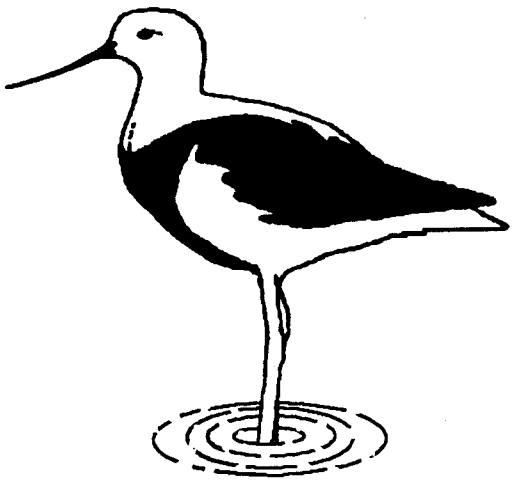
The Stilt



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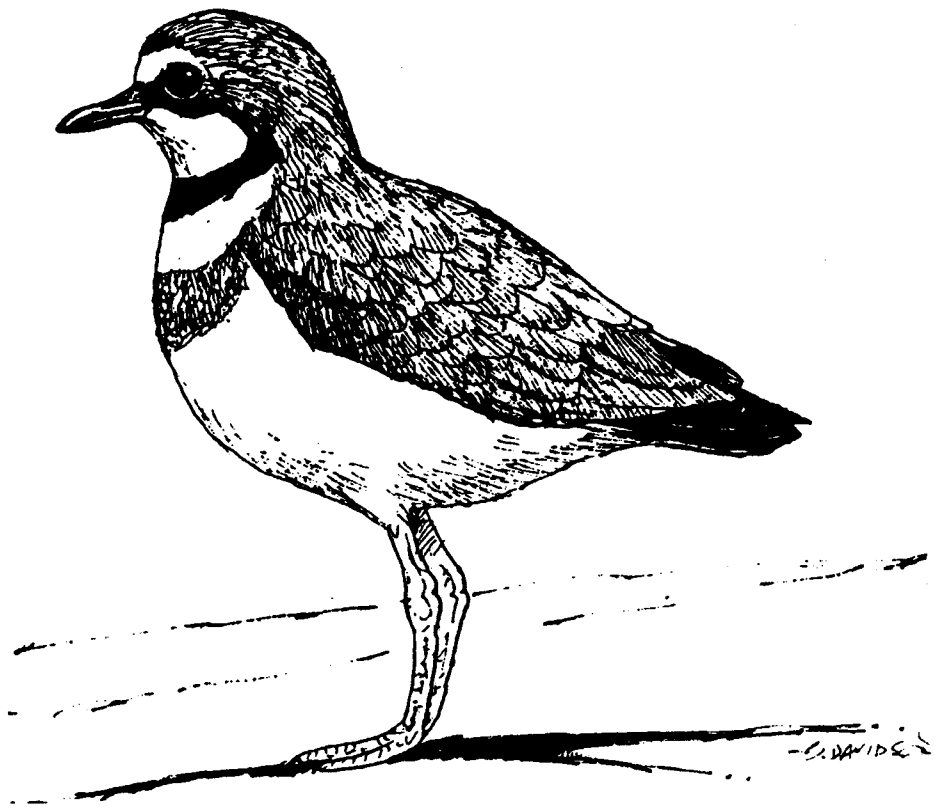

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Group

A special interest group of Birds Australia

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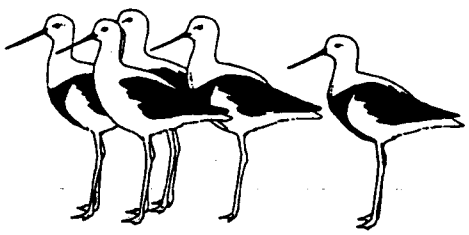


The Stilt

ISSN 0726-1888

OBJECTIVES OF THE AUSTRALASIAN WADERS STUDIES GROUP (AWSG) OF BIRDS AUSTRALIA, A DIVISION OF THE ROYAL AUSTRALASIAN ORNITHOLOGISTS UNION (RAOU):

1. To develop or assist with plans for wader research in Australasia in conjunction with other interested bodies.
2. To co-ordinate and encourage counting, banding, foraging studies and other scientific programmes involving amateur and professional skills.
3. To encourage and assist with the publication of results.
4. To maintain effective communication between wader enthusiasts within Australasia and with similar groups overseas.
5. To formulate and promote policies for the conservation and management of waders and their habitat.

MEMBERSHIP OF THE AUSTRALASIAN WADER STUDIES GROUP

Membership of the AWSG is open to anyone interested in the conservation and research of waders (shorebirds) in the East Asian-Australasian Flyway. Members receive the twice yearly bulletin *The Stilt*, and the quarterly newsletter *The Tattler*. Please direct all membership enquiries to the Membership Manager at Birds Australia (RAOU) National Office, 415 Riversdale Rd, East Hawthorn, 3122. Vic., AUSTRALIA. Ph: 03-9882 2622, fax: 03-9882 2677. Email: Membership@RAOU.COM.AU

Cover Illustration: Stephen Davidson

EDITORIAL

This is my second issue as editor of *The Stilt* and I feel that I am getting to grips with most of the tasks that confronted the previous editors like deadlines, inconsistent formats of text, bird names and figure layouts. Many of these problems will recur as many authors of manuscripts are not professional scientists and have access to only a limited range of graphing software or wordprocessors. However, being a basically lazy person, I have tried to lay out as clearly as possible, a set of detailed instructions to authors that I hope will result in more uniform formats of manuscripts submitted to *The Stilt*. We will republish these instructions, with any amendments, in the next issue and even numbered issues in subsequent years. In these instructions, I have tried to condense the essential elements of the layout Mike Weston developed during his period as editor. Where Mike had not imposed any specific style, I have taken the liberty to include my preferences, based on my work experience of a range of marine science journals. Please let me know if you identify any inconsistencies or ambiguous directions in these instructions so they are corrected for the next issue.

I have received a lot of positive and constructive feedback on the last issue of *The Stilt* and I appreciate those who have taken the time to write to me with their comments. This issue is a bit "light" because many of the main workers in the East Asian-Australasian Flyway are in Northwestern Australia banding large numbers of waders as they return from northern Asia. However, I think that a number of the articles in this issue are particularly interesting and highlight the diversity of topics and areas covered by the Flyway. The paper by Ming *et al.* updates the paper in 1997 by Barter *et al.* (*The Stilt* 31) and shows that the situation with hunting of birds in eastern China has deteriorated as the price for waders increases and more people turn to hunting for a living. This is presumably tied with the rising unemployment caused by a reduction in viable state-owned enterprises and the rising overall standard of living. The perception among the hunters that the numbers of waders are endless needs addressing by a public education campaign as endangered species like Spotted Greenshank *Tringa guttifer* are taken in the catches.

I hope that you all enjoy this issue and please try and make the time to put fingers to the keyboard and send any manuscripts that you think may contribute to our knowledge of waders in the region. No contribution is too small and minor personal observations can add enormously to our knowledge of waders.

Happy birding,

DAVID MILTON, *Editor*

WORDS FROM THE CHAIR.

Members will have noticed that I have taken over the chair from Mark Barter. It is thanks to his efforts over 12 years that the AWSG is in good shape and going strong. It is appropriate at this juncture to look at what the group is doing and where it should be going.

The longest term project of the AWSG is the Population Monitoring Project (PMP). Mark Barter reported on the shortcomings of this project in the April Stilt and Peter Driscoll has finalized an analysis of the Project for Environment Australia. The committee is at present working on ways that the Project can be improved and how cash funds can be raised to give it the professional leadership that it needs. Environment Australia has expressed interest in funding a pilot project to assess methods of improving data collection. They plan to run a small workshop on Population Monitoring of waders towards the end of the year with invited members from the AWSG and state WSGs. The PMP is one of the most important aspects of the fieldwork of the AWSG and has been crucial to our knowledge of wader populations in Australia, and hence their conservation. All those who are faithfully counting at their regular sites should not give up! Indeed lack of continuity at some sites has been one of the weaknesses of the project. The PMP is still up and running. It just needs improving

The Stilt has reached a quality in presentation and material which was undreamed of a few years ago. It is important that the AWSG and other state wader groups, which tend to publish papers from their work in Stilt, show that we can produce work of a high scientific standard. However this should not deter the less scientifically minded from publishing in Stilt. One of the policies of Stilt is to encourage the publication of work that is inconclusive, interim or incomplete, and written by amateurs. Data collection is useless, and in some circumstances irresponsible, if it is not published. It is only through the constant analysis and publication of the results of fieldwork that we can move forward in a positive way. The quality of Stilt and Tattler is also the best service we can give to our considerable overseas membership.

Dissemination of information, spreading of ideas and social contact between people interested in waders is very important. My personal wish is to hold annual or biennial AWSG conferences. The first of these will be held at Phillip Island in June 1999, and we are at the moment making arrangements to hold another conference in June 2000 at Brisbane within, and as an extension of, the Southern Hemisphere Ornithological Conference. Any states volunteering a venue for a 2001 conference?

Two million of the waders in Australia migrate to and from Asia. Money and effort used in protecting these migratory waders in Australia is of very limited value if the birds and their habitat are not sufficiently protected in Asia. The threats to wader populations there through hunting and especially land reclamation are very real and immediate. It is important to expand our activities into Asia, and work side by side with countries needing our expertise to teach about wader identification, counting and banding. We hope that in the future there will be more opportunities for Australian members to study waders within Asia. We are working actively to strengthen our ties with Asia and invite any Asian country to contact the AWSG if they need assistance with fieldwork.

The apparent decrease in membership related elsewhere in this copy of Stilt begs the question as to whether the policies of the group are out of tune with the wishes of the members. The distribution of the membership shows that it is strongest where there are active and independent state wader study groups as, for example, in Victoria. Field work and the companionship of others who have similar interests is the motivation for many. However, because of the tyranny of distance, some are isolated from the main stream of the work of the wader groups. Ideally the AWSG would like to see active wader study groups in all states. Members are invited to submit their views on what direction they feel the AWSG should be moving.

Jim Wilson.

AWSG MEMBERSHIP STATISTICS

There are three types of membership within the AWSG: paying members, complimentary members, and members supported through funding from Environment Australia. The complimentary members are mostly libraries and institutions. Members funded by Environment Australia are chosen by the Wetlands International Canberra Office and are mostly in South-East Asian countries.

As of 15 July 1998, the distribution of non-funded members was as follows:

In Australia:	
Australian Capital Territories	11
New South Wales	40
Northern Territories	3
Queensland	31
South Australia	11
Tasmania	9
Victoria	60
Western Australia	21
Total Australia	186

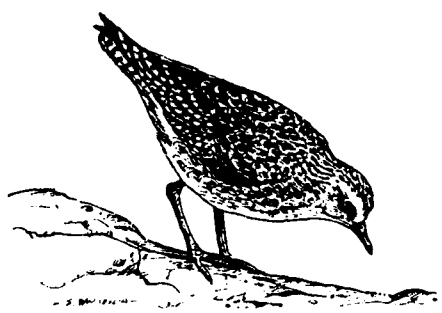
Outside Australia:	
New Zealand	16
USA	9
UK	8
Netherlands	6
Germany	4
Hong Kong	3
Japan	2
Taiwan	2
Singapore	2
Canada	2
South Africa	1
Total overseas	54

The distribution of complimentary and funded members was: Australia 14, China 11, Russia 10, Japan 8, Malaysia 6, Hong Kong 5, India 5, Indonesia 5, Bangladesh 4, Phillipines 4, New Zealand 3, Republic of Korea 3, Taiwan 2, Sri Lanka 2, Thailand 2, Vietnam 2, Pakistan 2, Singapore 1, Cambodia 1, Kazakhstan 1, Micronesia 1, Myanmar 1, Papua & New Guinea 1, Republic of Palau 1, USA 1, UK 1, Netherlands 1, Germany 1, South Africa 1, Denmark 1, Ukraine 1. Total 102.

Total membership was 342, of which 102 were non-paying members. Members come from 32 countries. We are very grateful for the support of Environment Australia in recognising the importance of sending the publications of the AWSG to interested groups and organisations within the East-Asian Australasian Flyway, who could not afford to join the group. We hope that this support will continue in the future. Wetlands International and AWSG are reviewing the list of non-funded members.

67 (28%) of the paying members included in the above list had 'lapsed' up to mid-July 1998. We hope that the reminders sent out in June with *The Stilt* will encourage members to resubscribe.

Jim Wilson.



The Stilt 33 (1998): 3–9

MOULT, AGE STRUCTURE, BIOMETRICS AND SUBSPECIES OF LESSER SAND PLOVER *CHARADRIUS MONGOLUS* WINTERING ALONG THE SOUTH-EAST COAST OF INDIA.

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ABSTRACT

This paper provides information on the population, moult, biometrics and subspecies of Lesser Sand Plover, *Charadrius mongolus*, banded during winter at the Gulf of Mannar (GOM) and the Great Vedaranyam Swamp (GVS) on the south-east coast of India between 1985 and 1992. Four subspecies of Lesser Sand Plover belonging to the two racial groups (all three central Asian races of the *atrifrons* group and the eastern Siberian race *C. m. stegmanni* from the *mongolus* group) are known to winter in southern India. The dominant subspecies is the himalayan race *C.m.atrifrons*. Counts of up to 13,000 Lesser Sand Plover were recorded at the Gulf of Mannar and most of these were birds in adult plumage. Lesser Sand Plover showed strong site fidelity, returning to the same site each year. We found that the interannual recapture rates at Gulf of Mannar varied between 4 to 5.2%, whereas the recapture rate was 7 to 8% at Great Vedaranyam Swamp. There were two different moult strategies among the birds we ringed. One group commenced moulting soon after arriving in southern India, while the other group had started their primary moult before arriving. Birds began arriving in late August and departed in April. During the departure period, the birds were much lighter than that recorded for Lesser Sand Plovers wintering in Australia. This is probably because the distances between the breeding and wintering sites of the himalayan race are much shorter than those flown by the east siberian races wintering in Australia. The high proportion of adult birds in the catches in all years was probably due to the long lifespan of Lesser Sand Plover.

INTRODUCTION

Cramp and Simmons (1983) grouped the five subspecies of Lesser Sand Plover *Charadrius mongolus* under two groups namely *mongolus* (east siberian) and *atrifrons* (Central Asian). Nominate *C.m.mongolus* and *C.m.stegmanni* races are part of the *mongolus* group, and *C.m.schaeferi* (west Chinese race), *C.m.atrifrons* (Himalayan race) and *C.m.pamirensis* (western race) come under the *atrifrons* group. The east siberian group winters mainly in China, Philippines, eastern Indonesia, melanesian islands and Australia; the west Chinese race winters in Gulf of Siam, Malaysia and western Indonesia; the himalayan race winters in Sumatra and around the Bay of Bengal; and the western race winters in western India, Pakistan, Arabian Sea, Persian Gulf, Seychelles and eastern Africa south to South Africa and Namibia.

The himalayan race breeds in Ladakh in China on the Tibetan plateau at between 3900 and 5500 m. It is an abundant winter visitor, perhaps the commonest wader on the seaboard from Makran and Sind in Pakistan around the entire peninsular to West Bengal and Bangladesh (Ali & Ripley 1983).

In spite of its abundance in India during winter, little information is available on the wintering ecology of this species. Balachandran and Natarajan (1992) reported the possible occurrence of four subspecies at Great Vedaranyam Swamp and Balachandran and Hussain (1994) recorded the longest lifespan of this species. This paper provides information on subspecies, primary moult, biometrics and age structure of the Lesser Sand Plover wintering along the south-east coast of India based on the bird ringing data collected at the Gulf of Mannar and the Great Vedaranyam Swamp between 1985 and 1992.

STUDY AREA

The Gulf of Mannar (GOM) and the Great Vedaranyam Swamp (GVS) are situated about 200 km apart along the southern Bay of Bengal coast. Regular wader trapping was carried out at these two stations throughout the wintering season. Although these two study sites are located along the south-east coast, the habitats varies considerably as GOM has mostly natural intertidal sandy areas with coral islands, while GVS has extensive mudflats and saltpans. As this species prefers sandy areas to mudflats, more plovers were caught in the GOM than at GVS. For more description of each site see Sampath and Krishnamurthy (1989) and Balachandran (1997). Short term bird ringing was also conducted at Kaliveli and Pulicat lakes further north of these two study areas (Figure 1).

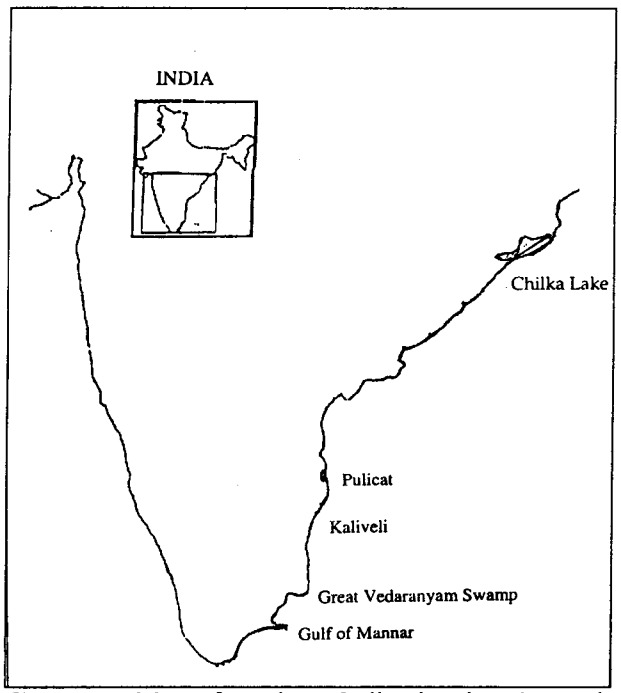


Figure 1. Map of southern India showing the study sites.

MATERIAL AND METHODS

Over 2,400 birds were aged, measured and examined for primary moult at GOM in four seasons (1985-86, 1986-87, 1987-88 and 1990-91), and 1,200 individuals at GVS between 1988-89 and 1991-1992 seasons. Prater *et al* .(1977) and Snow (1967) were followed for ageing and moult scoring, respectively. For the details of the terms: first-year, adults, winter, autumn, spring, and season see Balachandran (1997). Longevity was obtained by calculating the time lapse between the ringing and recapture dates of retrapped birds. Subspecies were recognised using biometric data (wing - tarsus ratio) Cramp & Simmons (1983) and Lane (1986), and partial pre-breeding plumage during spring. The ages of Lesser Sand Plover ringed at Kaliveli Lake (in 1988-89 and 1990-91) and Pulicat Lake (1988-89) have been included in this paper for comparison. The term moult generally refers to primary moult unless it is mentioned otherwise. Seasonal population fluctuation of this species were based on bird count data collected during the first three seasons at GOM.

RESULTS

Population fluctuation

The Lesser Sand Plover is an abundant winter visitor to the south-east coast of India that arrive in late August and depart in April. Some adults in partial breeding plumage, along with hundreds of first-year birds, summer both at GVS and GOM. The seasonal fluctuations in counts of this species had been studied at GOM for three seasons from 1985-86 to 1987-88. Although the birds are seen throughout the year their numbers fluctuate within the season. Maximum were generally observed in September/October and February corresponding to the autumn and spring passages (Figure 2).

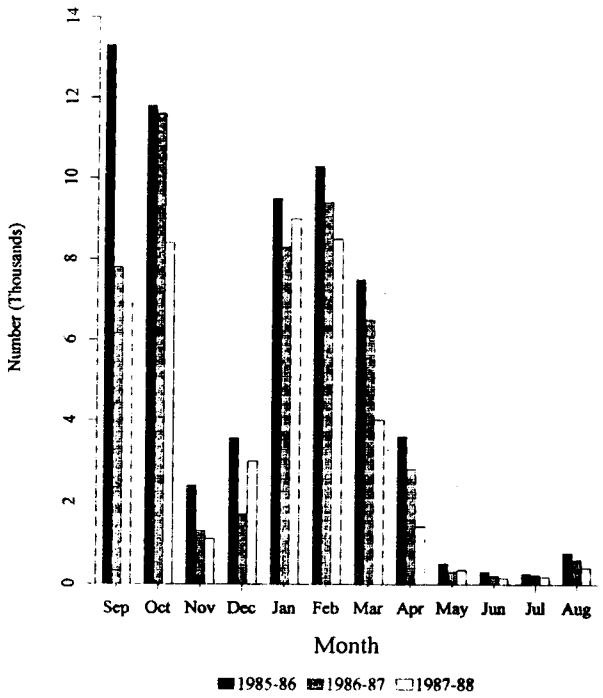


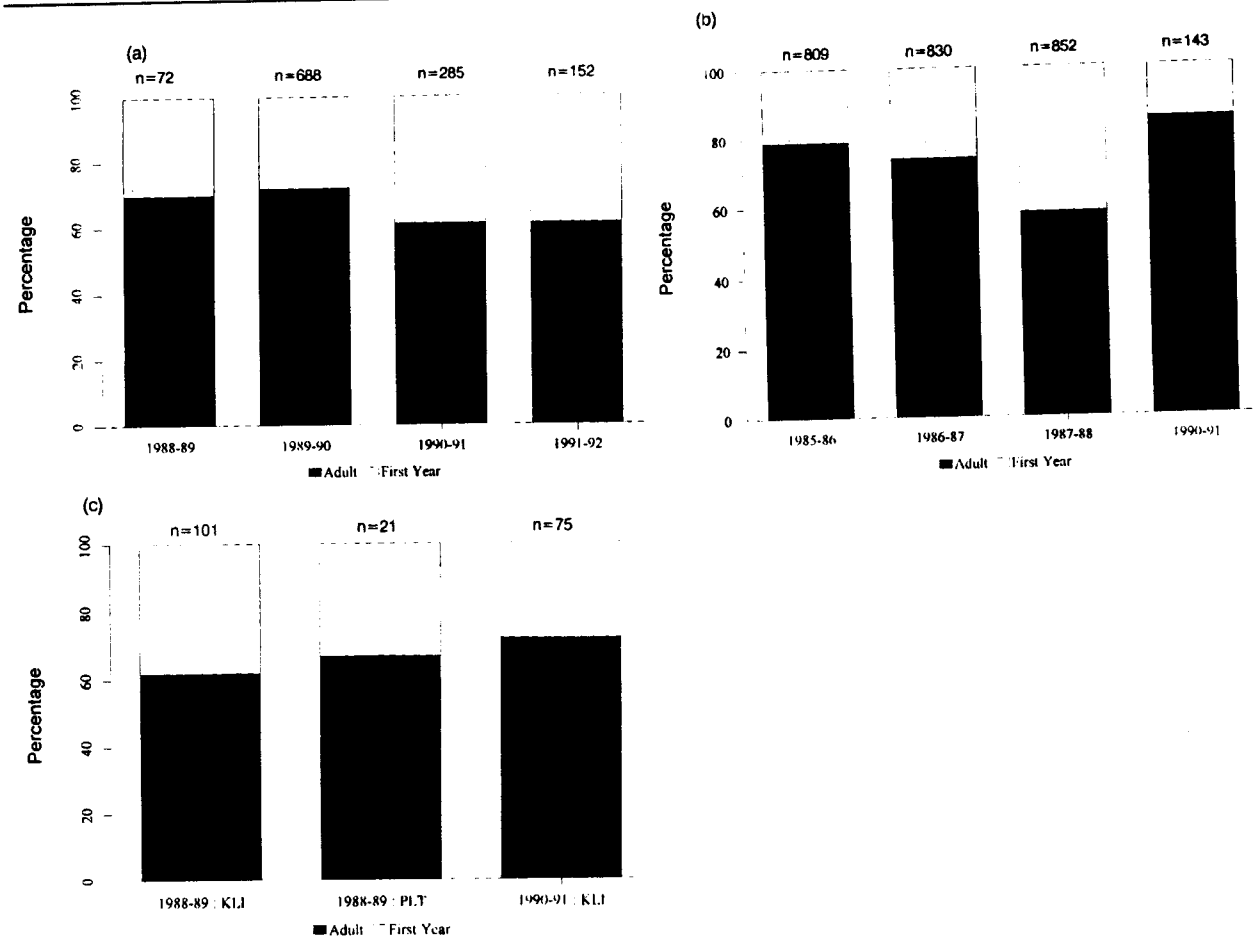
Figure 2. Population fluctuations of *C. mongolus* at Gulf of Mannar between 1985 and 1988.

Age Composition

Estimates of the proportion of juvenile birds were calculated for four seasons when a large number of birds were ringed at GOM (1985-86, 1986-87, 1987-88, 1990-91) and GVS (1988-89, 1989-90, 1990-91, 1991-92). Adult/juvenile ratio was very similar (61:39) for the 1990-91 and 1991-92 seasons at GVSand did not vary much during 1988-89 and 1989-90 (Figure 3a). The proportion of first-year birds at GOM was highest (42%) in 1987-88 and lowest (15%) in 1990-91 (Figure 3b). However, the proportion of first-year birds was lower than the adults in all the years at all the study sites (Figure 3 a, b & c).

