

## 3. OVERVIEW

### 3.1 Shorebirds and the EAA Flyway

The EAA Flyway is one of the world's major flyways for migratory shorebirds. Most species of this flyway pass through eastern Asia on migration, but are drawn from breeding grounds that extend across northern Asia and into North America. Therefore, the breeding range of EAA Flyway birds overlaps with the breeding range of birds that utilise other flyways. In the non-breeding period, birds of the EAA Flyway may occur as far west as the east coast of India, south to Australia and New Zealand, and across to the Western Pacific. There is overlap in the non-breeding extent of the EAA Flyway with the Central Asian Flyway to the west and the Central Pacific Flyway to the east.

This review estimated that a minimum of 8 million shorebirds of 54 species occur in the EAA Flyway, and identified 400 sites of international importance for their populations. The estimated population size of each species is presented in Table 3.1, with pooled count data and estimates (where applicable) for each country. Criteria used for the identification of important sites are included.

Many of the shorebird species in the EAA Flyway are represented by populations in other flyways. These other populations may or may not be genetically distinct. Eleven species, however, are confined to the EAA Flyway, while a further six species are represented by a subspecies endemic to the EAA Flyway.

### 3.2 Data Limitations on Shorebird Counts

There are a number of limitations to the existing database of shorebird counts for the purpose of estimating population sizes and identifying important sites. These are discussed below.

#### 3.2.1 Shorebird behaviour and habitat

The majority of shorebirds forage on tidal shorelines and roost in flocks during high tide, which facilitates counting. Some species, however, do not normally aggregate even at high tide and these can be overlooked or under-surveyed. There are also many species that utilise non-tidal and often freshwater wetlands, and some that occur mainly on grasslands. Such birds may be dispersed and therefore hard to locate and comprehensively count. Some freshwater species, particularly the snipe and painted-snipe,

are also cryptic and favour vegetated wetlands, making them especially hard to observe. As a result of these behavioural and habitat differences, shorebirds that readily flock and utilise tidal environments during the non-breeding period are better represented in count data than species that do not.

#### 3.2.2 Survey coverage of countries

Inevitably, there have been more surveys undertaken in some countries than in others. Japan and New Zealand have been well-surveyed, and Barter (2002) has undertaken and reviewed work in the Yellow Sea. Australia has had considerable survey effort in populated parts of the country, but more remote coastal and inland regions have received less attention. The same pattern has occurred elsewhere, with surveys regularly carried out at known and accessible sites, but many areas, especially away from the coast, being under-represented. This review has identified Mongolia, North Korea, inland China and some tropical coastal areas (parts of Indonesia, Papua New Guinea and Australia) as being especially under-represented in surveys.

#### 3.2.3 Survey coverage of habitats

Species of freshwater wetlands and grasslands may not only be difficult to count, but occur in habitats that may be difficult to access. For example, massive distances are involved in just getting to inland wetlands of Australia and China, whereas coastal wetlands are often accessible. Some coastal environments, particularly mangroves, are an exception to this, as birds may roost in trees or in small, tidal creeks where they cannot be seen.

#### 3.2.4 Shorebird identification

Even among shorebirds that roost in flocks on tidal coastlines, there can be difficulties with species that occur in small numbers in mixed flocks, as these may be under-surveyed, and there can be difficulties with identification. The Lesser and Greater Sand Plovers can be difficult to distinguish in the field, and M. Barter (pers. comm.) considers this may account for the low numbers of Greater Sand Plover recorded in the Yellow Sea. Separation of different populations (within the same species) in the field is rarely possible, while the recognition of regional populations with distinct migration patterns can only be achieved through a comprehensive flagging programme. This has begun in several countries and may eventually allow for the development of an understanding of migratory pathways followed by species, subspecies and populations within the EAA Flyway.

**Table 3.1 Population Estimates for Migratory Shorebirds in the East Asian - Australasian Flyway**

Species	Max. Count	Sum Country Estimates	Flyway Estimate	1%	Staging
Common Snipe	NA	NA	100 000-1 000 000	1 000	250
Japanese Snipe	NA	NA	36 000	360	90
Swinhoe's Snipe	NA	NA	25 000-100 000	250	63
Solitary Snipe	NA	NA	10 000-100 000	100	25
Pintail Snipe	NA	NA	25 000-1 000 000	250	63
Eurasian Woodcock	NA	NA	25 000-1 000 000	250	63
Black-tailed Godwit	158 720	162 750	160 000	1 600	400
Bar-tailed Godwit	321 580	326 450	325 000	3 250	813
Little Curlew	180 970	180 950	180 000	1 800	450
Whimbrel	54 270	NA	100 000	1 000	250
Eurasian Curlew	33 200	39 550	40 000	400	100
Far Eastern Curlew	38 880	37 800	38 000	380	95
Spotted Redshank	NA	NA	25 000-100 000	250	63
Common Redshank	64 360	72 750	75 000	750	188
Marsh Sandpiper	NA	NA	100 000-1 000 000	1 000	250
Common Greenshank	57 120	58 700	60 000	600	150
Spotted Greenshank	NA	NA	1 000	10	3
Green Sandpiper	NA	NA	25 000-100 000	250	63
Wood Sandpiper	NA	NA	100 000-1 000 000	1 000	250
Terek Sandpiper	52 660	58 050	60 000	600	150
Common Sandpiper	NA	NA	25 000-100 000	250	63
Grey-tailed Tattler	43 720	48 900	50 000	500	125
Ruddy Turnstone	31 210	35 050	35 000	350	88
Asian Dowitcher	23 280	23 610	24 000	240	60
Great Knot	379 125	379 350	375 000	3 750	938
Red Knot	218 960	219 450	220 000	2 200	550
Sanderling	21 420	21 550	22 000	220	55
Red-necked Stint	309 100	318 500	325 000	3 250	813
Long-toed Stint	24 200	25 600	25 000	250	63
Temminck's Stint	NA	NA	25 000 - 100 000	250	63
Sharp-tailed Sandpiper	155 420	154 500	160 000	1 600	400
Dunlin	NA	NA	950 000-2 750 000	9 500	2 375
Curlew Sandpiper	178 750	175 700	180 000	1 800	450
Spoon-billed Sandpiper	NA	NA	<3 000	30	7
Broad-billed Sandpiper	25 130	25 100	25 000	250	63
Red-necked Phalarope	NA	NA	100 000-1 000 000	1 000	250

