

The many unknowns about plovers and sandpipers of the world: introduction to a wealth of research opportunities highly relevant for shorebird conservation

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Piersma, T., Wiersma, P. & van Gils, J. 1997. The many unknowns about plovers and sandpipers of the world: introduction to a wealth of research opportunities highly relevant for shorebird conservation. *Wader Study Group Bull.* 82: 23-33.

We review the current information, especially with respect to conservation biology, about the plover (Charadriidae) and sandpiper (Scolopacidae) families, based on information assembled for the family-chapters in the *Handbook of the Birds of the World*, Volume 3 (del Hoyo *et al.* 1996). The existing information about 155 species is summarized in a comprehensive table (Appendix 1), and some informative statistics have been derived. Existing knowledge is very unequally distributed. For example, for those plovers and sandpipers breeding in South America only, nothing is known about the demography of the species. Species confined to Africa and Asia are slightly better known, but also here demographic and feeding ecological knowledge is absent in most cases. Best studied are species in the remaining regions of the world, but even for species breeding in Europe any demographical knowledge, so critical for sound conservation practise and management, is lacking for a third of the species. There are no fewer than 27 plover and sandpiper species about which virtually nothing is known. Inland species such as several lapwings, plovers, woodcocks and snipes with restricted distribution in South America, Africa and Asia, feature prominently in this list; a third of these species are known to face conservation problems. There is work to be done by waderologists all over the world.

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INTRODUCTION

During the preparation of the species descriptions, species distribution maps and family texts of the two most diverse families of waders (the Charadriidae and the Scolopacidae) for the *Handbook of the Birds of the World*, Volume 3 (del Hoyo, Elliott & Sargital 1996), the three of us assembled a lot of information in a fairly comprehensive and systematic way (Piersma & Wiersma 1996, Piersma *et al.* 1996). During this process, we became acutely aware of the paucity of information on many species, suggesting much scope for basic investigations in most parts of the world, and we also realized the need for further integrative and comparative studies on the biology of these families. In this brief review we present a tabulated summary of our findings (Appendix 1). As the knowledge base for the other wader families may not be directly comparable, we have refrained from the temptation to do a similar exercise for them as well.

To indicate the strength and weaknesses in the worldwide knowledge about plovers and sandpipers, we have summarized the information in Appendix 1 further in a series of tables. Of most relevance, of course, is an identification of the state of knowledge about rare and endangered wader species. If this review stimulates relevant explorations and focusses some of the necessary field and desk efforts, we have achieved our aims. We

hope that the knowledge eventually gained will help to safeguard endangered wader species in due course.

METHODS

For the preparation of the species-texts (Piersma & Wiersma 1996; Piersma *et al.* 1996), most of the regional handbooks were examined, all "Recent publications on waders" published in the *Wader Study Group Bulletin* were scanned, and several computerised literature searches were made. The relevant information was assembled under the headings "Taxonomy", "Distribution", "Descriptive notes", "Habitat", "Food and Feeding", "Breeding", "Movements", "Status and Conservation" and "Bibliography". For the compilation in Appendix 1 we used our original, unedited bibliographies and counted the number of publications specifically devoted to the biology of the species concerned to assign it to one of the six categories of the publication record.

On the basis of the distribution map and the "distribution" section we assigned each species to one or more continents, adding Oceania (the islands of the Pacific Ocean) as the seventh region. In Appendix 1 we then listed the official conservation status according to the IUCN criteria as adopted and assigned by BirdLife International (Collar *et al.* 1994). Many species give no

immediate conservation concern and are called "Not-Globally Threatened". Species that may have a problem are "Near-Threatened". According to the IUCN criteria, species in dire straights are either "Vulnerable" (awarded a 10% chance of going extinct in the next 100 years), "Endangered" (with a 20% chance of going extinct in the next 20 years) or "Critical" (with a 50% chance of going extinct within five years).

Apart from the official conservation status, Appendix 1 gives a listing of the degree of knowledge about five topics that are most relevant for conservation biology. For each species we have asked ourselves, on the basis of the information assembled for the *Handbook of the Birds of the World*, whether nothing ("No"), something ("±") or quite much ("Yes") is known about respectively

- 1) population size,
- 2) demographic structure (age composition, sex ratio, recruitment, survival and mortality factors),

- 3) reproductive biology (mating system, breeding biology, parent-offspring relationships),
- 4) migration system (use of flyways by different segments of population, geography of wintering and breeding grounds, (re-) fueling strategies), and
- 5) food and foraging.

Obviously, there is a degree of subjectivity in making these assignments, but this seems unavoidable. The patterns of No's and Yes's should nevertheless give a fair picture of the state of our knowledge base.

TAXONOMIC DIVERSITY AMONG PLOVERS AND SANDPIPERS

The diversity among the Charadriidae is illustrated in Figure 1.

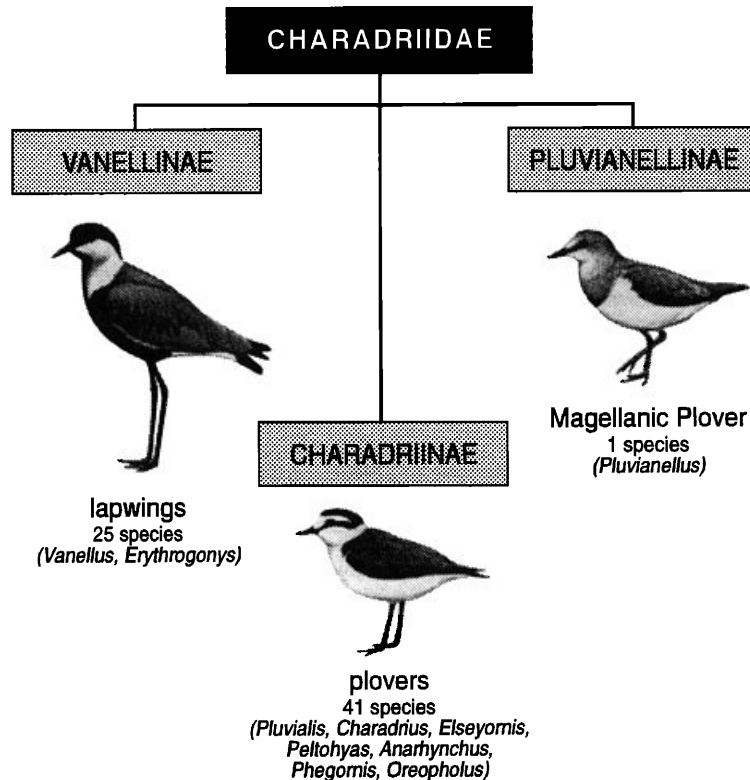


Figure 1. Subdivision of the plovers, Charadriidae, in three subfamilies, illustrating the diversity of this wader family, with listings of the currently recognized genera, and total numbers of extant species. The white-on-black name is that of the family, whilst the shaded boxes give sub-family names. This is a black-and-white reprint (by permission of the editors) of a figure by Àngels Jutglar & Etel Vilaró in del Hoyo *et al.* (1996: p. 384).

