by Feb. Moult of body also suspended with primaries; resumed body-moult has been noted on chin and upperparts after primaries resumed.

Adult pre-breeding Second and subsequent pre-alternate moults; partial, not including remiges or most rectrices. Occurs Feb.–Mar. Extent not well known; obviously includes feathers of head, neck and breast because change of colour occurs. Perhaps feathers of upperparts and upper wing-coverts usually retained or not moulted until after leaving Aust., as most adults photographed in breeding plumage show little or no fringing above, looking similar to non-breeding skins in which feathers of upperparts are worn. **Post-juvenile** First pre-basic; partial. Body-moult occurs rapidly, on breeding grounds or during s. migration; most arrive in our region with first-basic body-plumage but two collected in Sept. (NT and Kermadec Is) retained much juvenile plumage. Not known how much post-juvenile moult continues in Aust., but at about time of departure in Mar., only remnants of juvenile plumage are primaries, greater primary coverts, secondaries and varying number of secondary coverts in upperwing and rectrices. **First immature pre-breeding** First pre-alternate. Partial. Some must undergo partial moult of outer primaries, because birds caught Sept.–Nov. of second Aust. summer can have very worn outer primaries (retained juvenile feathers) or new outer primaries contrasting with worn inners. Latter indicates partial moult of outer primaries occurring some time between Apr. and Sept.; and assumed to be fairly late in this period because, when birds return to Aust., primaries are fresh. Some develop breeding plumage on head and breast during second Palaearctic summer.

MEASUREMENTS (1) Adult, skins (AM, ANWC, HLW, MV, SAM). (2) Immature, males in first Aust. winter (AM, ANWC, HLW, MV, NMNZ, SAM). (3) Skins, ages combined (AM, ANWC, HLW, MV, NMNZ, SAM).

	MALES	FEMALES	
WING	(1) 166.5 (4.31; 159–172; 21) (2) 163.5 (4.10; 159–172; 7)	164.5 (3.85; 156–169; 10) 160.0 (3.43; 156–165; 8)	ns ns
STH P	(3) 108.4 (3.20; 105–113; 5)	108.1 (5.07; 95–115; 10)	ns
TAIL	(1) 62.5 (2.84; 58–68; 11) (2) 61.8 (1.92; 59–64; 4)	61.4 (2.59; 58–66; 9) 58.2 (2.32; 55–62; 5)	ns ns
BILL	(3) 22.5 (1.15; 19.3–25.1; 20)	22.3 (0.96; 20.6–24.1; 18)	ns
TARSUS	(3) 46.2 (1.79; 42.6–50.0; 22)	45.0 (1.83; 42.2–49.1; 18)	ns
TOE-C	(3) 22.5	18.9, 21.6, 24.1	

(4) Unsexed live birds, n. Aust., Oct. to Nov. (Rogers *et al.* 1990).

	ADULT AND SECOND BASIC	FIRST BASIC	
WING	(4) 167.3 (5.22; 50)	167.5 (2.92; 18)	ns
BILL	(4) 23.2 (1.11; 58)	23.3 (0.85; 19)	ns
THL	(4) 56.4 (1.24; 58)	56.0 (1.23; 19)	ns
TARSUS	(4) 47.3 (5.40; 44)		

Sexes similar in size. In skins, juvenile wing and tail significantly shorter than in adults; this was also reported by Prater *et al.* (1977) and is also the case in closely related Caspian Plover (BWP). These results not replicated by measurements from live birds in Oct.–Nov., which suggests that primary wear causes slight decrease in length of wing, because at this time of year adults have worn outer primaries and juveniles are fresh.

WEIGHTS In nw. Aust., in Oct. to early Nov, adult and second-years combined 95 (9.0; 58) and immatures in first Aust. summer 96 (9.4; 19) (Rogers *et al.* 1990). Data from museum labels, collected Sept.–Jan., shows similar range of variation, except that vagrant juvenile from Kermadec Is in Sept. weighed only 50.7 (NMNZ). No information from other times of year and extent of pre-migratory gain in weight is unknown.

STRUCTURE Wing, long narrow and pointed. Eleven primaries; p10 longest, p9 0–4 shorter, p8 9–15, p7 21–28, p6 33–38, p5 46–52, p4–p2, not measured, p1 88–98; p11 minute, concealed by greater secondary coverts. No emarginations. Sixteen secondaries including five tertials. Tips of longest tertials generally rest between p7 and p9 of folded wing. Tail, square to slightly rounded; 12 feathers. Bill, slender and only slightly shorter than head; straight, with underside of lower mandible slightly upcurved on distal gonys; distal third of upper mandible raised slightly as a bill nail. Nostrils, very narrow, pervious; set in deep broad nasal groove extending for at least half length of bill. Tibia and tarsus, long and slender; distal two-thirds of tibia bare; scaling reticulate with a single row of larger scutes on front of tarsus. Outer toe c. 78% of middle, inner c. 67%; no hind toe; claws, short, straight and pointed.

RECOGNITION Confusion possible with Caspian Plover *Charadrius asiaticus*, which was recorded in NT once last century and on Cocos-Keeling Is, 1941. Adult males readily distinguished; Caspian has dark-brown cap and hindneck, with brown stripe from eye to nape isolating long white supercilium. Broad chestnut breast-band has much narrower black border below than in Oriental, and top of breast-band sharply demarcated. Other plumages much more similar to Oriental but consistently separable on size and pattern of wing. Sequences of plumages and moults similar in both (BWP). Caspian is smaller and less gangly, with shorter wing, 150 (3.07; 19); bill, 20.0 (0.94; 33); and tarsus 39.9 (1.73; 32) (BWP). Upperwing has narrow white wing-bar formed by tips of greater secondary coverts and white bases to outer webs of p2–p4; this bar retained when worn, at least on primaries (note that a few Oriental Plovers also have this character, so it is not diagnostic unless absent). Axillaries, white in Caspian, with faint traces of grey-brown mottling at bases; wholly grey-brown in Oriental Plover except for occasional narrow white fringes at tips. Unlike Oriental, underwing of Caspian looks mostly white; coverts, white with greyish bases, which are usually concealed and always inconspicuous. Legs, usually more strongly tinged grey or olive in Caspian. See Cox (1988), Lewington *et al.* (1991) and references

therein for further information.

GEOGRAPHICAL VARIATION None.

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Oriental Plover *Charadrius veredus* (page 877)

1 Adult male breeding; 2 Adult female breeding; 3 Adult non-breeding; 4 Juvenile; 5, 6 Adult non-breeding

Inland Dotterel *Charadrius australis* (page 884)

7 Adult male; 8 Adult female; 9 Downy young; 10 Juvenile; 11, 12 Adult male