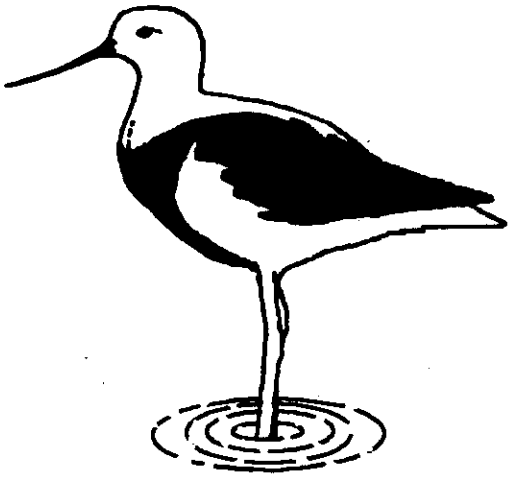
The Stilt



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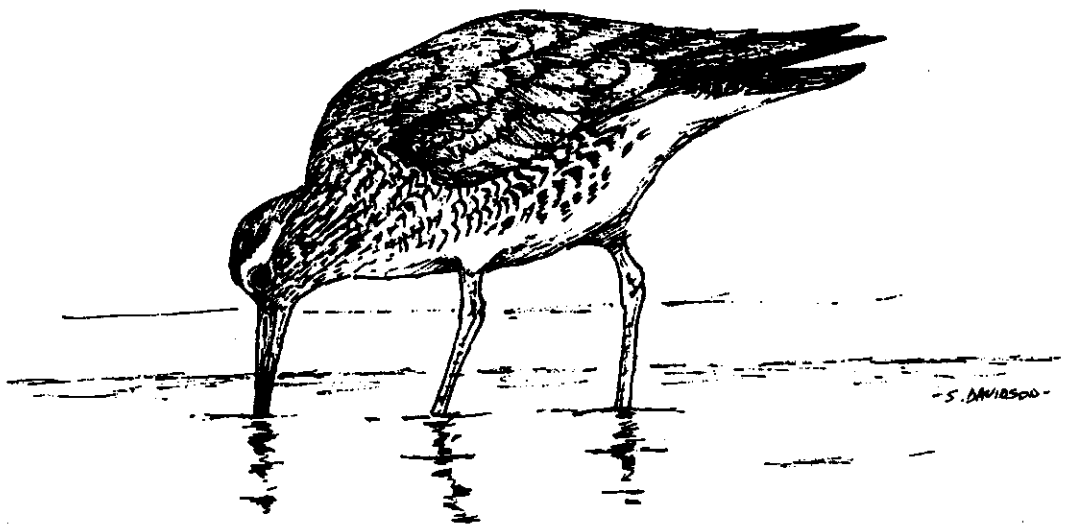
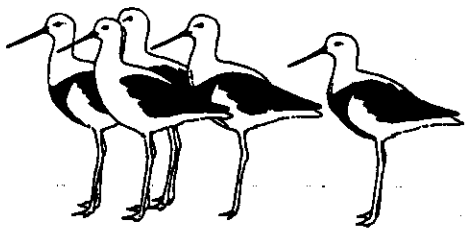


Australasian Wader Studies Group

A special interest group of Birds Australia

Number 34
April 1999



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

I apologise for the delay in the publication of this issue of *The Stilt*. It has been brought about largely because of my heavy work travel commitments. The quality of articles in *The Stilt* continues to improve and there are articles in this issue that could have easily been published in international scientific journals. This brings me to a dilemma I face as a professional scientist editing a bulletin such as *The Stilt*. I know that the only way for good science on shorebirds by amateurs and professional scientists to be widely available is through publication in international scientific journals. I agree completely with Jim Wilson, in his chair's report in this issue, where he comments on the absence of studies on shorebirds in the journals that publish the majority of the ornithology in the East Asian-Australasian Flyway. I think that there are positives and negatives associated with the increasing publication of the more "rigorous" scientific articles in *The Stilt*. It enhances the reputation of *The Stilt* and AWSG and will encourage more authors to send material here. However, I think that there are long-term disadvantages by increasing the profile of *The Stilt* in its current form. The major disadvantage is that these articles are not as widely available to other scientists as they would be if published in an international journal that is abstracted by the major abstracting services and subscribed to by libraries around the world. This means that the information in *The Stilt* is almost impossible to access by people other than subscribers or their friends and colleagues. The potential for Environment Australia to make issues of *The Stilt* available on their web site will help address this issue.

As a first step to try and address this situation, I have approached Ian Rowley, the editor of *Emu* about his attitude to republishing suitable articles. He felt that *The Stilt* was a scientific publication and is being cited in the scientific literature. Under that scenario, he could not merely republish papers from *The Stilt*. This is not what I think most of the AWSG membership thought was the situation. Ian did have a number of good suggestions that we could adopt to try to improve the availability of the results published in *The Stilt*. I plan to discuss some of these options with the committee during the conference at Phillip Island in June.

I think that we have some important articles in this issue. The most comprehensive survey of shorebirds in Korea to date, by Nial Moores has demonstrated the importance of the Korean coastal wetlands for many shorebird species. This highlights how critical it is that these wetlands are protected from the reclamation projects that threaten the most important sites. Mark Barter's article identifying the first known stopover site for Little Curlew is also very interesting and significant. It highlights the lack of knowledge of shorebird movements and habitats in China and demonstrates the benefits of continuing close collaboration between Australian and Chinese scientists. The short report on the construction of an artificial high tide roost in southern Moreton Bay, Queensland is the first article by QWSG members for many issues and I hope that there will be more material by non-Victorian members.

We are still struggling to fill each issue of *The Stilt* so please do not be shy and send in any interesting observations or accounts of studies on shorebirds. I just request that you adhere to the 'Instructions to Authors' published on the back cover of each issue. This will make my life (and yours) a lot easier.

David Milton

CHAIR'S REPORT FOR 1998.

1998 was another year of increasing activity for the AWSG.

Progress was made on a follow up to Peter Driscoll's report on the Population Monitoring Project, when a workshop on population monitoring was organised by Environment Australia in December in Canberra. Nearly all the invited representatives were AWSG members, although some were wearing different hats appropriate to their particular expertise and organisations they represented for the day. It is the intention of Environment Australia to fund a project in 1999 to design and test methodologies for a refined scheme which will be more statistically reliable than the present scheme. It was this which was discussed at the Workshop.

On the expedition front, training programs continued in China with three key sites being censused in April and May by Mark Barter and Jim Wilson, while Ros Jessop and Peter Collins were assisting the South Koreans with census and banding work in May. We are grateful to Environment Australia for support for this work through Wetlands International. The largest expedition yet in North-West Australia from August to October was organised by Clive Minton, Ros Jessop and Humphrey Sitters. 15,000 waders were banded and the first ever complete ground count of 80 Mile Beach was carried out. Members of the AWSG are also involved in a three year program by the Queensland Wader Study Group to census the S.E. Gulf of Carpentaria, under the leadership of Peter Driscoll. All these projects are yielding extremely valuable data.

However, data collection is useless if it is not published. Writing up and analysis is often the hardest part of any project, especially for the amateur who often has little time due to the pressing need to earn a living. The late James Fisher estimated that for every hour he spent in the field he spent 7 hours writing up. Writing up is too often

left until a project is finished, sometimes many years afterwards, or often not done at all. It ought to be a continuous process so that one can define constantly where one is going, what needs to be changed in the project and what data one is missing. *The Stilt* encourages such an approach by accepting papers on unfinished or incomplete studies, and encourages papers by amateurs. However, the almost total lack of recent publications on Australian waders in other scientific journals is a cause for reflection. This is partly because *The Stilt* has overtaken this role, but is also probably partly a reflection of the lack of interest or tradition within Australian Universities for waders, and also a reflection of the almost total lack of professional involvement in wader research. Most of the work on waders in Australia is done by amateurs with limited time.

The high standing of *The Stilt* is recognised by Environment Australia who have subsidised Asian members of the AWSG in the past and have indicated intentions of continuing this support over the next three years. An application for continued funding was submitted in November.

In August, Phil Straw and Doris Graham took part in the International Wader Study Group Conference and Workshop on Curlew Sandpipers in South Africa. A paper on Australian Curlew Sandpipers was presented. Australia has possibly some of the best data in the world on this bird on its non-breeding grounds. This is being written up for the workshop proceedings that are expected to be published in 2000.

On the conservation front, the AWSG is a member of the Australian Wetlands Alliance which was reinvigorated as a lead up to the forthcoming Ramsar conference in Costa Rica. Sandra Harding, our Conservation Officer, has been heavily involved in this and other aspects of wetland and wader conservation. Thanks Sandra for an excellent job. The forthcoming AWSG conference on Phillip Island in June 1999 will focus especially on the conservation of Australian waders.

Mark Barter stepped down from the Chair in 1998 and has moved on to the Chair of the Shorebird Working Group that has the prime responsibility to oversee the implementation of the Shorebird Action Plan (SAP). The AWSG has contributed comments on the plan and will be heavily involved over the next three years with various aspects of the SAP. The core funding for the SAP comes from Environment Australia.

The outlook for 1999 looks good. The work in the Gulf of Carpentaria is continuing as I write this in March. Mark Barter and Jim Wilson will work with the Chinese to survey large chunks of the northern Chinese coasts of the Yellow Sea in late April and May. This will tie in with survey work going on at the same time in Thailand, Vietnam and Mongolia. The AWSG has planned a joint project with the South Australian Ornithological Association to survey and count waders on the coast from the Coorong to Gulf St. Vincent and Spencer Gulf. An application for funding has been submitted to the Natural Heritage Trust. This area is one of the most important for waders in Australia and it is essential to update the population estimates from there as a part of the planned revision of estimated population numbers throughout Australia. We look forward to sending a team over to join the South Australians.

Jeff Campbell has passed on the task of Secretary/Treasurer to Ken Gosbell, and David Milton has taken over from Mike Weston the time-consuming task of editing the *Stilt*. We thank Mark, Jeff and Mike for their work over the years. We particularly thank Ken and David for an excellent start in their new posts. There are also many members of the Committee and other volunteers who work away effectively behind the scenes who I have not mentioned, but who are vital to the running of our organisation. I would like to thank them for their work in the past year.

The Committee hopes that we shall meet many of the AWSG members at Phillip Island in June. It promises to be a stimulating weekend which will spur us on with new ideas and plans for the future. Its very rare for the AWSG meet, so let us use this opportunity.

Jim Wilson

TREASURER'S REPORT FOR 1998

The Consolidated Accounts provided below show that we made a loss of $1496.83 *excluding* the $1238.50 of Specific Donations. However Environment Australia acknowledge an outstanding amount of $3318. The $990 allowance for depreciation is related to two-way radios purchased primarily for use at the Broome Bird Observatory from a specific grant from the Feilman Foundation in 1997.

Australian Wader Studies Group Consolidated Accounts
Statement of Receipts and Payments 1 January 1998 - 31 December 1998

RECEIPTS			PAYMENTS		
ITEM	1998	1997	Item	1998	1997
	$	$		$	$
Balance B/f	19,453.63	14,151.60	Stationary/Printing	5,918.15	6,483.87
			Photocopying	63.60	4,051.75
Subscriptions	8,456.00	4,473.00	Insurance		310.00
W.I. Subscription		3,000.00	Postage/Courier	2,593.78	
Sales	629.00	30.00	Phone/Fax	16.30	111.51
Specific Donations	1,238.50	13,660.00	Travel/Accom		481.00
			Field Expenses		92.90
			Meeting Costs		106.70
			Admin Fee (BA)	1,000.00	1,000.00
			Depreciation	990.00	
TOTAL INCOME	**10,323.50**	21,163.00	**TOTAL EXPENSES**	**10,581.83**	12,637.73
BALANCE AT 31/12/98	**19,195.30**				

Membership Statistics for 1998

The distribution of paying members is shown in the table below. It will be noted that 28 members (13%) failed to renew membership in 1998. With overall numbers falling it is important that all members renew their membership for 1999 if they have not already done so. In addition there were 102 members supported through funding provided from Environment Australia.

	Lapsed (97)	Current (98)	Pre-paid (99)
Overseas	2	41	14
ACT	0	10	2
NSW	8	28	3
NT	0	3	0
QLD	5	22	6
SA	1	8	2
TAS	2	7	1
VIC	9	45	10
WA	1	19	4
Totals	**28**	**183**	**42**

Ken Gosbell

WADERS AT WOODMAN POINT, SOUTHERN WESTERN AUSTRALIA

M.J.C. Singor
149A Bishopsgate Street, Carlisle, 6101 WA, AUSTRALIA.

ABSTRACT

Regular wader counts and records of changes in plumage were made at Woodman Point in Cockburn Sound, near Perth from 1995 to 1998. The results of these counts give an overview of the annual cycle of wader migration up and down the Western Australian coast. Comments on the status of the local wader population are presented and compared with their relative abundance during an earlier RAOU survey in the 1980s. Most species still occur in similar numbers to those recorded during the earlier survey. However, the impact of upcoming coastal developments on wader habitats needs to be monitored.

INTRODUCTION

The RAOU conducted several national wader counts between 1981 and 1990. These formed the Wader Study Project from 1981 to 1985 and the Australasian Wader Studies Group Regular Counts Project, 1986 to 1990. During these projects, a range of different wader habitats from sites around Australia was selected and these sites were counted on a regular basis to determine migratory movements of waders. The findings were published in the final report of the regular count project 1981-1990 (Alcorn et al, 1994). One of the sites selected was Woodman Point, WA, classified as a sandy beach wader site. Monthly counts were made at Woodman Point from July 1983 to June 1984 (excluding August) and further counts in January 1986, November /December 1988 and February 1989 during the survey organized by the RAOU. These counts are referred to in the species accounts as the 1983 - 1989 survey.

Some twelve years after the initial counts were made, I conducted a comparative survey of the waders at Woodman Point. The intention was to see if any substantial changes had taken place and to compare data between the two surveys. My survey commenced in May 1995 and ended in August 1998.

Woodman Point (Fig. 1) is located at 32° 08'S and 115° 44'E and is on the West Australian coast 10 kilometres south of Fremantle, the port city of Perth. Considerable changes have taken place since the first surveys were conducted during the 1980s. The coastal strip behind Woodman Point now contains new residential areas. The expansion of the shipbuilding industry around Jervoise Bay has turned Cockburn Sound into an important industrial site. Cockburn Sound is the busiest marine area in Western Australia. Major developments are planned for Cockburn Sound. A major new harbour is envisaged as are more breakwalls and the expansion of adjacent industrial areas. Jervoise Bay shipbuilding industries will expand with the construction of big groynes in Cockburn Sound. The potential environmental problems associated with the harbour at Jervoise Bay are most likely to impact on the waders of

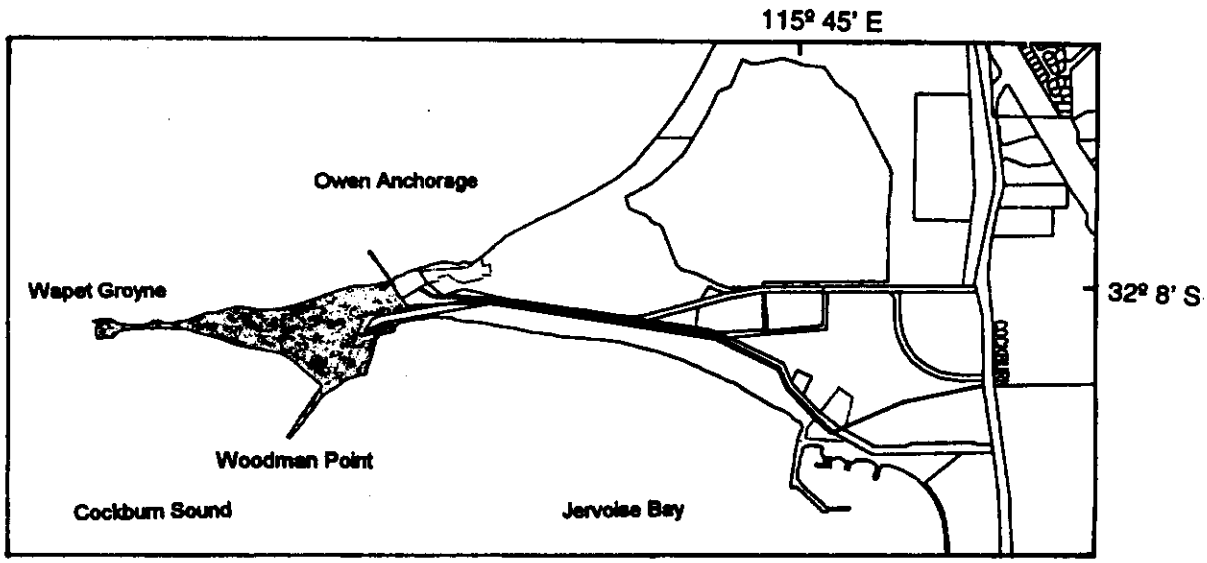


Figure 1. Map of Cockburn Sound showing Woodman Point.

Woodman Point. Research by the Environmental Protection Authority has found that more harbours and breakwaters in Cockburn Sound would reduce the flushing capacity and cause a build up of pollutants in the shallow waters along the shore. The impacts of the disposal of dredging spoil on the water quality is another issue.

Since the 1970s, pollution has destroyed more than 80 percent of the seagrass meadows in Cockburn Sound. More industrial development would impact on the remaining seagrass and reduce the potential for seagrass to re-establish in Cockburn Sound. High levels of the toxic chemical Tributylin (TBT) have been detected near harbours and wharves in Cockburn Sound. TBT is an active ingredient in paint designed to keep boat hulls clean.