With the exception of the Magellanic Plover (*Pluvianellus socialis*; subfamily Pluvianellinae), clearly not belonging to the clade of plovers and usually awarded family status, biochemical evidence suggests that all modern plovers share the same common ancestor. Although the family is commonly divided into two subfamilies, the lapwings (Vanellinae) and the true plovers (Charadriinae), the Grey and golden plovers of the genus *Pluvialis* may be an

outgroup to the other two, having derived from a common ancestor early on. Perhaps, *Pluvialis* should not be included in the subfamily Charadriinae, but rather have a subfamily of its own. It has been suggested several times that the plovers are a family that originated at low latitudes in the southern hemisphere, the region where most species are around today. The plover family should have evolved under rather arid, semidesert conditions,

specializing on small prey that are most active at night. Only the genus *Pluvialis*, of which all four species breed in tundra areas around the Arctic Ocean, may have its origin in the northern hemisphere.

The great diversity of the sandpiper family, Scolopacidae, which consists of some six subfamilies (woodcocks, snipes, turnstones, sandpipers, tringine-waders and phalaropes), with the Tringinae being subdivided further in godwits & curlews, shanks and Polynesian sandpipers, is illustrated in Figure 2. There is little doubt that the Scolopacidae is monophyletic, but there are problems with the biological subdivision of this variable family. Four of the subfamilies (the woodcocks, turnstones, sandpipers, and phalaropes) are almost certainly monophyletic. Apart from a possible merger of woodcocks with snipes into a

single subfamily of snipe-alikes, the exact position of the three dowitchers (*Limnodromus*) remains unresolved. Most previous authors have listed them with the snipes, but others have put them with the tringine sandpipers, and for both hypotheses there is something to say. The tringine-waders are very likely to be composed of different evolutionary lineages. Recent work suggests that the shanks and tattlers may be closely related to the phalaropes, and that this combined lineage is a sister group to the woodcocks and snipes. The godwits (*Limosa*) and the curlews (*Numenius* and *Bartramia*) appear to be two independent taxa, quite unrelated to the rest of the Tringinae, possibly branching off at the base of the scolopacid family. The position of the Tuamotu Sandpiper and its two extinct relatives remains unresolved in view of a lack of modern phylogenetic studies.

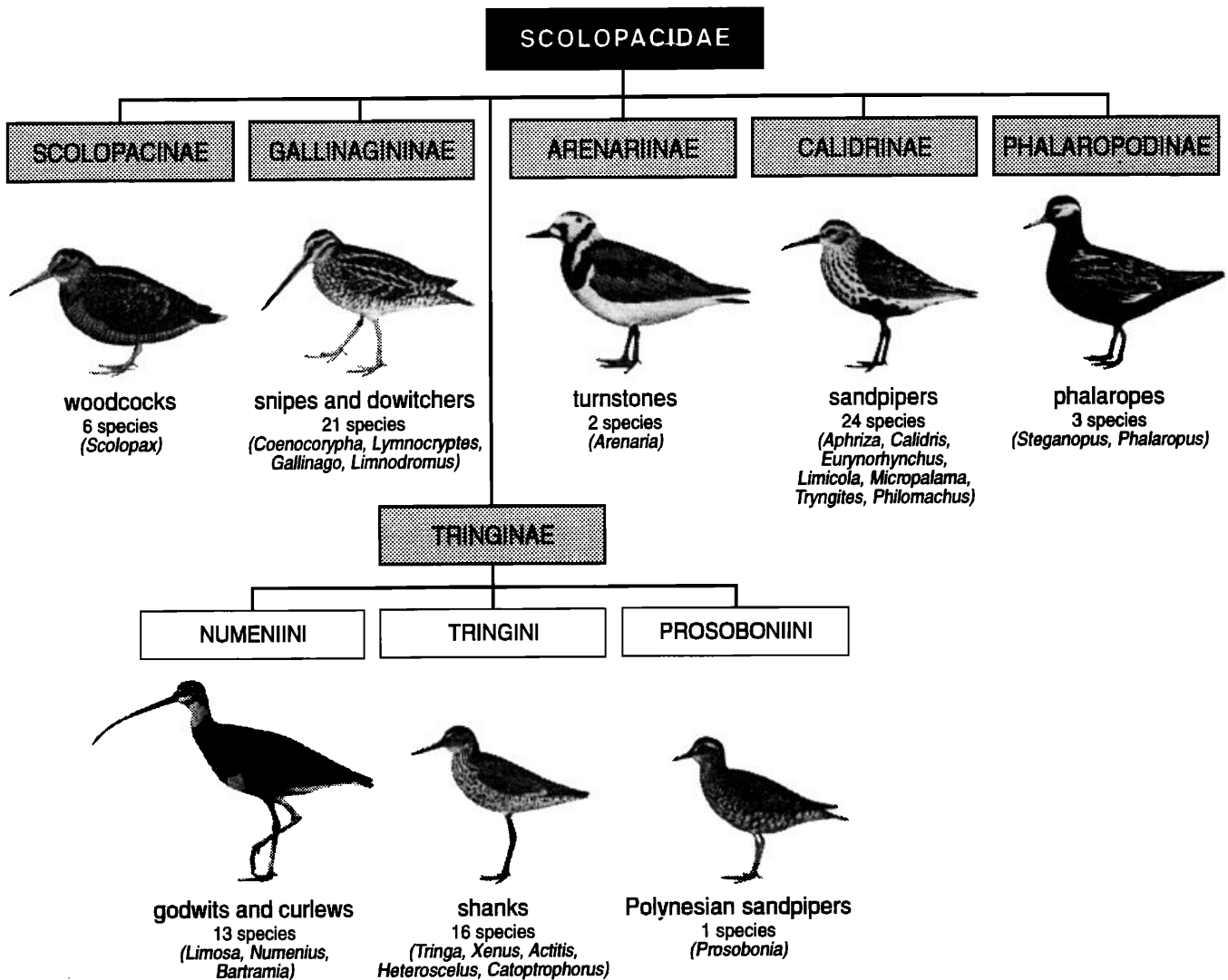


Figure 2. Subdivision of the sandpiper-family, Scolopacidae, in six subfamilies (and the subfamily Tringinae in three tribes), illustrating the great diversity of this wader family, with listings of the currently recognized genera, and total numbers of extant species. The white-on-black name is that of the family, whilst the shaded boxes give sub-family names, and open boxes give names of tribes. This is a black-and-white reprint (by permission of the editors) of a figure by Francesc Jutglar and Etel Vilaró in del Hoyo *et al.* (1996: p. 445).

OVERVIEW OF PUBLISHED INFORMATION

The four best known plover and sandpiper species in the world are the Wrybill, the Black-tailed Godwit, the Red Knot and the Dunlin (Table 1), each of which scored a "Yes" for all five knowledge-categories in Appendix 1. Even though very well-studied, our knowledge about these species is, not even remotely, approaching the degree of understanding of the biology of Eurasian Oystercatcher (*Haematopus ostralegus*, Haematopodidae), about which well over 500 papers have been published (Goss-Custard 1996). The five most abundantly researched plover and sandpiper species in the world are Northern Lapwing, Common Redshank, Red Knot, Dunlin and Ruff (Table 2). Even for those species, large parts of the biology are not very well known, often because the particular subject is difficult to study in the particular species (e.g. food and feeding in Dunlins). Note that in the case of the two *Coenocorypha*-snipes from the oceanic islands of New Zealand, a publication record of "A" is not indicative of a poorly studied species. In fact, these two species have had detailed attention, and the results were published in a few excellent and detailed papers (e.g. Miskelly 1990).