Primary moult

The adults caught during September had moult scores ranging between 0 and 50. This variation was not only due to the different adults age groups, but also due to the differences between races originating from different regions. At least two groups were recognised, one group commenced moulting soon after they arrived, These birds had a moult score between 2 and 8, with the 2-3 innermost primaries in growth during early September.



KLI=Kaliveli, PLT=Pulicat,

Figure 3. The proportion of adult and juvenile *C. mongolus* at (a) Great Vedaranyam Swamp, (b) Gulf of Mannar and (c) Pulicat and Kaliveli between 1988 and 1992.

The other group arrived in southern India with active moult that had started elsewhere, either at the breeding site, or on passage. Retrap data showed that the adults with advanced scores and completed moult with fresh primaries during September and October are second year birds. It is apparent that birds that arrive here in active moult complete it from late January to February. Whereas the birds that started their moult after arriving at GOM took until April before it was complete. The pattern was similar for the birds wintering at GVS (Figure 4a & b). The first-year birds did not commence their moult until January. A few of them (1.5%) commenced it by early February and this rose to 13% and 30% of the first-year birds in March and April. The presence of some first-year birds with the moult score between 0-5 until April indicates that moulting period varies considerably and the majority of young birds leave the wintering ground with old primaries. Most of the juveniles commenced the moult from the innermost primary and some of them from the middle primaries (5th to 7th), and one individual commenced it from the outermost primary.

During September to October, a few second-year birds were noticed to start their second moult from the middle primaries. Similarly, from February to April, some adults were observed in their second moult. Generally, birds in second moult had fresh primaries. The estimated moult duration is over 200 days, based on the feather growth rate of retrapped birds. This long duration was mostly due to arrested moult in most birds. Some retrapped birds had the same moult score even after 30 days.

Retrap and Recovery

Out of the 805 birds ringed in the 1985-86 season at GOM, 42 (5.2%) and 34 (4.2%) were retrapped in the 1986-87 and 1987-88 seasons, respectvely. Similarly, out of the 790 birds ringed in the 1986-87 season, 30 (4%) were retrapped. The percentage of retraps from the previous seasons were 7-8% at GVS. Two interesting retraps of this species at GVS were one after 18 years and the other after 20 years and three months. This is the longest recorded retrap interval for Lesser Sand Plover (Balachandran & Hussain 1994). The number of individuals retrapped after 10 years was highest for this species among all the wader species ringed at GVS. This

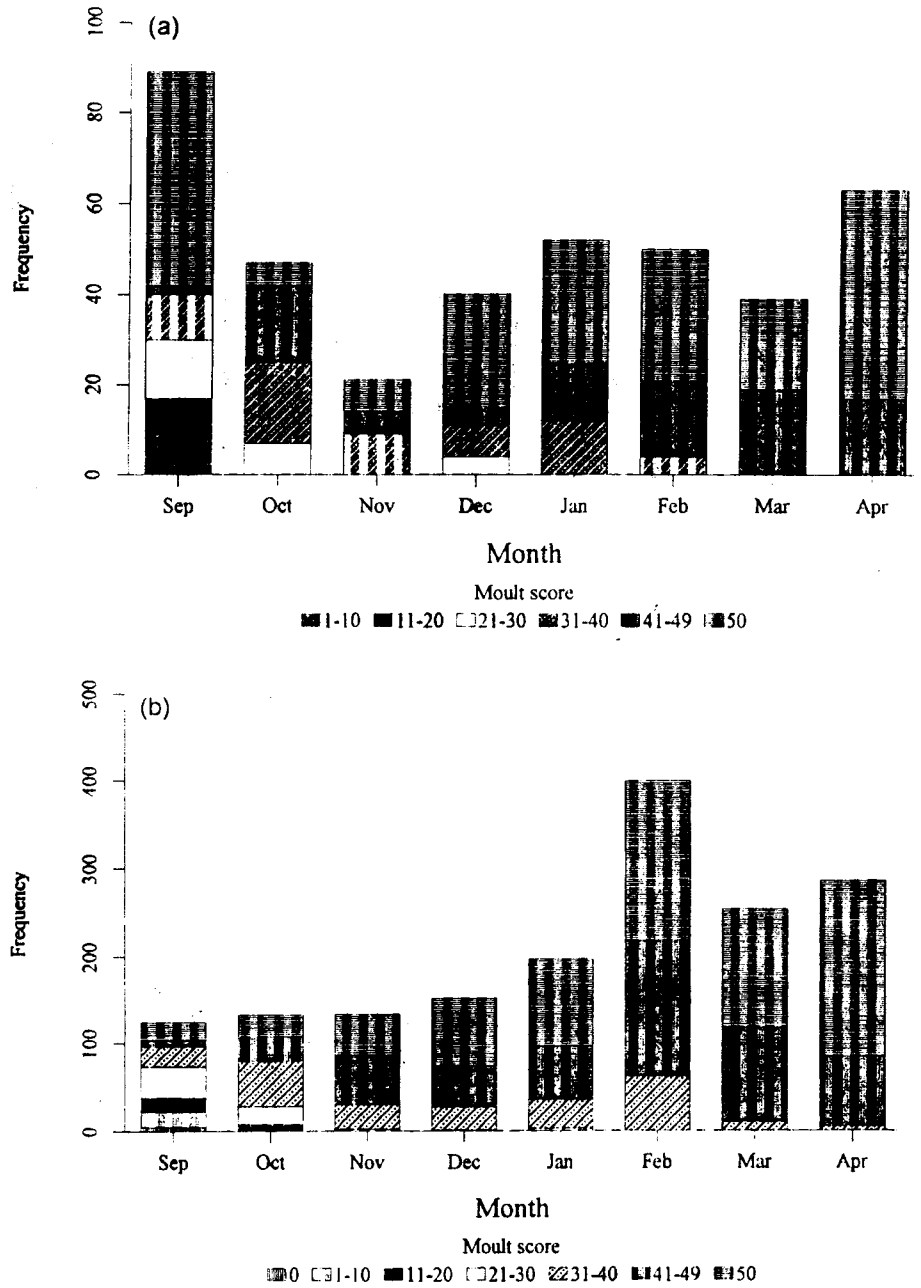


Figure 4. Seasonal changes in the moult score of *C. mongolus* at (a) Great Vedaranyam Swamp and (b) Gulf of Mannar.

higher percentage of retraps at GVS is partly due to the fact that bird ringing started here in 1979 but also this species relative longevity. This also shows that Lesser Sand Plover display strong site-fidelity to the wintering areas.

A total of eight birds ringed in earlier seasons at GVS were recovered at GOM. Similarly four GOM ringed birds between 1985 and 1988 were recovered in the subsequent seasons at GVS. But none of the birds ringed at either site were recovered at the other site in the same season. Birds ringed at GVS were recovered at Kaliveli during the spring passage, both in the same and subsequent seasons.

Biometrics

The measurements of wing, bill and tarsus (Table 1) are within the range of the measurements given by other authors (Cramp and Simmons1983, Ali and Ripley 1983, Prater *et al.* 1977). The frequency distribution of wing , bill and tarsus lengths are given in figure 5 a, b & c.

Table 1. Measurements (mm) of Lesser Sand Plover caught at Gulf of Mannar, south-eastern India between 1985 and 1991 (S.D. = Standard deviation).

		Range	Mean	S.D.	N
Wing	Adult	118-137	127.4	3.0	1297
	First-Year	117-135	124.3	3.0	703
Bill	Adult	17-20	18.6	0.8	1578
	First-Year	16-21	18.3	0.8	706
Tarsus	Adult	29-37	33.8	1.6	1563
	First-Year	30-37	33.1	1.5	702

Subspecies

The five known subspecies are generally grouped under the two groups, *mongolus* and *atrifrons*, based on wing/tarsus ratios (>4.1= *mongolus* and <4.1= *atrifrons*) and wing/bill ratios (>7.70= *mongolus* and <7.70= *atrifrons*) and bill length/ bill depth ratio (Cramp & Simmons 1983, Hayman *et al.* 1986, Lane 1986, Barter 1991). In this study we did not measure the ratios for all the individuals. Out of the 2400 birds ringed at GOM, the wing/tarsus ratios were calculated for the birds measured with the tarsus length of 30 and 31mm. Of the birds with 30 and 31 mm, 80% and 40% of them have wing/tarsus ratio >4.1 and fall into the *mongolus* group. To calculate the ratio for the first-year birds 3 mm were added to the original wing length, as suggested by Hayman *et al.* (1986). Balachandran and Natarajan (1994) reported the occurrence of *stegmanni*, *schaeferi* and *pamirensis* based on the measurements, wing/tarsus, wing/bill, bill length/depth ratios and breeding plumage pattern (only for *pamirensis*). Birds with longer bill (20 and 21 mm) probably belong to the race *schaeferi*.

Weight changes

There was no significant variation in the monthly mean weight from September to April as it ranged from 46-58g. Maximum mean weight of 58g was observed in September which declined to 46g in October and was maintained between 53-57g until April. The heaviest bird handled was 81g during the last week of March. The individual weight varied between 45-81g. This is very much lower than that observed in Australia, where Victorian adults weighed 64g on average, in the November /January period and increased to 104g in April (the heaviest weighed 110g). North-western Australian birds attain a mean weight 83-85g (heaviest 105g) before leaving for the breeding grounds (Barter 1991).

DISCUSSION

The measurements of wing , bill and tarsus of Lesser Sand Plover wintering at GOM are within the range of the measurements given by other authors from various places. However, at GVS the tarsus length 27.5 mm obtained for the only indvidual of *stegmanni* is not falling under the measurements given by Cramp and Simmons (1983) and Ali and Ripley (1983), but within the range (27-34 mm) *mongolus* group's measurements given by Prater *et al.* (1977). Barter (1992) mentioned that among the *mongolus* group, the tarsus length of *stegmanni* is 2 mm shorter than *mongolus*. It also confirms the identity of *stegmanni*, as 27.5 mm is the minimum range of *mongolus* group. The average wing length of Australian birds (adult 136-139 mm, first-year 130.4 mm) given by (Barter 1991) are 8-11mm shorter than GOM bird (Table 1), also indicating that the racial group wintering in southern India are mostly *atrifrons*. The occurrence of birds of the east Siberian *mongolus* group along the south-east coast of India is also possible, because other species in the East Asia -Australasian Flyway that breed in eastern siberia, such as Large Sand Plover *Charadrius leschenaultii* (Balachandran *in press*), commonly occur here. Great Knot *Calidris tenuirostris* and the eastern subspecies of Knot *Calidris canuta rogersi* have been confirmed in south-east India (Balachandran *in press*). Cramp & Simmons (1983) suggested that the races *C.m. pamirensis* and *C.m.atrifrons* mix in western India, and *C.m.schaeferi* and *C.m.atrifrons* mix in Sumatra. But racial mixing of both these groups are possible on the east coast of India and this will be further confirmed with detailed biometric data analysis. The first-year birds in Australia were only known to commence their primary moult from the innermost primary (Barter 1991). We found that some started moulting from the middle primaries instead. Some adults were observed with the two to three innermost primaries growing simultaneously and is contrary to the statement of Cramp & Simmons (1983) that only after the innermost primary is renewed do the other primaries start growing.

Birds wintering in GVS and GOM weighed much less than those wintering in Australia, which is probably due to the differences in distances being covered during their flight to the breeding grounds. This kind of weight difference between two wintering sites was also observed in two other wader species, Greater Knot *Calidris tenuirostris* (Balachandran 1997) and Large Sand Plover *Charadrius leschenaultii* (Balachandran *in press*). The weight at departure time in Victoria, Australia was 86% heavier than in southern India. The southern Indian wintering birds mostly belong to the himalayan *C.m.atrifrons* race. These birds have to cover less than one fourth distances to reach the breeding grounds compared to those wintering in Australia (east siberian *mongolus* group). Hence, they do not need to gain as much weight and can stage at other coastal wetlands further north along the east coast of India. The recoveries of GVS ringed birds at Kaliveli and Chilka lakes also confirm this fact. The weight pattern further confirms that the races wintering in southern India and Australia are different.

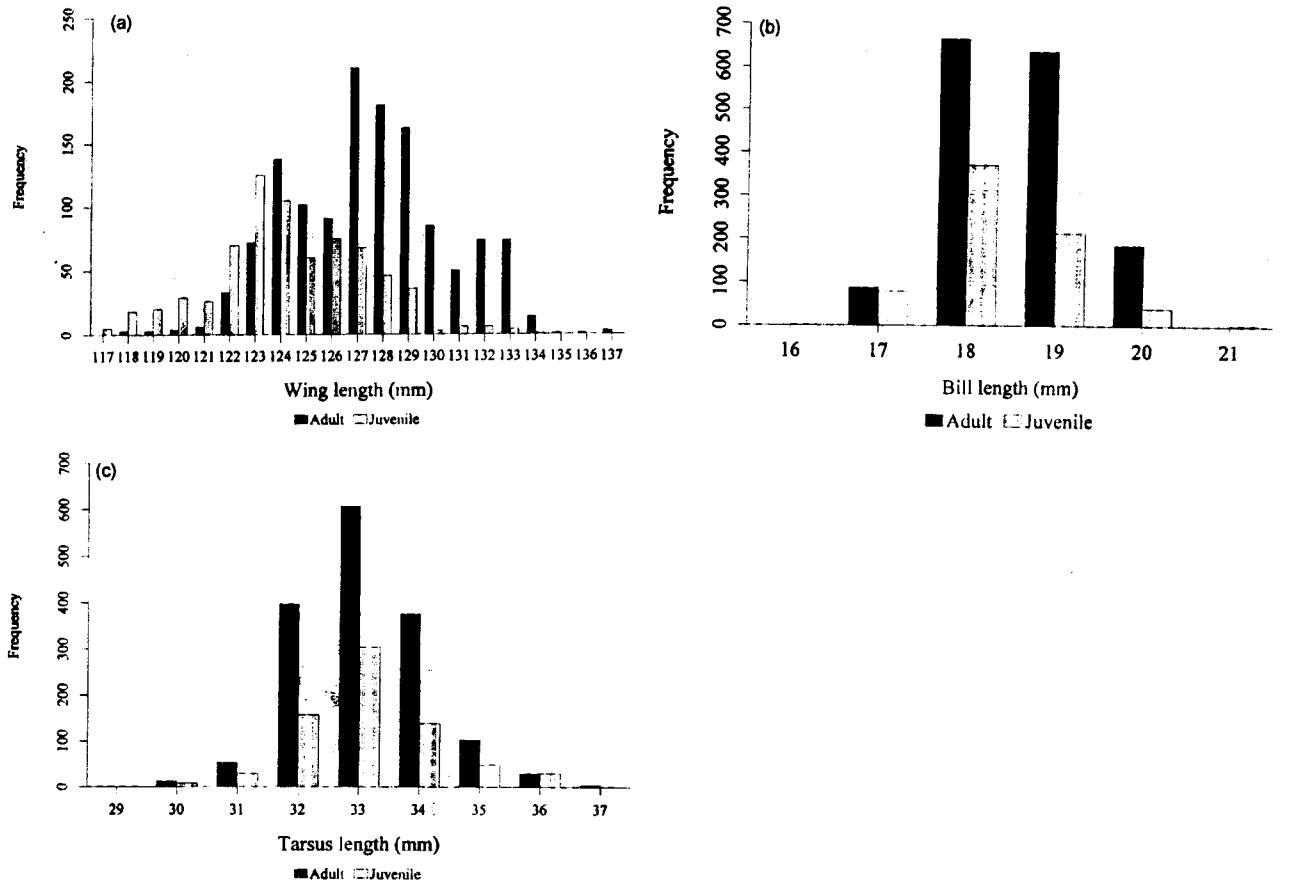


Figure 5. The combined frequency distribution of (a) wing length (mm); (b) bill length (mm) and (c) tarsus length (mm) of adult and juvenile *C. mongolus* at all sites.

Adult Lesser Sand Plover outnumbered the first-year birds in catches in all the years at all sites. This pattern is in contrast to the proportion of first-year birds in two other common waders, Little Stint *Calidris minuta* and Curlew-Sandpiper *Calidris feruginea,* that fluctuated considerably from 10-76% (Hussain 1992). This fluctuation was mainly due to changes in the breeding success rate which was also influenced by the lemming density in the Arctic tundra. It is obvious that Indian Lesser Sand Plover differ in their breeding origin (subspecies wintering here breed in the himalayas) from these species, and hence may have a different the age composition. Moreover, species with a long lifespan will have higher proportion of adults than species with a shorterr lifespan. As Lesser Sand Plover appear to be longer-lived (20 years, 3 months) than Little Stint (11 years) and Curlew-Sandpiper (12 years) (Hussain 1992), it is not surprising that there is a smaller proportion of first-year birds than adults. This may also be attributed to the clutch size. The clutch size of Lesser Sand Plover is normally three (Ali & Ripley 1983), which is smaller than Little Stint which usually has four eggs and sometimes up to eight (Cramp & Simmons, 1983). Hence, the proportion of young birds in the Little Stint population can reach over 75% during years when breeding success is high.

ACKNOWLEDGEMENTS

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DECLINE IN MIGRATORY WADERS AT PELICAN POINT, SWAN RIVER, WESTERN AUSTRALIA

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ABSTRACT

Since 1971, waders at Pelican Point on the Swan River, Western Australia have been counted weekly during the months of November to February. The numbers of five migratory wader species, Bar-tailed Godwit, Red-necked Stint, Curlew Sandpiper, Sharp-tailed Sandpiper and Grey Plover, have declined during the 26 year study. There has also been a slight overall reduction in the numbers of Great and Red Knots and for the resident Red-necked Avocet. The numbers of Red-capped Plover and Black-winged Stilt have stayed fairly constant. Only Greenshank has been seen more frequently. Twenty years ago, 1,000 Red-necked Stint and Curlew Sandpiper were frequently present at one time; now 100 birds are rarely seen together. The numbers of other species are smaller and more variable. It is concluded that the decline in numbers is due to a decrease in the number of birds reaching the Swan River rather than changes at Pelican Point.

INTRODUCTION

Pelican Point is a sandy spit projecting into the Swan River at Crawley, 6 km west of the centre of Perth. Each year many waders arrive in Australia after travelling south across the equator from their breeding sites in the Arctic Tundra (Hayman *et al.* 1986). Together with a few species that breed in Australia, some of these birds collect in the Swan River Estuary. Detailed wader records from the Swan River including Pelican Point were first published in 1921 (Alexander 1921) and the point was the centre of several years' investigation by Serventy and his colleagues (1938, 1962) and a detailed survey was carried out in 1966-68 (Job 1972).

We have already published records of waders seen at Pelican Point for the 20 years from 1971-1992 (Bailey and Creed 1993). We concluded that the same species of waders were seen in 1991 as in 1971 but some species were seen less often. Since then, there has been much anecdotal evidence that wader numbers on the Swan River have declined but no published records to support this. We have therefore investigated the wader counts for the subsequent six years, up to 1998, and reanalysed the earlier data. This time we have concentrated on the 4 months (November to February) when migratory species are present so that we could make a more accurate comparison with the abundance of local species. In particular, we have analysed the frequency when a species was seen in the 26 years and the number of individuals observed on any visit.

METHODS

One or more visits were made to Pelican Point in most weeks from November to February in the 16 years from 1971 -1998 (except 1975-76). These counts usually occurred at 5.30 pm on a weekday with 13 - 25 visits each year. In 1975-76 only 6 visits were made. During each visit, all bird species were recorded and the numbers of each wader species was counted. If more than 100 birds were present, an estimate was made by comparing the total area occupied by the group with the area occupied by 50 or 100 birds. A detailed analysis of the 11 wader species (8 migratory, 3 local species) (Table 1) was carried out in order to assess any changes in the frequency (% visits present) and numbers per visit over the 26 years. In addition to recording the data for each separate year, the average for successive 5 year periods was calculated (moving 5 year average) to make overall trends more obvious.

Of 23 species of wader seen between 1971 and 1982, 10 occurred in 18 or more years. Sharp-tailed Sandpiper *Calidris acuminata* was seen in 14 years and Great Knot *Calidris tenuirostris* in 16 years, whereas other species occurred in 2-8 years (Bailey and Creed 1993). The Common Sandpiper *Actotis hypoleucos* (18 years) was not included in the present analysis because a single bird tended to be present for several weeks in succession then absent for long periods. The records for Great Knot and Red Knot (19 years) were amalgamated because of the difficulty in telling the two species apart in the field with certainty. The Sharp-tailed Sandpiper was included since it was earlier reported to be the third most common species of wader on the point after Red-necked Stint *Calidris ruficolis* and Curlew Sandpiper *Calidris ferruginea* (Serventy 1938; Serventy 1948).

RESULTS

Habitat

Pelican Point is a triangular area of about 2 hectares on the northern shore of the Swan River (Fig 1). It has been separated from adjacent public open space since 1976 when a 500 m long fence was built to limit access to the general public. The other two sides have sandy beaches. The area contains a lagoon, which fills up through the ground at high tide, and a variety of vegetation, including sedges round the lagoon and *Eucalyptus rudis, Melaleuca cuticularis* and *Callitris preisii* (Teatree) near

Table 1. Percentage of visits when migratory and local waders were seen in November to February 1971/72 and 26 years later in 1997/98

Species		1971-72 %	1997-98 %
Migratory waders			
Bar-tailed Godwit	*Limosa lapponica*	86	0
Common Greenshank	*Tringa nebularia*	48	58
Red and Great Knots	*Calidris canutus & C. tenuirostris*	62	6
Red-necked Stint	*Calidris ruficolis*	90	67
Sharp-tailed Sandpiper	*Calidris acuminata*	48	6
Curlew Sandpiper	*Calidris ferruginea*	76	17
Grey Plover	*Pluvialis squatarola*	90	28
Local waders			
Black-winged Stilt	*Himantropus himantropus*	43	78
Red-necked Avocet	*Recurvirostra novaehollandiae*	52	0
Red-capped Plover	*Charadrius ruficapillus*	86	83

the fence. The beaches lie between the river and low sand dunes sparsely covered with *Trachyandra divaricata* and various grasses. In 1990, Pelican Point, together with Alfred Cove and Milyu on the south side of the river, were made into the 'Swan Estuary Marine Park' for the protection of waders. Since then the only major change has been slight erosion of the sandy point and partial removal of introduced plant species such as *Leptospermum laevigatum* and *Casuarina glauca*. The use of the adjacent river for recreation has increased. In particular wind surfers periodically land on the sandy beach and motor boats pass within 100m of the point.

Frequency of occurrence

Most species of migratory wader were seen on fewer visits in 1997-8 compared with 1971-2 (Table 1). For four of these species (Fig.2), a marked decline occurred over several years, but the years when maximum declines occurred were different for each species. A steep drop occurred after about 1973 for Bar-tailed Godwit *Limosa lapponica*, 1981 for Grey Plover

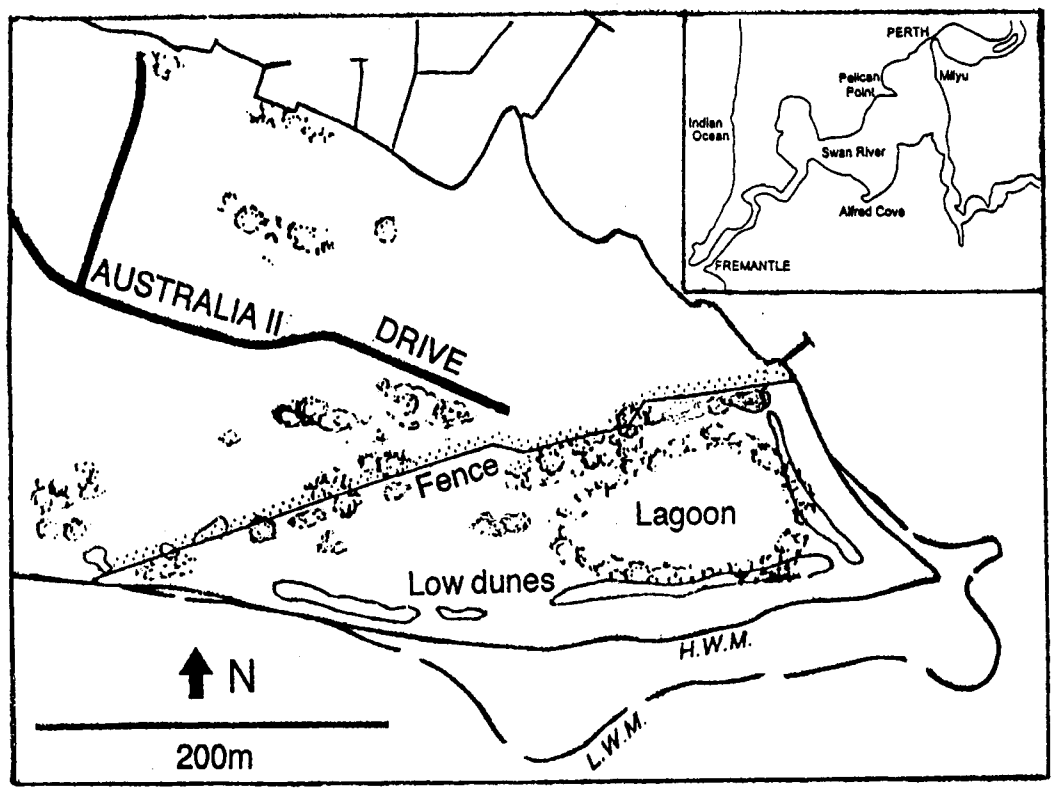

Figure 1: Pelican Point on the Swan River showing the fence and lagoon with associated vegetation. Most waders are seen on the beach south of the point or in the lagoon.