Recreational pressures have increased during the past decade. Four-wheel drive vehicles, in particular, are disturbing waders and causing considerable damage to Woodman Point. The installation of limestone barriers in September 1996 and additional reinforcements in April 1998 have reduced these intrusions to some extent.

What makes Woodman Point attractive to waders? There are probably a number of reasons. Woodman Point protrudes into Cockburn Sound and presents waders migrating up and down the coast with a quieter and more isolated stopover than the surrounding beaches. A diverse range of wader habitats are available at Woodman Point. The wide and gently sloping beaches covered by shells are visited by Sanderling (*Calidris alba*), Grey Plover (*Pluvialis squatarola*), Red-capped Plover (*Charadrius ruficapillus*) and Greater Sand Plover (*Charadrius leschenaultii*). The washed up seaweed banks are visited by Grey-tailed Tattler (*Heteroscelis brevipes*) and Great Knot (*Calidris tenuirostris*) and the rocky coastal strips that are covered in algae, limpets and little crabs are preferred by Ruddy Turnstone (*Arenaria interpes*), Common Sandpiper (*Actitis hypoleucos*) and Grey Plover use the shallow pools and sandbanks are favoured by Common Greenshank (*Tringa nebularia*) and Bar-tailed Godwit (*Limosa lapponica*). The layout of Woodman Point ensures that there is always at least one sheltered beach regardless of weather conditions. Some very low tides occur in late spring and summer. These low tides result in extensive exposure of the adjacent seagrass beds, mud and sandbanks and provide additional feeding habitat for the waders.

Most important are the weedbanks that are formed when the seagrass beds (*Posidonia*) in Cockburn Sound die off and wash ashore. The seagrass banks were at times 2 foot high and cover half the beach. Waders show a certain affinity to weedbanks that harbour food, provided shelter against strong winds and are used as a place to roost.

METHODS

At least twice a month, counts were conducted early in the morning, just after sunrise. Early visits facilitated accurate counts and avoided unwanted wader movements, as disturbances were minimal at this time in the morning. A total of 122 counts were made during the survey. Counting commenced at the Cockburn Cement works at the end of Woodman Point View and followed the beach along Owen Anchorage out to the small plateau at the end of Wapet Groyne then back past the seaweed covered beach to Woodman Point (Figs.1 and 2). The survey continued along the rocky shoreline facing Jervoise Bay and finished opposite the Cement works. Generally each count took about an hour to an hour and a half to complete.

RESULTS

Comparison of counts

The present survey recorded 20 species which was similar to the 1983-1989 wader counts that identified 21 species. Most species had maintained their status in the period 1995-1998, although Red-kneed Dotterel (*Erythrogonys cinctus*), previously rated as uncommon was conspicuous by its absence. Waders sighted rarely or as vagrants in 1983-1989 but absent in 1995-1998 were Lesser Sand Plover (*Charadrius mongolus*), Red-kneed Dotterel, Whimbrel (*Numenius phaeopus*) and Broad-billed Sandpiper (*Limicola falcinellus*). Black-winged Stilt (*Himantopus himantopus*), Eastern Curlew (*Numenius madagascariensis*) and Common Greenshank were present in 1995-1998 but absent in the 1983-1989 counts. Other wader species that have been reported from Woodman Point but did not show up in either of the surveys were:

Little Curlew (*Numenius minutus*): A single bird recorded on 20 October 1996 by Simon Neville and Ray Downes (WABN 80).

Asian Dowitcher (*Limnodromus semipalmatus*): A single bird was recorded on 25 November 1995 by Peter Sandilands (WABN 78).

Sharp-tailed Sandpiper (*Calidris acuminata*): Single birds were seen on September 1995 and January 1997 by B. Barrett.

Hooded Plover (*Thinornis rubricollis*): A single bird recorded on 7 December 1996 by Kim-Chye Lim (WABN 81). Hooded Plover is also mentioned in historical records autumn 1956 and summer 1957 (Newby).

Figure 2. Photograph of Woodman Point facing WSW towards Wapet Groyne.

Species account

The highest numbers of species were recorded in November and December and the lowest in June and July. Highest numbers of individuals were counted in November, December and April. The high April counts were due to an influx of Great Knot. The following comments should be read in the context of the 1995-1998 observations. Bar graphs are presented showing the pattern of occurrence of most waders (Figs. 3 – 5). Wader sightings from the RAOU survey period 1983-1989 were given abundance ratings in the following order: absent, vagrant, rare, uncommon, common and abundant (Alcorn *et al.* 1994).

Bar-tailed Godwit *Limosa lapponica*

Bar-tailed Godwits were sighted in 1995 but absent in the following years.
Most arrived in November and departed in January and was only present in small numbers (Fig. 3a).

Abundance ranking 1983 - 1989 survey: Rare.

Eastern Curlew *Numenius madagascariensis*

One sighting at the end of March of a bird probably on its northward migration.

Abundance ranking 1983 - 1989 survey: Not present.

Common Greenshank *Tringa nebularia*

Common Greenshanks occurred irregularly at Woodman Point from September through to May (Fig. 3b). I found them feeding in shallow pools of seawater, among seagrass beds at low tides and at the end of Wapet Groyne. They were most common during 1998 and this was presumably due to the very dry winter of 1997 which resulted in many lakes on the Swan river plain drying out early.

Abundance ranking 1983 - 1989 survey: Not present.

Terek Sandpiper *Xenus cinereus*

Only two sightings of this species at Woodman Point (11 November 1995 and 5 December 1997). Many other sightings in the Perth metropolitan area are made from late October to November.

Abundance ranking 1983 - 1989 survey: Rare.

Common Sandpiper *Actitis hypoleucos*

Migratory birds arrived at Cockburn Sound from mid to late August (Fig. 3c). At this time, some were still in juvenile plumage. Observations of solitary birds at Woodman Point were made from mid-August through to January. At nearby Point Peron, which has a similar coastal habitat, several Common Sandpipers were present from August to April. This species favoured the rocky limestone coastal habitat such as can be found around the Cement works and along the shoreline facing Jervoise Bay.

Abundance ranking 1983 - 1989 survey: Rare.

Grey-tailed Tattler *Heteroscelis brevipes*

One of the few species of wader that remained throughout the year at Woodman Point (Fig. 3d). This species is most numerous in December and January. Birds were found sheltering behind seaweed (*Posidonia*) banks in blustery conditions. Grey-tailed Tattlers were usually solitary, but a few observations were made of two and three birds and a juvenile was seen in late

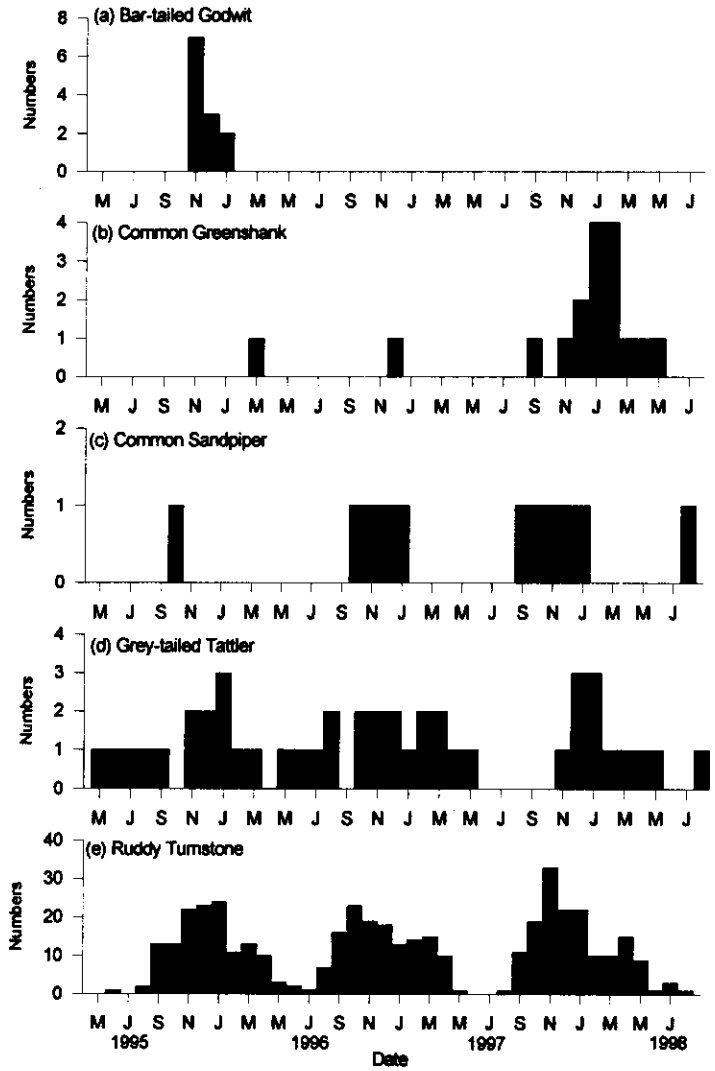


Figure 3. The abundance of (a) Bar-tailed Godwit, (b) Common Greenshank, (c) Common Sandpiper, (d) Grey-tailed Tattler and (e) Ruddy Turnstone at Woodman Point from 1995 to 1998.

October. Birds showing strong barring on their flanks were seen on 17 May 1997 and 14 September 1997. Some were observed feeding on floating seagrass beds and among rocks in the tidal zone.

Abundance ranking 1983 - 1989 survey: Rare.

Ruddy Turnstone *Arenaria interpes*

Ruddy Turnstones increased in numbers from September onwards (Fig. 3e) and was most abundant from November through to March. Small groups fed on banks of washed up seagrass, along the rocky foreshore and on the beach. The Ruddy Turnstone can be found in similar habitats around Cockburn Sound. For example, at Point Peron, Garden Island and the older harbour groynes in Jervoise Bay. They are the first wader species to start their moult into breeding plumage. Initial signs of their rufous plumage were evident from late February and by the first week of April birds were in full breeding plumage. This did not extend to all Ruddy Turnstones as a number remained in winter plumage. Ruddy Turnstone numbers were easily underestimated due to their camouflage and ability to disappear among the rocks. Even after a thorough count additional birds seemed to appear from nowhere and when accidentally flushed numbers were often much higher than estimated. Small numbers overwintered and these birds remained in non-breeding plumage.

Abundance ranking 1983 - 1989 survey: Common.

Great Knot *Calidris tenuirostris*

First appeared in September and maintained small numbers throughout the summer months. A peak in Great Knot numbers occurred at the end of April and early May when some were in partial breeding plumage. These dates are too late to coincide with any northwestern departure so these movements are presumably linked with a regular local movement of Great Knots within Western Australia. These birds may

be moving up from southern coastal areas and/or the Peel Inlet. Great Knot were often found in mixed groups with Red Knot. They roosted on the weedbanks and bathed in the shallow breakers. B. Barrett (personal comments) recalls nearly always seeing a flock of Great Knot on the beaches at Woodman Point during the winter months of 1982-1986. Generally 40-50 individuals were present, although up to 87 were present in April 1986 (Fig. 4a). Tony Kirkby made a notable winter observation of 46 Great Knot at Woodman Point on 2 July 1994 (WABN 71)

Abundance ranking 1983 - 1989 survey: Common.

Red Knot *Calidris canutus*

Red Knots were seen irregularly, often in company with Great Knots. Some appear to move into Woodman Point area through the autumn months (March to May)(Fig. 4b). Rosy tinge observed on chest plumage in late March.

Abundance ranking 1983 - 1989 survey: Uncommon.

Sanderling *Calidris alba*

The numbers of Sanderlings slowly built up from mid-September onwards peaking in November and then gradually decreasing towards April (Fig. 4c). Juveniles were present among the first arrivals. Sanderlings were sighted on the beach along Jervoise Bay and can be found on Garden Island. The number of Sanderling remained constant during 1997 (eight) and 1998 (seven) possible indicating a stable summer population. In June 1996 and 1998, an overwintering Sanderling was showing partial breeding plumage. Observations made by B.Barrett show that numbers of Sanderling at Woodman Point have been higher in the past. For example 1986 (54), 1987 (52) and 1988 (40).

Abundance ranking 1983 - 1989 survey: Common.

Red-necked Stint *Calidris ruficollis*

Frequented Woodman Point in small numbers. Birds were seen during every month except July (Fig. 4d) and were most common before Christmas, after that numbers dropped off. A few observations were made of solitary stints during the winter months of August 1995, June 1996 and August 1998. Stints were often found resting among Red-capped Plovers and were sometimes seen foraging on floating seaweed masses along the beach

Abundance ranking 1983 - 1989 survey: Uncommon.

Curlew Sandpiper *Calidris ferruginea*

Only three observations: 27 August 95, 10 April 96 and 15 June 1997.

Abundance ranking 1983 - 1989 survey: Vagrant.

Broad-billed Sandpiper *Limicola falcinellus*

Not observed during current survey but one was observed in January 1987 (B. Barrett).

Abundance ranking 1983 - 1989 survey: Vagrant

Pied Oystercatcher *Haematopus longirostris*

Pied Oystercatchers were often found on the beach stretching around Jervoise Bay and although this was not part of the area surveyed their numbers have been included in the overall count. The count data shows a peak in numbers in August and April (Fig. 4e). Pied Oystercatchers can be found at Woodman Point all year round. A sandbank north of Wapet Groyne, rich in cockles, was used as a feeding site at low tides. Winter storms washed large numbers of cockles and mussels up onto the sandy areas of Wapet Groyne and these provided another good feeding site for the Pied Oystercatchers.

Abundance ranking 1983 - 1989 survey: Common.

Sooty Oystercatcher *Haematopus fuliginosus*

A rare and solitary species sighted mainly in the winter months (Fig. 5a) and is probably a visitor from nearby Garden Island. Sooty Oystercatchers also frequents Point Peron, which is another site fronting onto Cockburn Sound.

Abundance ranking 1983 - 1989 survey: Vagrant.

Black-winged Stilt *Himantopus himantopus*

Irregular sightings were made during the summer months. At very low tides, some Black-winged Stilts were seen feeding on the exposed sandbanks in Jervoise Bay.
A small party was found resting on Owen Anchorage beach in early February 1996. The Black-winged Stilts were probably opportunistic visitors looking for new feeding grounds as the lakes on the Swan coastal plain were drying out.

Abundance ranking 1983 - 1989 survey: Not present.

Banded Stilt *Cladorhynchus leucocephalus*

Three observations limited to the summer months. (December, January, February)

Abundance ranking 1983 - 1989 survey: Rare.

Red-necked Avocet *Recurvirostra novahollandiae*

One observation on 3 February 1996 of nine Avocet flying past Woodman Point

Abundance ranking 1983 - 1989 survey: Uncommon.

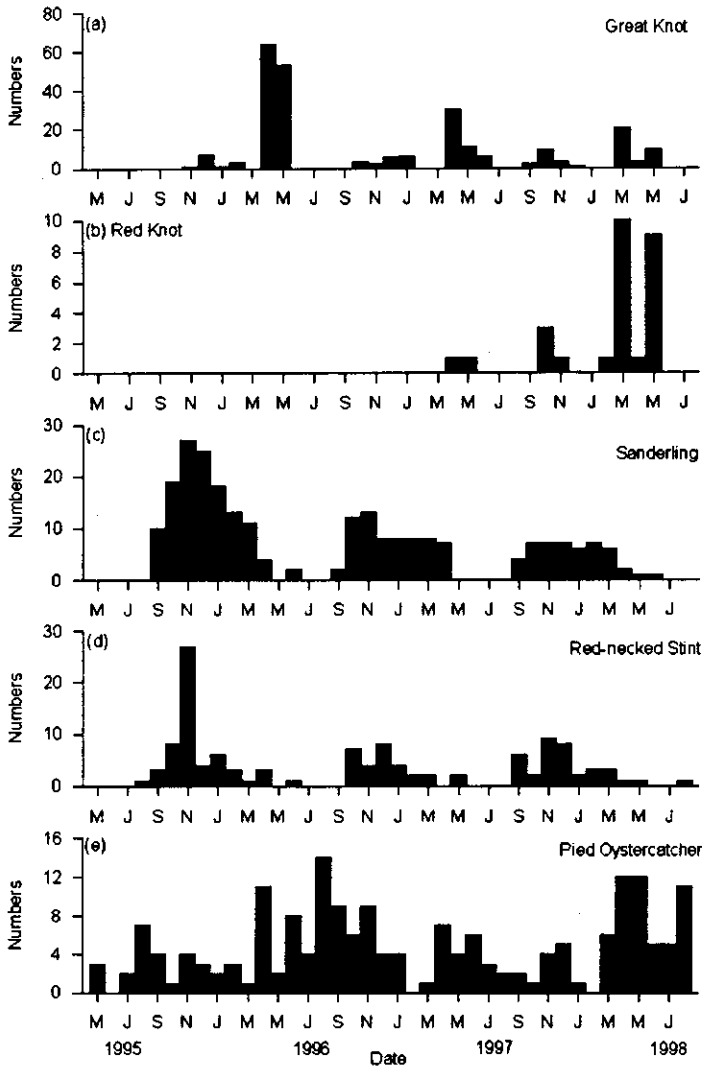


Figure 4. The abundance of (a) Great Knot, (b) Red Knot, (c) Sanderling, (d) Red-necked Stint and (e) Pied Oystercatcher at Woodman Point from 1995 to 1998.