Going from the well-researched to the poorly researched side of the plover and sandpiper realm, Table 3 lists the degree of lack of knowledge about different topics for species breeding in different parts of the world. (Note that the species have been arranged hierarchically with respect to best studied region [Europe], and that the geographical categories in Table 3 are not mutually exclusive.) Overall, population size is completely unknown in about half the species. Knowledge about the demography of wader species scores even more poorly, with 70% (!) of the world's plover and sandpiper species not being covered. The remaining three knowledge-categories fare better, with only a third to a quarter of the species completely lacking information.

Table 3. Relative lack of knowledge about plovers and sandpipers of the world, broken down by geographical (breeding) region. For each of the five categories of knowledge, the percentage of species that scored "No's" according to information in the *Handbook of the Birds of the World*, Vol. 3 (Appendix 1) is given. Species are ordered according to breeding origin, with the least studied regions being followed by the better studied regions. Species that breed uniquely in South America, Africa, Asia and Australia + Oceania are examined first. Of the remaining species, those that breed in North America (but not in Europe, including Greenland) are examined next, finally followed by those that (also) breed in Europe.

Breeding area	No species	Population size	Demography	Reproduction	Migration	Food & foraging	Overall score
Overall	155	46 %	70 %	23 %	22 %	32 %	39 %
South America	15	87 %	100 %	73 %	53 %	87 %	80 %
Africa	19	95 %	89 %	21 %	37 %	58 %	60 %
Asia	35	51 %	86 %	34 %	31 %	49 %	50 %
Australia & Oceania	16	0 %	63 %	19 %	25 %	25 %	26 %
North America	34	38 %	71 %	9 %	0 %	3 %	24 %
Europe	36	28 %	33 %	0 %	0 %	8 %	14 %

The existing knowledge is very unequally distributed (Table 3). Of the plovers and sandpipers breeding in South America only, 80% of the possible slots scored a "No", with nothing being known about the demography of

Table 1. The four best known plover and sandpiper species of the world. These species scored a "Yes" under each of the five categories of knowledge listed in Appendix 1.

English name	Latin name	Breeding area
Wrybill	<i>Anarhynchus frontalis</i>	New Zealand
Black-tailed Godwit	<i>Limosa limosa</i>	temperate Europe & Asia
Red Knot	<i>Calidris canutus</i>	circumpolar
Dunlin	<i>Calidris alpina</i>	circumpolar

Table 2. The five most abundantly researched plover and sandpiper species of the world. These species scored an "F" for their publication record: more than 50 topical (i.e. devoted) publications by 1995.

English name	Latin name	Breeding area
Northern Lapwing	<i>Vanellus vanellus</i>	temperate Europe & Asia
Common Redshank	<i>Tringa totanus</i>	temperate Europe & Asia
Red Knot	<i>Calidris canutus</i>	circumpolar
Dunlin	<i>Calidris alpina</i>	circumpolar
Ruff	<i>Philomachus pugnax</i>	temperate Europe & Asia

any of the species. Species confined to Africa and Asia are slightly better known, but also here demographic and feeding ecological knowledge is absent in most cases. Best studied are species in the remaining regions of the

world, but even for species breeding in Europe any demographical knowledge, so critical for sound conservation practise and management, is lacking for a third of the species. It is noteworthy that the Australians are doing very well with respect to population assessments, although again little is known about demographic aspects of the majority of their species.

There are no fewer than 27 plover and sandpiper species about which virtually nothing is known (Table 4). Inland species such as several lapwings, plovers, woodcocks and snipes with restricted distribution in South America, Africa and Asia, feature prominently in this list. The remoteness of many of the regions where the species occur is obviously a factor that has inhibited the study of their ecology. Nevertheless, it is opportune for work to be done on these species, since a third (nine out of 27) of the birds listed as unstudied are known to face conservation problems.

Table 4. Hitlist of the 27 extant plover and sandpiper species about which virtually nothing is known. This selection is based on data in Appendix 1, and gives species for which the sum of the scores for the five different kinds of knowledge (where No = 0, ± = 1 and Yes = 2) is zero or one. Species printed in **bold** belong to one of the categories of (near) threatened species.

English name	Latin name	Breeding area	Conservation status
Spot-breasted Lapwing	<i>Vanellus melanocephalus</i>	Africa	Not Globally Threatened
Brown-chested Lapwing	<i>Vanellus superciliosus</i>	Africa	Not Globally Threatened
Pied Lapwing	<i>Vanellus cayanus</i>	South America	Not Globally Threatened
Andean Lapwing	<i>Vanellus resplendens</i>	South America	Not Globally Threatened
Long-billed Plover	<i>Charadrius placidus</i>	Asia	Not Globally Threatened
Black-banded Plover	<i>Charadrius thoracicus</i>	Africa	Vulnerable
Three-banded Plover	<i>Charadrius tricollaris</i>	Africa	Not Globally Threatened
Javan Plover	<i>Charadrius javanicus</i>	Asia	Not Globally Threatened
Malaysian Plover	<i>Charadrius peronii</i>	Asia	Not Globally Threatened
Chestnut-banded Plover	<i>Charadrius pallidus</i>	Africa	Not Globally Threatened
Puna Plover	<i>Charadrius alticola</i>	South America	Not Globally Threatened
Diademed Plover	<i>Phegornis mitchelli</i>	South America	Near Threatened
Tawny-throated Dotterel	<i>Oreopholus ruficollis</i>	South America	Not Globally Threatened
Amami Woodcock	<i>Scolopax mira</i>	Asia	Vulnerable
Rufous Woodcock	<i>Scolopax saturata</i>	Asia	Not Globally Threatened
Sulawesi Woodcock	<i>Scolopax celebensis</i>	Asia	Near Threatened
Moluccan Woodcock	<i>Scolopax rochussenii</i>	Asia	Vulnerable
Solitary Snipe	<i>Gallinago solitaria</i>	Asia	Vulnerable
Wood Snipe	<i>Gallinago nemoricola</i>	Asia	Vulnerable
African Snipe	<i>Gallinago nigripennis</i>	Africa	Not Globally Threatened
Madagascar Snipe	<i>Gallinago macrodactyla</i>	Africa	Not Globally Threatened
South American Snipe	<i>Gallinago paraguaiiae</i>	South America	Not Globally Threatened
Noble Snipe	<i>Gallinago nobilis</i>	South America	Not Globally Threatened
Giant Snipe	<i>Gallinago undulata</i>	South America	Not Globally Threatened
Fuegian Snipe	<i>Gallinago stricklandii</i>	South America	Near Threatened
Andean Snipe	<i>Gallinago jamesoni</i>	South America	Not Globally Threatened
Imperial Snipe	<i>Gallinago imperialis</i>	South America	Near Threatened