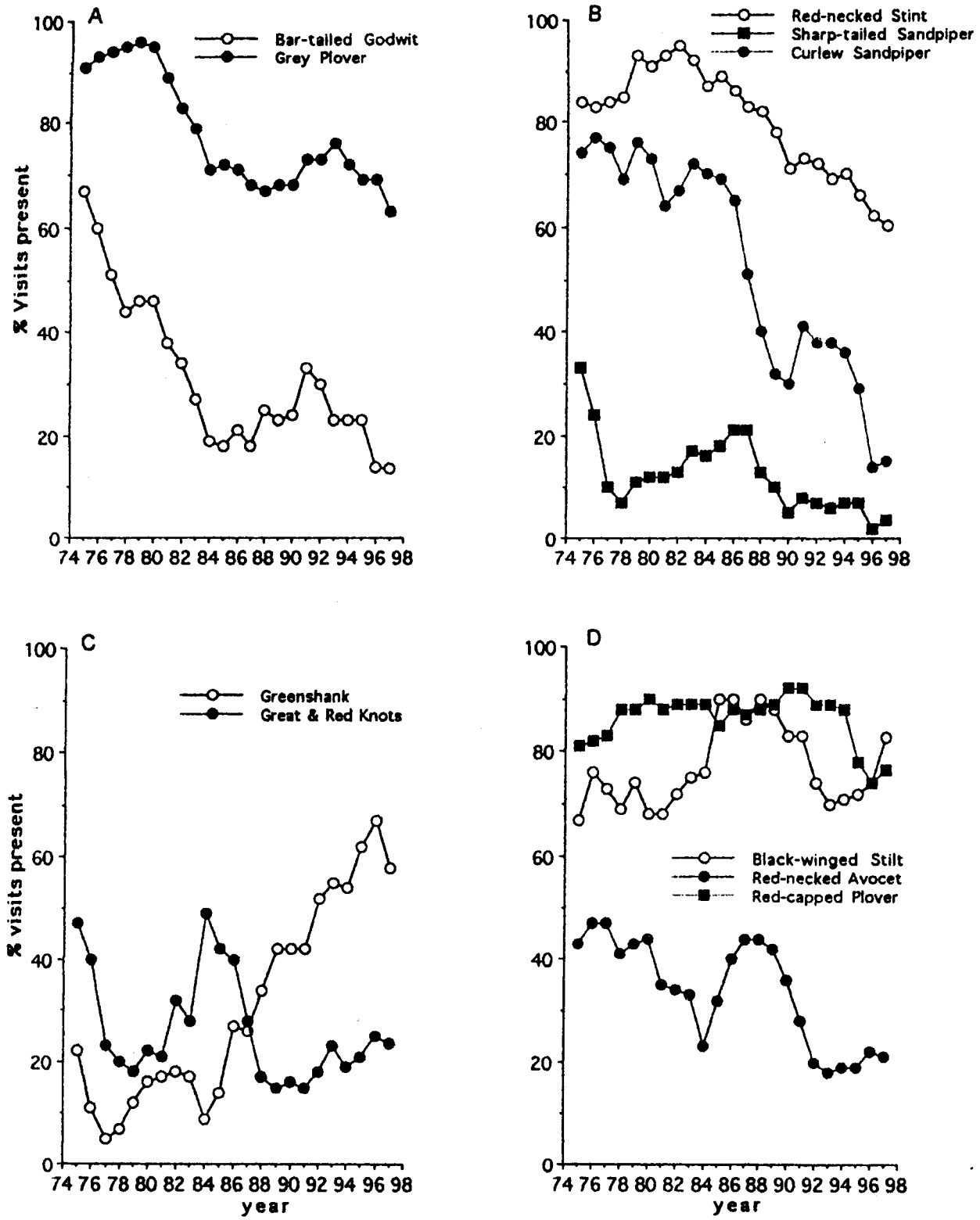

Figure 2: Frequency of occurrence of migratory (A, B and C) and local (D) waders recorded at Pelican Point during weekly visits from November to February. Each point represents the mean over five years up to the year indicated.

Pluvialis squatarola, 1985 for Curlew Sandpiper and 1988 for Red-necked Stint. For all four species there was a slight but transient recovery in 1991. Sharp-tailed Sandpiper were present on 48% and 59% of visits in 1971 and 1972 and subsequently they were only seen on more than 25% of visits in two years. The highest frequency of occurrence was in 1991 (28%) and no birds were seen in 10 of the years. The Red and Great Knots rallied for several years before becoming rare. Only one migratory migrant, Common Greenshank *Tringa*

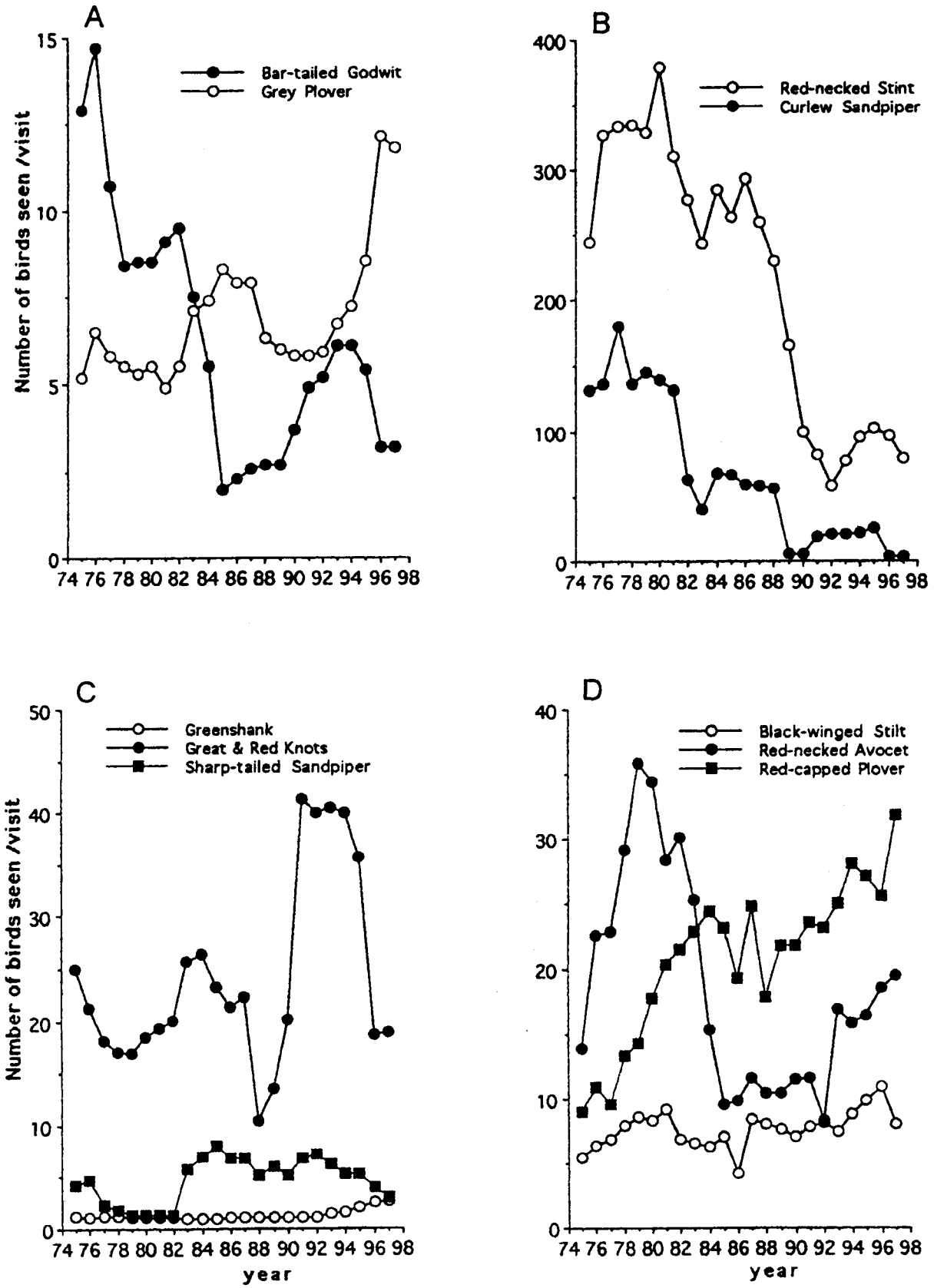

Figure 3: Average number of birds seen on each visit when present in November to February. Each point represents the average of all counts for 5 years up to the year indicated.

nebularia, was seen more frequently in recent years, a steep increase occurring from 1984.

Of the three local species Red-necked Avocet *Recurvirostra novaehollandiae* declined overall but it showed considerable fluctuations. Red-capped Plover *Charadrius ruficapillus* has been relatively constant until the last 2 years, whereas Black-winged Stilt *Himantropus himantropus* showed some increase between 1971 and 1991 but decreased in 1992.

Number of each species

Several hundred Curlew Sandpiper and Red-necked Stint were frequently seen during visits in the first 10 years. However, recently it would be unusual to see even 100 birds at one time (Fig 3). During the 26 years, Bar-tailed Godwit have declined from more than 20 per visit to less than 10. Average numbers of Knots, Grey Plover and Sharp-tailed sandpiper were always small but have all shown a slight increase over the 26 years (Fig 3). Likewise it was unusual to see more than 2 Greenshank until recently when more birds were seen. Of local resident species, Red-capped Plover and Black-winged Stilt have increased over the years whereas Red-necked Avocet initially increased then decreased again to an average of 10-20 birds since 1985.

DISCUSSION

Over 26 years there has been an overall decrease in numbers of waders at Pelican Point and also the frequency that a particular species is seen in the four month period November to February. The decline started in different years for four migratory species. Furthermore, Sharp-tailed Sandpipers were the third most frequently seen species by Serventy (1938;1948) and the high values for 1971 and 1972 suggest that the frequency may have declined just prior to the start of our observations. Of the migratory species only the Greenshank has been seen more often in recent years. The numbers of individuals of Curlew Sandpiper, Red-necked Stint and Bar-tailed Godwit seen on each visit has shown a marked drop over the past 26 years.

The reduction in birds could be due to conditions on the Swan River, changes at the feeding/roosting stops through East Asia or in the breeding areas in the Arctic. Pelican Point has changed little in the past 20 years and appears to remain attractive to waders since Greenshank have occurred more often in recent years and two local resident species, Red-capped Plover and Black-winged Stilt, have been seen on 65 to 90 % of visits throughout the 26 years. Furthermore a greater number of individuals of these species has been recorded when they are present. This suggests the decline is probably due to numbers arriving rather than local changes at Pelican Point. This conclusion is supported by the impression that there are generally fewer waders on the Swan River and coastal regions of Western Australia.

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SHOREBIRD NUMBERS IN THE HUANG HE (YELLOW RIVER) DELTA DURING THE 1997 NORTHWARD MIGRATION

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ABSTRACT

Analysis of the most comprehensive shorebird count data ever obtained for the Huang He Nature Reserve and adjacent wetlands confirms the outstanding importance of the area for migratory shorebirds in the East Asian-Australasian Flyway. On the basis of this information, it is believed that the Huang He delta supports at least 500,000 shorebirds during northward migration. The annual total may well be double this, when southward migration numbers and non-breeding populations are taken into account. The delta is internationally significant for at least 15 shorebird species. This number will almost certainly increase as additional data is obtained. Substantial numbers of Little Curlew were found, making the delta region the first significant northward migration staging site discovered for this species. Potentially significant threats to shorebird usage of the region are intensive oil exploration and extraction activity, and the large reduction in river flows due to upstream water diversion.

INTRODUCTION

The Yellow Sea is probably the most important region in the East Asian-Australasian Flyway for many species of shorebirds preparing for their final flight into the breeding grounds in Far East Russia (Wilson and Barter 1998). However, count data from the region are limited and there is an urgent need to obtain more information so that effective conservation action can be taken.

The Huang He (Yellow River) delta has been shown to be of particular importance for migratory shorebirds (Wang *et al.* 1991, 1992) and we were fortunate to be able to carry out a comprehensive count of shorebirds in the Huang He Nature Reserve, and adjacent wetlands, from 18 April to 1 May 1997, as part of a China-Australia cooperative programme of shorebird survey and training involving staff of the Huang He Nature Reserve and two Australian shorebird specialists from the Australasian Wader Studies Group.

The Huang He is China's second longest river, rising in Qinghai Province and flowing for 5464 km via a 5400 km^2 delta into the Bohai Gulf in north-eastern China (see Figure 1). It has the most morphologically active delta in the world (CZMC 1995) with an average annual sediment load at the mouth of 1.05 billion tonnes (range 0.24/2.1) contained in 30 billion m^3 of water. These enormous silt-laden volumes have led to the formation of 1891 km^2 of new land and an increase in the length of coastline by 53 km since 1855, with the river changing course ten times during this period (CZMC 1995, Meng 1997).

The largest flows at the mouth occur from July to September, whilst discharge is least during March to June. Flows are limited from December to March due to ice formation in the river. The increasing removal of water up stream has led to a reduction in river flows and

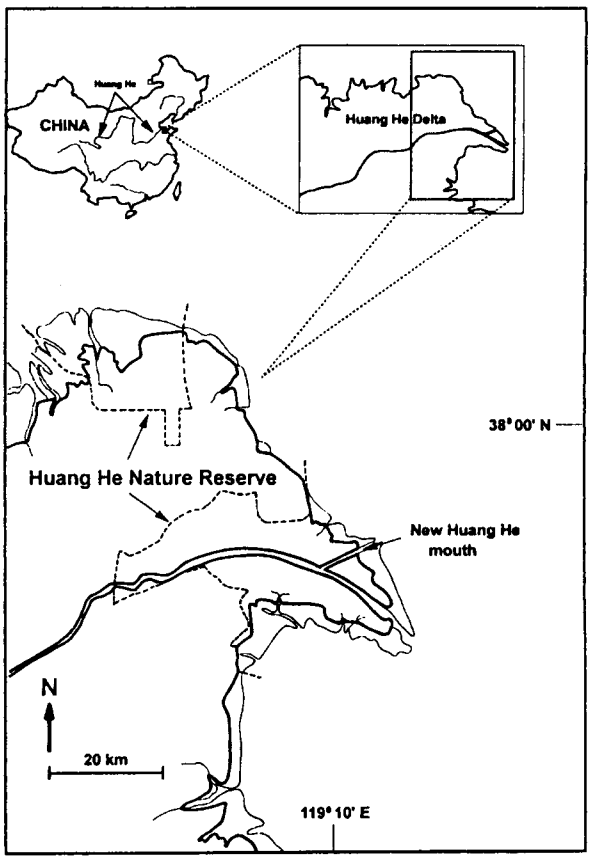

Figure 1. Location of the Huang He delta and the location of the Nature Reserve.

the number of days per year with nil flow at the mouth has increased from around 50, to in excess of 200 in recent years (CZMC 1995, Meng 1997).

The Huang He Nature Reserve was established in 1992 and comprises two separate areas within the delta (Figure 1) lying between 37° 40' - 38° 10' N and 118° 41' - 119° 16' E. The Reserve area of 1,530 km² represents 28% of the Huang He delta. A wide range of wetland types occurs within the Reserve, including intertidal mudflats, saline coastal lagoons, salt marshes, fresh water lakes, marshes and rivers. Artificial wetlands include salt pans, and fish and shrimp ponds (Li 1995, Meng 1997).

Scott (1989) notes that the delta "is an extremely important area for passage and wintering waterfowl, particularly herons and egrets (Ardeidae), swans, geese and ducks (Anatidae), shorebirds, and gulls and terns (Laridae)."

The most comprehensive published shorebird counts for the delta are those of the East China Waterbirds Ecology Study Group of the East China Normal University (Wang *et al.* 1991, 1992). During the 1991 southward migration (1-17 September), the Group estimated that there were 71,000 - 81,000 shorebirds of 35 species at 6 sites within the delta (Wang *et al.* 1991). They reported that local conservationists estimated that 800,000 to 1,000,000 shorebirds used the delta during passage. During the 1992 northward migration (10 April-2 May), they counted 62,000 shorebirds of 28 species at 8 sites (Wang *et al.* 1992). On the basis of the two surveys, they concluded that three sites within the delta were of international importance (carrying > 20,000 shorebirds) and a fourth was of national importance. Wang *et al.* (1991, 1992) determined that the delta was internationally important for eight shorebird species (Eastern Curlew, Great Knot, Bar-tailed Godwit, Black-tailed Godwit, Nordmann's Greenshank, Asian Dowitcher, Eurasian Curlew and Marsh Sandpiper) and one gull species (Saunders' Gull) [see Table 1 for scientific names of waterbird species mentioned in the text, tables and figures].

Table 1. Common and scientific names of waterbirds found at the Huang He delta during surveys in 1997.

Common name	Scientific name
Snipe sp.	*Gallinago sp.*
Black-tailed Godwit	*Limosa limosa*
Bar-tailed Godwit	*Limosa lapponica*
Little Curlew	*Numenius minutus*
Whimbrel	*Numenius phaeopus*
Eurasian Curlew	*Numenius arquata*
Eastern Curlew	*Numenius madagascariensis*
Spotted Redshank	*Totanus erythropus*
Common Redshank	*Totanus totanus*
Marsh Sandpiper	*Tringa stagnatilis*
Common Greenshank	*Tringa nebularia*
Nordmann's Greenshank	*Tringa guttifer*
Green Sandpiper	*Tringa ochropus*
Wood Sandpiper	*Tringa glareola*
Terek Sandpiper	*Xenus cinereus*
Common Sandpiper	*Actitis hypoleucos*
Ruddy Turnstone	*Arenaria interpres*
Asian Dowitcher	*Limnodromus semipalmatus*
Great Knot	*Calidris tenuirostris*
Red Knot	*Calidris canutus*
Red-necked Stint	*Calidris ruficollis*
Temminck's Stint	*Calidris temminckii*
Long-toed Stint	*Calidris subminuta*
Sharp-tailed Sandpiper	*Calidris acuminata*
Dunlin	*Calidris alpina*
Curlew Sandpiper	*Calidris ferruginea*
Broad-billed Sandpiper	*Limicola falcinellus*
Ruff	*Philomachus pugnax*
Eurasian Oystercatcher	*Haemotopus ostralegus*
Black-winged Stilt	*Himantopus himantopus*
Pied Avocet	*Recurvirostra avosetta*
Pacific Golden Plover	*Pluvialis fulva*
Grey Plover	*Pluvialis squatarola*
Kentish Plover	*Charadrius alexandrinus*
Greater Sand Plover	*Charadrius leschenaultii*
Oriental Plover	*Charadrius veredus*
Northern Lapwing	*Vanellus vanellus*
Oriental Pratincole	*Glareola maldivarum*
Oriental White Stork	*Ciconia boyciana*
Common Gull	*Larus canus*
Saunders' Gull	*Larus saundersi*
Caspian Tern	*Sterna caspia*

METHODS

The main focus of the counting programme was on the coastline of the three management areas of the Huang He Nature Reserve (Yi Qian Er, Huang He Kou and Da Wen Liu: Figure 2). We also surveyed two additional areas: The coastline between the two sections of the Reserve (Wu Hao Zhang), because the site had been previously reported to contain significant numbers of shorebirds (Wang *et al.* 1991) and is obviously part of the same ecological unit as the Reserve. The joint mouth of the Guangli-Zima Rivers, to the south of Da Wen Liu, as this site was found by Wang *et al.* (1992) to be of international significance for shorebirds.

The length of coastline over which shorebirds were counted was approximately 165 km, and comprised: Yi Qian Er - 35 km, Wu Hao Zhang - 35 km, Huang He Kou - 40 km, Da Wen Liu - 45 km, and the Guangli-Zima Rivers mouth - 10 km.

Additionally, two salt works (Yanchi and Old Huang He) and a number of inland wetlands were visited on an opportunistic basis. We also made population estimates of Little Curlew located in rice paddies and grassland in the delta to the south-west of Da Wen Liu.

The counting group comprised eight people working in two or three teams, each with at least one experienced

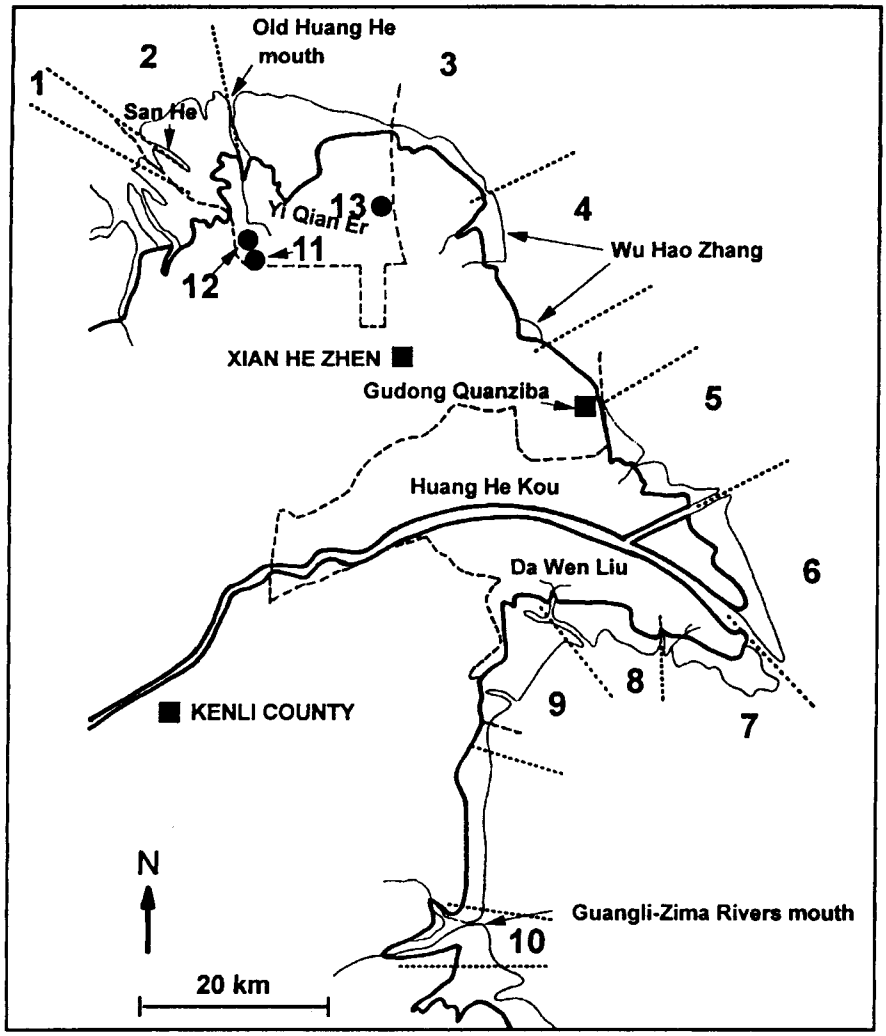

Figure 2. Location of count regions, individual sites and the three management stations within the Huang He Nature Reserve (see Table 2 for key).

counter. The group used two bases during the counts (Figure 2) - Xian He Zhen for coverage of Yi Qian Er, Wu Hao Zhang, Huang He Kou and a variety of inland wetlands, and Kenli County for Da Wen Liu and the mouth of the Guangli-Zima Rivers. Two four-wheel drive vehicles were used to transport the teams as close as possible to the count sites. The time taken to reach the count sites varied from one to four hours.

The 165 km of coastline, together with the inland wetlands and the sample of Little Curlew habitat, was counted over a fourteen day period from 18 April to 1 May. The coastline was covered in 16 sections which were subsequently merged into ten sites (Figure 2). The sections were generally counted in a clockwise direction commencing with the Xintiao estuary, in western Yi Qian Er. Boats were used to count the Xintiao estuary, the area around the mouth of the Huang He and a small portion of central Da Wen Liu. However, most counting was conducted on foot. South Wu Hao Zhang was counted on two separate occasions (19 and 24 April) and the count we recorded of each species is the maximum from either date. The Wu Hao Zhang total is made up by summing these maxima.