**Table 3.1 (cont.) Population Estimates for Migratory Shorebirds in the East Asian - Australasian Flyway**

Species	Max. Count	Sum Country Estimates	Flyway Estimate	1%	Staging
Asian Painted-snipe	NA	NA	10 000-100 000	100	25
Pheasant-tailed Jacana	NA	NA	25 000-100 000	250	63
Eurasian Oystercatcher	NA	NA	10 000	100	25
Black-winged Stilt	NA	NA	25 000-100 000	250	63
Pied Avocet	NA	NA	25 000-100 000	250	63
Pacific Golden Plover	NA	NA	100 000-1 000 000	1 000	250
Grey Plover	NA	NA	125 000	1 250	313
Little Ringed Plover	24 200	24 600	25 000	250	63
Kentish Plover	96 910	NA	110 000	1 100	275
Double-banded Plover	NA	NA	50 000	500	125
Lesser Sand Plover	130 560	143 950	140 000	1 400	350
Greater Sand Plover	103 420	109 400	110 000	1 100	275
Long-billed Plover	2 510	NA	<10 000	100	25
Oriental Plover	70 100	70 100	70 000	700	175
Grey-headed Lapwing	NA	NA	25 000-100 000	250	63
Northern Lapwing	NA	NA	100 000-1 000 000	1 000	250
Oriental Pratincole	73 030	2 883 000	2 880 000	20 000	5 000
Australian Pratincole	60 300	60 300	60 000	600	150

**Notes:** **Max. Count** - sum of Regional Maxima

**Sum Country Estimates** - sum of national population estimates

**Flyway Estimate** - rounded Estimate or estimate range for the Flyway

**1%** - the numerical criterion applied to the Flyway population estimate of the species to identify sites of international importance

**Staging** - the numerical criterion used to identify sites of international importance during migration.

**20 000** - if the population estimate is greater than 200 000 the 1% criterion is set at 20 000

### 3.2.5 Survey coverage of seasonal periods

The above limitations can hinder the estimation of population sizes and the documentation of important sites. A further limitation is the time of year in which surveys are undertaken. Surveys are often carried out in the non-breeding period and data from this time of year were used for the calculation of population estimates. This means that sites important at other times of the year may have been overlooked. These sites could be significant for species that are dispersed during the non-breeding period but aggregate during migration. Few counts are carried out during the breeding period when most shorebirds are expected to be dispersed across breeding sites, but important sites have been identified in Australia and New Zealand at this time of the year. These counts were presumably aggregations of immature and other non-breeding birds, but identification of sites used by this cohort of a species' population is important. Chatto (2003) found an increase in the abundance of some shorebird species in northern Australia during the breeding period.

### 3.2.6 Flyway overlap

The identification of important sites in Alaska is difficult because they may be used by shorebirds of both the EAA Flyway and one of the American flyways. Similarly, some species in countries such as Bangladesh may be represented by both EAA and CA populations. As noted above, the recognition of distinct flyway populations in regions of overlap can only be achieved through a colour flagging programme, especially if this is based on the breeding grounds.

## 3.3 Shorebird Species Population Estimates

### 3.3.1 Abundance

Population estimates were calculated for 34 of the 54 species included in this review, with population ranges for the remaining 20 species. These were data-deficient species because they were under-sampled due to behaviour or habitat (see Data Limitations). The most abundant species were the Dunlin (a minimum of 950 000) and the Oriental Pratincole (2.88 million), while the least abundant species were the Endangered Spotted Greenshank (1 000) and the Vulnerable Spoon-billed Sandpiper (<3 000). Two other species in the EAA Flyway, the Far Eastern Curlew and Asian Dowitcher, are listed as Near Threatened (Birdlife International 2001).

### 3.3.2 Distribution

Summed count data and Country Estimates (of those species for which these could be calculated) illustrate where species occur during the non-breeding period (Table 3.2). There is considerable variation in the distribution of species, but there are some common patterns.

During the non-breeding period shorebird concentrations are mainly in:

- Australasia, e.g. Red-necked Stint;
- South-eastern Asia, e.g. Asian Dowitcher, Long-toed Stint;
- Myanmar/Bangladesh/India, e.g. Spoon-billed Sandpiper, Spotted Greenshank, Pheasant-tailed Jacana and Grey-headed Lapwing;
- Inland Asia, e.g. Dunlin, Spotted Redshank.
- Coastal eastern Asia, e.g. Kentish Plover, Eurasian Oystercatcher.

Not all species fit into these classes with some overlapping, such as between Australasia and south-eastern Asia. The Sanderling and Ruddy Turnstone occupy temperate areas in both the northern and southern hemisphere during the non-breeding period, with low numbers and few important sites in the tropics in this period. Distinct populations may be involved.