Red-breasted Plover, living on Stewart Island (65 birds) and North Island (1400 birds) of New Zealand, have shown drastic declines in numbers and in range over the past 150 years. As a result of predation by introduced rats and cats, the effective breeding population on Stewart Island is reduced to 12 pairs. Another New Zealand endemic, the Shore Plover, lives on a small (2 km²) island in the Chatham group. It is doing slightly better with 40-50 breeding pairs. The population has been stable between 1969 and 1993 and is probably constrained by the availability of suitable habitat ever since Shore Plovers have become extinct on North and South Island more than 100 years ago. Habitat also seems the limiting factor for the third plover species that is regarded endangered, the

PLOVER AND SANDPIPER SPECIES OF IMMEDIATE CONSERVATION CONCERN

Of the 155 species in Appendix 1, 33 face the danger of passing away and three have gone extinct already (Table 5). In this paragraph we discuss the species that are of most concern, and therefore need the particular attention of conservationists and waderologists.

The one recognized plover species that certainly will not make it into the 21st century is the Javanese Wattled Lapwing, historically an endemic of the Indonesian Archipelago. It was last observed on the southeast coast of Java in 1939. Javanese Wattled Lapwings probably succumbed under the combined pressures of degradation of breeding habitat by intensified agricultural practices and hunting. Other island populations of plovers are threatened with extinction too. The two populations of

St. Helena Plover, of which about 300 were alive during the last survey in 1993. The Black-banded Plover, an endemic of Madagascar, is considered vulnerable. The species is limited to the dry and saline lowlands in southwestern Madagascar, but may not be as rare or as endangered as previously suggested (F. Hawkins, WWF-Madagascar, pers. comm. December 1996).

Although plover populations living on islands may run the greatest risk of extinction due to their restricted distribution, there are several continental and more widespread plover species that give cause for concern. Sociable Lapwings were once quite widespread on the steppes in southern Russia and Kazakhstan. They are

now in sharp decline due to changes in land use for agricultural reasons, and, perhaps, desertification. Sociable Lapwings are considered vulnerable. On the North American subcontinent two vulnerable plover species are the Piping Plover, a bird of open, often saline, lowland habitats, and the Mountain Plover, a bird breeding and wintering in shortgrass prairies. In the last century both species were still very widespread but are now in steep decline as a consequence of changes in land use and, perhaps, hunting. The two remaining vulnerable plovers are the Hooded Plover, a south Australian endemic shoreline species that is threatened by an increased human use of beaches and nest predation by gulls and introduced mammals, and the Wrybill from New Zealand. Hunted until the 1940s for sport, the population of Wrybills expanded until the 1960s, when it stabilized between 5000 and 6000 birds. However, the entire population may be at risk if the breeding sites on braided rivers in the Canterbury and Mackenzie Basins of South Island were to be modified by the development of hydroelectric schemes.

There are a few widespread inland east Asian plover species about which preciously little is known, but which

might well be in the danger zone. One is the Grey-headed Lapwing of Manchuria and neighbouring areas of China and far-eastern Russia. There are indications that the population of less than 20 000 birds is decreasing. Land-use changes and the application of pesticides and herbicides on the tropical southeast Asian wintering grounds, could form a serious threat for this species. The Long-billed Plover has a slightly larger but overlapping range, perhaps an even smaller world population (less than 10 000 birds), and very similar problems. In both species, the resident populations in Japan are of small and unknown size, but may be relatively safe. Grey-headed Lapwings and Long-billed Plovers require urgent attention, and so does one more resident species from southeast Asia, the coastally living Malaysian Plover. Its total population size is also smaller than 10 000 birds, but only 410 individuals were counted during the most recent international Asian waterfowl census.

In South America the Diademed Plover, an endemic restricted to the Andes, has an unknown but probably small population size. It lives in areas that are difficult to access, and its status needs clarification. The endemic

Table 5. The 36 extinct, critical, endangered, vulnerable and (near) threatened species of plover and sandpiper of the world.

English name	Latin name	Breeding area	Conservation status
Javanese Wattled Lapwing	<i>Vanellus macropterus</i>	Asia	Extinct
White-winged Sandpiper	<i>Prosobonia leucoptera</i>	Oceania	Extinct
Moorea Sandpiper	<i>Prosobonia ellisi</i>	Oceania	Extinct
Eskimo Curlew	<i>Numenius borealis</i>	North America	Critical
Slender-billed Curlew	<i>Numenius tenuirostris</i>	Asia	Critical
Red-breasted Plover	<i>Charadrius obscurus</i>	Oceania	Endangered
St Helena Plover	<i>Charadrius sanctaehelenae</i>	Africa	Endangered
Shore Plover	<i>Charadrius novaeseelandiae</i>	Oceania	Endangered
Nordmann's Greenshank	<i>Tringa guttifer</i>	Asia	Endangered
Tuamotu Sandpiper	<i>Prosobonia cancellata</i>	Oceania	Endangered
Sociable Lapwing	<i>Vanellus gregarius</i>	Europe, Asia	Vulnerable
Piping Plover	<i>Charadrius melodus</i>	North America	Vulnerable
Black-banded Plover	<i>Charadrius thoracicus</i>	Africa	Vulnerable
Mountain Plover	<i>Charadrius montanus</i>	North America	Vulnerable
Hooded Plover	<i>Charadrius rubricollis</i>	Australia	Vulnerable
Wrybill	<i>Anarhynchus frontalis</i>	Oceania	Vulnerable
Amami Woodcock	<i>Scolopax mira</i>	Asia	Vulnerable
Moluccan Woodcock	<i>Scolopax rochussenii</i>	Asia	Vulnerable
Chatham Snipe	<i>Coenocorypha pusilla</i>	Oceania	Vulnerable
Solitary Snipe	<i>Gallinago solitaria</i>	Asia	Vulnerable
Wood Snipe	<i>Gallinago nemoricola</i>	Asia	Vulnerable
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	North America	Vulnerable
Spoon-billed Sandpiper	<i>Eurynorhynchus pygmaeus</i>	Asia	Vulnerable
Broad-billed Sandpiper	<i>Limicola falcinellus</i>	Europe, Asia	Vulnerable
Diademed Plover	<i>Phegornis mitchelli</i>	South America	Near Threatened
Magellanic Plover	<i>Pluvianellus socialis</i>	South America	Near Threatened
Sulawesi Woodcock	<i>Scolopax celebensis</i>	Asia	Near Threatened
Subantarctic Snipe	<i>Coenocorypha aucklandica</i>	Oceania	Near Threatened
Latham's Snipe	<i>Gallinago hardwickii</i>	Asia	Near Threatened
Great Snipe	<i>Gallinago media</i>	Europe	Near Threatened
Fuegian Snipe	<i>Gallinago stricklandii</i>	South America	Near Threatened
Imperial Snipe	<i>Gallinago imperialis</i>	South America	Near Threatened
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	Asia	Near Threatened
Hudsonian Godwit	<i>Limosa haemastica</i>	North America	Near Threatened
Far Eastern Curlew	<i>Numenius madagascariensis</i>	Asia	Near Threatened

"plover" from Patagonia, the Magellanic Plover, may have suffered badly from the introduction of sheep in Tierra del Fuego 100 years ago. Magellanic Plovers make no attempts to distract potential predators or herbivorous intruders from their nests or chicks. Since the shores of ponds where they breed are paths for hordes of sheep, trampling is still an important cause of egg loss. With a total population of less than 1500 individuals, it is potentially a vulnerable species. Certain management practices, for instance keeping sheep away from breeding sites during the nesting season, may both be practical, and critical to safeguard this weird and wonderful shorebird species.