Generally, both vehicle access and surveying conditions were better than anticipated and we were able to completely cover the coastlines of Yi Qian Er, Huang He Kou and the Guangli-Zima Rivers mouth. However, the intertidal flats in the central part of Da Wen Liu comprised a lot of deep mud and many channels which were difficult, and sometimes impossible, to cross. This region of the coastline was also some distance from the access road. Potential undercounting of birds at this site is dealt with in the Results.

Tides were favourable for counting during the early days of the counting programme. High tides occurred in the afternoon and progressively increased in height during the survey. During this period birds were counted in the afternoon on rising tides. However, later we were forced to count on low tides when high tides were either too early or late. Over the final days, counting took place in the morning at or after high tide (Figure 3).

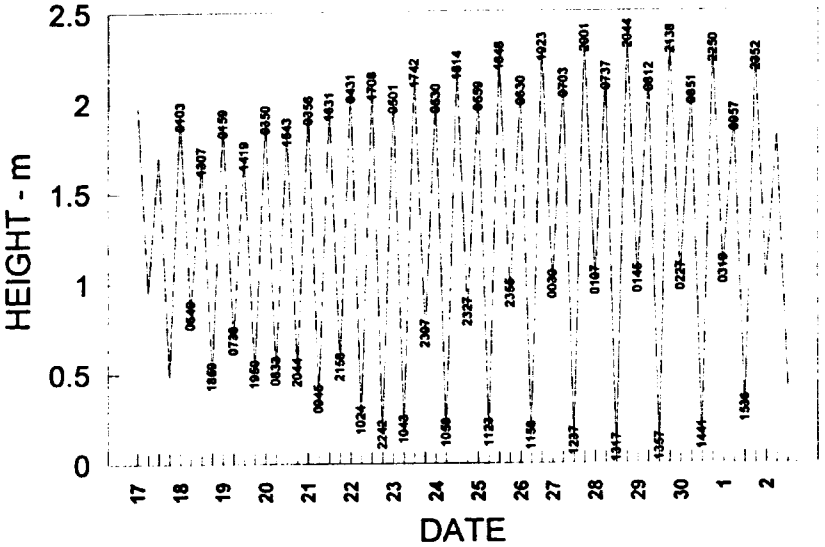

Figure 3. Huang He tides for 17 April - 2 May 1997. The times of each tide are also shown.

Weather conditions throughout the count were generally favourable with dry, sunny, mild days and light to moderate winds. Poor visibility due to misty conditions was a major problem in the central and western parts of Da Wen Liu. This affected shorebird identification and count accuracy, and created significant navigational problems which compounded the access difficulties described above. One counting team was fortunate to be able to hire a fishing boat in central Da Wen Liu and this led to a considerable increase in birds both counted and identified.

Little Curlew numbers were estimated by counting birds present in six widely separated 10 hectare plots within an area of approximately 22 km^2 of fallow rice paddy and grassland where the species had been observed previously. The numbers present in the censused area was estimated by summing the birds counted in the six plots and multiplying by 2,200/60.

Population estimates from Rose and Scott (1994) were used in determining whether individual species were present in internationally significant numbers.

RESULTS

Numbers and general distribution

A total of 130,122 shorebirds of 37 species were counted. This number included 13,071 unidentified shorebirds (10% of the total count) and 12,487 curlew (almost 9% of the total count) which were not identified to the species level. Count data for individual species are listed by site in Table 2, which also contains summaries of total numbers present within each site and region.

Shorebirds were fairly evenly distributed throughout the coastal regions covered (Figure 4), with the greatest numbers being located in the eastern parts of Huang He Kou and Da Wen Liu, and at the Guangli-Zima Rivers mouth. All three management areas within the Huang He Nature Reserve, together with the mouth of the Guangli-Zima Rivers, supported more than 20,000 shorebirds each.

It should be noted that the count of 130,122 shorebirds is a minimum estimate of the numbers present as it represents those birds actually seen. It is believed that the site counts are a reasonable estimate of the numbers present in Yi Qian Er and Huang He Kou. However, there are good reasons to believe that numbers in the central part of Da Wen Liu were significantly higher than those recorded, as counts in this region were undertaken at low tide under conditions of difficult access and poor visibility (see Methods for details). It is quite possible that undercounting by 10,000 birds, or more, may have occurred. The count only includes 1,619 Little Curlew although, as discussed below, it is believed that tens of thousand of Little Curlew were present in the delta during the count period.

Individual species numbers and distribution

The ten most common species counted were Dunlin (24,106), Kentish Plover (19,939), Grey Plover (14,899), Great Knot (11,957), Bar-tailed Godwit (10,678), Black-tailed Godwit (7,197), Eurasian Curlew (6,836), Red-necked Stint (1,896), Little Curlew (1,619) and Whimbrel (1,444). These ten species represent 96% of the identified shorebirds. If the unidentified curlew species are apportioned in the same ratio as the numbers of identified Eurasian and Eastern Curlews, Eurasian Curlew numbers would exceed 18,000, making this the third most common species counted.

Table 2. Shorebird count numbers by region and site

REGION	YI QIAN ER				HUANG HE KOU			DA WEN LIU	
SITE	1	2	3	4	5	6	7	8	9
SPECIES									
Snipe sp.									
Black-tailed Godwit	2				2600	4333	60		
Bar-tailed Godwit	109	50	34	6	227	29	4115	2860	93
Little Curlew									
Whimbrel	10			26	63	11	22	670	323
Eurasian Curlew	1619	2	84		1091	293	1845	42	83
Eastern Curlew	162		21		51	30	2	12	6
Curlew sp.	150	384	55	1534	922	954	298	5642	2548
Spotted Redshank	144	2	7	15	32	7		123	
Common Redshank	1			6		6			
Marsh Sandpiper	85	5	300	252	1	16	7	135	
Common Greenshank	67	1	7	101	61	38	31	13	50
Nordmann's Greenshank									
Green Sandpiper									
Wood Sandpiper				2					
Terek Sandpiper	5	1	2		5	39	2	7	
Common Sandpiper					3	6	1		
Ruddy Turnstone									
Asian Dowitcher	1								
Great Knot			10	129	70	60	1626	458	86
Red Knot					7	252	59		
Red-necked Stint	4			1		557	90		
Temminck's Stint									
Long-toed Stint									
Sharp-tailed Sandpiper	6								
Dunlin	2084	148	1360	221	19	10809	4406	652	35
Curlew Sandpiper					2		3		
Broad-billed Sandpiper							6		
Ruff									
Eurasian Oystercatcher	4	2	3					6	2
Black-winged Stilt									
Pied Avocet			4						
Pacific Golden Plover									
Grey Plover	4353	444	562	177	1772	1209	3227	1078	222
Kentish Plover	4496	909	3814	7804	913	664	50	206	69
Lesser Sand Plover					3	3	83		14
Greater Sand Plover	3			6	19	30	10		8
Oriental Plover		1							
Oriental Pratincole	1								7
Unidentified waders	1540		20		1000	516	1855	4670	7
Unidentified waders - small		73				200		670	
Unidentified waders - medium		121		16				575	
SITE TOTAL	14745	2143	6283	10297	8579	20162	20034	17819	3553
REGIONAL TOTALS	23171			10297	28741		41406		

SITE KEY: 1 Xintiao River estuary; 2 west Old Huang He mouth; 3 east Old Huang He mouth
4 Wu Hao Zhang; 5 west Huang He Kou; 6 east Huang He Kou;
7 east Da Wen Liu; 8 central Da Wen Liu; 9 west Da Wen Liu

NOTES
1. Although only 1619 Little Curlew were counted, the estimated number present was "at least a few tens of thousands". See Results.
2. The shaded areas indicate numbers of international importance.

Table 2. Shorebird count numbers by region and site

	REGION					TOTALS	1%	IMP
SITE	10	11	12	13	14			
SPECIES								
Snipe sp.				2	4	6		
Black-tailed Godwit	1		1			7191	1600	X
Bar-tailed Godwit	3155				4	10678	3300	X
Little Curlew					1619	3619	2000	X
Whimbrel	319					1443	400	X
Eurasian Curlew	119					4137	550	X
Eastern Curlew	23					1057	210	X
Curlew sp.						12487		
Spotted Redshank	1	135	106		22	484	175	X
Common Redshank	6				4	23		
Marsh Sandpiper	4	60	230	15	25	1135	900	X
Common Greenshank	199				17	585	400	X
Nordmann's Greenshank	1					1		X
Green Sandpiper					2	2		
Wood Sandpiper	1				92	95		
Terek Sandpiper	152					213		
Common Sandpiper	1				1	12		
Ruddy Turnstone	5					5		
Asian Dowitcher						1		
Great Knot	815					11957	3200	X
Red Knot	53					371		
Red-necked Stint	1242	2				1896		
Temminck's Stint			2			2		
Long-toed Stint					5	5		
Sharp-tailed Sandpiper	4				23	33		
Dunlin	4272					24106	5100	X
Curlew Sandpiper			1			6		
Broad-billed Sandpiper						6		
Ruff					8	8		
Eurasian Oystercatcher	59					76	50	X
Black-winged Stilt			6	143	24	173		
Pied Avocet	2					6		
Pacific Golden Plover					18	18		
Grey Plover	1855					14899	5100	X
Kentish Plover	462	120	31	366	34	19939	5100	X
Lesser Sand Plover	98					201		
Greater Sand Plover	4					80		
Oriental Plover						1		
Oriental Pratincole					21	29		
Unidentified waders	1808					11416		
Unidentified waders - small						943		
Unidentified waders - medium						712		
SITE TOTAL	23364	317	377	526	1923	130122		
REGIONAL TOTALS	23364							

SITE KEY: 10 Guangli-Zima Rivers mouth; 11 Yanchi Salt Works; 12 Old Huang He Salt Works; 13 Yi Dai Oui Fish Ponds; 14 Miscellaneous

NOTES:

3. The "Miscellaneous" column includes opportunistic counts made in a variety of shorebird habitats within the delta.
4. Figures in the "1%" column refer to population estimates in Rose and Scott 1994
5. Species marked "X" in the "IMP" column indicate those present in internationally important numbers.

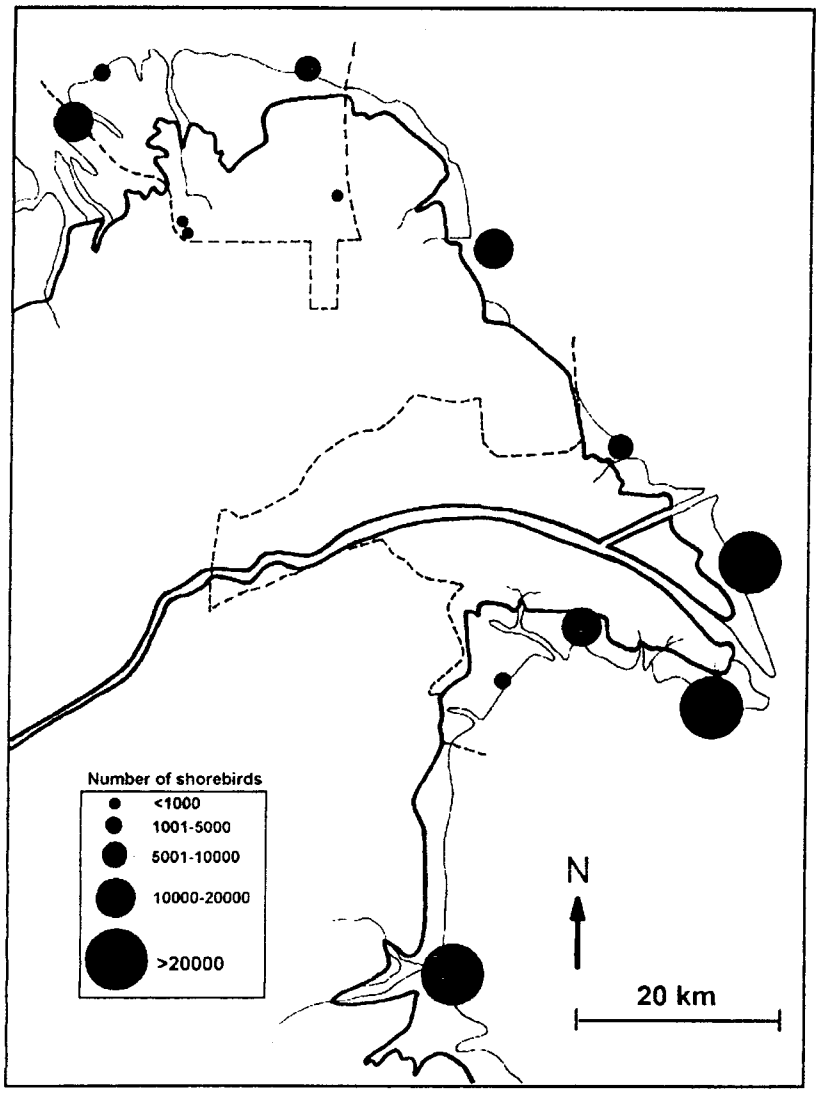

Figure 4. Distribution of shorebirds in the Huang He Nature Reserve in April - May 1997.

The Little Curlew census found that a total of 160 birds were present in the six 10 hectare plots (individual counts - 19, 50, 27, 21, 18, 25), implying that approximately 5,900 Little Curlew were present within the 22 km^2 of contiguous habitat. Little Curlew were seen in a number of other areas of the delta and it seems likely that total numbers present were at least a few tens of thousands. As further support for this view, an estimate, based on a single count of birds in a 10 hectare plot in grassland in western Da Wen Liu, indicated that 9,600 birds could have been present in the adjacent 20 km^2 of similar habitat. The delta is the first major staging area discovered for this species, which has an estimated population size of 180,000 (Watkins 1993) and migrates between non-breeding grounds in Australia and breeding areas in eastern Siberia.

The counts showed that the area, as a whole, was internationally important for 15 species of shorebird and also that a number of individual sites supported internationally significant numbers of some species (Table 2 - see hatched areas). The distribution and numbers of these (except for Nordmann's Greenshank) are shown graphically in Figures 5 - 8. Most species have a widespread distribution. However, Black-tailed Godwit showed their usual habitat preference for soft mud by concentrating around the new Huang He mouth, whilst Kentish Plover preferred the northern part of the area surveyed, and Bar-tailed Godwit and Great Knot the southern. Eurasian Oystercatchers seemed to have a preference for river banks, especially at the mouth of the Guangli and Zima Rivers.

One Nordmann's Greenshank was seen alive at the Guangli-Zima Rivers mouth, whilst another was found freshly dead at the same site. It is believed that other birds of the same species were seen or heard at this site, but these could not be positively confirmed due to constant movement of flocks at the time.

Comparison with the 1991 and 1992 counts (Wang *et al.* 1991,1992) is limited by the high proportion of unidentified birds in the earlier surveys (81 and 72%, respectively). However, the 1997 count confirmed the conclusions of Wang *et al.* (1991,1992) that the Guangli-

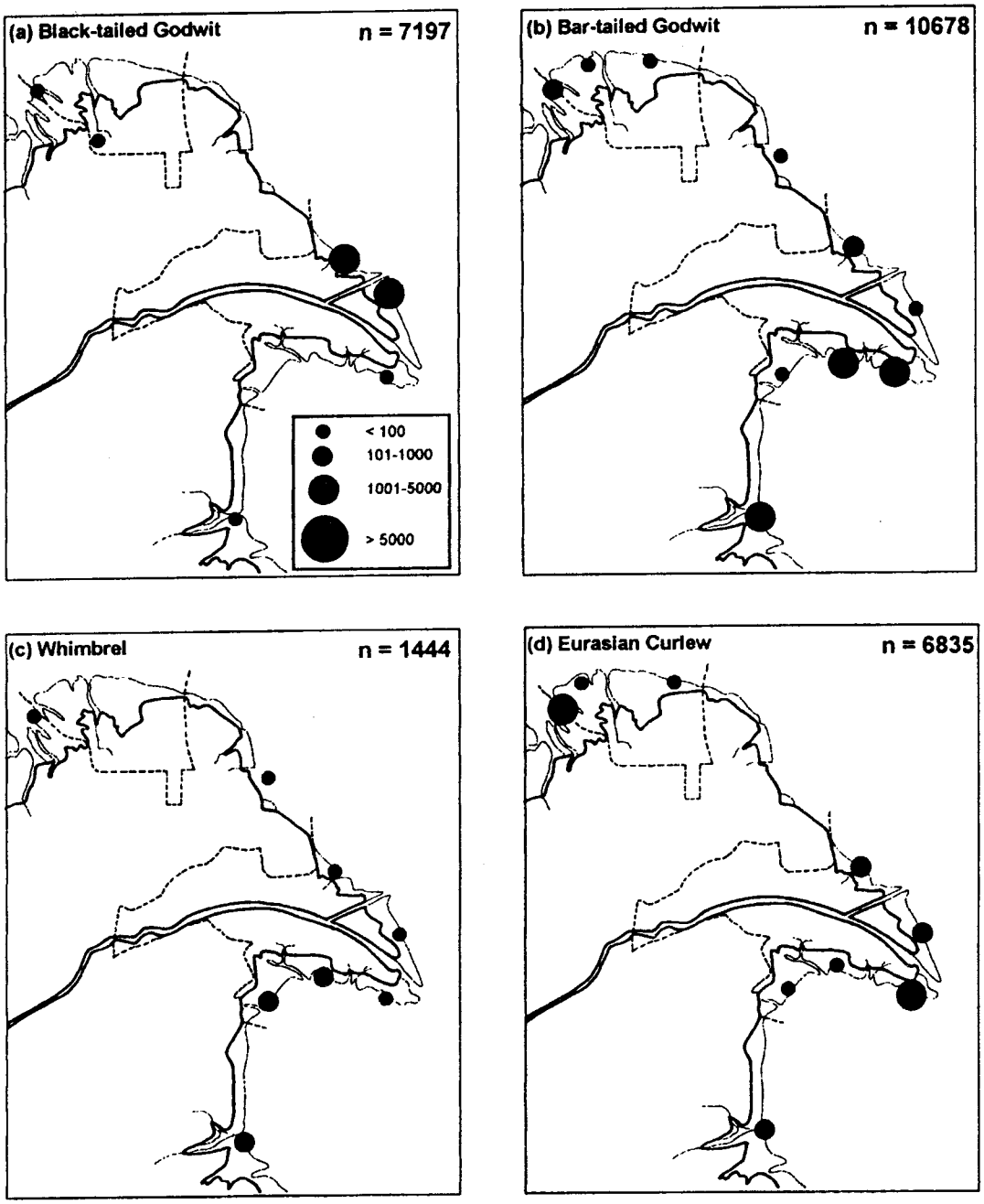

Figure 5. Distribution and counts of (a) Black-tailed and Bar-tailed Godwits (b), Whimbrel (c) and Eurasian Curlew (d) in the Huang He Nature Reserve in April - May 1997.

Zima Rivers mouth and the eastern ends of Huang He Kou and Da Wen Liu are of international importance (ie. hold > 20,000 shorebirds), and that the Xintiao River estuary is of national importance (ie. holds > 10,000 shorebirds).

Other waterbird species

During our visit we observed a number of other waterbird species and made counts of these if they were present in large numbers or were rarities . Those occurring in numbers of international importance were Saunders' Gull, Common Gull and Caspian Tern.

A total of 1,419 Saunders' Gulls were seen, although there were probably more present. The species was widespread and major concentrations occurred at Wu Hao Zhang (222), east Huang He Kuo (732) and east Da Wen Liu (210). A flock of at least 2,000 Common Gulls was seen at the mouth of the Guangli-Zima Rivers. Caspian Terns numbered 548, of which 439 were observed at east Huang He Kou. Nineteen Oriental White Storks were also seen in a fresh water wetland in south east Da Wen Liu. This species, like Saunders' Gull, is on the IUCN Red List of Threatened Animals (Groombridge 1993).

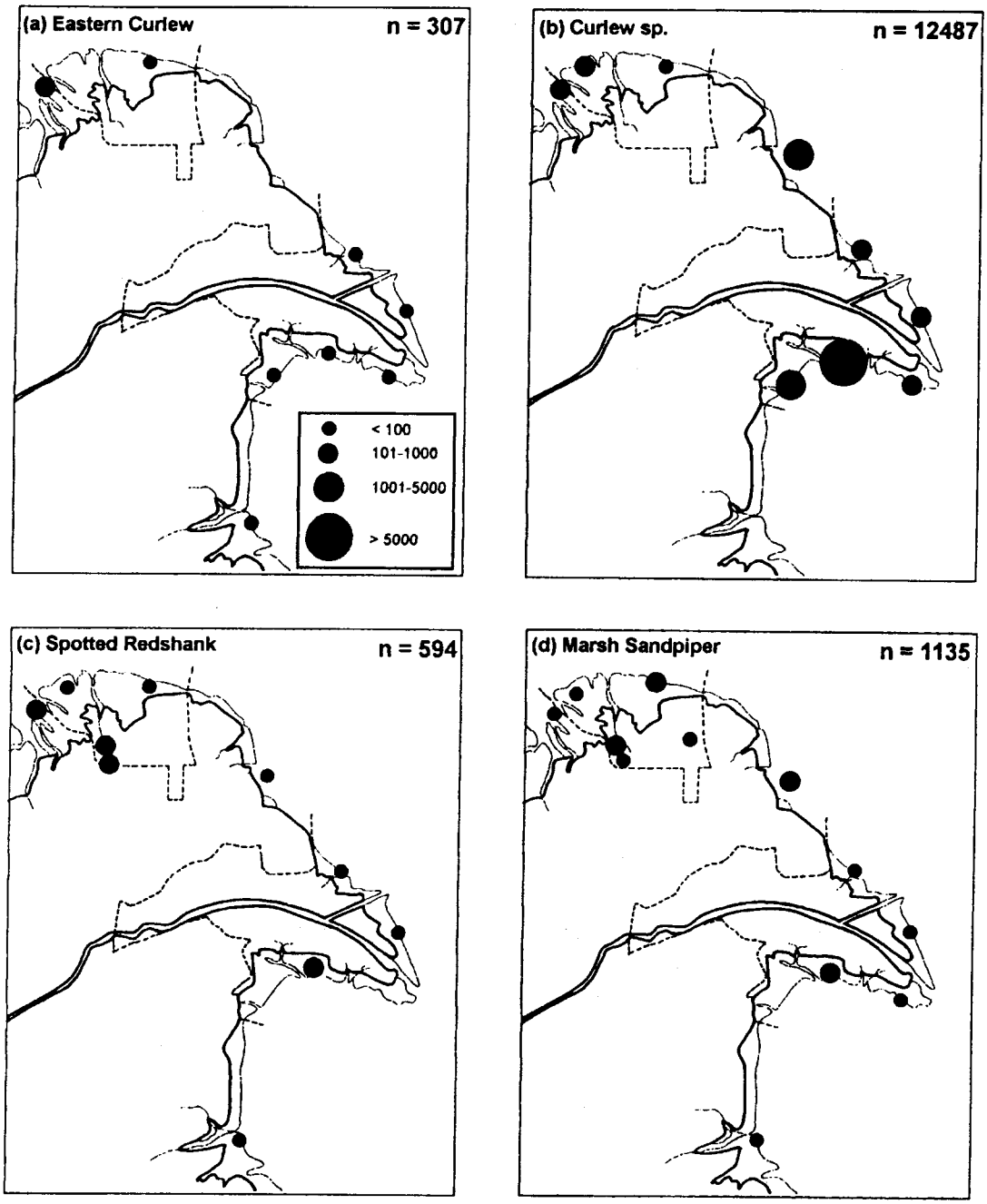

Figure 6. Distribution and counts of (a) Eastern Curlew, Curlew sp. (b), Spotted Redshank (c) and Marsh Sandpiper (d) in the Huang He Nature Reserve in April - May 1997.

DISCUSSION

Our count, over a two week period, totalled 130,122 shorebirds, which includes 33,661 birds at Wu Hao Zhang and the Guangli-Zima Rivers mouth, both of which lie outside the Reserve. Thus, the Reserve count was approximately 95,000, if allowance is also made for 1,500 of the birds reported in the 'Miscellaneous' category (Table 2) being outside the Reserve boundary.

As explained above, the count in the central part of Da Wen Liu is considered to be a significant underestimate of the numbers actually present at the time of the survey, perhaps by 10,000. Thus, the surveyed area of the Reserve almost certainly held more than 100,000 shorebirds during the count period.

Additionally, a proportion of the Little Curlew using the delta were certainly within the boundaries of the Reserve. As stated above, it is believed that tens of thousands of Little Curlew were present in the delta in the late April period. A conservative estimate is probably 30,000 birds, of which possibly 10,000 were within the Reserve.