Grey Plover *Pluvialis squatarola*

The Grey Plover is a common wader at Woodman Point. It does not overwinter every year. In 1995 and 1996, several Grey Plover stayed during the winter (Fig. 5b), but this was not the case during the winter of 1997 and 1998. The first migratory Grey Plover appear at Woodman Point towards the end of August still showing large parts of their black breeding plumage. The newly arrived birds have extensive black colouring around the face and on the breast. This progressively faded during the ensuing months and mainly manifested itself as black scaling on the breast. The black colouring persisted well into late November with the last observation of colour made on 23 November 1996. Colour became visible again in late March with black smudges on the flanks. The plovers liked to shelter among the dunes during inclement weather with some standing on top of the dunes among the grass. Numbers of plovers increased in March. Some grouping of Grey Plover was observed in late April.

Abundance ranking 1983 - 1989 survey: Common.

Red-capped Plover *Charadrius ruficapillus*

This species is one of the residential waders. Numbers started to increase from October and peaked in the summer months, December through to February (Fig. 5c). Red-capped Plovers were often seen roosting high up on the beach above the high water line where Sea Rocket (*Cakile maritima*) grows. They were generally seen in loose groups.

Abundance ranking 1983 - 1989 survey: Common.

Greater Sand Plover *Charadrius leschenaultii*

This species visited Woodman Point from early September till January (Fig. 5d) and was usually found with Red-capped Plovers. They favoured the open sandy

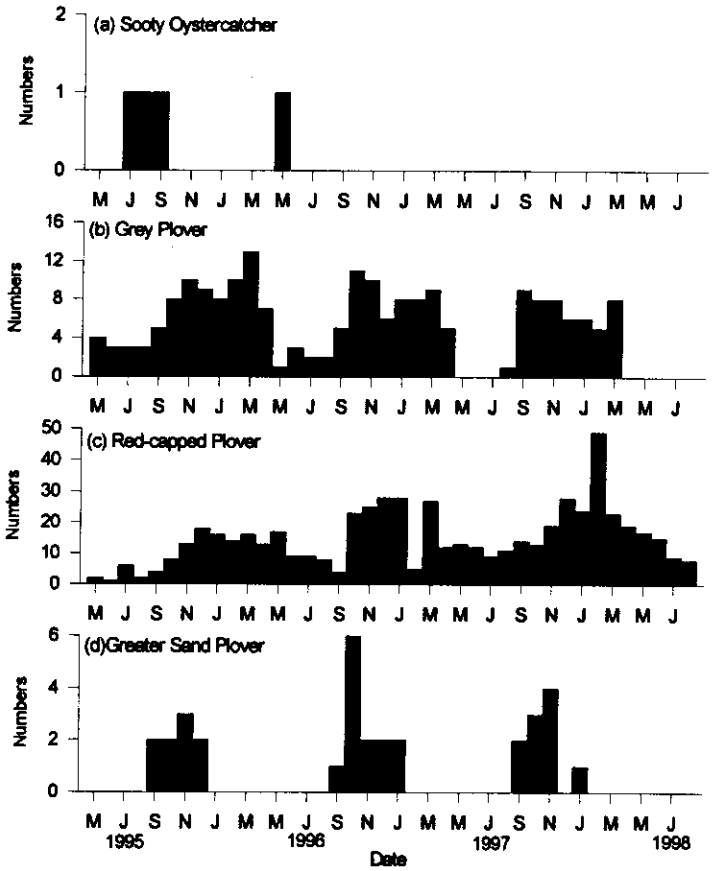


Figure 5. The abundance of (a) Sooty Oystercatcher, (b) Grey Plover, (c) Red-capped Plover and (d) Large Sand Plover at Woodman Point from 1995 to 1998.

beach areas well above the high tide line. C. Davis (personal comments) has reported passage of Greater Sand Plover in late April. Leg trembling behaviour by Greater Sand Plover has been reported in the Stilt (No 29 page 29). Similar behaviour was noted on 9 October 1996 at Woodman Point. Whilst remaining stationary, one leg trembled rapidly up and down. After it stopped the plover pecked at the ground. The leg movements were repeated several times on the sandy beach.

Abundance ranking 1983 - 1989 survey: Vagrant.

DISCUSSION AND CONCLUSIONS

Woodman Point remains a valuable wader habitat on the West Australian coast. The site supports a diverse range of wader species not readily seen in other areas. It is one of the few areas around Perth where Sanderling can be seen and provides a stopover for Great Knot during April and May. Most species appear to still occur in similar numbers to those recorded during the previous counts in the 1980s. The abundance rating of Grey-tailed Tattler previously rated as rare at this site should be changed to uncommon. The same rating applies to Common Greenshank. Major industrial developments planned for Cockburn Sound have the potential to degrade the habitat at Woodman Point reducing its importance for waders and require close monitoring.

ACKNOWLEDGEMENTS

I would like to thank Bryan Barrett for sharing his recollections and observations of waders at Woodman Point.

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THE HUANG HE DELTA - AN IMPORTANT STAGING SITE FOR LITTLE CURLEW *Numenius minutus* ON NORTHWARD MIGRATION

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ABSTRACT

The Little Curlew *Numenius minutus* is a relatively little known species and improved information on its annual life cycle is needed for conservation purposes. Large numbers of individuals were first seen during a visit to the Huang He (Yellow River) National Nature Reserve in late April/early May1997 and it was decided to carry out a more comprehensive survey during the same period in 1998. The resulting survey estimated that 17,079 ± 4051 were present in an area of 88 km^2. This area was only a small fraction of the apparently suitable habitat within the region. The delta is the first major staging site discovered for Little Curlew. Recommendations are made for further studies in the delta to obtain adequate information to develop an effective management plan for Little Curlew.

INTRODUCTION

The Little Curlew *Numenius minutus* is an intriguing shorebird having a very different life style to coastal shorebird species, particularly during the non-breeding season. There are large gaps in our knowledge of the breeding range, migration strategies and movements within the non-breeding area. No significant staging sites have been reported on either the northward or southward migrations. It may be particularly important to remedy these deficiencies in information as the closely related Eskimo Curlew *Numenius borealis* has declined to near-extinction in the Americas (Banks 1977). A brief summary of some of the more important data available on the Little Curlew's annual life cycle is given below.

Annual Life Cycle

Breeding

Little Curlew breed in Central Yakutia and East Siberia (Labutin *et al.* 1982, Flint *et al.* 1984), although the known nesting sites only hold a small fraction (Hayman *et al.* 1986) of the estimated world population of 180,000 (Watkins 1993). Birds arrive on the breeding grounds in the last ten days of May, with nesting occurring on the dry, well-drained slopes of low hills and in glades of sparse woodland of larch and dwarf birch. The discontinuous breeding distribution is apparently due to the species' preference for nesting in areas regenerating after fire (Labutin *et al.* 1982).

Southward migration

Little Curlew begin to leave the breeding grounds in the last ten days of July (Labutin *et al.* 1982) and seem to move in a narrow front to and along the west coast of the Yellow and East China Seas (Cramp & Simmons 1983), which they pass through in September (la Touche 1931-1934, de Schauensee 1984).

Non-breeding season movements

Birds start to arrive in Papua New Guinea and northern Australia from early September onwards (Coates 1985, Bamford 1990), where their preferred habitat is dry flood plains and black soil plains with short, dry grasslands and sedgelands and shallow fresh water pools. They can also occur on artificial short-grassed areas, such as lawns (Higgins & Davies 1996). As the monsoon develops, they move progressively southwards to sub-coastal northern Australia as the more northerly foraging areas become wet (Lane 1987). Movements within northern Australia are poorly known (Higgins & Davies 1996). Bamford (1990) suggested that after arriving on the plains between Darwin and Kakadu National Park, Little Curlew disperse to the grasslands of the Barkly Tableland, south-east Gulf of Carpentaria and Roebuck Plains, near Broome, with the onset of the wet season in November and December (Fig. 1).

Non-breeding season behaviour

Little Curlew feed mainly on insects, but also on seeds and berries (Higgins & Davies 1996). In Australia, they forage in a variety of dry habitats, ranging from bare soil to grassy areas. Grass cover can vary between sparse coverage (up to 20 cm high) and dense coverage (up to 10 cm high) (Bamford 1990).

In tropical northern Australia, Little Curlew have an interesting daily activity pattern during the non-breeding season which involves foraging in the early morning and late afternoon and roosting around open shallow pools during the hot part of the day (typically >35°C during the

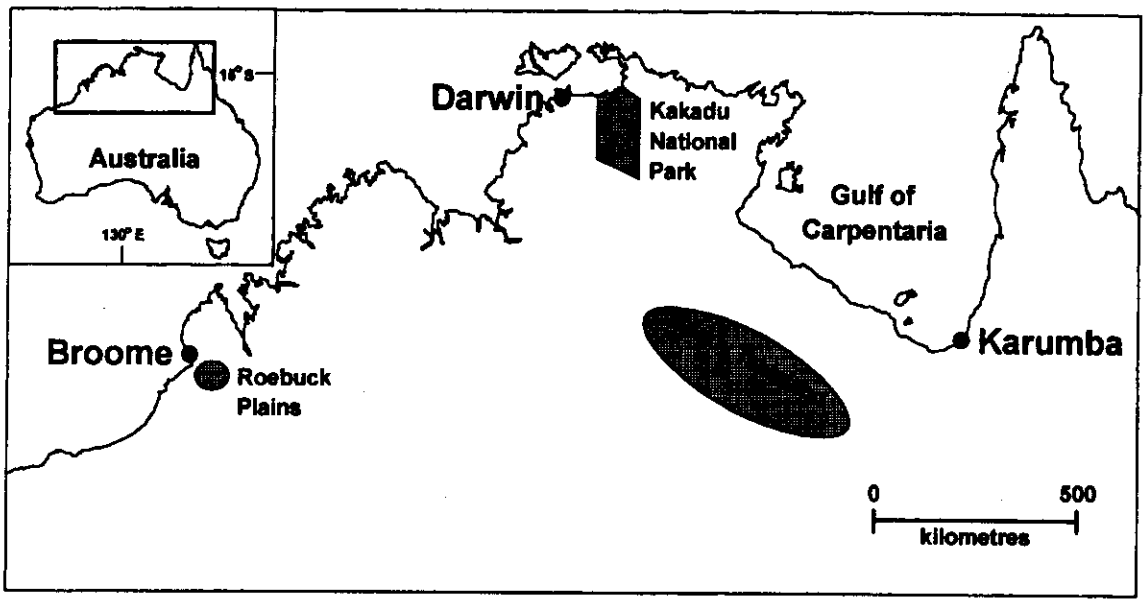

Figure 1. Location of areas and places in northern Australia that are mentioned in the text.

Australian summer [Australian Bureau of Meteorology]). However, in late March, when it is still hot, the behaviour at Roebuck Plains, near Broome (mean March maximum: 34°C [Bureau of Meteorology long term data]) and in the Karumba region (mean March maximum: 32.5°C [Bureau of Meteorology long term data]) changed from this pattern. Birds came to drink in large numbers during the day but appeared to return to feed after a short rest period (Garnett & Minton 1985, pers. obs.). It is probable that birds need to feed for longer hours at this time in order to put on nutrient stores for the imminent northward migration to the breeding grounds. Night roosting appears to occur in open areas such as recently-burnt grassland or areas of bare soil, and individuals are spaced irregularly at intervals of several metres (Bamford 1990).

Northward migration

Departures from Australia for the breeding grounds occur mostly in the first two weeks of April (Higgins & Davies 1996). Little Curlew are uncommon, scarce or rare in Papua New Guinea, Java, the Philippines, Hong Kong, Thailand, Korea and Japan during northward migration (Coates 1985, MacKinnon 1988, Delacour & Mayr 1946, Chalmers 1986, Lekagul and Round 1991, Gore & Won 1971, Brazil 1991) and transit coastal China in April and May (la Touche 1931-1934, de Schauensee 1984, Chalmers 1986). Lane (1987) suggests that Little Curlew probably make non-stop flights from Australia to China on northward migration because few are seen in areas between these countries.

Occurrence in China

During a visit to the Huang He delta in April and May 1997 we saw large numbers of Little Curlew in fallow paddy and grassland areas. An initial attempt was made to estimate numbers in a small part of the delta (Barter *et al.* 1998). The resulting success led to planning for a more detailed estimate of numbers in another part of the delta during a visit in the same months of 1998 (Fig. 2 and 3).

This paper describes (a) how we carried out the surveys in both years; (b) provides an estimate of the numbers present in the region surveyed in 1998; (c) discusses the importance of the Huang He delta as a staging area for Little Curlew and (d) makes recommendations for further work to obtain sufficient information for the development of an effective management plan for the species in the delta.

METHODS

The first Little Curlew sighted during the our visit were a flock of about 600 birds in an area of fallow rice paddy on 25th April 1997. Although the main focus of the study was counting coastal shorebirds, we decided to try to assess Little Curlew numbers by carrying out a survey on 29th April in an area of apparently suitable habitat, on either side of the main road, south west of Da Wen Liu (Site A; Fig. 3). Birds were counted in six randomly selected and widely separated 10 ha plots (about 310 m x 310m) located within a conservatively estimated area of 22 km^2 of fallow rice paddy and grassland. The counting technique involved 3-4 people walking, evenly spaced apart, across the plot disturbing birds and causing them to fly. One person had responsibility for counting birds, thus ensuring that double counting did not occur. The average density in the six plots (no. ha^{-1}) was calculated by summing the six individual counts and dividing by

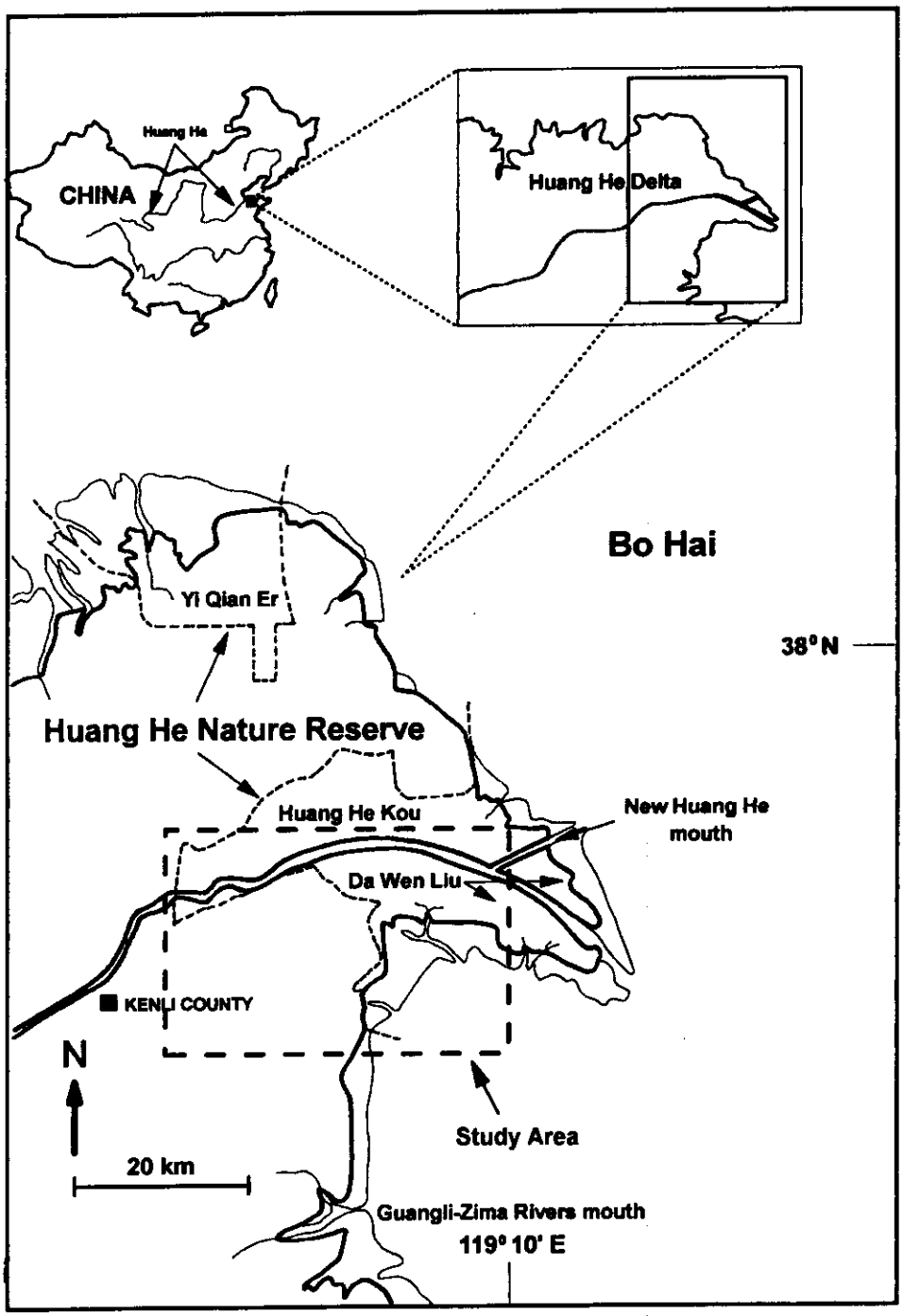

Figure 2. Location of the Huang He delta and details of the Nature Reserve and the survey area.

60. The estimated population in the censused region (22 km^2) was obtained by multiplying the average density by 2,200 (1 km^2 = 100 ha).