Countries around the Bay of Bengal (Myanmar, Bangladesh and India) are in the overlap zone between the EAA and the Central Asian Flyways. They are of special interest as they are within the main non-breeding range of several species that have small populations and are endemic to the EAA Flyway. Species that utilise the Bay of Bengal region, and those of inland and coastal eastern Asia, remain within the northern hemisphere during the non-breeding period.

### 3.3.3 Changes and trends

Population estimates for shorebirds in the EAA Flyway have been calculated previously (Watkins 1993, Rose and Scott 1997, Delany and Scott 2002), making it possible to examine trends in estimates. These trends may reflect real patterns in the size of populations, or may be the result of improved information.

The populations of many species do appear to be stable, while for other species improved information has allowed for an upward revision of the population estimate. Such species include the Far Eastern Curlew, Eurasian Curlew, Asian Dowitcher and Oriental Pratincole.

Lack of adequate data in the past and currently makes it difficult to determine if lower estimates are due entirely to improved information. For

some species, however, there is reason to believe that their population is declining. This includes the Spoon-billed Sandpiper, already listed as Vulnerable, and the Curlew Sandpiper and Red-necked Stint. Declines of these latter two species may be part of a long-term cycle (Minton *et al.* 2005). Declining and even apparently stable numbers for species with low population numbers are a concern.

In a few cases, species are undergoing local changes in distribution and abundance. The Far Eastern Curlew has declined in abundance in parts of southern Australia (Higgins and Davies 1996), while the Black-winged Stilt has expanded into Taiwan and the Red Knot has increased in abundance on migration through Mai Po.

### 3.4 Internationally Important Sites

#### 3.4.1 Distribution of important sites across the Flyway

The distribution of the 397 important sites across the 23 countries that make up the EAA Flyway is summarised in Table 3.3. The number of important sites in each country is a function of coverage as well as the size and location of the country, availability of habitat and abundance of migratory shorebirds. This is well illustrated with Japan, a small country compared with some others in the EAA Flyway, but with a large number of sites. Japan does support large numbers of shorebirds, especially during migration periods, but it is also well-surveyed. Apart from Japan, countries with many important sites are Australia, China, South Korea, Philippines, Malaysia and Indonesia. There are undoubtedly more sites to be identified in all countries, but countries where the identification of sites is particularly deficient are Mongolia, North Korea, Papua New Guinea, Cambodia and Laos. There are also likely to be further important sites identified in inland Asia and inland Australia, particularly during migration periods.

Table 3.3 also examines the distribution of important sites in each country by period. For example, in Australia there are 35 sites recognized as important during southward migration but only 21 during northward migration, while 18 are important during the breeding period and 95 during the non-breeding period. The number of sites recognized in each country in each period contributes to an understanding of migratory patterns in the EAA Flyway. This information is discussed below and in the country accounts.

#### 3.4.2 Breeding Period

Regions used for breeding by migratory shorebirds that occur in the EAA Flyway are moderately well known and include large areas of Arctic and Sub-Arctic Russia and Alaska, and areas within China, the Korean peninsula and Japan. Outside these main northern breeding areas for migratory shorebirds, there are species that also breed further south, such as in Taiwan (Black-winged Stilt) and the Philippines (Pheasant-tailed Jacana). Two species breed only in the southern hemisphere: Australian Pratincole on grasslands of northern Australia and Double-banded Plover in New Zealand.

Few important breeding sites were identified during the breeding period because most species are dispersed when breeding. This dispersal means that conservation on a landscape scale is required and the identification of individual sites is not an appropriate measure.

Not all birds return to the breeding grounds during the breeding period. Many young birds remain in the non-breeding areas – perhaps undertaking a partial migration to preferred habitat. Within the breeding period but outside the breeding range of the shorebirds, important sites were identified in several countries, particularly Australia and New Zealand. These were sites that supported important numbers of non-breeding birds, including immature specimens. In parts of northern Australia, there is an increase in the abundance of some species during the breeding period (Chatto 2003), due to the partial migration of non-breeding birds from southern Australia. The identification of important sites that are used during the breeding period by non-breeding birds is crucial, as these birds are often the future recruits into the breeding population. There appeared to be very little breeding period data from much of the Flyway and therefore, it is likely that sites important for non-breeding birds during the breeding period are under-represented.

#### 3.4.3 Southward and Northward Migration

Some species of migratory shorebirds follow the same route on southward and northward migration, but in many species there are differences in the usage of important sites between these two periods. As a result, there are differences in the distribution of important sites during southward and northward migration (Table 3.3), and the number of species with important sites in different countries (Table 3.4).

Across the Flyway, shorebird numbers are concentrated during southward migration in the far

**Table 3.3: Distribution of known internationally important sites for migratory shorebirds within the EAA Flyway (by country), and the number recognized as important in that country within each period.**