Other shorebird species that were probably underestimated include allsnipe species. No attempt was made to survey for snipe, although there are very large

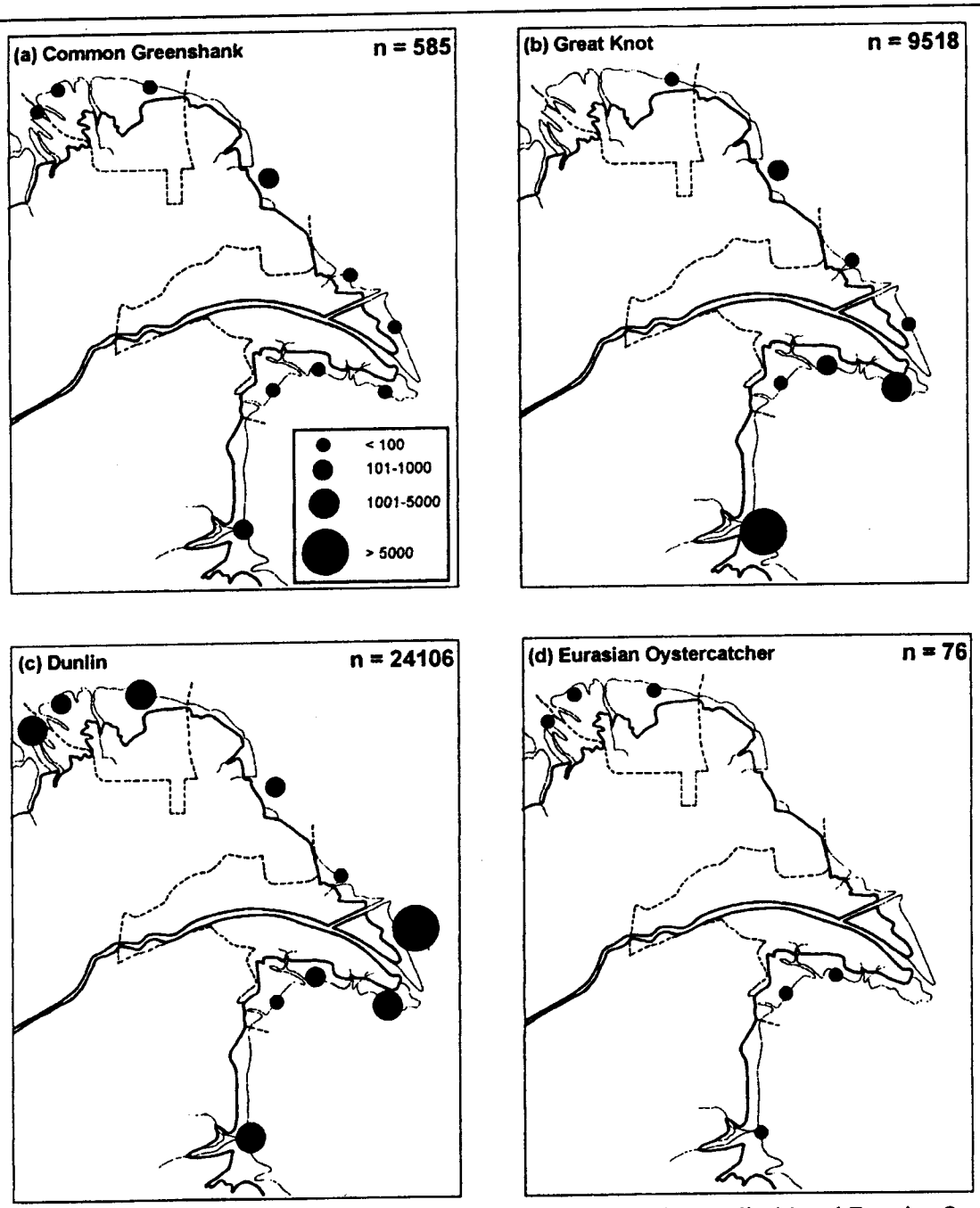

Figure 7. Distribution and counts of (a) Common Greenshank, Great Knot (b), Dunlin (c) and Eurasian Oystercatcher (d) in the Huang He Nature Reserve in April - May 1997.

areas of suitable habitat within both the Reserve and the delta. Thus, it is estimated that the minimum number of shorebirds present in the Reserve during the last half of April was of the order of 115,000 birds. With a main migration period of at least six weeks (all April and the first half of May), and allowing for individual birds remaining in the area for two to three weeks each, it seems reasonable to suggest that a minimum of 250,000 shorebirds would use the Reserve during northward migration.

There are significant coastal wetland areas within the delta that lie outside the Reserve. Two of these were counted - Wu Hao Zhang and the mouth of the Guangli-Zima Rivers. However, there are extensive intertidal areas to the west of Yi Qian Er and south east of the Guangli-Zima Rivers mouth. The coastline of the delta is 350 km long (Wang *et al.* 1991), of which this count covered 165 km (47%). Thus, using a simple extrapolation, the number of shorebirds in the coastal part of the delta could be double that estimated to be present in the Reserve during our count, say 230,000. The estimate increases to 250,000 if allowance is made for an additional 20,000 Little Curlew. It seems that the delta is probably supporting at least 500,000 shorebirds during the northward migration period.

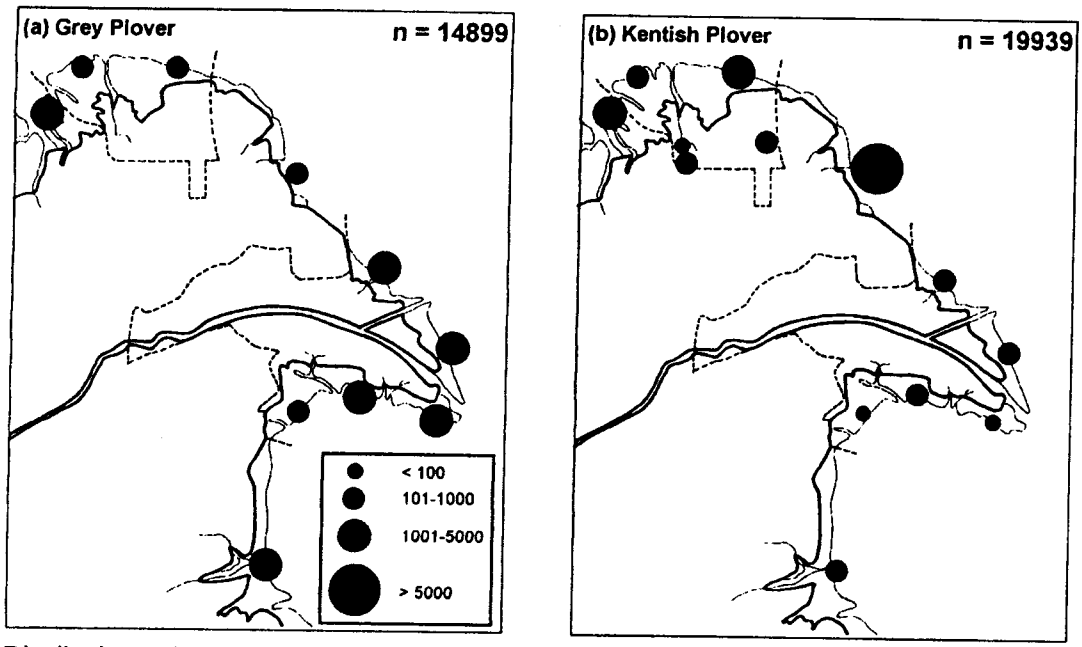

Figure 8. Distribution and counts of (a) Grey and (b) Kentish Plovers in the Huang He Nature Reserve in April - May 1997.

If account is taken of both southward migration, when numbers may be greater (Wang *et al.* 1991, 1992), and the shorebirds present during the non-breeding season, the inevitable conclusion is that the Huang He delta is one of the most important sites in the East Asian-Australasian Flyway and probably supports in excess of 1 million shorebirds annually. It is possibly the single most important site in the Flyway in terms of numbers.

It is important that more information on shorebird numbers, distribution and turnover rates in the Huang He delta is obtained. This will improve estimates of the numbers of shorebirds passing through the delta and ensure all important shorebird areas are identified. This will involve surveys being conducted both earlier and later during northward migration, and during the whole of the southward migration and non-breeding season. These surveys should include intertidal areas not covered in 1997 and comprehensive censuses for Little Curlew and snipe. Such additional information would almost certainly lead to the identification of additional sites of international importance within the delta and an increase in the number of species present in internationally important numbers.

Potentially serious threats to shorebird usage arise from (a) the extensive oil exploration, drilling and extraction program in the delta and the Reserve, and (b) the impact of the declining water flow in the Huang He the rate of intertidal flat accretion. Human disturbance pressures are relatively minor, with the major shell fishing activity limited to parts of Yi Qian Er and Wu Hao Zhang.

There was no obvious pollution problem associated with either the oil extraction or drilling activities. However, there was considerable oil field development occurring in the eastern parts of Huang He Kou and Da Wen Liu. They involve construction of access bunds across intertidal areas to new wells, movement of heavy vehicular traffic across intertidal and high tide flats, and seismic blasting. Whilst the disturbance caused by these activities did not appear to be serious during the survey, ways should be explored to ensure that these activities are carried out in a manner that minimises the effect on shorebirds.

The changing river flows could have a serious effect on shorebird usage of the delta, as its attraction is based on the plentiful supply of food. This, in turn, is almost certainly dependent on the constant input of nutrients from the water and silt carried by the river. It will be important to monitor these potential effects over time to ensure that the region continues to support the largest aggregation of shorebirds in the entire East Asian-Australasian Flyway.

ACKNOWLEDGEMENTS

The surveys and counts would not have been possible without the generous assistance of the management and staff of the Huang He Nature Reserve, who planned the programme, provided invaluable advice on access to count sites and organised accommodation. In particular, we wish to acknowledge the help and hospitality of Wang Shumin (Director) and Zhao Yan Mao (Vice Director) of the Nature Reserve, and Zhao Lian Sheng, Shi Chuan Guo and Hsu Mao Shoi, the Directors of the three management stations within the Reserve.

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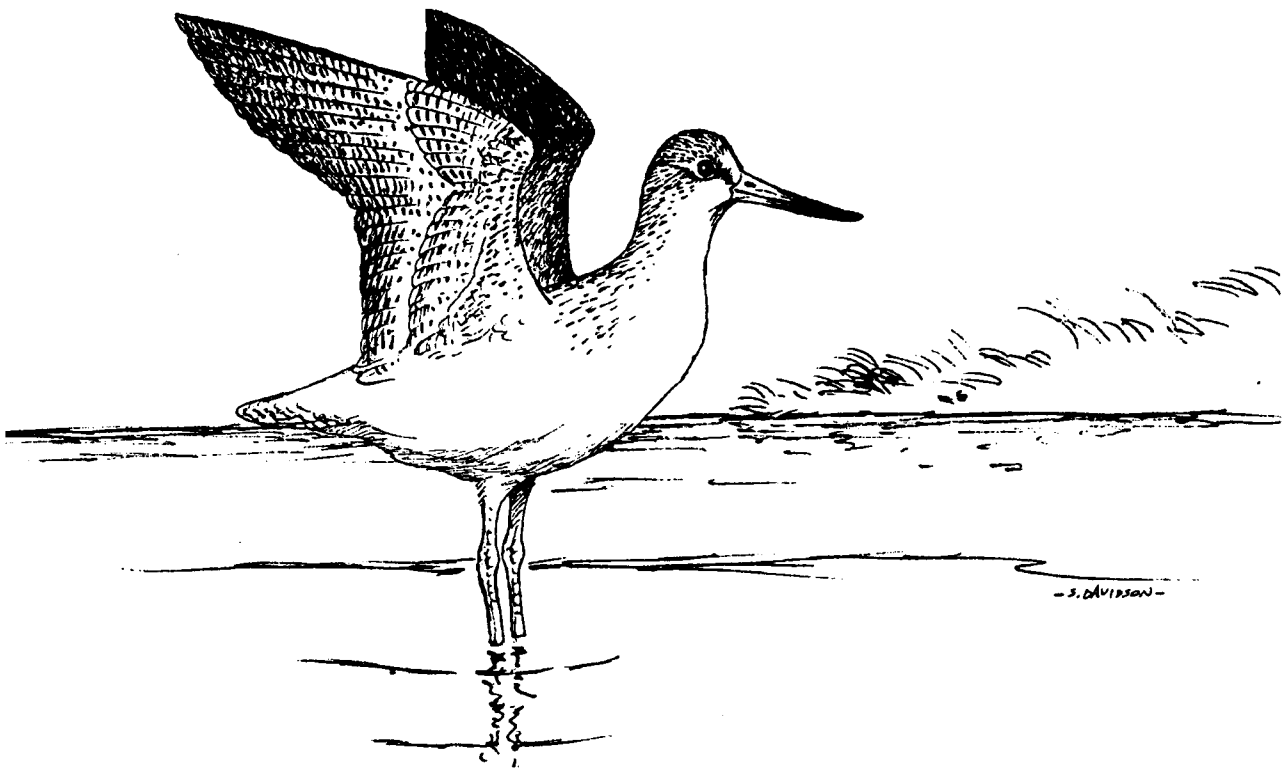

The Stilt 33 (1998): 27–31

AN ASSESSMENT OF THE IMPORTANCE OF THE TONDA WETLANDS IN SOUTH WESTERN PAPUA NEW GUINEA TO SHOREBIRDS AND WATERBIRDS.

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ABSTRACT

The Tonda Wildlife Management Area is the only Ramsar site in the Pacific outside Australia. Its nomination was based on anecdotal evidence from bird watchers of large concentrations of waders in the seasonal wetlands of the lower Bensbach River, southwestern Papua New Guinea. I conducted systematic surveys of the region during August and November 1995 counting all waders and waterbirds seen. I recorded 42 species of waterbird and wader (13 species) during the surveys. None of the wader species present were recorded in numbers of more than 1% of the Flyway population and so failed to support the nomination of the area as a Ramsar site. The previous records of large numbers of waders were made during October and it is possible that the most abundant species previously recorded, such as Little Curlew, may have arrived and departed between the two surveys. However, the major value of the Tonda wetlands appears to be as a staging site for birds migrating to Australia as it provides one of the larger undisturbed wetland areas in the region.

INTRODUCTION

The Tonda Wildlife Management Area (WMA) is the only Ramsar site in the south Pacific region outside Australia. It was declared a Ramsar site on 23rd March, 1993 because it is believed to support internationally significant populations of both resident and migratory shorebirds and waterbirds and is probably an important staging point for shorebirds during migration between eastern Australia and the breeding grounds in eastern Russia.

There have been no systematic surveys of the shorebirds and waterbirds in Tonda WMA apart from anecdotal notes published by amateur birdwatchers from the Papua New Guinea Bird Society. Finch (1980) counted an estimated 10,000 Little Curlew along the Bensbach River in October 1980 making the area internationally significant for this species (Watkins 1993). Other trips by the PNG Bird Society found that shorebirds and waterbirds were most abundant along the middle and lower reaches of the Bensbach River. This is the main wetland area within the Tonda WMA and holds the highest concentrations of these species. The aim of this study is to assess the importance of the wetlands along the Bensbach River in Tonda WMA for shorebirds and waterbirds by providing the first systematic counts of all species of shorebirds and waterbirds (sensu Pringle 1985; 1987) during two visits to the region in the 1995 Dry Season.

STUDY AREA

The Tonda Wildlife Management Area was gazetted in 1978 following concern among landowners the large populations of wallaby, deer and other wildlife would decline with the use of modern weapons. The area covers almost 450,000 ha and includes a range of vegetation types from coastal mangroves to dense rainforest (Fig. 1; Paijmans *et al.* 1971). However, the greatest concentration of wildlife occurs along the middle and lower reaches of the Bensbach River.

The Bensbach River rises in low hills south of the Fly River and flows southwards until it reaches the sea at the Indonesian border (Fig. 1). Up to 200 kilometres inland the relief is still less than 20 m. Inland of the coastal mangrove and littoral forest are vast low-lying grassland plains that flood during the Wet Season (December-April). These flooded areas form large, shallow swamps and waterholes narrowly connected with the main river. Further inland, the grassland gives way to *Melaleuca* forest and mixed gallery forests with many overflow lagoons and swamps in lower areas (Paijmans *et al.* 1971).

METHODS

Birds were surveyed in the Tonda WMA twice during the 1995 Dry Season: for four days between 21 and 25th August, 1995 and again for three days between 13 and 15th November, 1995. Sightings were made during all travel within the Tonda WMA but special effort was made to count all waterbirds along the Bensbach River. This data was to be used as background data for the PNG Department of Environment and Conservation when preparing their submission for the Ramsar conference in Brisbane in March, 1996. Sightings were made from a flat bottom punt with 10 x 40 Nikon binoculars during systematic surveys along the river between 0700h and 1800h each day. All birds present on the river, in adjacent vegetation and on known roosting and feeding swamps within two kilometres of the river were counted.

Sightings in the area by other birdwatchers that were published in the PNG Bird Society newsletter have also been included in the completed list of waterbirds seen in the area (Table 1). These include trips by B.W. Finch in October 1980 and December 1981, M.M. Clarke in November 1982 and S. Spanner *et al.* in October 1994.

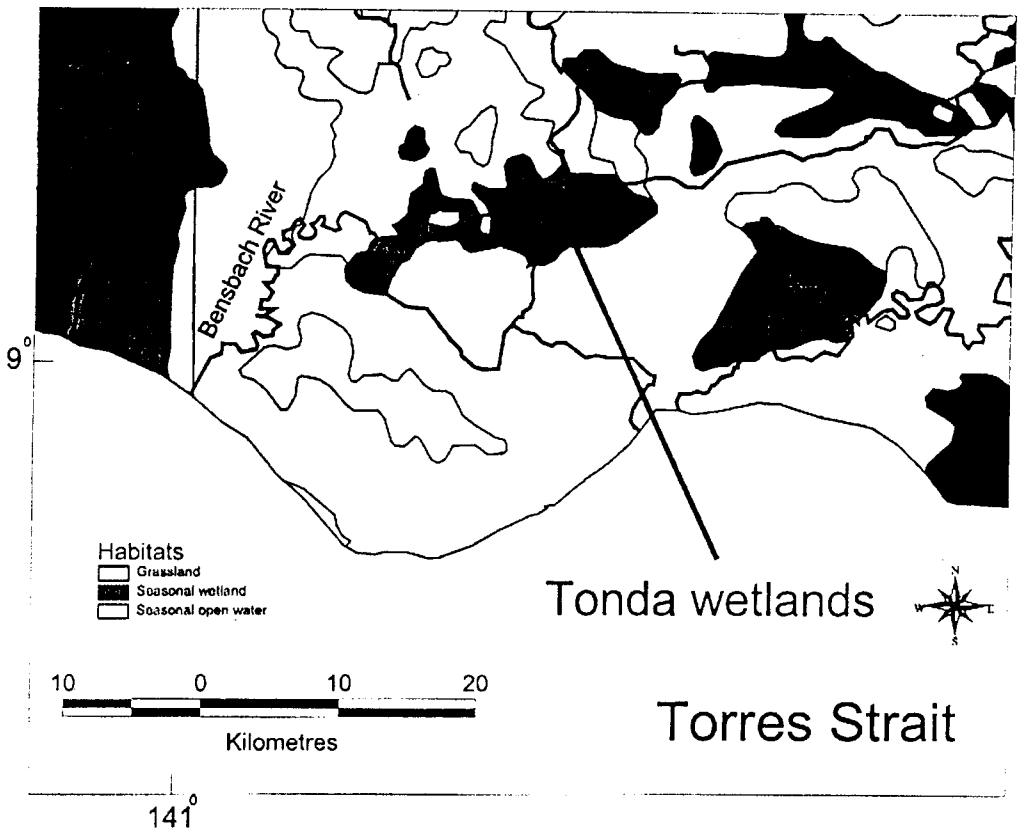

Figure 1. Map of south western Papua New Guinea showing the Tonda wetlands on the lower Bensbach River.

RESULTS AND DISCUSSION

Sixty species of waterbirds have been recorded from the lower Bensbach River (Table 1). These represent almost all of the species of waterbird known to occur in the Papua New Guinea lowlands (Beehler *et al.* 1986). Most groups are well represented, especially the Areidae (12 species) and the Characharidae (18 species). Forty-five species were seen during the survey period in 1995 (Table 2). Most of the species absent during the survey were migratory shorebirds that probably occur irregularly or in low numbers.

There are some clear patterns in the habitat preference of most species and few occurred in similar numbers in the two major habitats surveyed (Table 2). Most species preferred the sections of the river surrounded by forest (30 species) although the number of birds was higher in the grassland habitat in both survey periods. Early in the Dry Season (August) there was large numbers of ducks in the waterholes off the main river in the grassland habitat. Later, these were replaced by shorebirds as these waterholes dried and exposed large areas of shallow open mud. The ducks appeared to have moved upstream to the more permanent swamps that had become shallower and provided suitable feeding habitat.

Some species present during the second survey in November, such as Magpie Geese, Brolgas and Masked Lapwings, were absent or in low numbers during the first survey in the early Dry Season. These birds had probably migrated into the area following the drying of other swamps and waterholes in the region. Magpie Geese and Brolgas breed shortly after the Wet Season in Tonda (May - June) (Brian Bromley pers comm.) and the birds disperse after breeding, apparently returning later in the Dry Season as swamps and other wetlands dry. Banding studies in northern Australia show that movements of Magpie Geese and Brolgas are largely governed by the availability of food and water with 70% of recoveries of Magpie Geese less than 100 km from the banding place (Marchant & Higgins 1990). Draffan *et al.* (1983) recorded regular movement of Magpie Geese across Torres Strait indicating that these may not be only local movements.

Masked Lapwing populations outside Australia are estimated to total about 29,000 (Marchant & Higgins 1993) and the Papua New Guinea population is likely to be less than half this number. Unlike Magpie Geese and Brolgas, there is limited evidence of widespread movements by Masked Lapwings. The large number of birds recorded along the Bensbach River probably reflects the resident population of a larger area that has aggregated as wetlands in the region dry up. It does show that the Tonda wetlands hold nationally significant populations of this species.

Table 1: List of the waders and waterbirds seen in the Bensbach River region of Tonda WMA. Data compiled from published lists in the Papua New Guinea Bird Society newsletter and this study.

Common Name	Scientific Name
Magpie Goose	*Anseranas semipalmata*
Spotted Whistling-Duck	*Dendrocygna guttata*
Wandering Whistling-Duck	*Dendrocygna arcuata*
Radjah Shelduck	*Tadorna radjah*
Green Pygmy-goose	*Nettapus pulchellus*
Pacific Black Duck	*Anas superciliosa*
Grey Teal	*Anas gracilis*
Australasian Grebe	*Tachybaptus novaehollandiae*
Darter	*Anhinga melanogaster*
Little Pied Cormorant	*Phalacrocorax melanoleucos*
Pied Cormorant	*Phalacrocorax varius*
Little Black Cormorant	*Phalacrocorax sulcirostris*
Great Cormorant	*Phalacrocorax carbo*
Australian Pelican	*Pelecanus conspicillatus*
White-faced Heron	*Egretta novaehollandiae*
Little Egret	*Egretta garzetta*
Great-billed Heron	*Ardea sumatrana*
Pied Heron	*Ardea picata*
Great Egret	*Ardea alba*
Intermediate Egret	*Ardea intermedia*
Cattle Egret	*Ardea ibis*
Striated Heron	*Butorides striatus*
Nankeen Night Heron	*Nycticorax caledonicus*
Glossy Ibis	*Plegadis falcinellus*
Australian White Ibis	*Threskiornis molucca*
Straw-necked Ibis	*Threskiornis spinicollis*
Royal Spoonbill	*Platalea regia*
Yellow-billed Spoonbill	*Platalea flavipes*
Black-necked Stork	*Ephippiorhynchus asiaticus*
Brolga	*Grus rubicunda*
Dusky Moorhen	*Gallinula tenebrosa*
Australian Bustard	*Adeotis australis*
Swinhoe's Snipe	*Gallinago megala*
Black-tailed Godwit	*Limosa limosa*
Little Curlew	*Numenius minutus*
Marsh Sandpiper	*Tringa stagnatilis*
Common Greenshank	*Tringa nebularia*
Wood Sandpiper	*Tringa glareola*
Common Sandpiper	*Actitis hypoleucos*
Grey-tailed Tattler	*Heteroscelus brevipes*
Ruddy Turnstone	*Arenaria interpres*
Red-necked Stint	*Calidris ruficollis*
Long-toed Stint	*Calidris subminuta*
Sharp-tailed Sandpiper	*Calidris acuminata*
Curlew Sandpiper	*Calidris ferruginea*
Ruff	*Philomachus pugnax*
Comb-crested Jacana	*Irediparra gallinacea*
Beach Stone-curlew	*Esacus neglectus*
Black-winged Stilt	*Himantopus himantopus*
Pacific Golden Plover	*Pluvialis fulva*
Lesser Sand Plover	*Charadrius mongolus*
Greater Sand Plover	*Charadrius leschenaultii*
Red-kneed Dotterel	*Erythrogonys cinctus*
Masked Lapwing	*Vanellus miles*
Oriental Pratincole	*Glareola maldivarum*
Australian Pratincole	*Stiltia isabella*
Gull-billed Tern	*Sterna nilotica*
Little Tern	*Sterna albifrons*
Whiskered Tern	*Chlidonias hybridus*
White-winged Black Tern	*Chlidonias leucopterus*

Table 2: Maximum counts of waders and waterbirds seen along forested and grassland sections of the Bensbach River during surveys in August and November 1995.