In 1998, detailed censuses were carried out between 0930 and 1630 on 2nd May and 1000 and 1500 on 3rd May over a contiguous area of 113 km^2 in western Da Wen Liu and nearby (Fig. 3). This region was chosen because Little Curlew had been seen flying in the area and because it contained a variety of potentially suitable habitats (grasslands of various types, fields with young wheat, fallow rice paddies, newly ploughed areas, fresh water wetland with associated grasslands, areas of low reeds). The region was split up into five separate survey areas of different habitat types as follows:

Site B (4 km^2) - fields with new wheat;
Site C (49 km^2) - sheep-grazed grasslands; grass 10-40 cm high, mostly around 20 cm; grass cover 70%, remainder bare earth;
Site D (9 km^2) - mixture of newly ploughed areas and wheat of various ages;

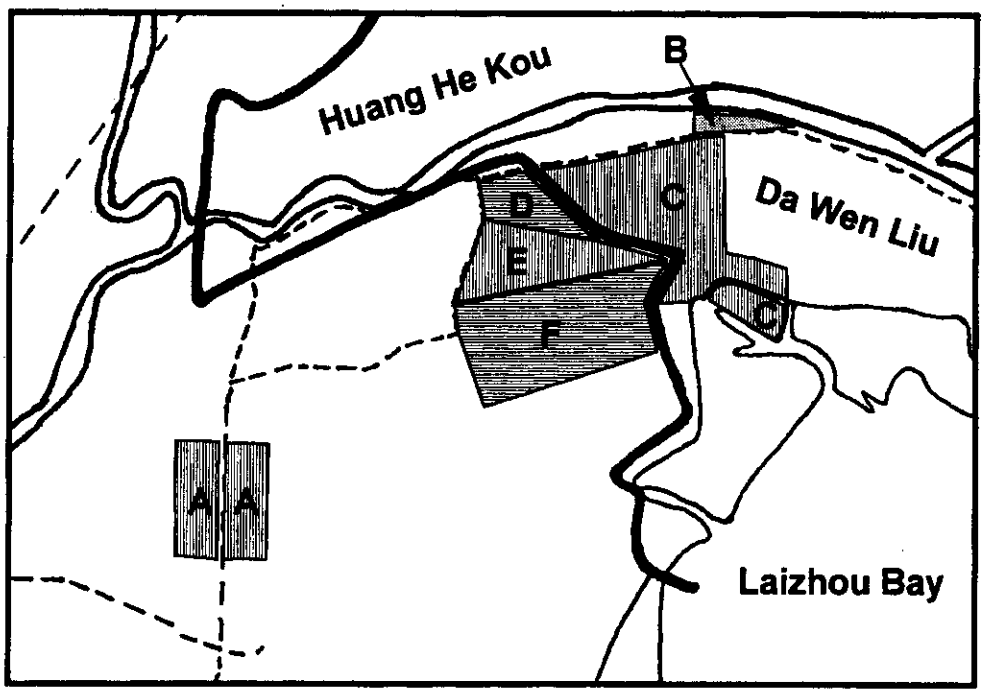

Figure 3. Survey areas where counts were made of Little Curlew. Dashed lines represent roads (see Figure 2 for location).

Site E (26 km^2) - patchy grassland, generally less than 20% coverage; some shallow pools covering less than 10% of area;
Site F (25 km^2) - mostly low reeds about 15 cm high, but 1-1.2 m high in some parts.

The boundaries of the various vegetation types were determined by inspection, with assistance from Huang He National Nature Reserve staff. Areas were calculated using a 1:100,000 map.

Survey methods used were broadly similar to those employed in 1997, although the random sample plot areas varied substantially depending on habitat and accessibility. Plot locations were selected in order to provide as even a coverage as possible of each site. The number of counters employed for a specific plot depended on its width. Counters walked 60 m apart and parallel to each other through the length of the plot. When the far end was reached all counters moved sideways in the same direction for 30 m and then walked back through the plot bisecting the previous parallel transects. In this way birds which did not fly on the first pass were flushed on the return trip. Birds flushed on the first pass rarely relanded in the plot; those that did were noted so that they were not counted a second time. The counter in the middle of the team was responsible for counting all birds flushed. Survey plot details for each site are listed below:

Site B - 3 x 10 ha (each 310 m x 310 m);
Site C - 4 x 10 ha (each 310 m x 310 m); 1 x 12 ha (300 m x 400 m);
Site D - 1 x 22 ha (400 m x 550 m); 1 x 27 ha (450 m x 600 m);
Site E - 2 x 28 ha (each 700 m x 400 m);
Site F - 5 x 10 ha (each 310 m x 310 m); 1 x 5 ha (300 m x 170 m).

It should be noted that plot dimensions, from which areas were calculated, were estimated by eye, as were the distances between counters.

Little Curlew were often seen flying around when counts were being conducted and records were kept of flock sizes. These flocks were not included in the site counts. Records were also kept of flocks observed at other times in the general region.

As a means of obtaining some measure of the distribution of Little Curlew within Da Wen Liu and the region to the south west, numbers and positions of birds seen were recorded whilst we were driving between the survey areas and our hotel at Kenli County. The coordinates of these positions and also of important locations in the count region were obtained by using a GPS (Magellan Pioneer).

RESULTS

The data we collected are reported below under three headings: population estimates, flying flocks and general distribution

Table 1. The estimated densities ± standard error (s.e.) of Little Curlew at six sites in the Huang He delta.

Date	Site	Site Area (km^2)	Individual plot counts	Count area (ha)	Density (no. ha^{-1})	s.e.
29 April 1997	A	22	19, 50, 27, 21, 18, 25	60	2.67	0.49
2 May 1998	B	4	27, 9, 28	30	2.13	0.62
2 May 1998	D	49	13, 5, 12, 9, 39	52	1.43	0.48
2 May 1998	D	9	93, 38	49	2.82	1.41
3 May 1998	E	26	74, 70	56	2.57	0.07
3 May 1998	F	25	0, 1, 3, 1, 0, 0	55	0.08	0.05

Population estimates

Count details for both 1997 and 1998 are tabulated in Table 1.

Few birds were present at the reed-dominated Site F and, consequently, this area was omitted from further consideration. An estimate was obtained of the total number of Little Curlew present at the other four sites surveyed in 1998 by summing the estimated numbers present at each site. This resulted in an overall estimate of 17,079 birds (s.e. = 4051) present in the combined area of 88 km^2.

Birds generally would not flush until a counter was within 20-25 m; often one bird flying when disturbed would cause nearby birds to flush and form a flock. The importance of making a return transect through each sample plot was confirmed by the numbers flushed on the second pass, which averaged around 10% of the total number counted in the plot. This indicates that the estimate of numbers in Site A during 1997 may be biased as the plots were only traversed once.

We generally scanned a plot prior to counting but rarely saw many Little Curlew because of their cryptic nature and unwillingness to fly when actively feeding. However, on most occasions these apparently unpopulated plots were found to contain numbers of birds.

Flying flocks

Flocks were often seen flying around when we were counting despite the apparent reluctance of individual birds to fly when feeding. Observations are tabulated in Table 2.

On 2nd May 1998, many flying flocks were observed in the general survey area during a period when we were not counting. Flocks seen during a 15 minute period (1430-1445) are those recorded as "Other" in Table 2. Smaller numbers were seen flying around on the next day. We did not get the impression that these birds were flying to pools to drink, as they do in northern Australia. In fact on both 2nd and 3rd May 1998 when we were observing Little Curlew flying around Site E from the vantage point of a high sea wall, none were seen to land to drink in the nearby shallow pools. However, we could not be certain that no individuals drank at any stage. Presumably, this difference in behaviour is due to the much cooler conditions at Huang He where temperatures during the survey period were in the range 20°-25°C (pers. obs.) versus typically >35°C in Australia.

The recorded number of flying flocks was only a small fraction of those actually flying around during the survey period as we were only able to look for them during limited periods of free time between plot counts.

General distribution

The locations and numbers of birds seen while we were driving around are shown in Figure 4. Many of the sightings are close to or within the survey areas. However, there were a number of other observations along the road to the west and south west of Da Wen Liu, and along the south bank of the Huang He in the extreme eastern part of Da Wen Liu. Some observations were also made alongside the road to the north of Kenli County. Interestingly, no sightings were made after 1700 although sunset did not occur until about 1900.

No Little Curlew were seen while we were travelling to, or counting within, the Yi Qian Er management region in either 1997 or 1998, although there appears to be suitable habitat available. Similarly, we did not see birds when driving to and from the Guangli-Zima Rivers, and a

Table 2. The sizes of flocks of Little Curlew seen flying over four sites and elsewhere during population surveys in the Huang He delta in 1998.

Site	Flock sizes
C	14, 4, 35, 25, 9
D	65, 80, 250, 500
E	21, 70, 25, 20, 50
F	10, 15
Other	60, 40, 100, 260, 55, 190, 30, 55

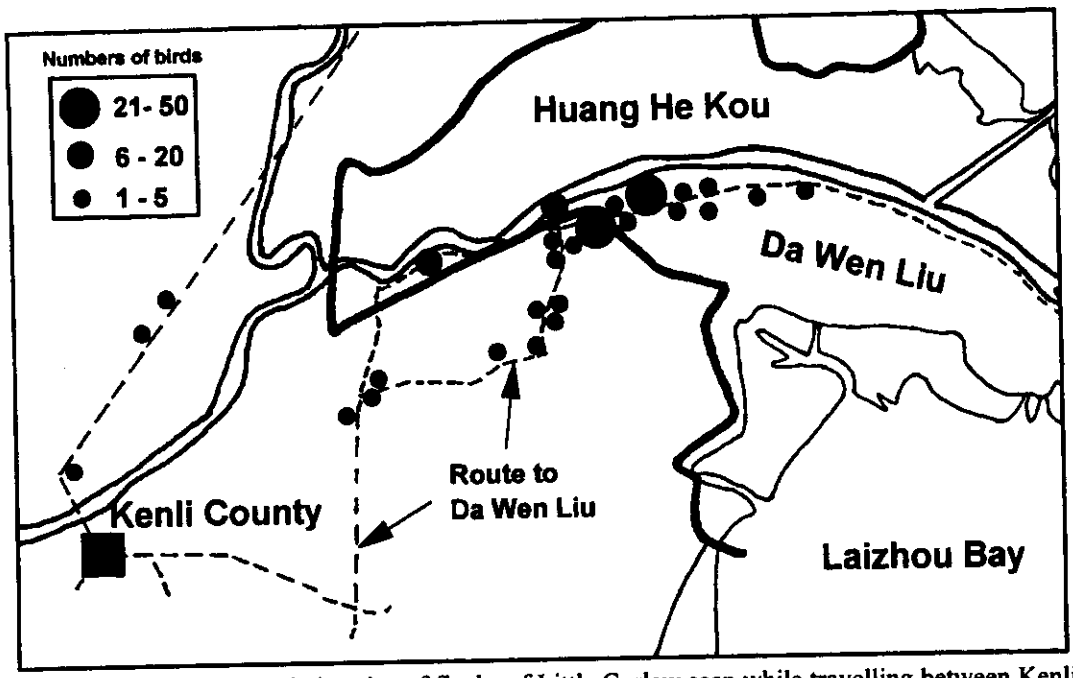

Figure 4. Location and relative size of flocks of Little Curlew seen while travelling between Kenli County and Da Wen Liu.

survey on foot of a prospective area of fallow rice paddy in this area on 1st May 1997 did not find any birds.

DISCUSSION

The estimate of approximately 17,100 Little Curlew present in the region around the western border of Da Wen Liu in 1998 confirms the 1997 conclusion (Barter *et al.* 1998) that the Huang He delta is a very important staging area for the species. In fact it is the first major migration staging site discovered for the Little Curlew. On the basis of this estimate alone, about 10% of the estimated world population were present in the 1998 survey area.

However, it is clear from the initial survey in 1997, which was conducted in a different area, and observations in 1998, that Little Curlew occur over a much wider region than covered in the 1998 survey. The fact that birds were not seen in the Yi Qian Er and Guangli-Zima Rivers regions suggests that Little Curlew may concentrate in western Da Wen Liu and adjacent regions to the west and south. However, Little Curlew are often not obvious when feeding and a more thorough survey is needed in order to obtain an improved estimate of numbers present and to establish the detailed distribution of the species within the delta.

The habitat requirements of Little Curlew in the Huang He delta are very similar to those recorded in Australia. No data were obtained on the types of food taken. This information would assist in understanding the habitat needs of the species in the delta. Changing land use in the delta (see below) makes it important that a comprehensive survey be carried out with the objectives of getting more accurate information on numbers, distribution and timing of arrival and departure, and an improved understanding of habitat needs and usage. This information is crucial to the development of an effective management program.

The cryptic feeding behaviour, mobility, timing of daily movements and widespread distribution of Little Curlew will provide significant challenges in the design of an effective survey and it will be important to ensure that the methods are statistically robust.

Discussions with local government officials and Reserve staff and our own observations indicate that changing agricultural practices may lead to a reduction in Little Curlew habitat. Conversion of grasslands to wheat production is occurring to the west of Da Wen Liu. By the time Little Curlew arrive in the delta, the wheat is often too tall to provide suitable foraging habitat. There has already been widespread conversion of rice paddy and grasslands to wheat in areas closer to Kenli County but it seems that soil conditions are not particularly suitable for wheat and there is, apparently a move back to rice. Obviously, obtaining improved information on agricultural trends should be an important part of the proposed survey.

Little Curlew are reported to make their return migration along the east coast of China (la Touche 1931-1934, de Schauensee 1984) and surveys need to be carried out in the August-September period to determine if they also use the delta on southward migration and, if so, how? This information may also be of importance for satisfactory management of the species in the delta.

CONCLUSIONS AND RECOMMENDATIONS

A survey of a small part of the Huang He delta shows that the region is a very important staging site for Little Curlew on northward migration with at least 10% of the estimated world population being present in late April and early May 1998. It is highly likely that total numbers using the delta are much higher than those estimated from this limited survey.

Changing agricultural practices, which could seriously affect Little Curlew habitat, indicate an urgent need for a more thorough survey to be carried out to obtain crucial species' management information. For the same reason, it is also important to survey the delta for Little Curlew during the southward migration period.

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A SURVEY OF THE DISTRIBUTION AND ABUNDANCE OF SHOREBIRDS IN SOUTH KOREA DURING 1998-1999: INTERIM SUMMARY

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ABSTRACT
A lack of data on waterfowl abundance, especially shorebirds, and the threats to their populations in South Korea necessitated a survey of wetlands between April 1998 and February 1999. The survey covered the three major periods of shorebird occurrence, northward (April-May) and southward (August-September) migrations, and the northern winter (January and February). Surveys were conducted in circuits along the south and west coasts, where 17% and 83% of tidal-flats remain, respectively. Nineteen species of shorebird were found in internationally important concentrations, with internationally important concentrations of one or more species at 20 sites. The majority of these sites, including all of the six most important (Saemankeum, Asan Bay, Keum estuary, Namyang Bay, Yong Jong Island and Kanghwa Island) are threatened by reclamation. The first, third, fourth and fifth most important sites will be completely reclaimed, the fourth most important site will be almost completely reclaimed, and the second most important site partially reclaimed. Declines in the abundance of some shorebird species at some sites could be detected between pioneering surveys in 1984 and 1988, and this study.

INTRODUCTION

Amongst the world's flyways, the East Asian Australasian Flyway is considered to support the highest number of species of endangered waterbird (Parish, 1994). Reclamation of intertidal areas in the Yellow Sea countries (South Korea, North Korea and the People's Republic of China) and in Japan – at the central-northern part of the Flyway - poses further significant threats to the remaining populations of many species of waterbird, including shorebirds. With the exception of Japan, only limited shorebird data are available from these countries, hampering international efforts to develop an effective conservation strategy for these species.

In response to this lack of data, a survey of wetlands and waterbirds was conducted in six circuits along the south and west coasts between 13 April, 1998 and 26 February, 1999. The aims of the program were: (1) to identify wetlands supporting internationally important concentrations of waterbirds – especially shorebirds; and (2) identify threats, if any, to the ecological character and integrity of such sites.

Topography and climate
South Korea is a peninsular country, with a total area of approximately 100,000 km^2 and a coastline (including islands) of 11,542 km. The three coasts are typified by cliffs with sandy beaches (eastern); rocky headlands and islands with muddy tidal-flats and bays (southern); and broader coastal plain with extensive tidal-flats, sandy in the southwest with many islands, and increasingly muddy northwards (western). Mean spring tidal range increases from approximately 3 m in the southwest to >9 m in the northwest (near Inchon City). In the survey period, temperatures in January and February irregularly fell below 0° C for several days at a time (presumably affecting prey catchability) (Zwarts 1996), whilst daytime maxima in April/May typically ranged between 12°-25° C and in August-September 20°-30° C.

Tidal-flats and reclamation
Tidal-flats are the most important habitat for shorebirds in South Korea. Remaining tidal-flats extend to about 285,000 ha (Koh 1997), although this includes approximately 60,000 ha presently being reclaimed (Jang 1999). Most of the tidal-flats are along the western coast (83%) with further significant areas along the south coast (17%) (Koh *in lit.*). The South Korean tidal-flats are part of the approximately 1,010,000 ha of the Yellow Sea complex (Wilson and Barter 1998). As one of the largest tidal-flat regions in the world it can be compared in area to the Waddensee of northern Europe – and similarly is a major staging area for shorebirds.