Country	# Sites	%	SM	NB	NM	B
Australia	118	29.7	35	94	20	17
Japan	89	22.4	48	4	77	
China	51	12.8	8	34	24	1
Russia	25	6.3	19		11	
South Korea	24	6.0	18	4	18	
New Zealand	14	3.5		14	1	2
Malaysia	12	3.3	5	10	2	
Bangladesh	12	3.0		11	1	
Thailand	9	2.3	1	8	3	
Indonesia	8	2.0	3	7	2	
Philippines	8	2.0		6	3	
Myanmar	6	1.5		6		
USA	6	1.5	6			
Vietnam	6	1.5	1	2	5	
Papua New Guinea	3	0.8	1	2	1	
Brunei	2	0.5	2			
Cambodia	1	0.3		1		
North Korea	1	0.3			1	
Singapore	1	0.3			1	
Timor Leste	1	0.3		1		
Mongolia	0					
Laos	0					
<b>Totals</b>	<b>397</b>	<b>100</b>	<b>147</b>	<b>204</b>	<b>169</b>	<b>20</b>

north, such as some Russian sites, and the far south, including Indonesia and northern Australia. In contrast, numbers appear concentrated during northward migration in eastern and parts of south-eastern Asia (China, Japan, Philippines and Vietnam). This suggests that there are some common underlying differences between southward and northward migration in the EAA Flyway. Understanding such general patterns can be important for the identification of regions where data may be deficient. However, it needs to be recognised that what appear to be patterns can be the result of biases in existing datasets.

In Russia, more sites are recognized as important during southward than northward migration (Table 3.3), but more species are reported in important numbers during northward migration (Table 3.4). This pattern may be related to the availability of sites, with many sites icebound during northward migration, thus concentrating birds on fewer sites. On southward migration, a

number of species are believed to fly direct from coastal Russian sites around the Sea of Okhotsk to non-breeding areas in south-eastern Asia and Australia.

On northward migration there is greater use of the Yellow Sea area of China and the Korean Peninsula, Japan, the Philippines and parts of south-eastern Asia. The concentration of birds in the Yellow Sea area in this period is especially significant, as for some species up to 90% of their EAA Flyway population passes through this region (Barter 2002). On northward migration the Yellow Sea may be the final staging point before flights to the breeding grounds, so the birds are putting on condition and waiting for suitable weather conditions before completing their migration. When they arrive on the breeding grounds, they need sufficient reserves to begin breeding and they may arrive before foraging areas at the breeding grounds have thawed out.

Northern Australia and possibly Indonesia are more important on southward than northward migration, due largely to the species that fly direct from Russia. On northward migration, however, many species depart from southern Australia and overfly the north of the country. Slightly higher usage of sites in parts of south-eastern Asia during northward than southward migration may be related to this. Within south-eastern Asia, there are some subtle seasonal differences, such as only southward migration of several species through Borneo. In Thailand, Pattani Bay is important mainly during southward migration, whereas the Bight of Bangkok is important only in the non-breeding and northward migration periods.

Species that undertake long, direct flights tend to have few important sites on migration. In contrast, a number of species disperse widely through eastern and south-eastern Asia and their important sites are scattered. Some of these species may make use of inland sites, particularly in China or Mongolia, but records are inadequate from this region. Other species are reported to migrate on a broad front so tend not to aggregate in significant numbers at particular sites.

#### 3.4.4 Non-Breeding Period

The distribution of shorebird species in the EAA Flyway during the non-breeding period varies. Four broad distribution classes were recognised: Australasia, south-eastern Asia, Myanmar/Bangladesh/India and inland China. Therefore, the distribution of important sites in the non-breeding period can be expected to reflect these groupings. A large proportion (87%) of sites identified as important in the non-breeding period are in Australia (Table 3.3), but there are important non-breeding period sites throughout Asia, overlapping with the breeding range of some species.

### 3.5 Concentrations of Species at Internationally Important Sites

#### 3.5.1 Key Areas

A small number of sites in the Flyway have been identified as supporting especially high concentrations or support a high number of species of shorebirds, either on migration and/or during the

non-breeding period. These sites or clusters help to identify which locations in the Flyway shorebirds will mostly depend on to maintain populations. There are 9 major regions in the Flyway which support 15 or more species in internationally important numbers, and some of these also support a large proportion of the flyway population of at least one species:

**Daursky Nature Reserve** (Russia). Important for 30 species, making this the most significant site in Russia. It is used mainly during northward migration and probably supports birds from both the EAA and Central Asian Flyways. Habitat that extends from the Daursky Nature Reserve into Mongolia has not been surveyed.

**Moroshechnaya River Estuary** (Russia). It is estimated that one million shorebirds pass through this site on southward migration, with about 300 000 on northward migration (Gerashimov and Gerashimov 1997). The area is important for at least 17 species.

**Yellow Sea area** (China, North Korea, South Korea). It is estimated that two million shorebirds pass through this region on northward migration, with about half that number on southward migration (Barter 2002). The region supports >90% of the EAA population of 6 species, and >30% of the EAA population of 18 species (Barter 2002). Sites within the area are important for almost 50 species on migration, and are important for breeding by 5 species.

**Southern Honshu** (Japan). Approximately half the important sites in Japan are on southern Honshu and adjacent islands and are utilised more on northward than southward migration. The region contains sites that are important for 22 species.

**Manila Bay** (Philippines). Important for 15 species during the non-breeding and northward migration periods.

**West coast of Malaya** (Malaysia). Sites important for at least 16 species occur on this coastline and are recognised during both migration periods and the non-breeding period.

**South-eastern Sumatra** (Indonesia). This region contains Banyuasin Delta and nearby coastline and is important mainly during southward migration for 15 species.

**Roebuck Bay/80 Mile Beach** (Australia). One of the most important areas in the EAA Flyway, with a single count on the 80 Mile Beach of

336 000 shorebirds and on Roebuck Bay of 170 900 (Australian Nature Conservation Agency 1996). Used more heavily during southward than northward migration, and with many birds staying through the non-breeding period. Numbers of some species remain high during the breeding period (Australian Nature Conservation Agency 1996). Important for 18 shorebird species.