Common Name	August		November	
	Forest	Grass	Forest	Grass
Magpie Goose	-	-	196	-
Wandering Whistling-Duck	34	-	8	-
Radjah Shelduck	32	267	107	-
Green Pygmy-goose	320	-	114	-
Pacific Black Duck	4	882	141	-
Grey Teal	-	4	4	-
Darter	3	-	-	-
Little Pied Cormorant	15	-	16	-
Little Black Cormorant	34	-	-	-
Great Cormorant	2	-	-	-
Australian Pelican	4	25	-	4
White-faced Heron	3	-	2	-
Little Egret	2	-	10	-
Great-billed Heron	3	-	2	-
Pied Heron	64	73	56	258
Great Egret	3	-	21	-
Intermediate Egret	6	-	106	60
Cattle Egret	-	-	-	3
Striated Heron	12	-	1	-
Nankeen Night Heron	77	-	20	-
Glossy Ibis	-	130	-	3
Australian White Ibis	1	1	8	90
Straw-necked Ibis	2	10	-	-
Royal Spoonbill	1	28	-	1
Yellow-billed Spoonbill	-	4	-	-
Black-necked Stork	2	-	1	-
Brolga	-	6	-	132
Dusky Moorhen	-	-	-	1
Australian Bustard	-	-	-	1
Little Curlew	-	-	-	131
Marsh Sandpiper	-	-	-	3
Common Greenshank	-	-	-	5
Common Sandpiper	8	-	27	57
Red-necked Stint	-	-	-	12
Sharp-tailed Sandpiper	-	-	-	813
Curlew Sandpiper	-	-	-	1
Ruff	-	-	-	2
Comb-crested Jacana	8	-	2	-
Black-winged Stilt	30	-	8	-
Greater Sand Plover	-	1	-	-
Masked Lapwing	-	19	-	152
Oriental Pratincole	-	-	-	12
Australian Pratincole	-	-	-	285
Gull-billed Tern	-	-	-	4
TOTAL	650	1431	850	2029

Another species that moved into the area as the flooded grasslands dried was the Australian Pratincole. This species breeds in dry inland parts of south eastern Australia in summer (October - December) (Blakers *et al.* 1984) and migrate to northern Australia, Papua New Guinea and southern Indonesia in winter (Pringle 1987). Coates (1985) notes that thousands of Australian Pratincole can occur in the Tonda WMA late in the Dry Season, presumeably in preparation for migration to their breeding grounds in south eastern inland Australia. Watkins (1993) does not list Australian Pratincole as a shorebird and so the significance of the large seasonal populations in Tonda WMA are difficult to assess. However, it seems possible that most of the population

that migrates to Papua New Guinea may stage in the grasslands of Trans-Fly region before they leave for Australia.

The numbers of shorebirds recorded during the two surveys were much less than expected. Up to 10,000 Little Curlew had been recorded along the lower Bensbach River in October 1980 (Finch 1980) and this area is believed to be an important stopping point during flights to their major wintering grounds in northern Australia (Higgins & Davies 1996). I recorded few Little Curlew during my survey in November. This suggests that the birds either the birds had left the area, probably for Australia, or that the count of Finch was unusually high.

Few other shorebirds were recorded in internationally significant numbers during the two surveys. Sharp-tailed Sandpipers were the most abundant species yet the counts were less than 0.5% of the estimated flyway population (Watkins 1993). A large number of species of shorebird have been recorded from the region but the numbers of most species appear to be low. Given the available habitat (Fig. 1) this is not surprising. The region is unlikely to be able to feed large populations of intertidal-feeding shorebirds throughout the wintering period. The importance of this area to shorebirds appears to be as a staging point for birds that winter in Australia.

Despite the low counts of most species, the wetlands of the Tonda WMA hold an impressive diversity of species, similar to that recorded by Morton *et al.* (1990) in the Alligator River wetlands in Kakadu National Park. The Papua New Guinea populations of many of these species are restricted to the Trans-Fly region (Beehler *et al.* 1986) increasing the region's importance as one of the largest undisturbed wetland areas in Papua New Guinea outside the Fly River catchment.

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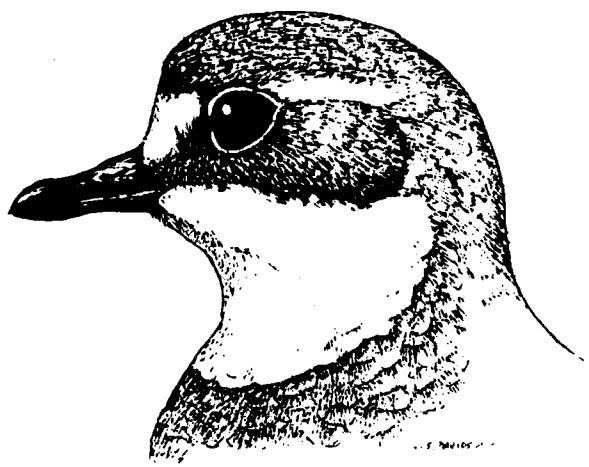

THE CONTRIBUTION OF SHOREBIRDS TO THE CATCHES OF HUNTERS IN THE SHANGHAI AREA, CHINA DURING 1997 - 1998

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ABSTRACT

We investigated the status of bird hunting in the Shanghai area during 1997-98. We found that the hunters are mainly from Chongming and Nanhui counties and were most commonly 30 to 50 years old. They hunted 50 to 70 species of migratory birds, in particular ducks, waders and passerines. We found rare and vulnerable species such as Little Curlew *Numenius minutus*, Nordmann's Greenshank *Tringa guttifer*, Black-tailed Godwit *Limosa limosa*, and Berwick's Swan *Olor columbianus* were among the species taken. These results confirm that hunting is still a very serious problem for waders in China.

INTRODUCTION

The Shanghai area is situated in the eastern part of China near one of the most important post or overwintering areas for migrant waterfowl. Birds using the area include waders, ducks, geese, swans, spoonbills, herons, egrets, bitterns and gulls.Of the 424 bird species recorded in the Shanghai area, 78% are migratory species and only 10% are considered resident (Huang *et al.* 1993). Some of the migratory waders hunted in spring have travelled 5 - 8,000 km from Australia. These birds are important for the common people as they have a long history of hunting migratory birds in China as a way of life. They hunt waders in spring and autumn and ducks in winter. Some ornithologists have gained useful information on migratory birds by sampling the hunters or the local markets (La Touche 1925-34, Pang 1994, Wang & Qian 1988, Qian *et al.*1985, Tang *et al.* 1995, Barter *et al.* 1997a).

METHODS

During September to November 1997 and March to May 1998, we studied the hunting of birds in the Shanghai region. The mani areas included Chongming Dao Island, Hengsha Dao Island, Jiuduansha, Cao-yang farm, Guoyuan, Miao-Gang and Luchao-Gang (Figure 1). In the field, we surveyed the migratory bird and recorded the species, number of birds at each site, date, time, weather, each species' behaviour, their altitude (if in flight) and direction. If we saw hunters, we counted the numbers present and tried to interview as many as possible. For each hunter interviewed we obtained biographic data including name, age, address, occupation, length of time as a hunter. Then we asked them about the details of that day's catch, including methods used (nets, poison, gun, traps or bird of prey), number of birds caught, main species, maximum number caught during a single catch. Hunters were also asked about information their general hunting activities such as:

(a) the number and species of banded or leg flagged birds seen and the fate of the bands.
(b) the main season when different species of banded birds were caught.
(c) prices obtained for birds, how it compares to previous years and any reasons for differences.
(d) hunting management practices by the local government and the views of hunters towards protecting hunted birds.

We also surveyed the markets in the areas where hunting occurred and took notes of the numbers of each species, collect bird bands and flags and measure all banded birds.

RESULTS

Species and numbers

We saw 50 species of bird in the filed or markets in the Shanghai area during 1997 - 98. This compares favourably with the study of Pang (1994) who found 70 species of bird were hunted in the Sunan region, southern Jiangsu Province. The main species of wader taken are shown in Table 1. Other species recorded included grey herons, egrets, night herons, swans, geese, teal, mallards, spot-billed duck, wigeon, garganey, shoveller, goshawks, quail, pheasants, moorhen, coot, gulls, terns, doves, owlets, skylarks, pipits, sparrows and buntings.

The main species caught are the ducks, geese, knots, stints, pipits and buntings. Hundreds of thousands of birds are offered for sale in the markets each day and the numbers and species change throughout the season and with different markets. In spring, the main species are all waders - knots, stints, godwits and sandpipers.

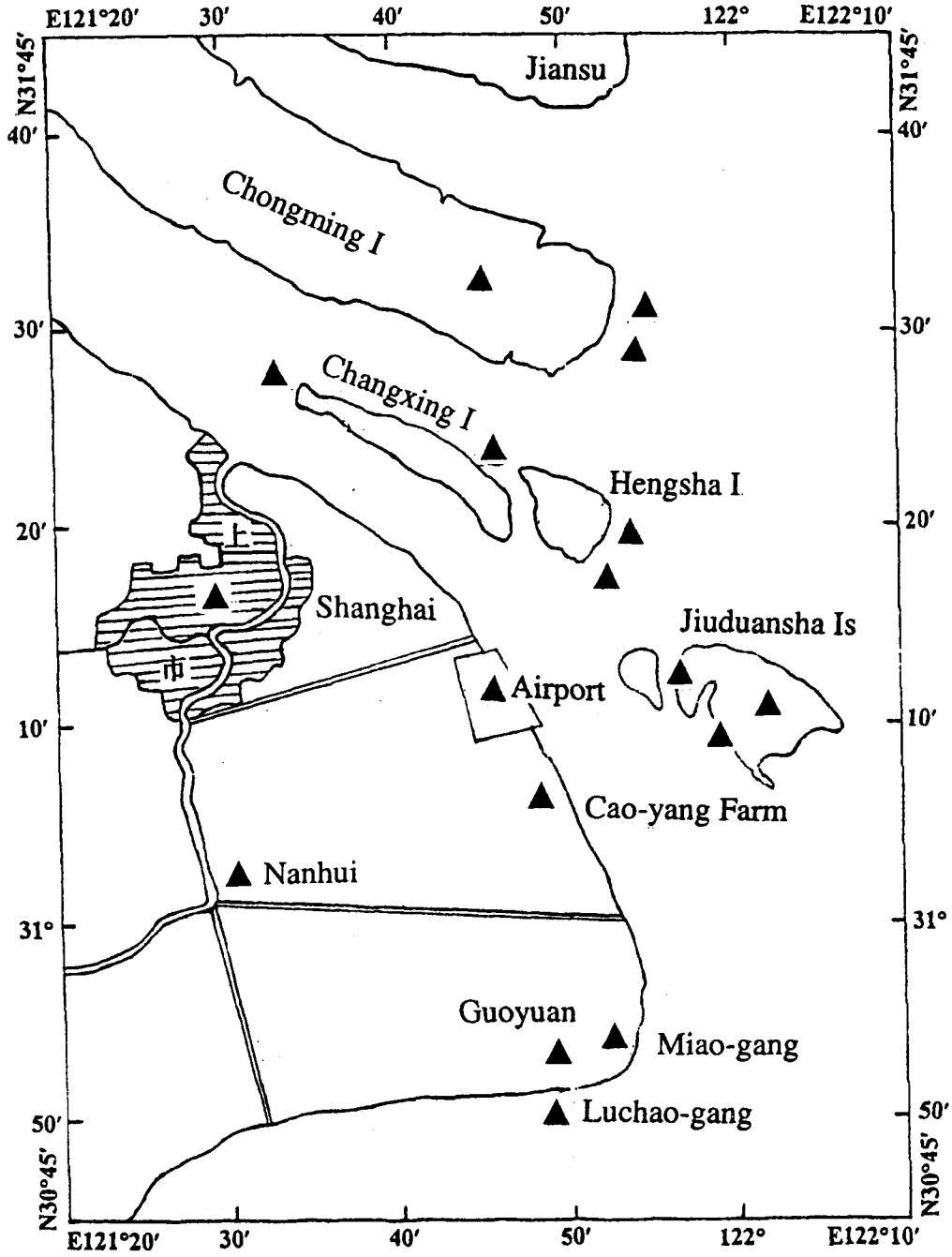

Figure 1. The points of survey in the Shanghai area. ▲ - points of hunting and selling.

Sometimes these can include species rare to the area such as Little Curlew, Black-tailed Godwit and Spotted Greenshank (Table 1).

Prices for birds

The peddlers of birds selling them in the markets are usually members of the family of the hunter. The prices they received in 1997-98 varied from 45 to 60 Yuan/kg. These prices are a four to six times increase over the prices in 1990-92 (Tang *et al.* 1995). Prices increased rapidly after 1992 at all sites and is the main factor behind an increase in the number of hunters (Table 2). These prices are an increase on those found by Barter *et al.* (1997b) during the 1996 spring migration.

Number of hunters and their age structure

In the past, hunting birds was seen as a profession of the elderly and those less able to work. However, analysis of the current age structure of hunters shows that more and more young and middle-aged people are becoming involved in hunting birds (Figure 2). Fifty to sixty hunters were interviewed during this study and about 65% of these were aged 31-50. We estimate that there may be between 500 - 700 active hunters in the Shanghai

Table 1. The numbers of the main species of wader hunted different areas in the Shanghai region during spring 1998 (% = percentage of all birds recorded).

Species	Chongming	Miao-gang		Jiuduansha		Total
	28 March	5 April	15-16 April	11 April	21-24 April	
Black-tailed Godwit	-	-	-	-	1 (0.01)	1 (<0.01)
Bar-tailed Godwit	-	1 (0.04)	58 (0.47)	6 (0.13)	4 (0.02)	69 (0.17)
Little Curlew	-	-	-	2 (0.04)	-	2 (0.01)
Whimbrel	-	-	3 (0.02)	-	2 (0.01)	5 (0.01)
Redshank	-	-	4 (0.03)	-	-	4 (0.01)
Spotted Greenshank	-	-	1 (0.01)	-	-	1 (<0.01)
Terek Sandpiper	-	-	4 (0.03)	-	24 (0.14)	28 (0.07)
Ruddy Turnstone	-	-	1 (0.01)	-	6 (0.03)	7 (0.02)
Great Knot	30 (1.0)	24 (0.96)	35 (0.28)	3 (0.07)	6 (0.03)	98 (0.25)
Red Knot	-	-	5 (0.04)	5 (0.11)	29 (0.17)	39 (0.1)
Red-necked Stint	-	-	5 (0.04)	-	15 (0.09)	20 (0.05)
Sharp-tailed Sandpiper	-	-	4 (0.03)	-	30 (0.17)	34 (0.09)
Dunlin	-	-	1 (0.01)	30 (0.65)	50 (0.29)	81 (0.2)
Golden Plover	-	-	-	-	3 (0.02)	3 (0.01)
Grey Plover	-	-	1 (0.01)	-	3 (0.02)	4 (0.01)
Lesser Sand Plover	-	-	1 (0.01)	-	-	1 (<0.01)
Greater Sand Plover	-	-	-	-	1 (0.01)	1 (<0.01)
Total	30	25	123	46	174	398 (1.0)

area in 1997-98. These included both skilled and unskilled workers mainly from Chongming and Nanhui counties (Figure 1). This appears to be a dramatic increase on the number of hunters estimated by Barter *et al.* (1997) who estimated a maximum of 30 hunters during the 1996 season.

Hunting methods

Previous studies of hunting in other parts of eastern China identified seven different methods (Shen 1960, Pang 1977, 1994, Yan 1982). We found that four main methods were being used in the Shanghai area: netting, poisoning, shooting and using birds of prey. Netting was the main method used to catch waders and ducks. The hunters set clap-traps (3 x 15 m) with a long string in flight paths of the birds. They play bamboo whistles to imitate their calls and lure the birds into the net. Some also have 10-15 decoys (live birds or specimens) near the net to help attract the birds.

Recovery of bands

We recovered 37 bird bands in the Shanghai area during spring 1998 (Table 3). These birds were originally banded in Australia (32), New Zealand (4) or Taiwan (1) and represented an estimated recovery rate of only1% of the banded birds caught. Most of the bands are thrown away by the hunters and sellers before we could get the required information. Most recoveries were of Great Knots *Calidris tenuirostris* banded in north-western Australia. The most recently banded birds had been caught during the last NW Australian wader expedition in 1996. In contrast, one Red Knot *C. canutus* had been banded in Victoria in February 1987. Several birds also had been leg-flagged including an Eastern Curlew *Numenius madagascariensis* banded at Amity Point, North Stradbroke Island in June 1994.

Views of local people

Many of the people interviewed were aware of the laws in relation to protecting birds. They also understood the concept of the 'Red Data Book' and the international feelings towards their activities. However, the government has been lax in its approach to this problem and has been backward in trying to provide alternative sources of income to these people. Some officials and many hunters think that they could not kill all the birds because the numbers involved appear so large. They also know that more birds died from environmental pollution than from hunting thus giving them ample

Table 2. The price of birds sold in the markets in the Shanghai region since 1990 in Yuan per kg.

Year	Chongming Is	Guoyuan	Zhe-lin	References
Autumn 1990	10	12	12 - 15	Tang *et al.* 1995
Spring 1992	10	14	14 - 20	Tang *et al.* 1995
Autumn 1997	40 - 50	40 - 50	-	This study
Spring 1998	45 - 60	45 - 60	-	This study

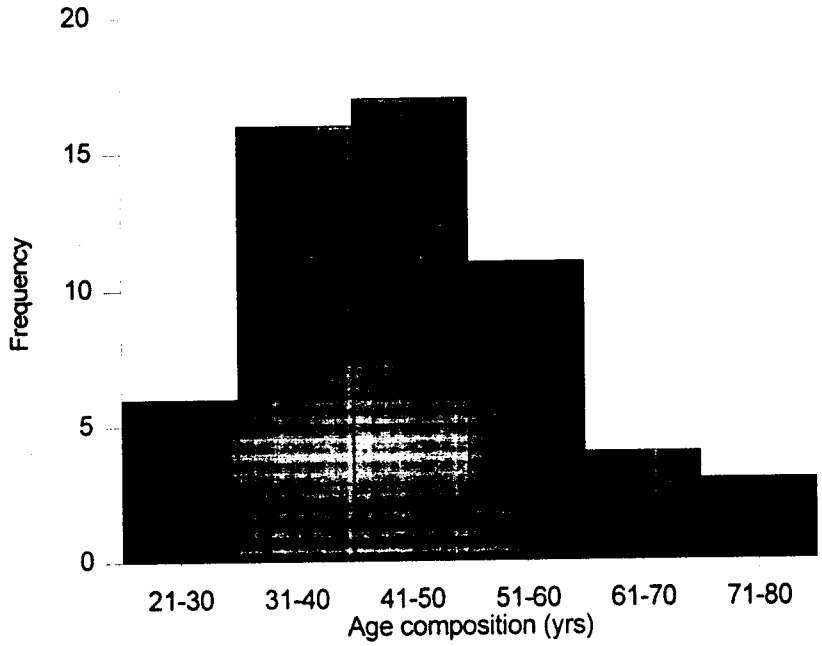

Figure 2. The age composition of hunters interviewed in the Shanghai area in 1997-98.

reason to continue. This highlights the problem of trying to tackle hunting of waders in China (Figure 3). Our data suggests that the problem is very serious but, unfortunately the solution will not be straightforward. The price of birds has been increasing faster than the growth in income in the Shanghai area (Barter *et al.* 1997b) suggesting that the demand for birds is also increasing. While the prices for birds continues to rise, any efforts to discourage hunting will not be successful without strong government support.

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Figure 3. Photograph of a group of waders caught by a hunter in the Shanghai area in April 1998.

Table 3. Data on banded birds recovered from the markets and hunters in the Shanghai area during spring 1998 (ND = no data).

Species	Recovery site	Band No.	Banding site	Banding date	Hunting date	Recovery date
Bar-tailed Godwit	Chongming	072-56860	Eighty Mile Beach, WA	4 April 1996	ND	6 April 1998
	Guoyuan	072-60561	Eighty Mile Beach, WA	18 April 1996	ND	6 April 1998
	Miaogang	072-33519	Eighty Mile Beach, WA	26 March 1994	ND	17 April 1998
	Miaogang	072-55873	Roebuck Bay, WA	6 March 1996	ND	17 April 1998
	Miaogang	072-55409	Roebuck Bay, WA	5 June 1995	ND	17 April 1998
	Miaogang	072-55133	Roebuck Bay, WA	16 July 1994	ND	17 April 1998
	Miaogang	072-56465	Eighty Mile Beach, WA	1 April 1996	ND	17 April 1998
	Miaogang	072-60630	Roebuck Bay, WA	15 June 1996	ND	17 April 1998
Eastern Curlew	Chongming	101-02321	Nth Stradbroke Is, Qld	26 June 1996	ND	6 April 1998
Great Knot	Chongming	062-15847	Roebuck Bay, WA	20 July 1996	28 March 1998	28 March 1998
	Chongming	062-14297	Roebuck Bay, WA	2 May 1995	6 April 1998	6 April 1998
	Chongming	062-15353	Eighty Mile Beach, WA	19 April 1996	30 March 1998	30 March 1998
	Miao-gang	062-14853	Eighty Mile Beach, WA	15 April 1996	5 April 1998	5 April 1998
	Miao-gang	062-14019	Roebuck Bay, WA	5 June 1995	6 April 1998	6 April 1998
	Miao-gang	062-38140	Finniss R mouth, NT	14 Sept 1995	17 April 1998	17 April 1998
	Guoyuan	062-09419	Roebuck Bay, WA	28 July 1994	ND	17 April 1998
	Guoyuan	062-14082	Roebuck Bay, WA	7 Oct 1995	ND	17 April 1998
	Guoyuan	062-08920	Roebuck Bay, WA	18 March 1994	ND	17 April 1998
	Guoyuan	061-71125	Roebuck Bay, WA	29 March 1990	ND	17 April 1998
	Guoyuan	061-91000	Roebuck Bay, WA	5 March 1994	ND	17 April 1998
	Guoyuan	061-72567	Roebuck Bay, WA	23 Sept 1992	ND	17 April 1998
	Guoyuan	061-72376	Roebuck Bay, WA	2 Sept 1992	ND	17 April 1998
	Guoyuan	061-90117	Roebuck Bay, WA	1 Oct 1992	ND	17 April 1998
	Guoyuan	061-91258	Roebuck Bay, WA	5 March 1994	ND	17 April 1998
	Guoyuan	061-72876	Roebuck Bay, WA	26 Sept 1992	ND	17 April 1998
Red Knot	Chongming	051-15429	Swan Is, Victoria	21 Feb 1987	ND	6 April 1998
	Chongming	051-86224	Eighty Mile Beach, WA	16 April 1996	ND	6 April 1998
	Jiuduansha	051-84474	Nudgee Beach, Qld	1 Sept 1996	12 April 1998	12 April 1998
	Guoyuan	051-38881	Eighty Mile Beach, WA	3 April 1988	ND	17 April 1998
	Guoyuan	051-81662	Roebuck Bay, WA	5 March 1994	ND	17 April 1998
	Guoyuan	C-46818	Miranda, NZ	4 July 1992	ND	17 April 1998
	Guoyuan	C-49403	Kaipara Harbour, NZ	3 March 1993	ND	17 April 1998
	Guoyuan	C-45131	Kaipara Harbour, NZ	23 Feb 1989	ND	17 April 1998
Red-necked Stint	Guoyuan	034-58566	Yallock Ck, Victoria	28 Feb 1993	ND	17 April 1998
	Guoyuan	033-43661	Werribee, Victoria	27 Feb 1988	ND	17 April 1998
no species	Guoyuan	C-xxx39	New Zealand	ND	ND	17 April 1998
	Guoyuan	B 14152	Taiwan	ND	ND	17 April 1998

PIED OYSTERCATCHER FEEDING ON GOLF COURSE

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On the morning of 30th November 1997 John White, a bird-watcher from Geelong, observed a Pied Oystercatcher (*Haematopus longirostris*) feeding on a golf course at Peterborough, close to the southern coast of Victoria. The bird was watched for approximately 20 minutes. It fed "most vigorously on the turf of the golf course where it probed like a jack-hammer".

On the previous day it had rained quite heavily at Peterborough - an uncommon event in the generally dry 1997. Presumably this had softened the ground sufficiently for the bird to probe. John did not notice if food was taken and swallowed - except to be certain that large earthworms were probably not on the menu. However the fact that the bird persevered for at least 20 minutes (it was already feeding when first observed and was still feeding when observations ceased) suggests it was being successful in obtaining food of some sort.