South Korea has a long history of reclamation, especially of upper tidal-flat areas (Poole 1990). However, the pace and extent of reclamation increased with the passing of the National Plan for Land Development in 1984. This plan targeted 85% (450,000 ha) of remaining tidal-flat and extensive areas of shallows for reclamation (Poole 1990). Although data are conflicting, it is estimated that from 1945-1994 about 96,000 ha were reclaimed, with a further 67,000 ha undergoing reclamation in 1995, including Namyang Bay and Saemankeum (Jang 1999). Recent modifications to the national plan have led to the cancellation of several projects – including one to reclaim 55,000 ha of tidal-flat in 1998.

SURVEY METHODS AND STUDY AREA

Counts of shorebirds were conducted along the south and west coasts, primarily in April and May (northward migration), August and September (southward migration) and in January and February (northern winter). The counts of all sites were conducted in circuits

along the coast, three spanning much of the northward migration, two in the southward migration and one in the northern winter. Counts were typically conducted for one day at one site, with the following day counting taking place at an adjacent site, until the majority of accessible coastline and tidal-flat had been surveyed. From approximate calculations, at least 80% of accessible tidal-flat areas were surveyed – including almost all of the sites suspected to be important for tidal-flat dependent shorebirds. Sites were selected on the basis of existing information (e.g. Long *et al.* 1988, Kim *et al.* 1997), examination of maps and available satellite images and following requests from local environmental groups for help with data collection.

In total, 59 wetland areas were surveyed – 56 of them at, or near the coast. Those sites which were considered to offer the most potential for shorebirds were surveyed 6 times (conditions permitting), whilst other sites with few birds were surveyed only once or twice. Counts were made from preferred vantage points with a tripod-mounted ED Nikon Field scope (up to 80x magnification), and 8 x 40 binoculars. Typically, birds were counted at high tide-roosts because of the high tidal ranges. Some low tide counts were possible along the south coast where the tidal range was much lower. Sometimes, mobility of flocks, or the large numbers of birds involved, prevented accurate counting – and on a few occasions counts were made in blocks of 100 birds. At each site, place name, time and state of tide were noted, and often slides and brief ecological notes were taken of the relevant areas. All counts was made by one observer (NCM), but records of the counts, note-taking and map-reading was undertaken by local Korean environmentalists.

RESULTS

The study identified 42 wetlands that met the Ramsar Convention waterfowl-based criteria for identification as internationally important (they support more than 1% of a known population of a waterfowl species or more than 20,000 individuals). Twenty of these wetland sites are internationally important for shorebirds (Fig. 1). Two areas not covered by this survey due to prohibition of access in militarily sensitive areas (Inchon western island

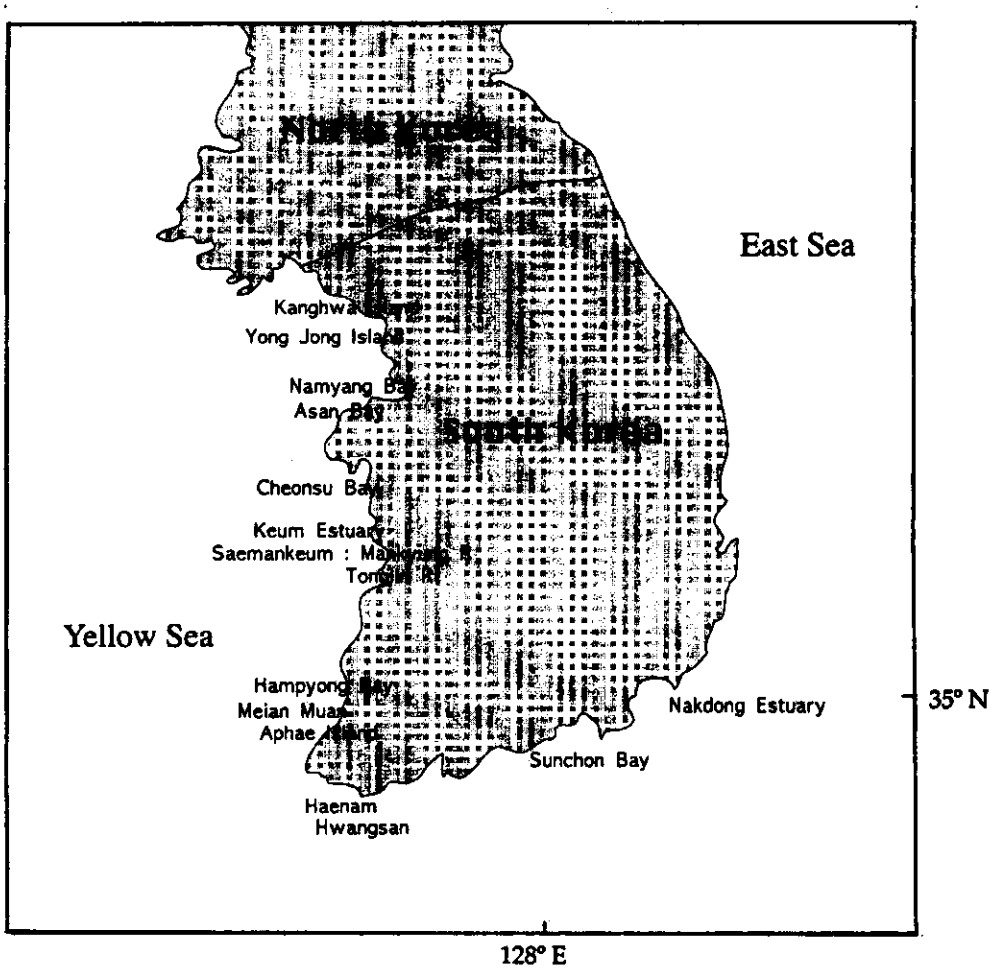

Figure 1. Map of South Korea showing the 20 coastal wetland sites that supported internationally significant numbers of shorebirds during the study.

Table 1. Aggregate totals of shorebirds at the 13 most important sites for shorebirds in South Korea. (* indicates counts added from October 8 at Haenam Hwangsan, and November 7 at Nakdong estuary).

Wetland Site	Northbound peak (April-May 1998)	Southbound peak (Aug-Sept 1998)	Winter count (Jan-Feb 1999)	Species peaks aggregate total	No of shorebird species in internationally important concentrations
Saemankeum	47 089	37 807 (-67 000)	10 314	87 229	12
Asan Bay	56 662	5 022	635	71 234	9
Keum estuary	28 432	3 458	4 084	38 417	14
Namyang Bay	21 177	6 513	2 303	26 061	8
Yong Jong Is.	15 252	12 481	240	24 348	6
Kanghwa Island	14 698	5 693	1 183	19 993	6
Aphae Island	9 040	8 584	606	18 152	6
Sunchon Bay	11 583	2 502	3 770	15 309	9
Nakdong estuary	7 052	2 606 (*10 370)	3 547	14 484	7
Haenam Hwangasan	6 706	2 192	1 160	*9 077	5
Cheonsu Bay	6 982	365	1 407	9 002	3
Hampyong Bay	4 659	5 059	964	8 083	5
Meian Muan	2 180	4 288	585	7 202	5

tidal-flats and the Han-Imjin estuary) are suspected also of being internationally important – giving a probable total of 22 key shorebird sites nationwide. Thirteen of these sites are considered to be especially important, supporting either more than 5,000 shorebirds at one count, or more than 3 species of shorebird in internationally important concentrations during the survey period (Table 1). With the exception of Meian Muan and Hampyong Bay, all of the especially important sites supported other non-shorebird waterfowl in internationally important concentrations, and must be considered conservation priorities.

Although tidal-flats are still extensive, most coastal wetlands are significantly degraded, and/or are threatened with reclamation (Table 2). Almost all major rivers have tidal barrages (with the exception of the Mankyung and Tongjin Rivers in the Saemankeum region, and the Han/Imjin River Estuary in the north-west of the country), and there are very few areas remaining of salt-marsh (mostly *Suaeda*), and no significant areas of meadow or grassy saltmarsh for roosting or high-tide feeding. It is strongly suspected that prey availability for shorebirds will also have decreased significantly at many sites in the past few decades due to reclamation, as many upper tidal areas have been lost (reducing potential feeding time), and benthos densities have decreased at many sites (Koh C-h, *in lit*) even since the mid-1980's. During roosting at high tide, shorebirds are often concentrated onto small offshore islands and into saltpans – where they often suffer frequent disturbance.

The largest concentrations of shorebirds occur at four main areas: the Inchon sites in the far northwest (primarily the adjacent sites of Kanghwa Island and Yong Jong Island); the central northwest (primarily the adjacent sites of Asan Bay and Namyang Bay); the southern western (the adjacent sites of Keum estuary and Saemankeum); and the far southwest (Aphae Island, the adjacent sites of Hampyong Bay and Meian Muan, and Haenam Hwangsan). During the survey, there was often strong similarity between species composition at adjacent sites or in each of the four main clusters, though with different ratios of abundance and occasional apparent anomolies.

The survey documented 19 species of shorebird occurring in South Korea in internationally important concentrations (Table 3). During the survey period, two other species were similiarly recorded by other researchers, Red-necked Stint *Calidris ruficollis* and Broad-billed Sandpiper *Limicola falcinellus sibirica*. *Calidris ruficollis* reached a peak of 10 880 at Nakdong Estuary in 1984 (Piersma 1985), and is still considered to reach 5 000 annually at Saemankeum (J-Y Park *pers comm.*), though numbers at north western sites were much lower in 1998 than in 1988 (Long *et al.*1988). Broad-billed Sandpiper is also considered to occur in irregularly in internationally important numbers based on old records (Fennel & King 1964) and recent unpublished data (J.Y. Park *pers comm.*).

As the survey was concentrated in coastal areas shorebirds that depend on freshwater habitats (eg Common Snipe *Gallinago gallinago*) were rarely recorded, However, those visits that were made to inland

Table 2. Threats to 20 Korean wetlands identified as being internationally important for shorebirds. Areas given are very approximate, and will be improved in later publications. TB = tidal-barrage, and R = reclamation. Surrounds R = adjacent tidal-flat have been reclaimed, and negative impacts on remaining tidal-flats are suspected.

Region of Korea	Site Name	Location	**Wetland types**	Approx. shorebird area (ha)	Threats to site integrity
South coast	Nakdong Estuary	35° 5'N 128° 50' E	Estuary, sandy mudflats	1 500	TB; Pollution; 500ha R
	Namhae Island	34° 00'N 127° 50' E	Narrow mud/shell flats	750	None known
	Kwangyang Bay	34° 55'N 127° 35' E	Relict sand / mud-flat	500	Pollution; surrounds R
	Sunchon Bay	34° 50'N 127° 30' E	Bay, mudflats, reed, paddy	5 000	Main river-straightening
Far South west	Haenam Hwangsan	34° 25'N 126° 30' E	Mud-sandy flats, saltpans,	1 000	Surrounds R
	Aphae Island	34° 50'N 126° 20' E	Sandy-mudflats	3 000	R cancelled
	Muan Gun Meian	35° 05'N 126° 20' E	Sandy-mudflats	10 000	R cancelled
	Hampy'ong Bay	35° 07'N 126° 25' E	Sandy-mudflats	5 000	R cancelled
	Paeksu	35° 12'N 126° 26' E	Sandy-mudflats	1 500	Small-scale R
South western	Seamankeum	34° 50'N 126° 45' E	Extensive mud- / sand-flats	20 000 +	100% R ongoing
	Keum Estuary	36° 00'N 126° 40' E	Estuarine sand-/mudflats	12 000	TB: 100% R plan
Central western	Cheonsu Bay	36° 37'N 126° 25' E	Narrow mud-, wide sandy flats	2 000	Prior R
Central northwest	Asan Bay	37° 02'N 126° 40' E	Extensive mudflats	5 000	TB: Small-scale R
	Honwonri	37° 05'N 126° 45' E	Rice-fields	1 000	None known
	Namyang Bay	37° 10'N 126° 45' E	Mudflats, saltmarsh, sandflats	10 000	TB: Main area R ongoing
	Teibu Island	37° 15'N 126° 29' E	Sandy-mudflats	3 000	Prior R
	Yong Hung Island	37° 15'N 126° 35' E	Sandy-mudflats	700	30% ongoing R
	Song Do Tidal-flat	37° 25'N 126° 39' E	Mud-flats	1 000 +	Surrounds R
Far northwest	Yong Jong Is.	37° 31'N 126° 32' E	Extensive mudflats	7500	100% R plan
	Kanghwa Island	37° 35'N 126° 25' E	Extensive mudflats	7500	100% R plan

wetlands suggest that such areas do not tend to support large numbers of shorebirds – with many rice-fields (a major shorebird habitat in Japan) remaining dry even in late April, and uncut even into October.

DISCUSSION

The current survey builds on pioneering studies (referred to above) by (1) covering all three major periods for shorebirds in Korea and (2) examining several previously non-surveyed areas. Peak counts of almost all species of shorebirds were higher than previously published data, probably because of more extensive coverage. However, some species, such as Red-necked Stint *Calidris ruficollis,* appear to have decreased generally since the previous surveys in the 1980s. Several other species appear to show significant declines at those sites suspected of being negatively impacted by reclamation between 1988 and 1998 (Long *et al.* 1988). At Namyang Bay and Yong Jong Do, for example, Spotted Greenshank *Tringa guttifer* declined from 65-76 and 28 respectively in 1988, to 3 and 2 respectively in 1998, and Dunlin *Calidris alpina* declined from 100 050 and 23 000 in 1988 to 4 000 and 11 500 in 1998.

At least one species appeared to be genuinely more numerous in 1998. Terek Sandpiper *Xenus cinereus* occurred in significantly higher peak counts at many sites during the present survey. As well, two new shorebird species for South Korea were recorded during the study. First, on May 8 at Asan Bay, a Hudsonian Godwit *Limosa haemastica* was seen briefly as it landed in a flock of over 18 200 Black-tailed Godwits *Limosa l. melanuroides*. Second, on October 28, a Long-billed Dowitcher *Limnodromus scolopaceus* was observed roosting with Common Greenshanks *Tringa nebularia* at Tongjin estuary, Seamankeum.

Northward migration

Amongst the important findings were the confirmation of the importance of Korean tidal-flats to Dunlin *Calidris alpina sakhalina* and Great Knot *Calidris tenuirostris* (with approximately a quarter of the suspected world minimum population estimate [MPE] of the latter present in Korea in late April-early May) (Appendices 1 & 2). Most of these had migrated by the end of May

Table 3. The estimated number of 19 shorebird species (plus *Calidris ruficollis)* that occurred in internationally important numbers at the sites surveyed and each species' minimum population estimates. ' = Rose and Scott (1997), ʷ = Watkins (1999), * = unpublished estimate.

Species	Min. Pop. Est.	April 13-25	April 29-May 11	May 14-27	Aug 12-Sept 3	Sept 5-Sept 29	Jan. 4-Feb 26
Limosa limosa melanuroides	162 000'	5 472	24 715	1 818	10 327	3 794	-
Limosa lapponica	333 000'	17 138	9 301	2 095	4 400	105	2
Numenius phaeopus variegatus	40 000'	1 157	2 785	1 902	1 295	415	-
Numenius arquata orientalis	10 000ʷ	40	12	3	1 399	2 530	2 671
Numenius madagascariensis	21 000'	2 877	1 685	236	1 852	1 324	2
Tringa nebularia	40 000'	201	1 016	770	3 792	3 066	-
Tringa guttifer	1 000'	4	9	8	44	44	-
Xenus cinereus	36 000ʷ	577	3 205	5 726	10 847	1 915	-
Heteroscelus brevipes	25 000ʷ	1	189	1 172	1 053	75	-
Calidris tenuirostris	333 000ʷ	77 136	80 404	21 663	18 793	12 854	-
Calidris alba	10 000ʷ	1	91	9	354	533	33
Calidris ruficollis	471 000'	3 942	4 159	3 797	1 938	1 406	-
Calidris acuminata	166 000'	380	783	779	8	2	-
Calidris alpina sakhalina	130 000ʷ	73 659	55 032	12 210	4 337	36 396	20 442
Eurynorhynchus pygmaeus	4 000 r	1	-	-	22	67	-
Haematopus ostralegus osculans	4 000*	162	6	104	18	369	2 987
Pluvialis squatarola	25 000ʷ	4 000+	4 173	3 991	4 600	3 776	4 493
Charadrius alexandrinus dealbatus	25 000ʷ	142	459	215	10 832	11 939	458
Charadrius mongolus	35 000ʷ	302	4 116	2 597	4 376	4 372	-
Other		376	2 362	566	597	419	21
Minimum Totals	1 871 000	187 568	194 502	59 661	80 884	85 401	31 109

(Appendix 3). Black-tailed Godwit *Limosa limosa melanuroides* were concentrated in a few sites (with at least 21 000 in three adjacent sites). Numbers of Eastern Curlew *Numenius madagascariensis* were highest at the more northerly sites (e.g. > 1 000 at Kanghwa Island). This suggests the possibility of larger concentrations of this species in North Korea, where a further 227 000 ha of tidal-flat are considered to still remain (Wilson & Barter 1998). Although much scarcer, counts of Red Knot *Calidris canutus rogersi* (with a peak count of 300 at Namyang Bay) were also similarly concentrated towards the northwest. The very low numbers of Curlew Sandpiper *Calidris ferruginea* recorded in this study (16 on northward, and 2 on southward migration) support the suggestion of Minton (1998) that the main migration route is to the west over inland China. The Pacific Golden Plover *Pluvialis fulva* was also recorded in small numbers (10 on northward and 47 on southward migration). However, it appears to have a more easterly migration route with significantly higher numbers being recorded in Japan (Hanawa 1985, Fujioka *et al.* 1998).