**South-eastern Gulf of Carpentaria** (Australia). Important mainly during southward migration for 16 species, many of which disperse to south-eastern Australia and New Zealand.

### 3.5.2 Other areas

There are 4 areas in the Flyway that support a large proportion of the Flyway population of particular species, or 5-14 species in internationally important numbers:

Northern Gulf of Thailand (Thailand). This region is recognised as one of the most important for waterbirds in Thailand (Round 2002), and is important for 14 species in either the non-breeding period or during northward migration.

Moreton Bay/Great Sandy Strait (Australia). Important throughout the year for at least some species and important for 10 species overall.

Southern Victoria and Eyre Peninsula/Spencer Gulf (Australia). These two regions contain major non-breeding concentrations of species that use southern Australia such as Curlew Sandpiper and Red-necked Stint.

North Island (New Zealand). Although important for few species, this area supports almost the entire population of one race of the Bar-tailed Godwit (*L. l. anadyrensis*) and a third of the Flyway's Red Knots during the non-breeding period.

## 3.6 Implications of this Review

### 3.6.1 Implications for Conservation

The updated Flyway population estimates and lists of important sites presented here enable some interpretation to identify key areas in which to focus protection and wise use of habitat for migratory shorebirds. This knowledge can thus provide a basis for directing coordinated international conservation actions. Whilst this document can help to determine priorities for shorebird conservation in the EAA Flyway, the available data to identify important sites in the Flyway are still incomplete and require ongoing updating and review. Key implications for conservation to come from this review are:

The list of internationally important sites identified can help toward developing Networks of Important Sites in the East Asian - Australasian Flyway. These networks form a basis for implementing internationally coordinated conservation efforts to help conserve the ecological network of wetlands that migrating birds need to survive. Staging sites form a large component of these internationally important sites. Whilst shorebirds may use staging sites more intermittently than breeding or non-breeding sites, the staging sites are extremely important for successful migration. A large number of staging sites are in Asia where impacts and threats are highest and often require more urgent conservation effort:

- Areas and countries with least information are often areas where shorebird field skills and general education and awareness are also needed.
- Significant data limitations still exist for this Flyway, pointing out the priority need for more information on particular species, habitats, regions or periods
- The boundaries of sites are often poorly-defined in the available information. For site conservation, improved recognition of site boundaries is imperative.

### 3.6.2 Threats and Threatened Species

Threats to shorebirds are well-documented but difficult to manage. Direct loss of habitat due to land reclamation is a major concern in parts of Asia. The effects of altered sediment flows and accumulation due to dam construction in major river systems, such as the Three Rivers Dam in China (Barter 2002), are largely unknown and unpredictable. Predicted slight rises in sea level due to the Greenhouse Effect could result in the loss of large areas of tidal flats, especially where the coastline is developed and therefore the tidal habitat cannot move inland.

Disturbance of shorebirds can take place even in conservation areas and is emerging as a major conservation issue. It often results from recreational activities such as fishing, walking, wind-surfing and kite-surfing (Paton *et al.* 2000). Shorebirds may have limited foraging opportunities during low tide periods, and disturbance can prevent them from foraging effectively. Disturbance can also affect roosting birds and cause them to waste energy required for migration.

Shorebirds are sensitive to loss of habitat and disturbance because they rely on small areas and often few sites, especially during migration. Their use of sites in different countries makes management of threats particularly difficult.

Species most sensitive are those in which the entire population relies on few sites and undertakes extremely long flights between these, such as the Red Knot. Such species require maximum fuel loads before undertaking long flights, and may arrive with very low body weights, and therefore need to forage efficiently to recover condition.

Despite threats and the loss of large areas of habitat in recent decades, shorebird numbers remain high. Only two species in the EAA flyway are listed as Threatened (Birdlife International 2001): the Spotted Greenshank (Endangered) and the Spoon-billed Sandpiper (Vulnerable). Both species have critically low populations and both rely on countries in the west of the Flyway, such as India and Bangladesh, during the non-breeding period. It is not known if impacts in their non-breeding range have contributed to their threatened status. The Far Eastern Curlew and Asian Dowitcher are listed as Near Threatened, but have larger populations than several other species in the Flyway, including the Eurasian Oystercatcher, Long-billed Plover and Grey-headed Lapwing.

Few species appear to be declining in population size, but many species do have what may be naturally small populations. There are also many species for which population estimates are imprecise.

### 3.6.3 Improved estimates and knowledge of sites

This review has identified 397 internationally important sites and has provided population estimates, or population ranges, for 54 shorebird species of the EAA Flyway. Management for the conservation of shorebirds in the Flyway requires this baseline information, but a major finding of the review is that there are deficiencies in information that need to be addressed. Many species are data-deficient and therefore only very broad population ranges could be proposed, while even for species with sufficient data to propose an estimate, there is some uncertainty. It is difficult to be confident about population trends when, for many species, estimates have risen simply because more data are available. There is also uncertainty due to inadequate coverage in many countries and some habitats, and due to lack of data in some periods.