Feeding of Pied Oystercatchers on grassland in Australia has rarely been recorded, except near Hobart, Tasmania, where it has occasionally been observed on flooded coastal pastures (O.M.G. Newman, pers. comm., also quoted in Lane 1987 and Marchant & Higgins 1993). In contrast, the New Zealand South Island Pied Oystercatcher (*H. finschi*) and the Eurasian Oystercatcher (*H. ostralegus*) regularly feed and often nest on grassy paddocks and cultivated land (Cramp & Simmons 1983, Marchant & Higgins 1993). Presumably pastures are generally too dry and hard to be utilised in the same way in Australia.

Colour-bands indicated that the Pied Oystercatcher at Peterborough had been banded at Queenscliff (170km away), at least 9 years previously. It was presumably part of a local shore breeding pair, so it is not clear what made it abandon its conventional shore-feeding habitat and try its luck on the golf course. There is no information to indicate whether this is a regular habit of this individual or whether this was a unique event. However, given the different climate in Australia, it is unlikely to be the precursor of a major spread into a new feeding habitat in the way that the Eurasian Oystercatcher expanded in the British Isles during this century (Cramp & Simmons 1983).

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BIRDS OF A FEATHER .....

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A remarkable history of "togetherness" is illustrated by two Ruddy Turnstones (*Arenaria interpres*) which have now been captured together on five occasions over the last ten years. Furthermore they have consecutive band numbers (051-15472 and 051-15473). Both birds were initially banded as adults (2+) at Sand Island, near Queenscliff, Victoria on 28 March 1987. Sand Island is part of the Swan Bay complex in the southwestern corner of Port Phillip Bay. They were recaptured for the first time on 18 November 1989 on the north end of Swan Island (about 2 km away from the first site). This is not surprising since the catch of 109 birds that day represented at least 75% of the Ruddy Turnstone population in the area.

The next encounter was exactly a year later (18 November 1990) at the same site, in a catch of 99 birds (70 of which were retraps). They then turned up, again together at this site, on 2 December 1995 in a catch of 20 birds. However both "dipped out" on other generally smaller catches of Ruddy Turnstone at the same site on 9 November 1991 (19 birds), 14 November 1992 (46 birds), 17 December 1993 (13 birds), 7 - 8 January 1995 (80 birds), 29 October 1995 (14 birds) and 20 December 1996 (6 birds). Were they absent without leave?

The most recent chapter in this remarkable history is when both birds were again retrapped together in a large catch of 473 waders (including only 11 Ruddy Turnstones) on 18 October 1997 on the north-west shore of Swan Bay (about 4 km from the north end of Swan Island). They must have thought they had found a quiet corner, but they now know there is "no where to hide". The definition of a retrap (a bird caught napping for the second time) needs revision.

It is tempting to wonder if these two birds have some special relationship (e.g. a pair). However this is highly unlikely on the basis, *inter alia*, of the low probability of both surviving over a ten year period. More probably it is an example of the extreme faithfulness of most long distance migrant waders to a particular non-breeding area (Sanderling *Calidris alba*, and to a lesser extent, Red

Knot *C. canutus* are the exceptions to this generalisation). When populations of a species are small in an area (e.g. typically 50 to 100 Ruddy Turnstones in this part of the Swan Bay/Mud Island complex) and it is intensively studied (Swan Bay is one of the key Victorian Wader Study Group's (VWSG) areas) the chances of birds being recaptured are increased.

A further indication of the lack of interchange of migrant wader populations between different non-breeding sites derives from the observation of a newly discovered flock of 140 Ruddy Turnstone at West Head, Flinders - at the mouth of Western Port and only 50 kilometres to the east of Swan Bay. On the 4 November 1997 not one bird in this flock had a band or leg flag. Yet on Swan Bay about 75% of the Ruddy Turnstones have carried bands during the last seven years. The lack of bands in this new flock has now been rectified as the site has been added to the VWSG 'menu' giving a better potential sampling of the rather meagre, and scattered, Victorian Ruddy Turnstone population.

PS The sequence has now been broken! Bird 051-15472 was recaptured (this time mist-netted rather than cannon-netted) on 2 February 1998 at Mud Island - a high tide roost some 10 km out in Port Phillip. This high tide roost is used by many waders (especially at night) that feed in Swan Bay at low tide. As only 13 Ruddy Turnstone were caught out of about 120 present it is quite possible that its "friend" was also present but not captured.

ANNUAL VARIATION IN THE MOULT SCORE OF TWO RUDDY TURNSTONES *Arenaria interpres.*

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The remarkable identical banding and capture history of two Ruddy Turnstones *(Arenaria interpres)* is detailed elsewhere in this issue of the Stilt (Birds of a feather .....).

The initial capture was in March, after the completion of the primary moult. However the four recapture events all occurred during the normal period of primary moult (October to January). This provided the opportunity for a comparison between individuals of their relative progress through their moult in different years. Details of the moult scores are given below.

Date	Moult Scores	
	Band No. 051-15472	Band No. 051-15473
18.11.89	5	10
18.11.90	26	5
02.12.95	0	18
18.10.97	30	0

A great variation is obvious with each individual being, often significantly, more advanced than the other on two occasions.

Overall the timing of moult of 051-15473 looks to be fairly similar each year with the moult scores showing a fairly steady progression with date if all years are put together.
The moult of 051-15472 is much more erratic. In successive years, the moult scores were 5 and 26 on the 18th of November. On the 2nd December 1995 moult had not yet commenced. Yet on the 18th October 1997 the moult score was already 30 (another adult caught at the same time had a moult score of 22). One can only presume that this wide variation is associated with differing times of arrival back from the breeding grounds and may reflect the relative success of each breeding season.

One consequence of this data is that it would be dangerous to assume individual birds follow the same moulting schedule each year. Such an assumption has occasionally been suggested when attempting to determine the duration of moult of an individual bird.

AN OBSERVATION OF BLACK-WINGED STILTS FORAGING ON THE SEASHORE WITH PIED OYSTERCATCHERS.

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The Australasian population of the Black-winged Stilt *Himantopus himantopus* normally inhabits shallow fresh or saline wetlands, including estuaries (Marchant & Higgins 1993). Australian records from exposed coastal sites are few. McGill (1954) observed a small flock roosting on a coastal reef near Sydney and Gibson (1977) reported sightings on coastal rock platforms in the Illawarra District of southern New South Wales. In Australasia, foraging by the Black-winged Stilt on ocean beaches has only been recorded in New Zealand, where low numbers were observed foraging in the wash-zone and among debris at several beach sites on the west coast of North Island (Powlesland & Robertson 1987). In this note, I report an observation of Black-winged Stilts and Pied Oystercatchers *Haematopus longirostris* foraging

together on an open ocean beach in northern New South Wales.

At 13:00 EST on 15 March 1998, whilst on RAOU Seabird Group beach patrol at Patch's Beach, about 10 km south of Ballina, I observed two adult Black-winged Stilts in the wash-zone together with two adult Pied Oystercatchers. The beach is a low gradient sand slope about 50 metres wide at low tide, rising to vegetated dunes. The tide was ebbing, the weather fine and calm and the swell exceptionally low. While I watched them for some fifteen minutes, all birds stayed in a loose group, moving around in apparent pursuit of prey. Both the Black-winged Stilts and the Pied Oystercatchers were foraging only by shallow pecking into exposed sand in the wash-zone. The main prey item of the Pied Oystercatcher at this beach is the Pipi *Donax deltoides* (Owner 1997). Although the low swell was sufficient to expose some Pipis at other sites along the beach, the Pied Oystercatchers were not observed dislodging any, nor were any Pipis seen at or near the feeding site. The Black-winged Stilts were wading in the waves to half way up their tarsi, but were not observed pecking when in the water. All birds appeared to be catching and devouring prey, but the Pied Oystercatchers were much busier and more determined in their foraging than the Black-winged Stilts, which were moving more leisurely and pecking only occasionally. Timing for five minutes showed one Black-winged Stilt pecked only 3 times a minute on average, against 15 times by a Pied Oystercatcher. Unfortunately, it was not possible to identify any prey using only 8 power binoculars, nor did a cursory search nearby detect any likely prey items of a similar small size. Returning to the site at 14:30, the presumably same four birds were still foraging about 100 metres from their previous position.

About 0.5 km to the south of the site, an isolated fresh-water swamp is situated just behind the fore- dunes, with a normal population of up to 70 Black-winged Stilts. Pied Oystercatchers also roost in this wetland in the non-breeding season along with other shore-feeding waders that regularly commute between roosting sites within it and the beach feeding grounds.

Although the Australian seashore is generally subject to much wave action, calm conditions are not uncommon in some parts, particularly the more sheltered waters of North Queensland. It is unusual that a common and widespread species such as Black-winged Stilts have been rarely recorded on beaches. Consequently, I conclude that the observed event was abnormal, and that the odd feeding association was the result of a combination of factors: the close contact and sharing of habitat by the two species, the proximity of the wetland to the seashore and the climatic conditions at the time.

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THE IMPACT OF RECORD RAINS DURING AUGUST 1998 ON TWO BUSH STONE-CURLEW NEST SITES IN TOWNSVILLE

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In North Queensland, the Bush Stone-curlew (*Burhinus grallarius*) breeds between June and December (Lavery *et al.* 1968). In Townsville (19° 19' S, 146 ° 45' E) a mild winter saw many pairs returning to nest sites occupied in previous years (Garnett 1987, Anderson 1991, Johnson & Baker-Gabb 1993). The incubation period is 21-28 days (J. Wren NRS).

In previous years Bush Stone-curlews have been known to abandon nest sites with a sudden deterioration in the weather (N. Canton, pers. comm). This report details the impact of unseasonal heavy rain on two active nest sites at James Cook University, Townsville and suggests that the choice of nest site rather than the weather is a factor in their survival.

Townsville lies in a rain shadow area along the coastal plain with Mt Stuart (528m) to the south, Mt Cook (493m) offshore on Magnetic Island to the north and Hervey's Range (580 – 615m) to the west. The wettest months are December to February when the monsoon trough extends south over Cape York. In the north the Bush Stone-curlew is believed to time its breeding before the onset of the wet season to maximise food available for growing chicks.

During the first week of August 1998 a female lay two eggs on the grassy terrace behind the English Department on the Western Campus. The terrace was originally part of the hillside and is vegetated with poplar gums (*Eucalyptus polycarpa*), gum-topped bloodwoods (*E. erythrophloia*) and *Melaleuca* species. The area has

now been developed with a car park down slope at its northern edge, buildings up slope to the west and south and an access road to the east. The terrace has been in use as a nest site by a pair of Bush Stone-curlews over a number of years with several chicks hatched there in spite of it being in a high use area (N. Canton, pers. comm). The nest, a bare scrape in the open in a shallow depression, was cordoned off with tape by ground staff to reduce disturbance. The companion bird settled beside a low shrub close to the access road.

In mid-August a second female lay a clutch of two eggs in a low-use area near to the horticulture sheds on the eastern edge of the campus where the land slopes gently to the north-west. The nest site was within a grove of *E. polycarpa* with the eggs laid in leaf litter under a tabuia (yellow trumpet tree). The companion bird settled near the roadway a short distance away.

In the early hours of Saturday, 29 August a low pressure cell moved in from the south-west. Twenty-four millimetres of rain was recorded to 9am locally at Douglas (C. Acton, pers. comm) before clearing to a fine day. The Western campus nest site was monitored at 7.30am and found to be well draining. The companion bird made a low zigzag run to divert attention from the nest.

During the early hours of Sunday, a second low pressure cell hit Townsville bringing heavy rain and electrical storms. A further 107mm was recorded at Douglas over the 24 hour period to 9am - twice the highest previous one day record for August. The Western campus nest site was monitored at 7.30am and in addition to rain falling directly on the nest, runoff was beginning to flow down the depression from a mound to the west and from the downpipes of the building to the south. At the base of the slope water was beginning to pond back but continued to drain to the culverts in the roadway. The nesting bird appeared safe but there was no sign of the companion, which is believed to have sought shelter on higher ground.

The same topography that forms a rain shadow area around Townsville can also trap storm cells approaching from a south-west or north-west direction. By midday on 30 August, the low pressure cell was in a holding pattern between Magnetic Island and the hills surrounding the coastal plain, dumping torrential rain. Localised flooding occurred across the city and during a temporary ease I drove through storm water back to the Western Campus to check on the nest. The nesting bird appeared drenched and very exposed, with water filling all pockets and crevices around her. Again there was no sign of the companion bird. At 12.30pm heavy rain resumed; I crossed the tape barrier towards the bird which fled the nest without a sound.

I inspected the eggs to find one quite cold and the second barely warm which suggested the bird had been losing body heat. The cold egg showed signs that the chick had tried to hatch but there was no piping or movement and it had probably died some hours earlier. I remained at the site in the shelter of a building for an hour cradling the warmer egg in case the adult bird returned. At 1.30pm I concluded that the nest had been abandoned. The nest itself was washed out on late Sunday afternoon. Two hundred and four millimetres of rain was recorded at Douglas between 9am Sunday 30 and 9am Monday 31 breaking all previous rainfall totals for August.

On the eastern side of the campus the tabuia tree had provided some shelter from the heavy rain and also broke the line of flow of runoff from up slope. Water was channeled away from the nest by the gentle slope in the land. The companion bird is thought to have remained by his mate throughout, however as the site was not monitored over the weekend this cannot be confirmed. Two chicks hatched on 10 September, approximately 25 days after the eggs were laid.

The Western campus site has been checked daily since the nest was abandoned, the depression in the terrace showing clear signs of where water washed through. It will be interesting to note if the pair returns to nest there later in the season and in subsequent years.

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ESTIMATES OF THE NUMBERS OF WADERS IN THE DONGSHA ISLANDS, CHINA

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INTRODUCTION

The Dongsha Islands contain immense areas of flats and shoals of suitable feeding habitat for waders. The islands are located in the Yellow Sea near the southern Yancheng coast (32° 55' 120° 57' to 33° 19' 121° 21') and covers an area of over 70,495 ha above the zero low water mark (Fig. 1). The islands have little relief (maximum 5.1 m) and have little vegetation except at the end of spring and in early summer when a few *Suaeda salsa* grow (Jiang 1993). Birds feed around the islands mainly at low tide. The most important site is Tiao zi ni (Fig. 1) and waders use this site for both foraging and roosting.

WADER COUNTS AND POPULATION ESTIMATES

Since 1993, we have visited the Dongsha Islands six times and surveyed the waders at Tiao zi ni. Four roosting areas were surveyed on each visit. Waders were counted at least annually as part of a population monitoring program that began in 1993. We counted all the birds at each site over a short period of time on each survey (1-2 days). Total counts suggest that in spring over 100,000 waders use the islands during northward migration and this increases to over 300,000 in autumn during the southern migration (Table 1). The Dongsha Islands are a Ramsar site because of the numbers of migrating waders. However, many endangered water birds also roost here, such as the Black-faced Spoonbill (*Platalea minor*) and Relict Gull (*Larus relictus*). This makes the islands one of the most important wetlands in the region.

THREATS

One of the major threats to the value of Dongsha to waders is from the effect of increasing water pollution from coastal industries. Algal red tides have already killed many fish and crustaceans in the region and the quality of the entire ecosystem is declining. Other threats to the area include unrestricted harvesting of shellfish and snails. This type of practice will exhaust many invertebrate populations and reduce the islands value to waders through deterioration or loss of feeding habitat.

RECOMMENDATIONS

1. The whole area around Dongsha Islands should be

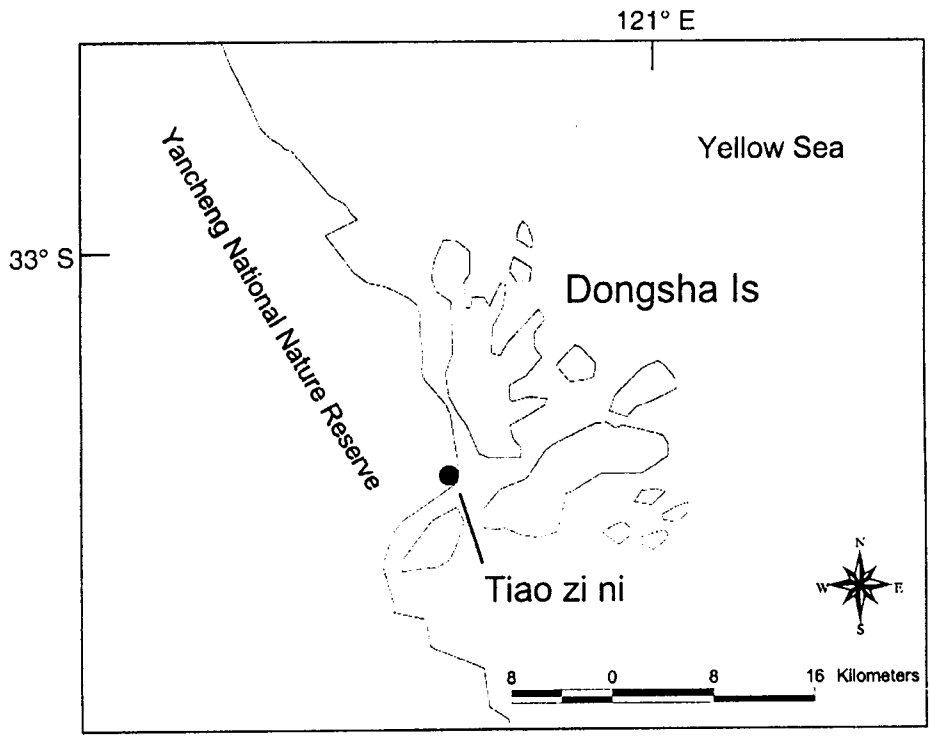

Figure 1. Location of Tiao zi ni and Dongsha Is on the northeastern coast of China.

protected as a marine reserve with a high priority given to the protection of shellfish resources.

2. Wader populations should continue to be monitored, especially during the northwards and southward migrations.

ACKNOWLEDGMENTS

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Table 1. The counts of waders at Dongsha Islands during surveys from 1993 to 1997.

Species	August 1993	February 1995	May 1996	January 1997	April 1997	September 1997
Black-tailed Godwit	145	-	323	-	259	1354
Bar-tailed Godwit	44	-	424	-	714	1668
Little Curlew	6	-	2	-	-	-
Whimbrel	90	-	165	-	128	200
Eastern Curlew	328	-	699	-	819	1532
Eurasian Curlew	-	400	-	260	-	-
Spotted Redshank	56	-	188	-	167	122
Common Redshank	-	-	-	-	142	-
Marsh Sandpiper	100	-	127	2	643	1140
Common Greenshank	545	-	132	-	215	615
Nordmann's Greenshank	-	-	16	-	-	-
Wood Sandpiper	1	-	-	-	22	3515
Asian Dowitcher	-	-	664	-	478	1320
Great Knot	490	-	457	-	144	2206
Red Knot	110	-	232	-	20	8140
Red-necked Stint	1146	-	1108	-	680	2900
Temminck's Stint	-	-	20	-	31	40
Dunlin	1216	120	4410	3480	4500	13081
Curlew Sandpiper	-	-	-	1220	-	-
Broad-billed Sandpiper	22	-	125	-	71	416
Ruff	-	-	-	-	-	45
Red-necked Phalarope	-	-	12	-	229	1728
Grey Phalarope	-	-	-	-	-	16
Oystercatcher	52	-	4	-	26	120
Black-winged Stilt	28	-	314	-	465	562
Grey Plover	-	29	-	40	-	120
Kentish Plover	27	-	656	1195	1103	> 3000
Lesser/Greater Sand Plovers	613	-	261	-	317	1123
Oriental Pratincole	-	-	-	-	60	640
Unidentified waders	47140	5400	35869	38540	61351	198573
Total waders	52169	5949	46208	44737	72584	244176
Saunder's Gull	88	280	60	48	210	135
Relict Gull	-	-	-	305	-	-
Little Tern	58	-	14	-	32	140
Black-faced Spoonbill	-	15	30	16	15	48
Other waterbirds	214	15956	1253	39783	845	12851

SIGHTINGS OF LEG-FLAGGED WADERS FROM VICTORIA, AUSTRALIA: REPORT NUMBER 6.

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An orange plastic leg-flag has been placed on the right tibia of most migrant and some resident waders banded in Victoria since 1990. This has led to a significant increase in the rate at which data has been generated on migration routes and key stopover regions in the flyway.

Lists of sightings of orange flagged birds away from the banding areas have been published in past editions of *The Stilt.* During the past year, the rate of reporting has increased dramatically as a result of sustained "flag-watch" programs introduced at various important locations. Massive totals of birds flagged in Australia (Victoria, NW Australia and Queensland) and New Zealand have been seen. For example,196 birds seen in Hong Kong (March to May 1998), 82 in the Republic of Korea (April to May 1998), 77 in Japan (August to September 1997), and 51 in New Zealand (mid 1997 to mid 1998). This will in due course permit quantitative analysis of the data, giving a much better insight into the routes and locations used by different species and different populations on migration through Asia (and Australia). The efforts of everyone who recorded these birds in the field and reported them to us are very greatly appreciated. A comprehensive list of all sightings of orange-flagged (VWSG) birds which have been reported since *The Stilt 31* are given below.

Bar-tailed Godwit

190598	Liaoning Province, China 40° 49'N 121° 33'E	M. Barter, J. Wilson
110498	Asan Bay, Republic of Korea 36° 54'N 126° 54'E	Ki-Seop Lee, Ok-Sik Jung, Kyung-Kyu Lee
240498	Yongjong Island, Republic of Korea 37° 30'N 126° 30'E	Jin-Young Park, Jeong-Yeon Yi
250498 3 birds	Namyang Bay, Republic of Korea 37° 05'N 126° 45'E	Jeong-Yeon Yi
170497	Yatsu Tidal Flat, Chiba, Japan 35° 40'N 139° 55'E	Sei Akutsu
180497	"	Tatsuo Tomioka
190497 to 050597	"	Tsutomu Ishikawa
260497	"	Miyako Nakamura
231197	Manukau Harbour, NZ	T. Habraken
121297	Kaipara Harbour, NZ	G. Pulham
220197	Southport Broadwater, Queensland	G. Miller & L. Bowden
131297	Manly Boat Harbour, Moreton Bay, Qld.	A. Keates
141097 2 birds	Botany Bay, NSW	G. Ross

An excellent collection of records of birds migrating northwards through Japan and Korea, and one probably fattening up in northern China at its last major stopover location before the breeding grounds. But where do the birds go on southward migration ? Recoveries show a similar lack of reports for July, August and September. Maybe they do fly non-stop all the way from the Sea of Okhotsk, eastern Siberia, to the northern Australia coastline! (8000 km).
Onward movements to New Zealand are reported in most years. However, the two Queensland records would appear to relate to birds which had changed their non-breeding areas from Victoria to Queensland.

Eastern Curlew

280797	Kanghwa Island, Republic of Korea 37° 35'N 126° 25'E	Jeong-Yeon Yi
300797	"	Jin-Young Park

These are the first reports of Victorian Eastern Curlew in south Korea. It appears that Eastern Curlew from SE, NE and NW Australia all mix together in south Korea and Japan.

Grey-tailed Tattler

021097	Manly Harbour, Moreton bay, Qld	J. Harris

This must have been one of three Grey-tailed Tattlers colour flagged off Manns Beach, Corner Inlet on 18 January 1996. It was probably on passage down the east coast back to Victoria.

Ruddy Turnstone

291297	Seal Rocks, Phillip Island	R. Kirkwood

This Ruddy Turnstone was probably one of those banded at our newly discovered site at West Head, Flinders on 12 November 1997. Although normally site faithful, this one had clearly commuted across the western entrance of Western Port Bay.

Great Knot

160597	Hua-Lien Estuary Taiwan 23° 58'N 121° 35'E	Taiwan Bird Banding Centre
040997	Mankyung Estuary, Republic of Korea 35° 52'N 126° 43'E	Jeong-Yeon Yi

Most Australian recoveries are from China, as a result of intense hunting there. It is particularly valuable to receive flag sightings from other stopover locations. Reports on southward migration (one of the above) are also not common in Asia.

Both of the above are the first reports in each country of Great Knot banded in Victoria.

Red Knot

260498	Asan Bay, Republic of Korea 36° 54'N 126° 54'E	Jin-Young Park
240897	Tainan, Taiwan 23° 01'N 120° 07'E	Taiwan Banding Scheme
030197 (3 birds)	Miranda, Firth of Thames, NZ	S. & J. Rowe
200197	"	R. Mavor
210197	Waipu Cove, Northland, NZ 35° 59'S 174° 29'E	G. Pulham
070297	Manawatu, NZ	S. & J. Slack
260797	Manukau Harbour, NZ	T. Habraken
161097	"	R Clough
151197	Kaipara, NZ	G. Grant
151197	Manukau Harbour, NZ	R Clough
291197 (3 birds)	Kaipara, NZ	A. Reigan
021297	Manawatu, NZ	I. Saville
061297	Kaipara, NZ	G. Pulham
010198 (2 birds)	Waipu Cove, Northland, NZ	K. Hansen
010298 (2 birds)	Kaipara, NZ	A. Reigan
090198 (2 birds)	Waipu Cove, Northland, NZ	G. Pulham
060298	Portland, Whangarei Harbour, Northland, NZ	G. Grant & M. Twyman
060298	Karewa, Te Whanga Lagoon, Chatham Islands, NZ 43° 45'S 176° 27'W	M. Bell
280298 (3 birds)	Manukau Harbour, NZ	T. Habraken
030398	"	R. Clough
270698	"	P. Agnew

210997	Lytton, Qld	A. &. Keates
300997	Toorbul, Pumicestone Passage Qld	J. Harris
301297	Kangaroo Island, Tasmania	T. Reid

This is probably the best ever crop of Red Knot sightings. In part this may have resulted from the excellent catch of birds at Swan Bay, Queenscliff on 18 October 1997. Many of these were clearly on their way to New Zealand. And at least one went to Tasmania!