Southward migration

Numbers of shorebirds during southward migration appeared to be much lower than on northward migration (Appendices 4 & 5). One species that appears not to move through Korea during southward migration is Great Knot *Calidris tenuirostris.* However, a significant part of this difference, I suspect, is probably because Dunlin *Calidris alpina* arrive in Korea outside of the survey period (based on previous research I conducted in Japan and counts at selected sites in Korea in late October/November 1998).

The southwest sandy tidal-flats were found to be highly important for Kentish Plover *Charadrius alexandrinus dealbatus* (>7 000 – or nearly 30% of this subspecies' MPE) and Terek Sandpiper *Xenus cinereus* (approximately 3600 - or 10% of the Flyway's MPE) at three sites within about10 km of each other. Although the Kentish Plover *Charadrius alexandrinus dealbatus* flocks contained many juveniles, almost all Terek Sandpiper *Xenus cinereus* appeared to be adults (though many were too distant to age confidently).

Bar-tailed Godwits *Limosa laponnica baueri/menzbieri* (all adults) were concentrated in north-west sites in August, but were almost absent nationwide in September – indicating a somewhat different southbound migration route for juveniles. Only 2-3 juveniles were amongst 65-76 Spoonbilled Sandpipers *Eurnorhynchus pygmaeus* at Seamankeum in a single scan in September (with only 2 juveniles amongst 180 recorded by another researcher at the same site the same month, Park J.Y, *pers comm.*), perhaps indicating a southbound migration route for (mostly) adults through South Korea. Only 1 was recorded on northbound migration. Peak counts of Spotted Greenshank *Tringa guttifer* were recorded in late September and October, with 22 at Sunchon Bay on September 29, and 58-61 at Seamankeum on October 21. This latter count recalls the 52 at Mankyung River, Saemankeum, in 1994 (Kim *et al.* 1997).

Northern winter

Shorebird diversity was much lower in January and February (Appendix 6). In addition to unexpectedly high numbers of Grey Plover *Pluvialis squatarola* at Saemankeum (representing 10% of the Flyway MPE),

the most notable finding was the concentration of Eastern Oystercatcher *Haematopus (ostralegus) osculans* at Keum River estuary – the meticulously checked 2 987 (or 75% of suspected MPE) representing the highest known count of this well-differentiated taxon on record. This form has a different upperwing pattern and measurements (Hayman *et al.* 1986) to European Oystercatcher *Haematopus ostralegus ostralegus*, lacks a white neck collar at all ages, and apparently has a different structure and nesting ecology.

More detailed reports on findings and site-level spreadsheets can be found on the internet at: http://kfem.or.kr, and in the 1999 Korean NGOs Ramsar Report.

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Appendix 1. Counts of the 19 species found in internationally important concentrations in South Korea during April 1998. LT/HT denotes Low Tide and High Tide respectively (with lower case letters indicating neap tide conditions). P/G/E denotes Poor, Good, or Excellent viewing conditions, where possibly less than 50%, between 50-80% and more than 80% of shorebirds present suspected counted. Inc. indicates incomplete count suspected.

Shorebird site	Nakdong Estuary	Sunchon Bay	Haenam Hwangsan	Aphae Is.	Hampyong Bay	Saemankeum	Keum Estuary	Cheonsu Bay	Asan Bay	Namyang Bay	Yong Jong Is. Sth	Kanghwa Is.	Main Sites Special Total
Date	13/4	14-15/4	16/4	17/4	19/4	20/4	21/4	21+23/4	22-23/4	22-23/4	25/4	24-25/4	
Tide/conditions	HT/LT:P/G: inc	Ht/LT:G	HT:G,inc	HT:G,inc	HT/LT Inc	HT/LT:inc	HT/LT: G/inc	HT:G/E	HT:E	LT/P;inc	HT:E	LT/HT:E	
Limosa l. melanuroides						130	30	20	5 250	41	1		5 472
Limosa lapponica		1 868	1 272	1 300	137	1 385	2 145	1 732	1 850	1 654	1 987	1 808	17 138
Numenius p.variegatus		70	19	12	55	275	51	73	250	100	182	87	1 157
Numenius arquata orientalis	1	1	2	6		10	2		1			17	40
Numenius madagascariensis	5	75	65	4	20	164	422		500	5	570	1 047	2 877
Tringa nebularia			27	15	13	17	78	2	30	4	7	10	201
Tringa guttifer						1						3	4
Xenus cinereus		2	9		12	42	133	20	221	3	80	55	577
Heteroscelus brevipes								1					1
Calidris tenuirostris		22	27	8	20	21 250	18 850	141	34 000	1 033	312	1 473	77 136
Calidris alba	1												1
Calidris ruficollis		Ca100	70	6	688	3 010	50	8			10		3 942
Calidris acuminata		9					121	8	20	50		182	380
Calidris alpina sakhalina	ca7 000	9 300	5 083	7 000	3 510	4 460	5 665	4 860	14 000	356	11 500	925	73 659
Eurnorhynchus pygmaeus								1					1
Haematopus o.osculans		3		2	2	13	131	4				2	162
Pluvialis squatarola	12	77	101	570	188	1 180-1 600	448	69	500	141	586	128	4 000+
Charadrius a.dealbatus	33	15	30	20	7	6	18	12			1		142
Charadrius mongolus			1		7	147	27				10	110	302
Other		41		24		7	134	31		29	6	104	376
TOTAL	7 052	11 583	6 706	8 967	4 659	32 097	28 432	6 982	56 622	3 416	15 252	6 031	187 568

Appendix 2. Counts of the 19 species found in internationally important concentrations in South Korea during early May 1998. LT/HT denotes Low Tide and High Tide respectively (with lower case letters indicating neap tide conditions). P/G/E denotes Poor, Good, or Excellent viewing conditions, where possibly less than 50%, between 50-80% and more than 80% of shorebirds present suspected counted. Inc. indicates incomplete count suspected.

Shorebird site	Nakdong Estuary	Sun-chon Bay	Kwang - yang Bay	Hae-nam Hwang san	Hamp-yong Bay	Meian Muan	Aphae Is.	Sae man-keum	Keum Estuary	Cheon su Bay	Asan Bay	Nam-yang Bay	Honw onri Rice-fields	Kang-hwa Is	Yong Jong Is. Sth	Main Sites Totals
Date	29/4	30/4	1/5	2/5	3/5	3/5	4/5	5/5	6/5	6-7/5	8/5	8-9/5	8/5	10/5	10-11/5	
Tide/conditions	HT/LT:P-G	HT/LT:G/E	HT/LT; P/G Inc	HT/LT:G inc	HT:G	HT:P	HT;E	HT/LT Inc	HT/LT: P?	HT/LT :P/G	HT:G/E	HT/LT :Inc	E	HT/LT:G	HT:E	
Limosa l. melanuroides		1			1		5	10	2 049	1 031	18 282	1 635	1 701			24 715
Limosa lapponica	250	382	250	337	106	499	2 157	350	1 096	932	1 500	500			942	9 301
Numenius p.variegatus	65-100	504	194	56	22	62	65	350	452	432	100	162		214	107	2 785
Numenius arquata orientalis	1	6		1				1			2				1	12
Numenius madagascariensis	2	32		10	6			30	200		346	10		813	236	1 685
Tringa nebularia	24	234	63	91	2	56	46	150	192	87		40		22	9	1 016
Tringa guttifer				2								3		2	2	9
Xenus cinereus	9		22	54	271	148	256	90	200	101	50	997		500	507	3 205
Heteroscelus brevipes	26	1	18	16	3	5		5	29	84		2				189
Calidris tenuirostris		1		2			13	38 500	8 023	19	18 000	12 500		1 950	1 396	80 404
Calidris alba	91															91
Calidris ruficollis	1 425	7	17	49	13	3	931	950	600	149					15	4 159
Calidris acuminata			11	7	1		5	19	180	58	2	250+		250		783
Calidris alpina sakhalina	4 750	7 000	1 300	2 431	1 729	917	3 214	4 680	815	3 017	3 500	4 000		10 800	6 879	55 032
Eurnorhynchus pygmaeus																
Haematopus o.osculans		2			1				1	2						6
Pluvialis squatarola	90	197	80	199	190	337	1 184	780	100	116	341	425		134		4 173
Charadrius a.dealbatus	ca100	2	10	20	1	6			157	35					128	459
Charadrius mongolus		11	27	7	285	141	1 144	848	488	18		250		11	886	4 116
Other, inc.sp	19	5	30	81	20	6	20	326	1 380	28	1	403		2	41	2 362
TOTAL	6 852	8 385	2 022	3 363	2 651	2 180	9 040	47 089	15 962	6 109	42 124	21 177	1 701	14 698	11 149	194 502

Appendix 3. Counts of the 19 species found in internationally important concentrations in South Korea during late May 1998. LT/HT denotes Low Tide and High Tide respectively (with lower case letters indicating neap tide conditions). P/G/E denotes Poor, Good, or Excellent viewing conditions, where possibly less than 50%, between 50-80% and more than 80% of shorebirds present suspected counted. Inc. indicates incomplete count suspected.

Shorebird site	Nak-dong Estuary	Nam-hae Is.	Sun-chon Bay	Haen-am Hwan gsan	Hamp-yong Bay	Saeman-keum	Keum Estuary	Asan Bay	Nam-yang Bay	Yong Jong Is.	Kang-hwa Is.	Yong Hun Is.	Total
Date	14/5	15/5	16-17/5	18/5	20/5	21/5	22/5	23/5	23-24/5	25/5	25/5	26-27/5	
Tide/conditions	HT/LT:G/E	LT:G/E	HT/LT:G	HT/LT:G	HT:P Fog	HT/LT:P/G:Inc	HT/LT:P/G	HT:G	HT/LT:G/P:Inc	HT:E	HT/LT:G	HT/LT:E	
Limosa l. melanuroides						645	772	400	1				1 818
Limosa lapponica	128		459	338	30	144	395		150	241	210		2 095
Numenius p.variegatus	143	407	528	116	10	294	110	150	69	37	24	14	1 902
Numenius arquata orientalis			2	1									3
Numenius madagascariensis	14		3	9		9	14	11	29	9	137	1	236
Tringa nebularia	23		478	110	5	41	59		39	9	6		770
Tringa guttifer	1		1-2	3		2					1		8
Xenus cinereus	90	31	1 046	190	316	893	761	1 072	426	685	216		5 726
Heteroscelus brevipes	371	170	429	23		6	161		3	7	1	1	1 172
Calidris tenuirostris	1			1		3 520	2 942	13 500	100	1 519	80		21 663
Calidris alba	9												9
Calidris ruficollis	1 205		40	696	30	1 030	715		30	5		46	3 797
Calidris acuminata				2		81	46		ca400		250		779
Calidris alpina sakhalina	3 135	1	1 375	1 714	150	1 730	2 811	150	ca300	344	500		12 210
Eurnorhynchus pygmaeus													
Haematopus o.osculans		9	2		1		5		7			80	104
Pluvialis squatarola	171		76	283	190	731	247	371	980	641	299	2	3 991
Charadrius a.dealbatus	50+		4	24	2	46	64		6			19	215
Charadrius mongolus	5		51	2	40+	2 015	165		ca200	15	104		2 597
Other	8	3		7	30	39	211		200	68			566
TOTAL	5 354	621	4 494	3519	804	11 226	9 478	15 654	2 940	3 580	1 828	163	59 661

Appendix 4. Counts of the 19 species found in internationally important concentrations in South Korea during August and early September 1998. LT/HT denotes Low Tide and High Tide respectively (with lower case letters indicating neap tide conditions). P/G/E denotes Poor, Good, or Excellent viewing conditions, where possibly less than 50%, between 50-80% and more than 80% of shorebirds present suspected counted. Inc. indicates incomplete count suspected. * indicates counts made by another observer at the same time: these counts suggested included an extra 1, 000 *Tringa cinereus* and 30,000 shorebird species.

Shorebird site	Nam-hae Is.	Nak-dong Estuary	Yong Jong Is.S/N	Song Do Tidal-flat	Kangh-wa Is.	Teibu Is., inc Shiwa	Asan Bay	Nam yang Bay	Cheon su Bay	Keum Estuary	Seaman-keum	Hamp yong Bay	Meian Muan	Chido Up Muan	Haenam Hwang san	Aphae Is.	Sunch-on Bay	Main Sites Totals
Date	12/8	14/8	17/8	18/8	18/8	19/8	21/8	22/8	24/8	25/8	25-26/8	29/8	29/8	29/8	30/8	31/8-1/9	2-3/9	
Tide/conditions	HT/LT:E	HT/LT:G	LT/ht:G	Lt/LT:G	HT/LT:G	Ht/LT:G	HT:E	LT/HT:G	LT/HT:G/E	HT/LT:G	HT/LT:G/PINC/FOG	LT/HT:E	LT/HT:G	HT:G	HT/LT:G	ht/LT:G?	HT/LT:G	
Limosa l. melanuroides			8	34	1 727		1 457	18		64	7000-10 000				14-25		5	10 327
Limosa lapponica			1 388	441	551	304	150	317	1	525	526	148	1		5	35	8	4 400
Numenius p.variegatus	62	16	115	34	16	207	424	69	68	18	20	14		10	93	35	94	1 295
Numenius arquata orientalis		46	22	25	13			755		19	23	31	3		195	28	239	1 399
Numenius madagascariensis		40	653	95	451	11	96	138	5	89	135	14	5	5	62	1	52	1 852
Tringa nebularia	31		416	9	296	236	412	344	36	699	226	4	236	3	191	105	548	3 792
Tringa guttifer			7		4	1	1-2	2		6					4		19-26	44
Xenus cinereus	70	241	1 358	268	698	203	531	115	52	1 653	413*	1 496	1 628	446	412	534	729	10 847
Heteroscelus brevipes	347	463	24	11	1	61	1	1	15	57	25	1	10		14	5	17	1 053
Calidris tenuirostris	17	18	1 524	500	1 352	125	1434	4		59	13 350+	3		1	5	2	399	18 793
Calidris alba	3	351																354
Calidris ruficollis	12	177	3		1			15		16	1200	60			429	15	10	1 938
Calidris acuminata		2									3				2		1	8
Calidris alpina sakhalina	2	3	10		30			25			4000	27		100	17	120	3	4 337
Eurnorhynchus pygmaeus											22-30							22
Haematopus o.osculans			4					11		1	1				1			18
Pluvialis squatarola		84	1450	34	406	15	510	402	160	34	450	64	46	348	294	269	34	4 600
Charadrius a.dealbatus	3	81		324	14	88		189	1	40	6300	934	1345	193	332	650	338	10 832
Charadrius mongolus		1	189	1	130	466		20	16	159	2100	245	862	74	19	94		4 376
Other	23	21	4	1	3	50	6	5	11	19	313 (*30 000)	5	20		103	7	6	597
TOTAL	570	1544	7151	1777	5693	1767	5022	2430	365	3458	36 107 (67 000)	3 046	4156	1 180	2 192	1 900	2 502	80 884

Appendix 5. Counts of the 19 species found in internationally important concentrations in South Korea during September 1998. LT/HT denotes Low Tide and High Tide respectively (with lower case letters indicating neap tide conditions). P/G/E denotes Poor, Good, or Excellent viewing conditions, where possibly less than 50%, between 50-80% and more than 80% of shorebirds present suspected counted. Inc. indicates incomplete count suspected.

Shorebird site	Nakdong Estuary	Kang-hwa Is.	Yong Jong Is	Asan Bay	Namyang Bay	Cheonsu Bay	Saemankeum	Keum Estuary	Aphae Is	Meian Muan	Hampyong Bay, Shinman	Haenam Hwangsan	Sunchon Bay	Main sites Totals
Date	5/9 LT/HT:E	13/9 Ht/LT:P: Inc	14/9 HT/LT:G	16/9 ht :G	17/9 LT/hT: G	20/9 LT/HT:G	21-22/9 LT/HT:G	23/9 LT/Ht:G	24/9 lt/HT:E	26/9 lt/HT: G	26/9 HT:G/E?	27/9 Ht/HT:G	28-29/9 HT/LT:G	
Limosa l. melanuroides	4	247	31	88	213		3 058-5 000	49				1	103	3 794
Limosa lapponica	8	13	5	1	1	2	37	22		4		5	7	105
Numenius p.variegatus	5	15	136	79	33	51	25	32		10	5	14	10	415
Numenius arquata orientalis	5	39	8		1950	1	12	347		9		120	39	2 530
Numenius madagascariensis	11	396	372	172	120	28	57	62			12	60	34	1 324
Tringa nebularia	28	217	419	238	449	2	276	323	361	110	152	144	347	3 066
Tringa guttifer		2	4				11-12				1	4	22	44
Xenus cinereus	415	11	48	105	59	14	36	43	275	450	200	123	136	1 915
Heteroscelus brevipes	67				1	2	2	3						75
Calidris tenuirostris	388	170	5978	425	172	120	5 500	9				26	66	12 854
Calidris alba	533													533
Calidris ruficollis	97	7	108	10	40		450	26	209	100	302	53	4	1 406
Calidris acuminata			1										1	2
Calidris alpina sakhalina	144	31	4297	90	1965	30	22 200	710	2 777	2 000	1 900	77	175	36 396
Eurnorhynchus pygmaeus							65-76						2	67
Haematopus o.osculans			1		39			329						369
Pluvialis squatarola	22	58	1042	310	905	12	588	48	56	233	240	245	17	3 776
Charadrius a.dealbatus	809	37			99	30	2 900	535	4 332	972	1 830	299	96	11 939
Charadrius mongolus	59	3	4		462		2 300	119	565	400	410	33	17	4 372
other	11	14	27	3	5		290	22	9		7	29	2	419
Total	2 606	1 260	12 481	1 521	6 513	292	37 807	2 679	8 584	4 288	5 059	1 233	1 078	85 401

Appendix 6. Counts of the 19 species found in internationally important concentrations in South Korea during January-February 1999. LT/HT denotes Low Tide and High Tide respectively (with lower case letters indicating neap tide conditions). P/G/E denotes Poor, Good, or Excellent viewing conditions, where possibly less than 50%, between 50-80% and more than 80% of shorebirds present suspected counted. Inc. indicates incomplete count suspected.