Although the status of no fewer than 21, or almost a quarter, of the living Scolopacidae gives reasons for concern, there are only two known extinctions in the past few centuries. Both are members of the tringine genus *Prosobonia*, and they were lumped as a single species until 1991. The two species of White-winged Sandpiper, *P. leucoptera* and *P. ellisi*, lived on the adjacent islands of Tahiti and Moorea in the Society Archipelago, respectively. Based on a few skins and several drawings, the two sandpipers were different with respect to several plumage characteristics and in the shape of the bill. If they indeed lived as residents along mountain streams, it is quite likely that the two populations were geographically isolated in spite of their proximity. The sandpipers of Tahiti and Moorea passed away unnoticed in the late 1800s, perhaps as a consequence of the introduction of goats, pigs and rats on the islands. A close relative, the Tuamotu Sandpiper is still distributed widely but thinly over a 3 700 km piece of ocean within the Tuamotu Archipelago, east of Tahiti in French Polynesia. It is considered endangered. Several hundred individuals live scattered over two handfuls of different islands, all of which are isolated and rarely visited, and none of which has rats.

A similar status has been awarded to the migratory Nordmann's Greenshank, breeding at the edge of peatmoss/larch bog forests near coastal saltmarshes around the Sea of Okhotsk in far-eastern Russia and wintering in coastal sites in south Asia. With a world population of less than 1000 birds, Nordmann's Greenshank is threatened by habitat loss on breeding and non-breeding areas and by hunting. Two other migratory species, both of them curlews, are in even graver danger and are considered critical. The Eskimo Curlew was hunted close to extinction in the last century, and was not seen for several decades until two birds were encountered in Texas in 1945. Eskimo Curlews were reported in 24 of the next 40 years, but the observed numbers were never larger than 23 individuals. Still, the Eskimo Curlew may linger on to this very day as suggested by the sporadic sightings. The reasons for the demise of the Slender-billed Curlews certainly include the heavy hunting pressure on its Mediterranean wintering grounds, but this process may have been aggravated by serious habitat loss both on the breeding grounds and in the winter range. Although they are observed every winter in very small numbers, the species is likely to involve fewer than 100 individuals and is seriously endangered.

The category vulnerable counts two long-distance migrating sandpipers, the Spoon-billed and Broad-billed Sandpipers, the Bristle-thighed Curlew breeding in Alaska and wintering on islands spread out over the Pacific, and four species of sedentary snipes and woodcocks. The populations of vulnerable migrant sandpipers and curlews all number several to many 1000 individuals. The Moluccan Woodcock is restricted to two islands in the Mollucas, Indonesia. Only known from eight specimens, the most recent of which was collected in 1980, they may possibly have been observed recently on one of the islands. The Amami Woodcock, restricted to broadleaf forest on several small islands in southern Japan, is probably less rare and may count several 1000 birds. It is nevertheless seriously threatened by deforestation and predation by newly released mongooses. A thousand pairs of Chatham Snipe are confined to two small predator-free islands in the Chatham Island group, New Zealand. The Wood Snipe is a bird of alpine meadows with scattered scrubs and streams. With an unknown population size, it is confined to the Himalayan region, escaping the harsh winters by a short southward migration to the lowlands of south and southeast Asia. Another snipe of high slopes close to the timberline, the Imperial Snipe, was thought to be extinct for over 100 years until it was rediscovered in 1967 in the Andean highlands of Peru, about 2000 km south of the locality from which it was originally known.

NEED FOR COMPARATIVE AND INTEGRATIVE STUDIES

With such a diverse group of species, the Charadriidae and Scolopacidae not only offer examples of conservation problems, both families and the knowledge assembled about the species within the families offer much scope for concerns other than conservation biology. The opportunities for good studies in comparative biology offered by shorebirds have been recognized widely (see, for example, Myers 1981; Reynolds & Székely 1997; Székely & Reynolds 1995), but there undoubtedly remains much more to be done. With respect to comparative demography of plovers and sandpipers, embarrassingly little has been achieved since Hugh Boyd's first review in 1962. The wealth of ringing studies calls for all sorts of survival analyses, even though the same wealth makes the tasks ahead quite daunting.

As an example of another nice attempt at an integration of existing biological knowledge, we would like to mention Ted Miller's reviews of the vocal communication behaviour of shorebirds (Miller 1992, 1995). The lists of what is known, and what isn't, should now be extended to studies of the kinds of messages transmitted by shorebirds. If a call is associated with a particular communicative function that should be quite general (e.g., a chick calling a parent to brooding, or *vice versa*) and if the particular signal appears missing in the described repertoire of a shorebird species, we better go out and look for it!

CONCLUSION

There is enormous scope to do important work for the curious, travelling and writing naturalist and the hard desk-bound worker! The tables presented in the brief overview, and the more extensive texts on plovers and sandpipers in the *Handbook of the Birds of the World*, Vol. 3 (del Hoyo *et al.* 1996) should direct your interest further.

ACKNOWLEDGEMENTS

We thank Josep del Hoyo, Andy Elliott and Sheila Hardy for their guidance, trust, patience and encouragement during the production of our handbook-contributions and their permission to reproduce the informative family "trees" in black-and-white. We thank Dick Visser for processing the colour figures from the Handbook, and Yvonne Verkuil and Petra de Goeij for much help and niceties over the long period of Handbook-work. This is NIOZ-publication 3029.