The sighting in Korea is the first of a Victorian Red Knot, but there has previously been a recovery. The sighting in Taiwan was on southward migration. It is rare to get sightings or recoveries of medium/large waders in Asia on their way south.

Overall pride of place for the unexpected must go to the sighting in the Chatham Islands - out in the Pacific some 800 km east of Christchurch, South Island, New Zealand. It was in a flock of 760 Red Knot and was accompanied by a Red Knot with a yellow flag (from NW Australia). It must be rather hazardous aiming for a small group of islands in the South Pacific each year! But it must be worthwhile or they wouldn't do it.

Sanderling

240797	Ichinomiya Estuary, Chiba, Japan 35° 23'N 140° 24'E	Kaita Kaneko
050897	Tokachi, Hokkaido, Japan 42° 42'N 143° 42'E	Kazunori Noro
100897 (6 birds)	Sousa, Chiba, Japan 35° 37'N 140° 34'E	Tatsu Sato
240897 (3 birds)	Ichinomiya Estuary, Chiba, Japan 35° 23'N 140° 24'E	Kenzo Tomiyo, Tomio Tanaka Akihiko Mine
300897 (5 birds)	"	Yasuo Suzuki
110997	"	Kaita Kaneko
240897	Taichung, Taiwan 24° 11'N 120° 29'E	per Taiwan Bird Banding Centre
020598	Mai Po Nature Reserve, Hong Kong 22° 29'N 114° 19'E	G. Carey & P. Leader
040997	Alas Purwo NP, East Java, Indonesia 8° 31'N 114° 15'E	M. Grantham
270997	South Ballina, NSW	Bo Totterman
040298 (2 birds)	Nora Greina, SA (between Robe and Beachport)	R. Schulz

Another amazing collection of overseas sightings of Sanderling, including our first from Taiwan, Hong Kong and Indonesia. This list brings the number of sightings in Japan to 44. It is incredible there has not yet been an overseas recovery of a Sanderling banded in Australia (or vice versa).

Most sightings in Japan (including all the 1997 records) are on southward migration. There must be a high concentration of birds heading for south east Australia with six individuals located at the same time at one site and five at another. The sightings in South Australia were at least 40 kilometres from the nearest site at which they were banded. In addition there have been sightings (details not yet available) at sites even further west, along the coast of the Coorong right up to the mouth of the Murray River.

The tendency of Sanderlings to move more freely than most migrant waders along the coast of southeastern Australia is further illustrated by systematic records collected at Sandy Point (near Wilson's Promontory) by Susan Taylor and Jim Wilson. They have seen Sanderlings with orange leg flags on the right tarsus (indicates South Australian origin) on seven occasions between October 1997 and June 1998 (during the course of monthly Hooded Plover surveys) - with up to three such birds seen on each occasion. Also most of the 22 Sanderlings with colour flags (out of 103 birds examined) seen by Chris Lester at Killarney Beach on 17 January 1998 had the flag on the tarsus.

Red-necked Stint

190597	Sakhalin, Russia 47° 27'N 142° 45'E	V. Zykov
240597	Watari, Miyagi, Japan 38° 02'N 140° 55'E	Hiroshi Ikeno
071097	Alas Purwo National Park, Indonesia 8° 31'S 114° 15'E	M. Grantham
071197 181197 030198 220298 140498 170498 180498 departed	Lake Ellesmere NZ 43° 43'S 172° 30'E	C. Hill et al.
02&041097	Darwin Sewage Ponds	J. Izzard
200497 (2 birds)	Wyndham WA	J. Lewis
270497	"	"
280398	"	"
050498	"	"
090498	"	"
020598 (2 birds)	"	"
241097	Broome WA	D. Rogers
221097 to at least 011197	Eyre Bird Observatory WA	Eyre Wardens
060297	Mirapool Qld	B. Baker & J. Thompson
081197 (2 birds)	Maroom Qld	E. Kleiber & R. Lamb
060797	Murray River Mouth SA	D. Robertson
181097	King Island, Tasmania	C. Lester
151197 (2 birds)	nr Hobart, Tasmania	T. Reid
281297	Georgetown Tasmania	T. Reid
180997	Lake Linlithgow (western Vic.)	S. Clark

Sightings of orange leg flagged Red-necked Stints at Mai Po Marshes, Hong Kong (22° 29'N 114° 19'E) were made on the following dates:

Date	Number of birds	Date	Number of birds
04/05/97	1	01/05/98	1
09/04/98	1	08/05/98	3
19/04/98	1	10/05/98	3
20/04/98	3	11/05/98	1
23/04/98	1	12/05/98	3
24/04/98	2	16/05/98	1
25/04/98	5	23/05/98	1
27/04/98	3	08/06/98	1
28/04/98	3		

This incredible series of sightings at Mai Po, and a similar long list of Curlew Sandpipers, was put together by Geoff Carey and Paul Leader. Others who contributed to the field observations were J. Hackett, I. Tyzzer, E.M.S. Kilburn, V.B. Picken, J.G. Holmes, R.W. Lewthwaite, C. Ma, D.S. Melville, P. Stevens, Wai Pang Lam and M.R. Leven.

The remainder of the list is another most valuable and varied list of sightings. The one in Russia is rather further north east than any previous record from SE Australia. Maybe there isn't the divide between NW and SE Australian birds suggested in the recoveries/flag sightings analysis presented in the April 1997 edition of *The Stilt!*

The sighting in Indonesia is only the second record from here. Most species seem to overfly in both their northward and southward migrations.

This is the sixth year in which one (or more) orange leg-flagged Red-necked Stints has inhabited the shores of Lake Ellesmere on the east coast of South Island, New Zealand. It is tempting to think that most records relate to an individual which returns there each year.

The sightings in Hong Kong are the most comprehensive set yet (see also Curlew Sandpiper sightings). The median date for the 1998 records is 28 April. This is only four days later than for Curlew Sandpipers even thought the first orange-flagged Red-necked Stints arrived two weeks later than the first Curlew Sandpiper from Victoria. Red-necked Stints also linger longer into May, with one late record even in June.

The sightings within Australia, but away from the coastal Victoria marking sites, largely refer to birds on passage through northern Australia to and from non-breeding areas in SE Australia. There is also some passage on to Tasmania. However, the Mirapool record (Queensland) appears to be a bird which has changed its non-breeding area and the Murray River record probably relates to a wandering one year old non-breeding bird.

A Red-necked Stint with a blue leg flag, from Lake Furen, Hokkaido, Japan was seen at Inverloch by Jim Whitelaw on 2 December 1997. This is the first sighting of a Japanese leg-flagged Red-necked Stint in Victoria. Later in the month one was retrapped at Werribee SF.

Sharp-tailed Sandpiper

270498	Mankyung Estuary, Republic of Korea 35° 52'N 126° 43'E	Jeong-Yeon Yi
270498	Mai Po Nature Reserve, Hong Kong 22° 29'N 114° 19'E	G. Carey & P. Leader
110498	Kooraggan, Newcastle, NSW	E. Vella
070597	Lake Alexandrina, SA	W. Syson
011197	Edithvale Wetlands	B. Brown

These are the first Victorian Sharp-tailed Sandpipers to be reported from Hong Kong and Korea.

The South Australian bird was in non-breeding plumage and may have been intending to "overwinter". Edithvale Wetlands is at least 40 km from any site where Sharp-tailed Sandpipers have been colour flagged. This species has a tendency to be less "site faithful" than most other migrant species.

Curlew Sandpiper

120997 (2 birds)	Pei-Mon Taiwan 23° 16'N 120° 07'E	Taiwan Banding Centre

An almost daily search for colour flagged birds at Mai Po Marshes, Hong Kong (22° 29'N 114° 19'E) between late March and the end of May 1998 resulted in 96 sightings of orange flagged Curlew Sandpipers.

Dates of sightings were:

Date	Number of birds	Date	Number of birds
26/03/98	3	24/04/98	6
27/03/98	3	25/04/98	6
03/04/98	1	26/04/98	2
04/04/98	1	27/04/98	11
09/04/98	5	28/04/98	11
10/04/98	3	29/04/98	2
11/04/98	3	30/04/98	2
12/04/98	3	01/05/98	2
13/04/98	5	02/05/98	2
16/04/98	1	03/05/98	2
17/04/98	4	10/05/98	1
19/04/98	4	12/05/98	1
20/04/98	9	16/05/98	1
23/04/98	2		

The median date of these records from Mai Po Marshes is 24 April. This is almost exactly the same as in previous years (which were based on less data). It is surprising that some birds from Victoria have already reached Hong Kong before the end of March even though departures are not thought to commence until the second week of March.

This incredible series of sightings was mainly achieved through the efforts and dedication of Geoff Carey and Paul Leader. For the names of others who contributed to the sightings see under Red-necked Stint.

220397	Wyndham WA	J. Lewis
020598 (2 birds)	Broome WA	C. Hassell, N. Grenfell
260598	"	C. Hassell
030997	Boonooroo, Qld	C. Barnes
130298	Ballina NSW	J. Harris
141097	Botany Bay NSW	G. Ross
070198	Price Saltfields SA	P. Walker
170197	Georgetown Tasmania	R. Cooper
080298	"	"

Many of the sightings of Curlew Sandpipers within Australia probably relate to birds stopping over on migration to/from Victoria. However the Ballina, Adelaide and Georgetown records appear to refer to birds which have changed their non-breeding area away from Victoria. One of the birds seen at Broome on 2 May was in non-breeding plumage, as was the bird on 26 May (possibly the same individual although the sites were 3 km. apart). This is further evidence that some one year old birds from SE Australia may move as far as NW Australia in their first year, even though they do not return to their breeding grounds. In addition, a Curlew Sandpiper with a green flag, from Queensland was seen at Barrallier Island, Westernport, on 16 November 97 by Jon Fallaw and Becky Hayward.

Red-necked Avocet

101097 (1) 261097 (3)	Werribee SF	B. Swindley.

These birds were probably part of the catch of 27 made at the Gurdies, Western Port, on 6 September 1997. A similar local movement of a flagged Red-necked Avocet was recorded in 1993.

Grey Plover

A bird seen with an orange flag by Brett Lane at North Spit, Werribee SF on 24 December 1997 was probably one of 23 marked in NW Swan Bay on 18 October 1997. No Grey Plover have actually been flagged at Werribee SF, and few anywhere else either.

Lesser Sand Plover

160297	Manly Boat Harbour, Moreton Bay, Qld.	A. Keates
300397	"	A. Keates, L. Agnew
080298	"	A. Keates
041097	Kurnell, NSW	J. Pegler

This species has turned up in four consecutive years in Moreton Bay in the February to April period. Considering the very small number flagged in Victoria (55) it is possible that the same bird is involved. It is also possible that the bird has permanently moved from Victoria to Queensland, but if this is the case it is surprising that the sightings are not made at other times of the year.

The Kurnell record is obviously a bird on southward migration making a stopover part way down the east coast of Australia on its way back to Victoria.

Greater Sand Plover

110498	Mai Po Nature Reserve, Hong Kong 22° 29'N 114° 19'E	R.W. Lewthwaite & C. Ma

This is the third sighting of a Victorian Greater Sand Plover in Hong Kong on northward migration.

OCCASIONAL COUNTS NO 1.

WADER COUNTS ON THE LACEPEDE ISLANDS, WESTERN AUSTRALIA

J.R.Wilson[1] and C. Hassell[2]

[1] 13/27 Giles St, Kingston, 2604. ACT, Australia.
[2] Broome Bird Observatory, P.O. Box 1313, Broome 6725, WA Australia

This is the first paper in a new series in Stilt of significant wader counts made at remote and little visited sites in Australia, on the coast and inland. The aim is to publish data on sites that have never been counted, or are infrequently counted owing to their temporal nature (inland wetlands). Readers are encouraged to make as accurate counts as possible at remote or little counted sites they visit and publish them under this occasional count series.

The Lacepede Islands, 16°51'S 122°06'E, lie approximately 125 km north of Broome, and 40 km west of Beagle Bay. The islands were visited on 2 September 1998 by 12 members of the Australasian Wader Study Group North-West Australia Wader Expedition and 3 members of the staff of Broome Bird Observatory.

The island group consists of 4 small low lying and treeless islands, West Island, Middle Island, Sand Island and East Island. A reef fringes the islands to the south and east. The shores of the islands are mostly sand beaches with rock outcrops and rock ledges, especially on the reef side of the islands. The rocky shores, reef, and sandflats enclosed within the reef, give suitable feeding habitat for waders.

On 2 September all the islands were visited and all the waders counted. Counts were started on the falling tide, continued through low tide, and were completed on the rising tide. Counts of most species seen at low tide from Middle Island were not included in the total as birds had probably dispersed off a roost in Creek Inlet on West

Table 1: Counts for each island in September 1998 and maximum counts made in December 1997.

Species	SEPTEMBER 1998					DEC 1997
	West Is.	Middle Is.	Sand Is.	East. Is.	Total	Total
Bar-tailed Godwit	220			75	295	300
Whimbrel	18			2	20	2
Eastern Curlew	30				30	28
Greenshank	16			2	18	53
Terek Sandpiper	10				10	6
Common Sandpiper	3	3			6	6+
Grey-tailed Tattler	182		3	212	397	295
Ruddy Turnstone	784	78	33	120	1015	1050
Red Knot	47			1	48	33
Great Knot	410		5	3	418	336
Sanderling				24	24	16
Red-necked Stint	14	35	6	30	85	575
Sharp-tailed Sandpiper	6				6	14
Curlew Sandpiper	339		2	24	365	250
Pied Oystercatcher	8 pr + 3 ind	10 pr + 5 ind	4 pr	1 pr + 3 ind	19 pr +11inds	3 pr + 1 ind
Sooty Oystercatcher	10 pr + 1 ind	1 pr + 1 ind	4 pr + 1 ind	1 pr	16 pr + 3 ind	5 pr + 5 inds
Golden Plover	2	10	1	2	15	4
Grey Plover	75		7	7	89	30
Red-capped Plover	37		1		38	0
Lesser Sand Plover					0	21
Greater Sand Plover	460		7	170	637	251
Oriental Pratincole					0	1
TOTAL WADERS					3600	3287

Island, which had been counted on the falling tide earlier in the day. The islands are so close to each other, the distance from East Island to West Island being about 6 kms., that they probably serve as one complex for a wader. Waders have previously been counted between 15 and 19 December 1997 by Swann and Willing (1998), but they only visited West and Middle Island.

Table 1 shows the counts for each island in September 1998, together with maximum counts made in December 1997.

Considering the counts were made at two different stages in the annual cycle of waders in Australia, in early September when adults, but not juveniles, are arriving from the breeding grounds, and in December when most if not all birds should have arrived, they are remarkably similar. The counts probably only represented a minimum of the waders present, especially in September 1998, when we could not count at high tide.

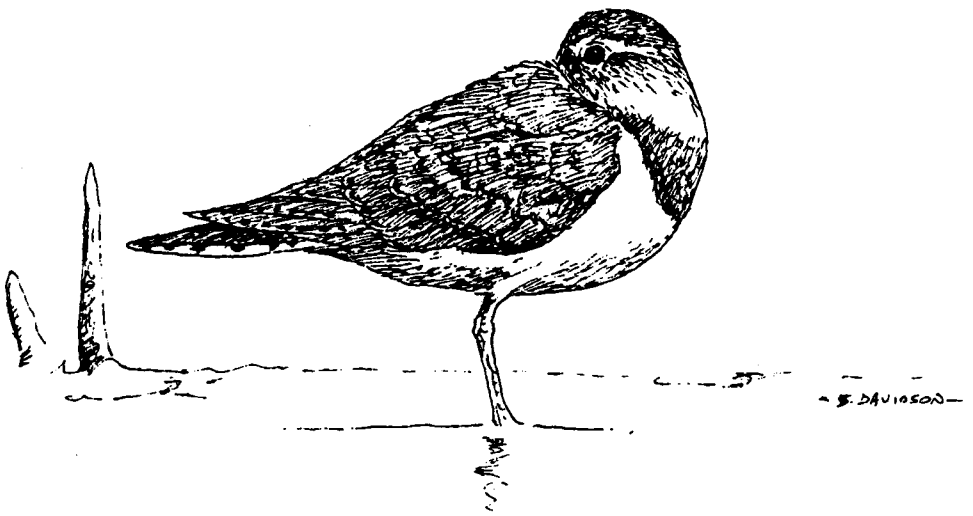
In September, no juvenile Pied or Sooty Oystercatchers were seen. One small Pied Oystercatcher chick was found, and behaviour of some pairs of both species suggested that they had eggs. After breeding the Oystercatchers could disperse away from the islands – that could explain the lower numbers in December.

ACKNOWLEDGEMENTS

We thank the Department of Conservation and Land Management (CALM), Broome Regional Office, for permission to land on the islands.

REFERENCES

Swann, G. & T. Willing, 1998.Annotated Bird List. The Lacepede Islands. Unpublished report.



INSTRUCTIONS TO AUTHORS

The Stilt is the bulletin of the Australasian Wader Study Group and publishes original papers, technical notes and short communications on all aspects of waders (shorebirds) of the East Asian-Australasian Flyway and nearby parts of the Pacific region. Authors should send an original and one hard copy of any manuscript plus the document saved on a 3 1/2" computer disc to the editor, Dr David Milton, 336 Prout Rd., Burbank Qld 4156 or by e-mail: *david.milton@marine.csiro.au*. Material sent to *The Stilt* is assumed to be original and must not have been published elsewhere. Authors are asked to carefully follow the instructions in the preparation of manuscripts and to carefully check the final typescript for errors and inconsistencies in order to minimise delays in publication. Suitable material submitted before 1st March or 1st September will normally be published in the next issue of *The Stilt* in April or October respectively. Late submissions may be accepted at the editor's discretion and he should be contacted to discuss the situation. Articles, including tables should be in 11 pt Times Roman font typed in MS Word 6.0 for PC or a wordprocessing package readable by Word 6.0. A disc copy of the figures is also preferred and can be included if they have been produced in MS Powerpoint or Excel, Harvard Graphics 3.0 or less, or Grapher 2.0 software.

Full research papers of more than 6 typed double-spaced text should contain the following elements:
TITLE - in bold, capitalised type
Authors name and address - John Smith[1], Stephen Brown[2] and Max Well[3]
[1] 1 Main St., Melbourne 3001 Vic. AUSTRALIA
[2] Dept. Biology, Univ. Queensland, St Lucia 4068 Qld. AUSTRALIA
[3] Birds Singapore, National Univ., Jurong N4321 SINGAPORE

ABSTRACT - Usually less than 200 words summarising the most important findings of the study.
INTRODUCTION - This should be a short section of about half a journal page to "set the scene" and explain to the reader why the study was important. It should end with a clear definition of the aims of the study. The first reference to a species of bird should have the scientific name in *italics* after it.
METHODS AND MATERIALS - Clearly sets out the methods used in the study and should include sufficient detail to enable the reader to duplicate the research. First level subheadings should be **Bold and lower case** and further subheadings in *italics.*
RESULTS - Highlights the key points that came out of the study in relation to the objectives set out in the introduction. Data should be presented in figures or tables.
DISCUSSION - Puts the study in context with other previous research on the same topic and explains the significance of the major results presented in the **RESULTS** section.
ACKNOWLEDGEMENTS - Recognises the contribution of others to the completion of the study.
REFERENCES - Records all the literature cited in the text, tables or figures. They should be in alphabetic and chronological order with multi-authored references after single author citations by the same author. These should be formatted as follows:

Single author papers: Smith, F.T.H. 1964. Wader observations in southern Victoria, 1962-1963. Aust. Bird Watcher 2, 70-84.

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Books: Kershaw, K.A. 1964. Quantitative and dynamic ecology. Edward Arnold, London.

Reports: Noor, Y.R. 1994. A status overview of shore birds in Indonesia. Pp. 178-88. *In:* Wells, D.R. & T. Mundur (Eds.) Conservation of migratory water birds and their wetland habitats in the East Asian-Australia Flyway. Asian Wetland Bureau, Malaysia.

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Tables - Captioned as **Table 1.** The list of suitable names of Australian waders.

There should be no lines in the table except for above and below the column headings and at the bottom of the table. All tables should be laid out in the same document as the text but located after the **REFERENCES** using the table facility in the word processing package. Wide tables can be set out in a separate, suitably titled document. All measurements should be in metric units (e.g. mm, km, °C etc) and rates should be recorded thus: $.d^{-1}$ rather than /day or

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Captions to Figures
Lists the captions of all the figures sequentially on a separate page. They should be captioned as:
Figure 2. The number of hunters of each age class interviewed in Shanghai during April 1998.

All maps should have a border, distance scale, reference latitude and longitude and/or inset map to enable readers unfamiliar with the area to locate the site in an atlas.

Other figures should have axis numbers and labels of sufficient size to be at least 1.5 mm high after 50% reduction. This usually corresponds to 14 - 16 pt or larger. Multi-graph figures should all be separately identified as (a), (b) etc. Legends should be located at the outer edge of a graph at the bottom or top right and in 12 pt.

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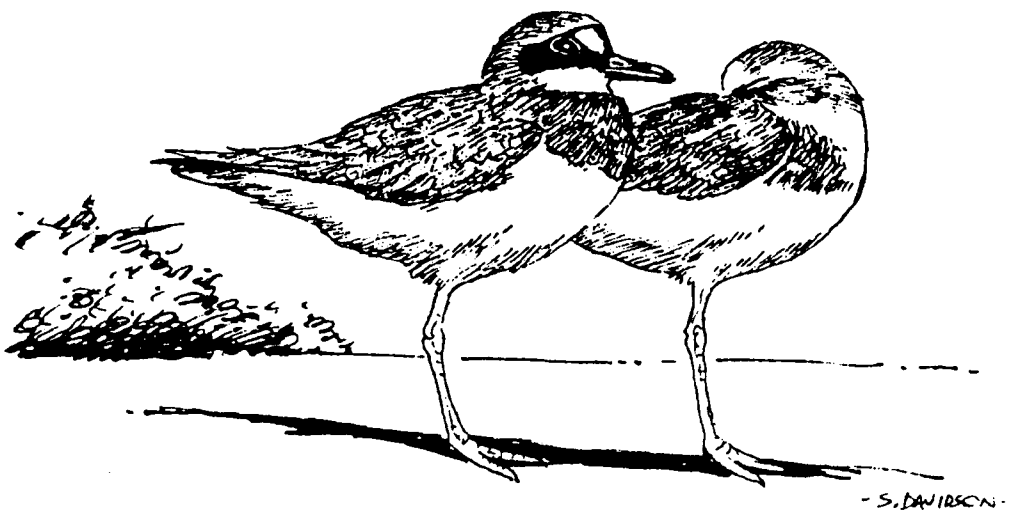
REFERENCES

Christidis, L., & W.E. Boles 1994. The Taxonomy and Species of Birds of Australia and its Territories. RAOU monogr. 2. 112pp.

Hayman, P., J. Marchant & T.Prater 1986. Shorebirds: An Identification Guide to the Waders of the World. Christopher Helm, London.



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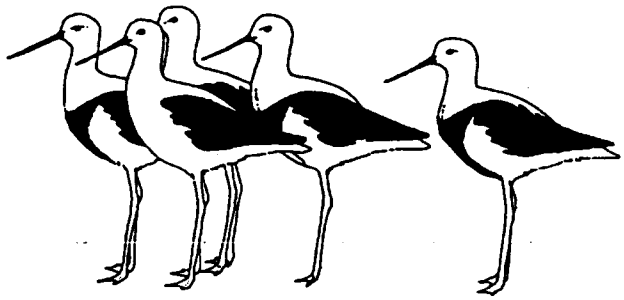
Indexes:

Author and species indexes have been published within *The Stilt* to volume 30.

Volumes Indexed	Volume containing Index
1-6	7
7-12	13
13-18	19
19-24	25
25-30	31

Deadlines:

The closing dates for submission of material have been revised. They are 1 March and 1 September for the April and October editions respectively. **Extensions to these dates must be discussed with the Editor.** Contributors are reminded that they will probably have some comments to consider, and possibly incorporate, at some time after submission. It would be appreciated if this could be done promptly.



Stilt 33 - October 1998
Table of Contents