Shorebird site	Paeksu	Aphae Is.	Meian Muan	Hampy-ong Bay	Haenam Hwangsan	Sunchon Bay	Nakdong Estuary	Saemann-keum	Keum Estuary	Cheonsu Bay	Asan Bay	Namyang	Yong jong Is Sth	Kanghwa Island	Main Sites Totals
Date	4/1	5/1	6/1	6/1	9/1	12-13/1	18/1	2-3/2	5-6/2	7/2	9/2	11/2	18/2	26/2	
Tide/conditions	LT/HT:G	LT/HT:G/E	LT/HT:P	LT/HT:P	HT/LT:G	HT/LT:G	HT/LT:G/Inc	HT/LT Inc	HT/LT E	HT/LT E	HT/E	HT/LT/G/E	HT Inc?	HT/lt Inc	
Limosa l. melanuroides															
Limosa lapponica					2										2
Numenius p.variegatus															
Numenius arquata orientalis	1	397	16	103	132	72	101	86	350		104	1148		161	2 671
Numenius madagascariensis														2	2
Tringa nebularia															
Tringa guttifer															
Xenus cinereus															
Heteroscelus brevipes															
Calidris tenuirostris															
Calidris alba							33								33
Calidris acuminata															
Calidris alpina sakhalina	60-100	16	352	558	882	3 550	3 400+	7 437	800	1298	522	1080	220	267	20 442
Eurnorhynchus pygmaeus															
Haematopus o.osculans						1		11	2 896	5	1	67		6	2 987
Pluvialis squatarola	250-350	46	172	270	121	16	2	2 780		61		8	20	747	4 493
Charadrius a.dealbatus		147	45	33	23	131	1		27	43	8				458
Charadrius mongolus															
Others							10		11						
TOTAL	311	606	585	964	1 160	3 770	3 547	10 314	4 084	1407	635	2303	240	1183	31 088

COMMUNAL BREEDING OF RED-CAPPED PLOVERS

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On Saturday 21st November 1998, I was with a group conducting a wader count at Tortoise Head on French Island, Westernport Bay. The route to Tortoise Head involves a detour off the beach around a stretch of mangroves. At the point where the route rejoins the beach, I observed a small flock of were 4 male and 3 female Red-capped Plovers, (*Charadrius ruficapillus*), on an exposed area of mud about 3 to 5 metres from the high tide mark. As I approached, the birds commenced a massed distraction performance that indicated they were nesting nearby. The male birds stretched to their maximum possible height, some with wings outstretched. The female birds adopted the broken wing pose in an attempt to lure us away.

From the point where the birds were performing, the beach rose reasonably steeply to about 3 metres beyond the high tide mark. Beyond the top of the sloping beach was a flat stretch of coarse sand and shellgrit that extended for no more than 20 metres by 3 metres. An examination of this flat stretch revealed 5 Red-capped Plover nests. It is possible further nests were present as our inspection was made fairly briefly due to the obvious stress we were causing the parent birds. The nests were scraped out of the shellgrit and lined with very pale coloured seaweed. Three of the nests had 2 eggs and the remaining two had 1egg each. Two of the nests were within 2 metres of each other. The space between the others was slightly larger.

Within the same area, there was also a Pied Oystercatcher (*Haematopus longirostris*) nest and a pair of these birds remaining close by. This nest contained one egg and was no more than 1 metre from one of the Red-capped Plover nests.

On the return journey after completing our count, 8 Red-capped Plovers (4 male and 4 female), were observed close to the nesting site. On this occasion the tide was higher leaving less exposed mud and the birds did not perform nearly as actively as on our outward journey. However a male Red-capped Plover was observed being very aggressive to one of the Pied Oystercatchers.

It appears this sighting may be unusual for several reasons. The Handbook of Australian, New Zealand and Antarctic Birds (Marchant and Higgins 1993) states that Red-capped Plovers nest near water, but rarely closer than 40 metres. Of 44 nests in a 14.4 hectare area, they were usually 70 - 100 metres apart and never closer than 28 metres. In this instance, the nesting was within 5 metres of the high tide mark and 5 nests occurred within a 20 metre stretch. Marchant and Higgins (1993) also state that almost invariably they lay 2 eggs per clutch and in this case 2 of 5 nests had 1 egg only. However it is possible these clutches were incomplete.

Acknowledgements

Thanks to Becky Hayward and Jon Fallaw for their verification of the detail in this sighting and to Mark Barter for reviewing the draft.

References

Marchant, S. and P.J. Higgins. 1993. Handbook of Australian, New Zealand and Antarctic Birds. 2. Raptors to Lapwings. Oxford University Press.

MORE ON PIED OYSTERCATCHER FEEDING ON GOLF COURSES

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In the last issue of *Stilt* 33: 37, I reported on an interesting feeding observation on Pied Oystercatchers. Since the above note was prepared and submitted to *Stilt* there has been some correspondence (in June 1998) on the "birding-aus" chat group involving other sightings of Pied Oystercatchers apparently feeding on grassland. These were:

On 19 June 1998 at Matilda Bay, Western Australia, 'some' were feeding on grass around a litter-bin about 100m from the Swan River (Robert Davis).

Some years ago birds were seen foraging, over a period of a few days on a grassy oval at Caloundra, Queensland (Hallden).

Birds were observed "feeding on grassy areas in Tasmania" (Andrew Geering).

A year or so ago birds were observed feeding on an oval at Swansea, near Newcastle (NSW). The oval was about 100m from the shore. There had been heavy rain before and the oval had many puddles of surface water (Alan Stuart).

The above observations confirm that foraging on grassland by Pied Oystercatchers in Australia is a rare event. Where it does occur it often seems to be at locations where the ground is particularly soft due to recent rain or artificial watering.

STATUS OF SHOREBIRDS IN KAMCHATKA, RUSSIA

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INTRODUCTION

The Kamchatka Oblast administrative division of Russia is located in the northeastern corner of the Asian continent and has an area of about 472,300 km^2 (see Fig. 1.). It includes Kamchatka Peninsula (about 250,000 km^2), a continental part (218,800 km^2), Karaginsky Island (1940 km^2) and the Commander Islands (1500 km^2). The continental part of the division includes the Koryak highlands and the Penzhina River valley. The Parapol, a vast, wet lowland, occurs between the Kamchatka peninsula and the continental part of the region. The region is about 1800 km from south-west to north-east and the most northern point is the upper basin of the Penzhina River (about 65° N) and the most southern point is Cape Lopatka (50° 50' N). The region has about 140,000 rivers and streams and more than 112,000 lakes. The total area of wetlands within the Kamchatka peninsula is about 34,000 km^2 but there are no data about the continental part of region (Vaskovski, 1973).

METHODS

We have collected data on the shorebirds of Kamchatka during many expeditions in different parts of the region since 1962. In addition, we use information from the published material of other ornithologists where appropriate (Stejneger, 1885; Averin, 1958; Johansen, 1961; Ostapenko et al., 1975; Kistchinsky, 1980; Firsova and Levada, 1982; Tomkovich, 1986) in our assessments of the status of each species. The scientific names and species taxonomy follow Stepanyan (1995) with additional use most common synonyms.

RESULTS

Currently 53 species and subspecies of shorebirds are recorded in Kamchatka Oblast. These are:

Solitary Snipe *G. solitaria japonica* (Bonaparte, 1856).
Uncommon, with unconfirmed breeding along the mountain streams. In winter, common on non-frozen parts of rivers and streams on the Kamchatka peninsula, uncommon in the Penzhina River valley to the south of Oklan, Commander Islands and on Karaginsky Island

Pintail Snipe *G. stenura* (Bonaparte,1830).
Vagrant. In May 1970 and 3 October 1973, it was recorded in Semyachik Lagoon and in July 1984 near the west side of the Vetveemskiy ridge in the Koryak highlands.

Common Snipe. *Gallinago gallinago gallinago* (Linnaeus, 1758)
Common breeder in wet grasslands and marshes of the whole region.

Black-tailed Godwit *Limosa limosa melanuroides* Gould, 1846.
Locally common breeder in wet grasslands and marshes on Kamchatka peninsula. Vagrant in the Parapol and the southern part of the Koryak highlands.

Siberian Bar-tailed Godwit. *L. lapponica menzbieri* Portenko, 1936.
Common transient on sea coasts and big inland lakes of the region.

Alaskan Bar-tailed Godwit *L. lapponica baueri* Naumann, 1836.
Common transient (probably in spring only) on sea coasts throughout the region.

Whimbrel *Numenius phaeopus variegatus* (Scopoli, 1786).
Common breeder in hummocky tundra in the Parapol and in the continental part of the region. Common to locally abundant throughout the whole region during migration.

Eastern Curlew *Numenius madagascariensis* (Linnaeus, 1766).
Locally common breeder on open wet grasslands and wet tundra in coastal areas and rivers valleys of west Kamchatka, from Bolsheretsk village to the Tigil River, and in eastern Kamchatka from the Avacha to the Apuka River. This species is common on the Kamchatka peninsula during migration.

Spotted Redshank *Tringa erythropus* (Pallas, 1764).
Rare breeder in hummocky wet tundra in the western part of the Kamchatka peninsula to the north of the Kolpakova River and in the southern part of the Parapol.

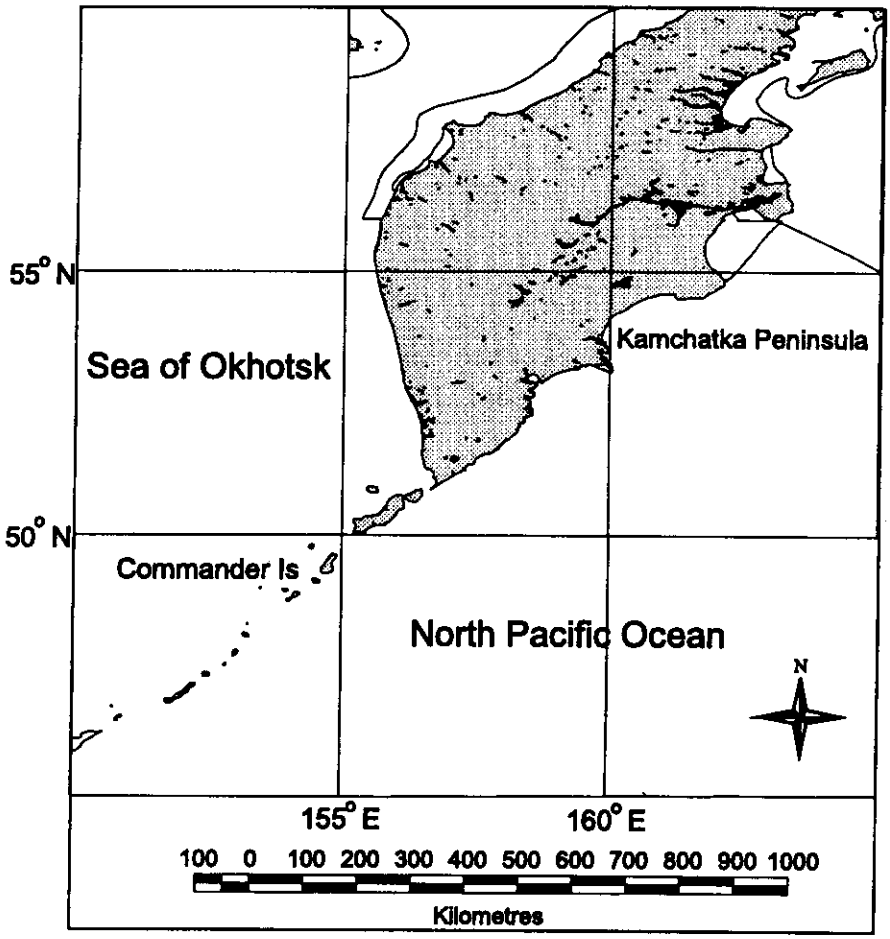

Figure 1. The Kamchatka Oblast administrative division of Russia.

Common Redshank *T. totanus* (Linnaeus, 1758).
This species has only been recorded once, at the mouth of Bolshaya River on 17 May 1974.

Common Greenshank *T. nebularia* (Gunnerus, 1767).
Common breeder in wet wooded grasslands and marshes throughout the region except the Commander Islands.

Spotted (Nordmann's) Greenshank *T. guttifer* (Nordmann, 1835).
A rare species that probably breeds in the region. It has been recorded on Moroshechnaya River and near Semyachik Lagoon in summer.

Green Sandpiper *T. ochropus* Linnaeus, 1758.
Rarely recorded species that occurs occasionally in different parts of Kamchatka peninsula during migration.

Wood Sandpiper *T. glareola* Linnaeus, 1758.
Common breeder in wet grasslands and marshes of the whole region.

Terek Sandpiper *Xenus cinereus* (Guldenstadt, 1775).
Common breeder on the shores of rivers and lakes in the continental part of the region to the north of the Pustaya River and on Karaginsky Island. During migration, it is uncommon on the west coast and rare on the east coast of the Kamchatka peninsula.

Common Sandpiper *Actitis hypoleucos* (Linnaeus, 1758).
Common breeder on sand beaches of rivers and lakes throughout the region except the Commander Islands.

Grey-tailed Tattler *Heteroscelus brevipes* (Vieillot, 1816).
Common breeder near creeks and small rivers in the subalpine belt, probably throughout the whole region. Common on seacoasts during the migration period.

Wandering Tattler *H. incanus* (Gmelin, 1789).
Rare, probably breeder along mountain streams in the Koryak highlands. Rare on the east Kamchatka coast and Commander Islands during the migration period.

Ruddy Turnstone *Arenaria interpres oahuensis* (Bloxham, 1826).
Common transient on seacoasts in the whole region.

Long-billed Dowitcher *Limnodromus scolopaceus* (Say, 1823).

Uncommon breeder in wet grassland in the continental part of region to the north of Talovskoe Lake and the Avya River.

Great Knot *Calidris tenuirostris* (Horsfield, 1821).
Common breeder in the alpine belt in the Koryak highlands. During the migration period, Great Knot are abundant on the northwestern part of Kamchatka peninsula and common in other parts of the region.

Red Knot *C. canutus rogersi* (Mathews, 1913).
Common transient on sea coasts of the whole region.

Sanderling *C. alba* (Pallas, 1764).
Rare transient on sea coasts of the whole region.

Little Stint Calidris minuta (Leisler, 1812).
Rare transient on the seacoast of southeastern Kamchatka..

Red-necked Stint *C. ruficollis* (Pallas, 1776).
Rare breeder in the tundra and on pebbly beaches of lakes in the Koryak highlands and occasionally on coastal beaches on Kamchatka peninsula. Common on seacoasts of the region during migration.

Long-toed Stint *C. subminuta* (Middendorff, 1851).
Locally common breeder in open wet grasslands and wet tundra throughout the whole region.

Temminck's Stint *C. temminckii* (Leisler, 1812).
Common breeder on sandy and pebbly coastal beaches and coastal grasslands in the Koryak highlands and a rare breeder on the Kamchatka peninsula. Uncommon on seacoasts of the whole region during migration.

Baird's Sandpiper *C. bairdii* (Coues, 1861).
Only one record, of one collected on Mutnaya River on 20 August 1973.

Pectoral Sandpiper *C. melanotos* (Vieillot, 1819).
Uncommon transient on sea coasts of the whole region.

Sharp-tailed Sandpiper *C. acuminata* (Horsfield, 1821).
Uncommon transient on sea coasts of the whole region.

Kurile Rock Sandpiper *C. ptilocnemis kurilensis* Yamashina, 1929.
Locally common breeder nesting (200-300 pairs) on coastal grasslands of Lopatka peninsula only.

Commander Rock Sandpiper *C. ptilocnemis quarta* (Hartert, 1920).
Numerous breeder in tundra on the Commander Islands. Probably partly resident as they are common on the rocky sea coast of the Commander Islands during winter.

Chukotkan Dunlin *C. alpina sakhalina* (Vieillot, 1816).
Common transient on seacoasts of the whole region.

Alaskan Dunlin *C .a.arcticola*
Probably common transient through the whole region.

Kamchatka Dunlin *C. alpina kistchinski* Tomkovich, 1986.
Common breeder throughout the whole region except Commander Islands in wet grasslands and wet tundra with lakes.

Curlew Sandpiper *C. ferruginea* (Pontoppidan, 1763).
Rare transient on seacoasts of the Kamchatka peninsula and the Commander Islands.

Spoon-billed Sandpiper *Eurynorhynchus pygmeus* (Linnaeus, 1758).
Rare breeder on dry coastal tundra in the Koryak highlands and the northeastern part of the Kamchatka peninsula, north of Makaryevsky Lagoon. Rare on coasts of the whole Kamchatka peninsula and Commander Islands during migration.