REFERENCES

- Boyd, H. 1962. Mortality and fertility of the European Charadrii. *Ibis* 104: 68-87.
- Collar, N.J., Crosby, M.J. & Stattersfield, A.J. 1994. *Birds to watch 2: the world list of threatened birds*. BirdLife Conservation Series 4. BirdLife International, Cambridge.
- del Hoyo, J., Elliott, A. & Sargital, J. (eds.) 1996. *Handbook of the Birds of the World*, Vol. 3. Hoatzin to Auks. Lynx Edicions, Barcelona.
- Goss-Custard, J.D. (ed.) 1996. *The Oystercatcher. From individuals to populations*. Oxford University Press, Oxford.
- Miller, E.H. 1992. *Acoustic signals of shorebirds. A survey and review of published information*. Royal British Columbia Museum Technical Report, Victoria, B.C.
- Miller, E.H. 1995. Sounds of shorebirds: opportunities for amateurs and an update of published information. *Wader Study Group Bull.* 78: 18-22.
- Miskelly, C.M. 1990. Breeding systems of New Zealand Snipe *Coenorypha aucklandica* and Chatham Island Snipe *C. pusilla*, are they food limited? *Ibis* 132: 366-379.
- Myers, J.P. 1981. Cross-seasonal interactions in the evolution of sandpiper social systems. *Behav. Ecol. Sociobiol.* 8: 195-202.
- Piersma, T. & Wiersma, P. 1996. Family Charadriidae (plovers). In del Hoyo, J., Elliott, A. & Sargital, J. (eds.) *Handbook of the Birds of the World*, Vol. 3. Hoatzin to Auks: 384-442. Lynx Edicions, Barcelona.
- Piersma, T., van Gils, J. & Wiersma, P. 1996. Family Scolopacidae (sandpipers, snipes and phalaropes). In: del Hoyo, J., Elliott, A. & Sargital, J. (eds.) *Handbook of the Birds of the World*, Vol. 3. Hoatzin to Auks: 444-533. Lynx Edicions, Barcelona.
- Reynolds, J.D. & Székely, T. 1997. The evolution of parental care in shorebirds: life histories, ecology and sexual selection. *Behav. Ecol.*: in press.
- Székely, T. & Reynolds, J.D. 1995. Evolutionary transitions in parental care in shorebirds. *Proc. R. Soc. Lond. B* 262: 57-64

Appendix 1. Summary list of the shorebird species belonging to Charadriidae and Scolopacidae that were researched for the *Handbook of the Birds of the World*, Vol. 3, including notes on their distribution and conservation status (according to designations by BirdLife International, Cambridge), the minimum number of publications reporting on aspects of the species biology, and the extent of knowledge about population size, demographic structure, reproductive biology, migration systems and food and foraging. Publication record gives approximate number of *topical* publications on the species published before late 1995, where 1-10=A (not or poorly studied), 11-20=B (a little attention), 21-30=C (some more attention), 31-40=D (well studied), 41-50=E (very well studied) and >50=F (extensively studied). Breeding regions: Eu=Europe (including Greenland), Af=Africa, As=Asia, Au=Australia, Oc=Oceania, NA=North America, SA=South America. Status: NGT=not globally threatened, N.Threat.=near-threatened, Vuln.=Vulnerable, Endang.=Endangered (see text). Near-threatened to Endangered species are printed in bold. The questions are answered with a clear No, a clear Yes, or ± = some information.

English name	Latin name	Publication record	Breeding region	Status	Population size known?	Demographic structure known?	Reproductive biology known?	Migration system known?	Food & foraging known?
Northern Lapwing	<i>Vanellus vanellus</i>	F	Eu,As	NGT	±	Yes	Yes	Yes	±
Long-toed Lapwing	<i>Vanellus crassirostris</i>	A	Af	NGT	No	No	Yes	No	±
Blacksmith Plover	<i>Vanellus armatus</i>	B	Af	NGT	No	No	Yes	±	±
Spur-winged Plover	<i>Vanellus spinosus</i>	B	Af, As	NGT	No	No	Yes	±	±
River Lapwing	<i>Vanellus duvaucelii</i>	A	As	NGT	±	No	±	No	No
Black-headed Lapwing	<i>Vanellus tectus</i>	A	Af	NGT	No	No	Yes	±	±
Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	A	As	NGT	No	No	Yes	No	±
White-headed Lapwing	<i>Vanellus albiceps</i>	A	Af	NGT	No	No	Yes	No	±
Lesser Black-winged Lapwing	<i>Vanellus lugubris</i>	B	Af	NGT	No	No	Yes	±	No
Greater Bl.-winged Lapwing	<i>Vanellus melanopterus</i>	B	Af	NGT	No	No	Yes	±	No
Crowned Lapwing	<i>Vanellus coronatus</i>	B	Af	NGT	No	No	Yes	±	±
African Wattled Lapwing	<i>Vanellus senegallus</i>	A	Af	NGT	No	No	Yes	±	±

English name	Latin name	Publication record	Breeding region	Status	Population size known?	Demographic structure known?	Reproductive biology known?	Migration system known?	Food & foraging known?
Spot-breasted Lapwing	<i>Vanellus melanocephalus</i>	A	Af	NGT	No	No	No	No	No
Brown-chested Lapwing	<i>Vanellus superciliosus</i>	A	Af	NGT	No	No	No	±	No
Grey-headed Lapwing	<i>Vanellus cinereus</i>	B	As	NGT	No	No	±	±	No
Red-wattled Lapwing	<i>Vanellus indicus</i>	B	As	NGT	No	No	±	No	±
Javanese Wattled Lapwing	<i>Vanellus macropterus</i>	A	As	Extinct	Yes	No	No	No	No
Banded Lapwing	<i>Vanellus tricolor</i>	B	Au	NGT	Yes	No	±	±	±
Masked Lapwing	<i>Vanellus miles</i>	B	Au,Oc	NGT	Yes	±	Yes	±	±
Sociable Lapwing	<i>Vanellus gregarius</i>	C	Eu,As	Vuln.	±	No	±	±	±
White-tailed Lapwing	<i>Vanellus leucurus</i>	B	Eu,As	NGT	No	No	±	±	No
Pied Lapwing	<i>Vanellus cayanus</i>	A	SA	NGT	No	No	No	No	No
Southern Lapwing	<i>Vanellus chilensis</i>	B	SA	NGT	No	No	±	±	No
Andean Lapwing	<i>Vanellus resplendens</i>	A	SA	NGT	No	No	No	±	No
Red-kneed Dotterel	<i>Erythrogonys cinctus</i>	A	Au	NGT	Yes	No	±	±	No
Eurasian Golden Plover	<i>Pluvialis apricaria</i>	D	Eu,As	NGT	No	±	Yes	Yes	±
Pacific Golden Plover	<i>Pluvialis fulva</i>	C	As,NA	NGT	No	±	±	Yes	±
American Golden Plover	<i>Pluvialis dominica</i>	C	NA	NGT	±	No	±	Yes	±
Grey Plover	<i>Pluvialis squatarola</i>	E	NA,Eu,As	NGT	Yes	±	Yes	Yes	Yes
Red-breasted Plover	<i>Charadrius obscurus</i>	B	Oc	Endang.	Yes	±	Yes	Yes	No
Common Ringed Plover	<i>Charadrius hiaticula</i>	D	NA,Eu,As	NGT	±	Yes	Yes	Yes	Yes
Semipalmated Plover	<i>Charadrius semipalmatus</i>	B	NA	NGT	±	No	±	±	±
Long-billed Plover	<i>Charadrius placidus</i>	A	As	NGT	No	No	No	±	No
Little Ringed Plover	<i>Charadrius dubius</i>	B	Eu,As	NGT	No	±	Yes	±	No
Wilson's Plover	<i>Charadrius wilsonia</i>	B	NA,SA	NGT	No	No	Yes	±	±
Killdeer	<i>Charadrius vociferus</i>	C	NA,SA	NGT	No	±	Yes	±	No
Piping Plover	<i>Charadrius melodus</i>	D	NA	Vuln.	Yes	Yes	Yes	Yes	±
Black-banded Plover	<i>Charadrius thoracicus</i>	A	Af	Vuln.	No	No	No	±	No
Kittlitz's Plover	<i>Charadrius pecuarius</i>	B	Af	NGT	No	±	Yes	±	±
St Helena Plover	<i>Charadrius sanctaehelenae</i>	A	Af	Endang.	Yes	±	±	±	No
Three-banded Plover	<i>Charadrius tricollaris</i>	A	Af	NGT	No	No	±	No	No
Forbes's Plover	<i>Charadrius forbesi</i>	A	Af	NGT	No	No	±	±	No
White-fronted Plover	<i>Charadrius marginatus</i>	C	Af	NGT	No	No	±	±	±
Kentish Plover	<i>Charadrius alexandrinus</i>	E	xpt Au,Oc	NGT	±	Yes	Yes	Yes	±
Javan Plover	<i>Charadrius javanicus</i>	A	As	NGT	No	No	No	±	No
Red-capped Plover	<i>Charadrius ruficapillus</i>	B	Au	NGT	Yes	No	Yes	No	±
Malaysian Plover	<i>Charadrius peronii</i>	A	As	NGT	No	No	±	No	No
Chestnut-banded Plover	<i>Charadrius pallidus</i>	B	Af	NGT	No	No	±	No	No
Collared Plover	<i>Charadrius collaris</i>	B	NA,SA	NGT	No	No	No	±	±
Puna Plover	<i>Charadrius alticola</i>	A	SA	NGT	No	No	No	No	No
Two-banded Plover	<i>Charadrius falklandicus</i>	B	SA	NGT	±	No	No	±	No
Double-banded Plover	<i>Charadrius bicinctus</i>	C	Oc	NGT	Yes	±	Yes	Yes	±
Lesser Sandplover	<i>Charadrius mongolus</i>	C	As	NGT	±	No	±	±	±
Greater Sandplover	<i>Charadrius leschenaultii</i>	B	As	NGT	±	No	±	±	±
Caspian Plover	<i>Charadrius asiaticus</i>	B	As	NGT	±	No	±	±	±
Oriental Plover	<i>Charadrius veredus</i>	B	As	NGT	Yes	No	No	±	No
Eurasian Dotterel	<i>Charadrius morinellus</i>	E	Eu,As	NGT	±	±	Yes	±	±
Rufous-chested Dotterel	<i>Charadrius modestus</i>	A	SA	NGT	No	No	±	±	±
Mountain Plover	<i>Charadrius montanus</i>	C	NA	Vuln.	Yes	Yes	Yes	Yes	±
Hooded Plover	<i>Charadrius rubricollis</i>	C	Au	Vuln.	Yes	±	Yes	Yes	±