The representation of species at sites identified as internationally important provides a measure of the potential to protect migratory shorebirds in the EAA Flyway (Table 3.5). For example, in any one period, a substantial proportion of a species' population should be in known important sites if

**Table 3.4. The number of species with internationally important sites in each country of the EAA Flyway and within that country in each period.**

Country	Number of species with important sites	Number of species with important sites - each period			
		SM	NB	NM	B
Alaska (USA)	4	4			
Russia	41	24		40	
Mongolia	0				
Japan	20	15	3	17	
North Korea	1			1	
South Korea	22	20	2	21	
China	46	34	23	37	1
Philippines	15		12	8	
Cambodia	2		2		
Laos	0				
Vietnam	12	1	4	8	
Myanmar	12		12		
Bangladesh	7		7	1	
Thailand	18	4	17	6	
Malaysia	19	10	14	7	
Brunei	3	3			
Singapore	1			1	
Indonesia	17	11	12	6	
Timor Leste	1	1			1
PNG	6	2	2	3	
Australia	27	20	27	14	10
New Zealand	4		4	1	2

the identification of those sites is adequate for conservation of that species.

This question was examined for the non-breeding period using the sum of highest counts at important sites for comparison with population estimates. Species were grouped according to the proportion of their population recorded in identified important sites during the non-breeding period.

Almost two thirds of the species are poorly represented in important sites, with <33% of their estimated population recorded (Table 3.5).

Many of these species are known to disperse across inland wetlands and therefore may not

aggregate sufficiently for important sites to be identified. The conservation of these species will require broad habitat management as opposed to an important site approach.

For other species, however, it is more likely that data are inadequate and that important sites have not been documented. There were 15 species which can be expected to aggregate in the non-breeding period but which are under-represented on important sites.

This analysis indicates that for at least 28% of the shorebird species of the EAA Flyway, a substantial proportion of important sites in the non-breeding period have not been identified.

A major conclusion of this review therefore is that much more information is needed on the distribution and abundance of a number of shorebird populations in the EAA Flyway.

**Table 3.5. Representation of the populations in internationally important sites during the non-breeding season**

<33% of the population	33 - 66% of the population	>66% of the population
Common Greenshank (31%)	Far Eastern Curlew (65%)	Little Curlew (156%)
Sanderling (31%)	Oriental Plover (59%)	Sharp-tailed Sandpiper (137%)
Eurasian Curlew (29%)	Kentish Plover (57%)	Australian Pratincole (129%)
Pintail Snipe (28%)	Ruddy Turnstone (55%)	Oriental Pratincole (103%)
Little Ringed Plover (27%)	Grey-tailed Tattler (43%)	Spotted Redshank (98%)
Eurasian Oystercatcher (23%)	Broad-billed Sandpiper (40%)	Red-necked Stint (94%)
Greater Sand Plover (23%)	Double-banded Plover (39%)	Curlew Sandpiper (87%)
Northern Lapwing (22%)	Spotted Greenshank (39%)	Pied Avocet (83%)
Whimbrel (21%)	Black-tailed Godwit (37%)	Lesser Sand Plover (79%)
Black-winged Stilt (19%)	Common Redshank (36%)	Bar-tailed Godwit (74%)
Marsh Sandpiper (17%)	Terek Sandpiper (35%)	Red Knot (66%)
Asian Dowitcher (14%)		
Great Knot (12%)		
Long-toed Stint (12%)		
Common Sandpiper (11%)		
Spoon-billed Sandpiper (11%)		
Pacific Golden Plover (10%)		
Grey-headed Lapwing (10%)		
Common Snipe (8%)		
Asian Painted-snipe (7%)		
Pheasant-tailed Jacana (7%)		
Green Sandpiper (4%)		
Temminck's Stint (4%)		
Long-billed Plover (4%)		
Grey Plover (3%)		
Solitary Snipe (3%)		
Dunlin (3%)		
Eurasian Woodcock (2%)		
Japanese Snipe (1%)		
Wood Sandpiper (1%)		

**Table 3.2a. Summary of Country Count data and Population Estimates for the non-breeding period (China, North Korea, South Korea and Japan)**

Country	China		North Korea		South Korea		Japan	
	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Common Snipe	9 892				8		449	
Swinhoe's Snipe	269							
Solitary Snipe	200							
Pintail Snipe	6 390							
Eurasian Woodcock	758						12	
Black-tailed Godwit	4 344	10 050					35	
Bar-tailed Godwit	3 036	5 050			2		293	300
Little Curlew	1 856	1 550					3	
Whimbrel	2 548				232		806	
Eurasian Curlew	13 725	19 700		250	3 545	4 000	851	1 000
Far Eastern Curlew	1 022	2 050			33		233	300
Spotted Redshank	17 323				2		11	
Common Redshank	7 791	20 150					44	100
Marsh Sandpiper	10 582						7	
Common Greenshank	6 306	20 700			9		522	600
Spotted Greenshank	36						1	
Green Sandpiper	1 782						53	
Wood Sandpiper	962						50	
Terek Sandpiper	297	1 050					757	1 000
Common Sandpiper	2 544				1		354	
Grey-tailed Tattler	219	300					151	200
Ruddy Turnstone	3 029	4 500					666	700
Asian Dowitcher	217	510						
Great Knot	7 300	10 050					180	200
Red Knot	6 075	10 050						
Sanderling	1 890	3 100	120	200	33	150	2 495	2 500
Red-necked Stint	4 541	12 000			10		1 308	1 500
Long-toed Stint	3 170	11 000					73	100
Temminck's Stint	2 163						10	
Sharp-tailed Sandpiper	1 235	4 100					8	
Dunlin	98 133		25		12 047		40 909	
Curlew Sandpiper	1 761	15 350					23	
Spoon-billed Sandpiper	42						46	
Broad-billed Sandpiper	1 352	2 100					2	
Red-necked Phalarope	34						17	
Asian Painted-snipe	847						11	
Pheasant-tailed Jacana	26							
Eurasian Oystercatcher	325				3 425		24	
Black-winged Stilt	3 479						228	
Pied Avocet	14 496						1	
Pacific Golden Plover	4 253				9		991	
Grey Plover	5 332				5 450		3 543	
Little Ringed Plover	2 276	4 500					403	500
Kentish Plover	75 405				227		7 472	
Lesser Sand Plover	4 596	8 550			30		1 113	1 000
Greater Sand Plover	1 912	3 000					253	300
Long-billed Plover	39						51	
Grey-headed Lapwing	1 503						318	
Northern Lapwing	28 327				359		1 038	
Oriental Pratincole	88	110					2	