English name	Latin name	Publication record	Breeding region	Status	Population size known?	Demographic structure known?	Reproductive biology known?	Migration system known?	Food & foraging known?
Shore Plover	<i>Charadrius novaeseelandiae</i>	A	Oc	Endang	Yes	Yes	Yes	Yes	±
Black-fronted Dotterel	<i>Euseyonis melanops</i>	A	Au,Oc	NGT	±	No	Yes	±	±
Inland Dotterel	<i>Peltohyas australis</i>	A	Au	NGT	Yes	No	±	±	±
Wrybill	<i>Anarhynchus frontalis</i>	B	Oc	Vuln.	Yes	Yes	Yes	Yes	Yes
Diademed Plover	<i>Phegornis mitchelli</i>	A	SA	N.Threat	No	No	No	±	No
Tawny-throated Dotterel	<i>Oreopholus ruficollis</i>	A	SA	NGT	No	No	±	No	No
Magellanic Plover	<i>Pluvianellus socialis</i>	B	SA	N.Threat	±	No	±	±	±
Eurasian Woodcock	<i>Scolopax rusticola</i>	E	Eu,As	NGT	No	Yes	Yes	Yes	±
Amami Woodcock	<i>Scolopax mira</i>	A	As	Vuln.	No	No	No	No	No
Rufous Woodcock	<i>Scolopax saturata</i>	A	As	NGT	No	No	No	No	No
Sulawesi Woodcock	<i>Scolopax celebensis</i>	A	As	N.Threat	No	No	No	No	No
Moluccan Woodcock	<i>Scolopax rochussenii</i>	A	As	Vuln.	No	No	No	No	No
American Woodcock	<i>Scolopax minor</i>	D	NA	NGT	No	Yes	Yes	Yes	Yes
Chatham Snipe	<i>Coenocorypha pusilla</i>	A	Oc	Vuln.	Yes	No	Yes	Yes	±
Subantarctic Snipe	<i>Coenocorypha aucklandica</i>	A	Oc	N.Threat	Yes	No	Yes	Yes	±
Jack Snipe	<i>Lymnocyrtus minimus</i>	B	Eu,As	NGT	No	No	±	±	±
Solitary Snipe	<i>Gallinago solitaria</i>	B	As	Vuln.	No	No	No	No	No
Latham's Snipe	<i>Gallinago hardwickii</i>	B	As	N.Threat	Yes	No	±	±	±
Wood Snipe	<i>Gallinago nemoricola</i>	A	As	Vuln.	No	No	No	No	No
Pintail Snipe	<i>Gallinago stenura</i>	B	As	NGT	No	No	Yes	±	±
Swinhoe's Snipe	<i>Gallinago megala</i>	B	As	NGT	No	No	±	±	No
African Snipe	<i>Gallinago nigripennis</i>	A	Af	NGT	No	No	±	No	No
Madagascar Snipe	<i>Gallinago macrodactyla</i>	A	Af	NGT	No	No	No	No	No
Great Snipe	<i>Gallinago media</i>	D	Eu	N.Threat	±	±	Yes	±	±
Common Snipe	<i>Gallinago gallinago</i>	D	NA, Eu, As	NGT	±	Yes	Yes	Yes	Yes
South American Snipe	<i>Gallinago paraguaiiae</i>	A	SA	NGT	No	No	No	±	No
Noble Snipe	<i>Gallinago nobilis</i>	A	SA	NGT	No	No	No	No	No
Giant Snipe	<i>Gallinago undulata</i>	A	SA	NGT	No	No	No	No	No
Fuegian Snipe	<i>Gallinago stricklandii</i>	A	SA	N.Threat	No	No	No	No	No
Andean Snipe	<i>Gallinago jamesoni</i>	A	SA	NGT	No	No	No	No	No
Imperial Snipe	<i>Gallinago imperialis</i>	A	SA	N.Threat	No	No	No	No	No
Short-billed Dowitcher	<i>Limnodromus griseus</i>	C	NA	NGT	No	No	±	±	±
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	B	NA	NGT	±	No	±	±	±
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	C	As	N.Threat	±	No	±	±	No
Black-tailed Godwit	<i>Limosa limosa</i>	E	Eu,As	NGT	Yes	Yes	Yes	Yes	Yes
Hudsonian Godwit	<i>Limosa haemastica</i>	A	NA	N.Threat	±	No	Yes	±	±
Bar-tailed Godwit	<i>Limosa lapponica</i>	B	Eu,As	NGT	Yes	No	±	Yes	Yes
Marbled Godwit	<i>Limosa fedoa</i>	A	NA	NGT	Yes	No	±	±	±
Little Curlew	<i>Numenius minutus</i>	C	As	NGT	±	No	±	±	±
Eskimo Curlew	<i>Numenius borealis</i>	B	NA	Critical	Yes	No	No	±	±
Whimbrel	<i>Numenius phaeopus</i>	D	NA, Eu, As	NGT	±	±	Yes	Yes	Yes
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	B	NA	Vuln.	Yes	±	Yes	Yes	±
Slender-billed Curlew	<i>Numenius tenuirostris</i>	B	As	Critical	Yes	No	No	±	No
Eurasian Curlew	<i>Numenius arquata</i>	C	Eu,As	NGT	Yes	±	Yes	Yes	Yes
Far Eastern Curlew	<i>Numenius madagascariensis</i>	B	As	N.Threat	Yes	No	No	±	±
Long-billed Curlew	<i>Numenius americanus</i>	B	NA	NGT	No	Yes	Yes	±	±
Upland Sandpiper	<i>Bartramia longicauda</i>	B	NA	NGT	No	No	Yes	±	±
Spotted Redshank	<i>Tringa erythropus</i>	B	Eu,As	NGT	±	No	±	±	±
Common Redshank	<i>Tringa totanus</i>	F	Eu,As	NGT	±	Yes	Yes	Yes	Yes
Marsh Sandpiper	<i>Tringa stagnatilis</i>	B	Eu,As	NGT	±	No	±	±	±
Common Greenshank	<i>Tringa nebularia</i>	B	Eu,As	NGT	±	Yes	Yes	±	±

English name	Latin name	Publication record	Breeding region	Status	Population size known?	Demographic structure known?	Reproductive biology known?	Migration system known?	Food & foraging known?
Nordmann's Greenshank	<i>Tringa guttifer</i>	B	As	Endang.	±	No	±	±	±
Greater Yellowlegs	<i>Tringa melanoleuca</i>	A	NA	NGT	Yes	No	±	Yes	±
Lesser Yellowlegs	<i>Tringa flavipes</i>	B	NA	NGT	±	No	Yes	Yes	±
Green Sandpiper	<i>Tringa ochropus</i>	B	Eu,As	NGT	No	No	Yes	±	±
Solitary Sandpiper	<i>Tringa solitaria</i>	A	NA	NGT	No	No	No	±	±
Wood Sandpiper	<i>Tringa glareola</i>	B	Eu,As	NGT	No	No	±	±	±
Terek's Sandpiper	<i>Xenus cinereus</i>	B	Eu,As	NGT	±	No	±	±	±
Common Sandpiper	<i>Actitis hypoleucos</i>	D	Eu,As	NGT	No	Yes	Yes	±	±
Spotted Sandpiper	<i>Actitis macularia</i>	C	NA	NGT	No	Yes	Yes	±	±
Grey-tailed Tattler	<i>Heteroscelus brevipes</i>	A	As	NGT	No	No	±	±	±
Wandering Tattler	<i>Heteroscelus incanus</i>	A	As,NA	NGT	±	No	±	±	±
Willet	<i>Catoptrophorus semipalmatus</i>	B	NA	NGT	No	No	±	±	±
White-winged Sandpiper	<i>Prosobonia leucoptera</i>	A	Oc	Extinct	Yes	No	No	No	No
Moorea Sandpiper	<i>Prosobonia ellisi</i>	A	Oc	Extinct	Yes	No	No	No	No
Tuamotu Sandpiper	<i>Prosobonia cancellata</i>	B	Oc	Endang.	±	No	No	No	±
Ruddy Turnstone	<i>Arenaria interpres</i>	E	NA, Eu, As	NGT	±	Yes	Yes	Yes	±
Black Turnstone	<i>Arenaria melanocephala</i>	A	NA	NGT	Yes	No	±	±	±
Surfbird	<i>Aphriza virgata</i>	B	NA	NGT	Yes	No	±	±	±
Great Knot	<i>Calidris tenuirostris</i>	C	As	NGT	Yes	±	Yes	Yes	Yes
Red Knot	<i>Calidris canutus</i>	F	NA, Eu, As	NGT	Yes	Yes	Yes	Yes	Yes
Sanderling	<i>Calidris alba</i>	E	NA, Eu, As	NGT	±	±	Yes	Yes	Yes
Semipalmated Sandpiper	<i>Calidris pusilla</i>	D	NA	NGT	Yes	Yes	Yes	Yes	±
Western Sandpiper	<i>Calidris mauri</i>	D	As, NA	NGT	±	Yes	Yes	Yes	±
Red-necked Stint	<i>Calidris ruficollis</i>	C	As	NGT	Yes	Yes	Yes	Yes	±
Little Stint	<i>Calidris minuta</i>	B	Eu, As	NGT	±	No	Yes	Yes	±
Temminck's Stint	<i>Calidris temminckii</i>	B	Eu, As	NGT	No	Yes	Yes	±	No
Long-toed Stint	<i>Calidris subminuta</i>	B	As	NGT	No	No	Yes	±	No
Least Sandpiper	<i>Calidris minutilla</i>	C	NA	NGT	No	No	Yes	Yes	±
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	C	NA	NGT	±	No	Yes	Yes	±
Baird's Sandpiper	<i>Calidris bairdii</i>	B	As, NA	NGT	±	No	Yes	Yes	±
Pectoral Sandpiper	<i>Calidris melanotos</i>	B	As, NA	NGT	No	No	Yes	±	±
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	B	As	NGT	Yes	No	Yes	±	±
Curlew Sandpiper	<i>Calidris ferruginea</i>	E	As	NGT	Yes	±	Yes	Yes	±
Purple Sandpiper	<i>Calidris maritima</i>	C	NA, Eu	NGT	±	±	Yes	Yes	Yes
Rock Sandpiper	<i>Calidris ptilocnemis</i>	B	As, NA	NGT	No	No	Yes	±	±
Dunlin	<i>Calidris alpina</i>	F	NA, Eu, As	NGT	Yes	Yes	Yes	Yes	Yes
Spoon-billed Sandpiper	<i>Eurynorhynchus pygmaeus</i>	C	As	Vuln.	Yes	Yes	Yes	±	±
Broad-billed Sandpiper	<i>Limicola falcinellus</i>	C	Eu, As	Vuln.	±	No	Yes	±	±
Stilt Sandpiper	<i>Micropalama himantopus</i>	B	NA	NGT	±	No	Yes	±	±
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>	C	As, NA	NGT	±	No	Yes	±	±
Ruff	<i>Philomachus pugnax</i>	F	Eu, As	NGT	±	±	Yes	Yes	±
Wilson's Phalarope	<i>Steganopus tricolor</i>	E	NA	NGT	Yes	±	Yes	Yes	Yes
Red-necked Phalarope	<i>Phalaropus lobatus</i>	E	NA, Eu, As	NGT	±	Yes	Yes	Yes	±
Red Phalarope	<i>Phalaropus fulicaria</i>	D	NA, Eu, As	NGT	No	No	Yes	±	±