**Table 3.2b. Summary of Country Count data and Population Estimates for the non-breeding period (Philippines, Vietnam, Cambodia and Laos)**

Country	Philippines		Vietnam		Cambodia		Laos	
	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Common Snipe	411		26		2		55	
Pintail Snipe			3					
Black-tailed Godwit	595	1 000	4 450	5 000	3			100
Bar-tailed Godwit	701	2 000	1	100	252	1 500		
Little Curlew	82	100						
Whimbrel	1 603		2		97			
Eurasian Curlew	256	300	330	400	40			
Far Eastern Curlew	127	150						
Spotted Redshank	254		1 605				51	
Common Redshank	3 056	3 500	964	2 000	90	1 000	2	
Marsh Sandpiper	3 108		393		6			
Common Greenshank	2 781	3 000	482	1 000	241	500	7	
Spotted Greenshank	6		3		13			
Green Sandpiper	186		28		5		54	
Wood Sandpiper	368		160		10		160	
Terek Sandpiper	740	1 000	103	150	65	150		
Common Sandpiper	2 332		8		10		40	
Grey-tailed Tattler	1 149	1 500						
Ruddy Turnstone	360	400			3			
Asian Dowitcher	214	300	2		12			
Great Knot	2 267	2 500	57	100				
Red Knot	153	500						
Sanderling	94	200	21					
Red-necked Stint	7 747	12 000	759	2 000	6			
Long-toed Stint	8	100	12	500		100		100
Temminck's Stint	79							
Sharp-tailed Sandpiper	58	100						
Dunlin	119		650					
Curlew Sandpiper	3 392	5 000	831	2 000	84	500		
Spoon-billed Sandpiper			1					
Broad-billed Sandpiper			43	500	400	500		
Asian Painted-snipe	68		1				1	
Pheasant-tailed Jacana	406				280			
Black-winged Stilt	748		174		98			
Pied Avocet	9							
Pacific Golden Plover	4 381		70		13			
Grey Plover	2 941		164		51			
Little Ringed Plover	1 471	4 000	36	500	4		26	300
Kentish Plover	6 879		1 211		4			
Lesser Sand Plover	5 496	7 000	212	5 000	222	1 500		
Greater Sand Plover	4 615	5 000	670	1 000	254	1 000		
Long-billed Plover	41							
Oriental Plover	53	100						

**Table 3.2b (cont.) Summary of Country Count data and Population Estimates for the non-breeding period (Philippines, Vietnam, Cambodia and Laos)**

Country	Philippines		Vietnam		Cambodia		Laos	
Species	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Grey-headed Lapwing	9		8		130		67	
Northern Lapwing	6							
Oriental Pratincole	1 380	1 500	37					

**Table 3.2c: Summary of Country Count data and Population Estimates for the non-breeding period (Thailand, Myanmar, Bangladesh and India)**

Country	Thailand		Myanmar		Bangladesh		India	
Species	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Common Snipe	675		178					
Solitary Snipe					175			
Pintail Snipe	351		13					
Black-tailed Godwit	1 857	2 000	1 284	5 000				
Bar-tailed Godwit	753	1 500	241	1 000				
Little Curlew	1		80	100				
Whimbrel	748		1 472					
Eurasian Curlew	324	400	13	500				
Far Eastern Curlew	1		193					
Spotted Redshank	1 645		65					
Common Redshank	2 997	3 000	1 983	10 000				
Marsh Sandpiper	2 545		48					
Common Greenshank	2 030	4 000	747	2 500				
Spotted Greenshank	26		24		200		7	
Green Sandpiper	1		4					
Wood Sandpiper	3 424		359					
Terek Sandpiper	313	1 000	211	500				
Common Sandpiper	337		599					
Grey-tailed Tattler	6		310	100				
Ruddy Turnstone	193	200	140	250				
Asian Dowitcher	601	600	8	100	15		137	150
Great Knot	454	500	9					
Red Knot	106	200	74	100	70	100		
Sanderling	14	100	56	100				
Red-necked Stint	2 670	4 000	281	500				
Long-toed Stint	1 167	5 000	394	1 000				
Temminck's Stint	434		115					
Sharp-tailed Sandpiper	2							
Dunlin	6							
Curlew Sandpiper	2 948	4 000	4	100				
Spoon-billed Sandpiper	5				202		120	
Broad-billed Sandpiper	915	2 000	65	500	1 200	2 000	510	1 000

**Table 3.2c (cont.) Summary of National Count data and Population Estimates for the non-breeding period (Thailand, Myanmar, Bangladesh and India)**

Country	Thailand		Myanmar		Bangladesh		India	
	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Red-necked Phalarope	7							
Asian Painted-snipe	5		38					
Pheasant-tailed Jacana	21		790		630			
Black-winged Stilt	3 166		671					
Pied Avocet	3							
Pacific Golden Plover	4 482		88					
Grey Plover	1 112		105					
Little Ringed Plover	1 713	5 000	1 144	5 000				
Kentish Plover	1 899		3 921					
Lesser Sand Plover	6 678	10 000	6 162	10 000	19 400	20 000		
Greater Sand Plover	984	1 000	2 590	3 000				
Long-billed Plover	1				50			
Grey-headed Lapwing	172		106		1 084		246	
Northern Lapwing	11		14					
Oriental Pratincole	10 585	1 000	85	100				

**Table 3.2d. Summary of National Count data and Population Estimates for the non-breeding period (Malaysia, Singapore, Brunei and Indonesia)**

Country	Malaysia		Singapore		Brunei		Indonesia	
	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Common Snipe	58		12		12		4	
Swinhoe's Snipe	274		1		1		2	
Pintail Snipe	71		22		3			
Eurasian Woodcock							4	
Black-tailed Godwit	791	4 000	13			500	38 215	62 000
Bar-tailed Godwit	2 799	4 000	1			500	9 342	22 000
Little Curlew							4 009	4 000
Whimbrel	2 341		140				3 620	
Eurasian Curlew	1 237	3 000					5 958	10 000
Far Eastern Curlew	9	300			2		3 008	5 000
Spotted Redshank							25	
Common Redshank	3 571	7 000	505	600	19		12 246	25 000
Marsh Sandpiper	5 314		600		23		1 029	
Common Greenshank	2 010	3 000	186	200	26		334	2 500
Spotted Greenshank	21							
Green Sandpiper					2		2	
Wood Sandpiper	1 247		62		400		618	
Terek Sandpiper	4 789	10 000	60	100		100	4 694	15 000
Common Sandpiper	551		130		40		1 254	
Grey-tailed Tattler	4	100			1		334	1 000
Ruddy Turnstone	222	1 000	14				766	1 500

**Table 3.2d (cont.). Summary of National Count data and Population Estimates for the non-breeding period (Malaysia, Singapore, Brunei and Indonesia)**

Country	Malaysia		Singapore		Brunei		Indonesia	
	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Asian Dowitcher	16	1 000			1		7 579	20 000
Great Knot	709	1 000					652	2 000
Red Knot	4	500					572	5 000
Sanderling	39	100	19		1		266	5 000
Red-necked Stint	2 794	6 000	140	150	72	100	1 695	5 000
Long-toed Stint	166	1 000	45		189	500		5 000
Temminck's Stint	301				2		32	
Sharp-tailed Sandpiper							658	5 000
Dunlin	32						114	
Curlew Sandpiper	7 958	10 000	400	500			8 770	20 000
Spoon-billed Sandpiper								
Broad-billed Sandpiper	897	2 000	11				155	4 000
Red-necked Phalarope							884	
Asian Painted-snipe	10		1					
Pheasant-tailed Jacana	10		2					
Black-winged Stilt	46						531	
Pacific Golden Plover	2 955		954		208		1 076	
Grey Plover	1 675		27		1		1 004	
Little Ringed Plover	306	2 000	53	100	124	200	167	2 000
Kentish Plover	191		30		63		201	
Lesser Sand Plover	6 246	10 000	419	500	128	150	18 272	45 000
Greater Sand Plover	5 205	10 000	5		100	100	464	5 000
Long-billed Plover	1				1			
Grey-headed Lapwing	5							
Oriental Pratincole	18	100	1		8		58	100

**Table 3.2e Summary of National Count data and Population Estimates for the non-breeding period (Timor, Papua New Guinea, Australia and New Zealand)**

Country	Timor	Papua New Guinea		Australia		New Zealand	
Species	Est.	Max. Count	Est.	Max. Count	Est.	Max. Count	Est.
Japanese Snipe				761			
Swinhoe's Snipe		9		27			
Black-tailed Godwit	100	265	3 000	76 249	70 000	4	
Bar-tailed Godwit		230	1 500	107 897	185 000	101 771	102 000
Little Curlew		131	200	236 461	175 000		
Whimbrel		65		7 268		178	
Far Eastern Curlew		344	2 000	13 770	28 000	46	
Common Redshank	100	5	100	200	200		
Marsh Sandpiper		24		5 095		3	
Common Greenshank	200	215	1 500	8 335	19 000	6	
Wood Sandpiper		14		515			
Terek Sandpiper		1 024	5 000	12 632	23 000	9	
Common Sandpiper		133		661			
Grey-tailed Tattler	200	90	500	20 008	45 000	13	
Ruddy Turnstone		23	500	9 512	20 000	5 915	6 000
Asian Dowitcher		4	500	424	450		
Great Knot		552	3 000	303 909	360 000		
Red Knot		2		181 803	135 000	67 367	68 000
Sanderling		10	100	4 903	10 000	8	
Red-necked Stint	1 000	716	4 000	220 068	270 000	231	250
Long-toed Stint	100		100	111	1 000		
Sharp-tailed Sandpiper	100	882	5 000	117 361	140 000	173	200
Curlew Sandpiper		8	100	182 899	118 000	136	150
Broad-billed Sandpiper			500	7 965	10 000		
Black-winged Stilt		8					
Pacific Golden Plover		28		6 561		1 120	
Grey Plover		54		8 048		8	
Little Ringed Plover		5	500				
Double-banded Plover				5 627		1 378	
Lesser Sand Plover		47	250	13 837	25 000	2	
Greater Sand Plover		1 730	5 000	37 895	73 000	5	
Oriental Plover				31 666	70 000		
Oriental Pratincole		15		63 831	2 880 000		
Australian Pratincole		285	300	31 737	60 000		