Buff-breasted Sandpiper *Tryngites subruficollis* (Vieillot, 1819).
Vagrant species recorded twice at Olga Bay on 10 November 1973 and in autumn 1975.

Broad-billed Sandpiper *Limicola falcinellus sibirica* Dresser, 1876
Rare transient on the sea coast of the Kamchatka peninsula.

Ruff *Philomachus pugnax* (Linnaeus, 1758).
Common breeder on marshes with small lakes in the continental part of the region to the north of Talovskoe Lake and Geka Bay. Uncommon on the Kamchatka Peninsula and Commander Islands during migration.

Red-necked (Northern) Phalarope *Phalaropus lobatus* (Linnaeus, 1758).
Common breeder on small coastal lakes and is common in coastal seas during migration.

Grey (Red) Phalarope *Ph. fulicarius* (Linnaeus, 1758).
Common transient on the Pacific Ocean and Bering Sea coasts.

Eurasian Oystercatcher *Haematopus ostralegus osculans* Swinhoe, 1871.
Uncommon breeder on sandy and pebbly beaches of the seacoasts of the main part of the region. Main part of population nests on the northwestern coast of Kamchatka peninsula and on the coast of Penzhina Bay.

American Black Oystercatcher *H. bachmani* Audubon, 1838.

One recorded near Zhupanovo village on 14 August 1994.

Black-winged Stilt *Himantopus himantopus himantopus* (Linnaeus, 1758).
Recorded only once, at the mouth of the Bolshaya Chazhma River on 28-30 April 1994.

Pacific Golden Plover *Pluvialis fulva* (Gmelin, 1789).
Uncommon breeder in hummocky tundra in the continental part of the region and the west coast of Kamchatka Peninsula to the north of the Kolpakova River. This species is common throughout the whole region during migration.

American Golden Plover *P. dominica* (Muller, 1776).
Accidental records including a specimen collected in "Kamchatka" in August 1847.

Grey (Black-Bellied) Plover *P. squatarola* (Linnaeus, 1758).
Common transient on seacoasts and uncommon inland throughout the whole region.

Ringed Plover *Charadrius hiaticula tundrae* (Lowe, 1915).
Rare breeder on sandy and pebbly beaches of rivers in continental part of region north of the Belaya and Achayvayam Rivers. Rare on Kamchatka Peninsula during the migration period.

Kentish Plover *Ch. alexandrinus alexandrinus* Linnaeus, 1758.
Only accidental records, including a specimen collected on Bering Island on 21 November 1911.

Lesser Sand Plover *Ch. mongolus stegmanni* Portenko, 1939.
Common breeder in dry mountain tundra of the whole region. Common on seacoasts of the whole region during the migration period.

Eurasian Dotterel *Eudromias morinellus* (Linnaeus, 1758).
Accidental species collected on Bering Island in September 1928.

Oriental Pratincole *Glareola maldivarum* Forster, 1795.
Vagrant, one collected near the mouth of the Opala River on 9 May 1994.

ACKNOWLEDGEMENTS

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OCCASIONAL COUNT NO. 2: ASHMORE REEF, NORTHWESTERN AUSTRALIA

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Ashmore Reef is an uplifted coral platform national park situated 400 km off the northwestern Australian coast approximately half way between Australia and Timor in Indonesia (10° 12' S, 115° 32' E). It consists of three low coral sand islands each of approximately 10 ha. Only West Island is vegetated with fringing *Poisonia* and several coconut trees and an extensive grass cover. I visited both West and East Islands for approximately 2 h each between 07:30 and 09:30 h on 4 and 5th October 1998, respectively. The tide was rising on both days and all waders on the reef were roosting on one of the three islands. Counts were made of all waders on both islands with 10 x 40 binoculars and birds were carefully examined for any leg flags. A total of over 2,500 waders of 13 species were seen during the survey (Table 1).

Table 1. Counts of waders on West and East Islands, Ashmore Reef between 4-5th October, 1998.

Common name	West Island	East Island
Little Curlew	50	-
Whimbrel	10	-
Common Greenshank	9	31
Grey-tailed Tattler	131	1500
Wandering Tattler	2	3
Ruddy Turnstone	65	242
Sanderling	4	-
Red-necked Stint	-	46
Curlew Sandpiper	-	252
Pacific Golden Plover	32	20
Lesser Sand Plover	-	30
Greater Sand Plover	83	10
Australian Pratincole	2	-
TOTAL	388	2124

These counts are the minimum number of each species present at the time as most birds were in tight bunches and difficult to count accurately without a telescope. Additionally, the Middle Island was not visited and although no waders were seen around its shore when passing nearby, it is likely that some waders were roosting there during the survey period.

How long each species spends at Ashmore Reef is unknown. All species were still present approximately two weeks later when a commercial bird tour group visited West Island (S. Keates, personal communication). This suggests that at least some birds stop for several weeks, presumably enroute to the Australian mainland. All species recorded are relatively abundant in at least some region of Australia. The large number of Grey-tailed Tattlers present is an important record, making Ashmore Reef internationally significant for this species (Watkins 1993). The estimated count of 1,500 represents approximately 3 percent of the Flyway population. Ashmore Reef is probably used by the Grey-tailed Tattlers that form the large population at Eighty Mile beach, NW Australia (Lane 1987). The coralline sandflats and seagrass meadows cover most of the eastern half of Ashmore Reef and appear capable of supporting those waders that feed in this habitat for an extended period. However, the feeding habitat of the Little Curlew (open terrestrial grassy areas) is more restricted and was only found on West Island suggesting that larger numbers of this species are unlikely to roost here for more than a few days.

All species seen during this survey have previously been recorded at Ashmore Reef (ANCA 1989), but several species that have been recorded at Ashmore Reef were not recorded during this survey. The summary of ANCA bird surveys at Ashmore on the website notes that large flocks of several species of wader occur during October-November and March April. This suggests that the number of birds present during most of the year is probably quite small.

ACKNOWLEDGEMENTS

I thank the Australian Department of Foreign Affairs for funding the reef resource survey of Ashmore Reef that I participated in. I also thank my CSIRO Marine Research colleagues for allowing me the time to go birding when everyone else was working.

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WADER BANDING RESEARCH IN CHINA

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Seventy-four species of shorebirds (Charadriiformes) have been recorded in China and represent 74% of the shorebird species in Asia and about one third of all shorebirds (Table 1). These facts show that China has a high diversity of shorebirds and supports large numbers of migratory shorebirds. Most species gather at sites in coastal China where many are easily caught, making it possible to band them for research into their migration.

BIRD BANDING STATIONS

Shorebirds have been banded at 13 stations in China between 1984 and 1997. All stations are on the eastern coast of China, except for Weishan Bird Banding Station (Table 2; Fig. 1). It is obvious from Figure 1, that all the bird banding stations where shorebirds have been banded are on the East Asian-Australasian Flyway. Important shorebird banding stations such as Chongmingdao Bird Banding Station are located in the areas of the Chinese coast where most of the migratory shorebirds roost in winter. The number of shorebirds banded at each of the 13 banding stations varies (Table 3), with the most birds banded at Chongmingdao.

Table 1. Families of shorebird (Order Charadriiformes) found in China, Asia and the world.

Family	China	Asia	World
Scolopacidae	47	60	86
Rostratulidae	1	1	2
Jacanidae	2	3	8
Dromadidae	0	1	1
Burhinidae	2	3	9
Haematopodidae	1	2	11
Ibidorhynchidae	1	1	1
Recurvirostridae	2	3	12
Charadriidae	15	22	66
Glareolidae	3	4	18
TOTAL	74	100	214

Table 2. Wader banding stations and sites in China.

Station or site	Location
Maoeshan Station	Maoeshan town, Shanghi City, Heilongjiang Province
Xianghai Station	Tongyu County, Jilin Province
Kuandian Site	Kuandian County, Liaoning Province
Laotieshan Station	Dalian City, Liaoning Province
Niaozhan Site	Dalian City, Liaoning Province
Shuangtaihekou Station	Panjin City, Liaoning Province
Nansihu Station	Weishan County, Jining City, Shandong Province
Changdao Station	Changdao County, Shandong Province
Qingdao Station	Qingdao City, Shandong Province
Chongmingdao Station	Chongming County, Shanghai
Poyanghu Station	Yongxiu County, Jiangxi Province
Beihai Site	Beihai City, Guangxi Auto. Reg.
Weishan Station	Weishan County, Yunnan Province

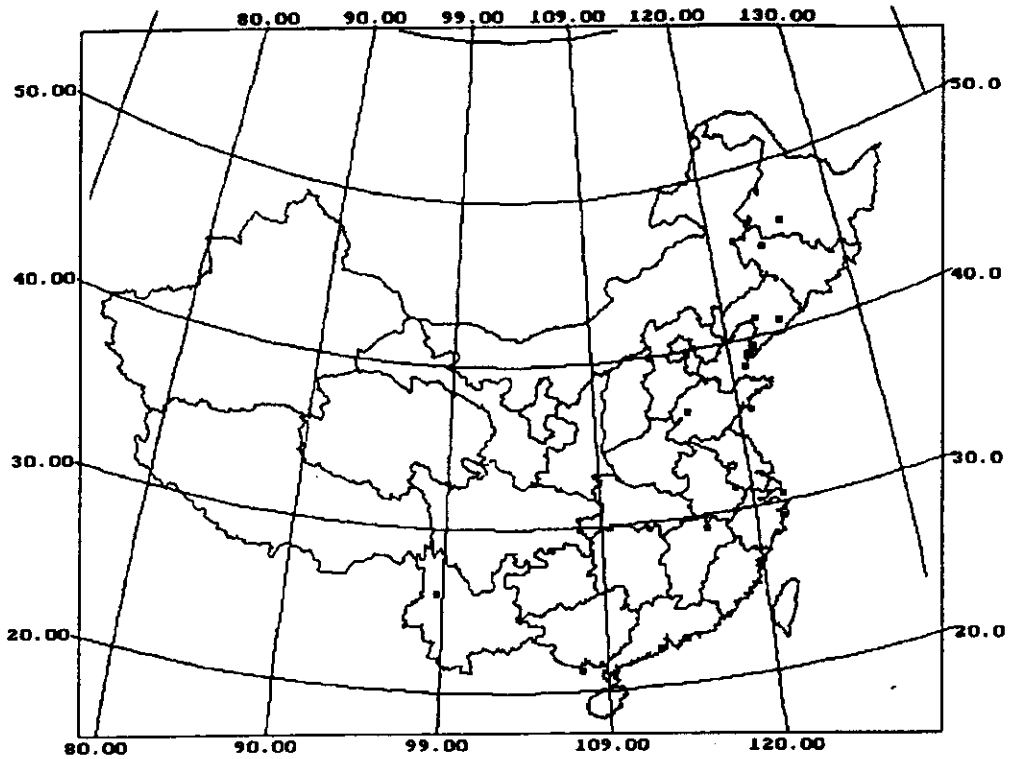

Figure 1. Map of China showing the location of shorebird banding stations and sites.

NUMBERS OF SHOREBIRDS BANDED AND THEIR RECOVERY

Since shorebird banding in China commenced in 1984, 1830 birds of 45 species have been banded (Table 4). The numbers of birds banded each year have fluctuated during this time (Fig. 2). More shorebirds were banded in 1988 and 1996 than in other years. These were mainly banded at Chongmingdao, where two Sino-Australian cooperative banding activities were conducted in these two years. This international cooperation has greatly stimulated the development of bird banding in China. The main species caught have been Eurasian Woodcock *Scolopax rusticola* (601), Great Knot *Calidris tenuirostris* (217) and Red-necked Stint *Calidris ruficollis* (179) (Table 4).

Up until the end of 1997, 252 banded shorebirds have been recovered in China (Table 5). Of these, 15 recoveries were of birds banded in China and five were banded in China and recovered elsewhere. The remainder were birds recovered in China but banded overseas. The 15 domestic recoveries were of 11 species, with the highest number being four Great Knots. These recoveries indicate that shorebirds migrate along the Chinese coast and that there is movement between the Changjiang River estuary and Taiwan. The five birds banded in China and recovered overseas were banded in Hong Kong (4) and Daduxikou in Taiwan. These birds were all recovered in Australia and indicate that there are at least two routes that shorebirds take when flying between China and Australia.

Two hundred and thirty-two shorebirds of 14 species banded abroad have been recovered in China up until the end of 1997 (Table 5). The greatest numbers of recoveries were of Great Knot (81) and Curlew Sandpiper *Calidris ferruginea* (37). Most of the recoveries were from wetlands and estuaries along the Chinese coast. These recoveries confirm that this area is extremely important to the shorebirds of the East Asian –Australasian Flyway. They reveal that shorebirds move between different parts of China and a number of other countries, including Australia, India, Japan, Malaysia, New Zealand, Philippines and Russia.

PROBLEMS FACED BY WADER BANDERS IN CHINA

Banding shorebirds has been beset with difficulties since these studies began in 1984. There are three main problems faced by banders in China:

There has been a continual shortage of operating funds for all the bird banding stations in China. The most important station at Chongmingdao could not continue to band any shorebirds because of a lack of funds.

Table 3. The number of shorebirds banded each year at the 13 banding stations in China between 1984 and 1997.

Station	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
Maoeshan														5	5
Shanghai		2													2
Kuandian		4													4
Laotieshan				1											1
Niaozhan											18				18
Shuangtaihekou													2	7	9
Nansihu		114	17												131
Changdao			21	36	21	18	9	11	7	6	5	9	87	16	246
Qingdao	8		118	12	55	12		16				1	13	10	245
Chongmingdao		136	47	109	412								283		987
Poyanghu								5							5
Beihai		1										118	27	18	164
Weishan		3										1		9	13
TOTAL	8	260	203	158	488	30	9	32	7	6	23	129	412	65	1830

Table 4. The number of each species of wader banded in China between 1984 and 1997.

Species	Scientific name	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
Solitary Snipe	*Gallinago solitaria*					1									1	2
Pintail Snipe	*G. stenura*						3						3	2	5	13
Common Snipe	*G. gallinago*						1								2	3
Eurasian Woodcock	*Scolopax rusticola*	8	118	137	49	76	26	9	27	7	6	5	10	100	23	601
Black-tailed Godwit	*Limosa limosa*					2									4	6
Bar-tailed Godwit	*L. lapponica*			2	6	31								33		72
Little Curlew	*Numenius minutus*													2		2
Whimbrel	*N. phaeopus*		2	2	4	7										15
Eurasian Curlew	*N. arquata*													2		2
Eastern Curlew	*N. madagascariensis*											1		3		4
Spotted Redshank	*Tringa erythropus*			5	2	11			5					1		24
Common Redshank	*T. totanus*		5			8							2	21		36
Marsh Sandpiper	*T. stagnatilis*															
Common Greenshank	*T. nebularia*		19	21	3	19							1	4		67
Spotted Greenshank	*T. guttifer*		19			1								1		21
Green Sandpiper	*T. ochropus*														2	2
Wood Sandpiper	*T. glareola*					5						1		7	1	14
Terek Sandpiper	*Xenus cinereus*		23	1	20	39							2	4		89
Common Sandpiper	*Actitis hypoleucos*					1							4		2	7
Wandering Tattler	*Heteroscelus incanus*				2	29										31
Ruddy Turnstone	*Arenaria interpres*		2	8	3	3										16
Great Knot	*Calidris tenuirostris*		1		24	53								139		217
Red Knot	*C. canutus*					1								17		18
Sanderling	*C. alba*													1		1
Temminck's Stint	*C. temminckii*												1	1		2
Red-necked Stint	*C. ruficollis*		27		1	107						1	41	2		179
Sharp-tailed Sandpiper	*C. acuminata*		21		4	8								9		42
Dunlin	*C. alpina*			13	27	34								11		85
Curlew Sandpiper	*C. ferruginea*		2		5	5							3	4		19
Spoon-billed Sandpiper	*Eurynorhynchus pygmeus*					1										1
Broad-billed Sandpiper	*Limicola falcinellus*				4	4										8
Grey Phalarope	*Phalaropus fulicaria*			3												3
Painted Snipe	*Rostratula benghalensis*			6	1	1							2			10
Pheasant-tailed Jacana	*Hydrophasianus chirurgus*		1										6	2	2	11
Eurasian Oystercatcher	*Haematopus ostralegus*													1		1
Black-winged Stilt	*Himantopus himantopus*														4	4
Pied Avocet	*Recurvirostra avosetta*					1								1		2
Pacific Golden Plover	*Pluvialis fulva*				2	8						2	5			17
Grey Plover	*P. squatarola*		1			7								16		24
Little Ringed Plover	*Charadrius dubius*		3									2	2	1		8
Kentish Plover	*C. alexandrinus*			1	1	17						8	43	13	14	97
Lesser Sand Plover	*C. mongolus*		9										4	2		15
Greater Sand Plover	*C. leschenaultii*		2			8								2	1	13
Caspian Plover	*C. asiaticus*			3												3
TOTAL		8	260	203	158	488	30	9	32	7	6	23	129	412	65	1830

Many of the areas with the largest concentrations of shorebirds such as the two national nature reserves, Yellow River Delta National Nature Reserve and Shuangtaihekou National Nature Reserve, have extensive areas of mudflat where shorebirds feed and roost but make it extremely difficult to catch the birds.

There is a shortage of suitably qualified wader banders in China. The Sino-Australian cooperative program has trained some Chinese wader banders but many more are needed if all the key sites along the Chinese coast are to be covered. I personally hope that AWSG and other foreign groups that band shorebirds can help the bird banding effort in China by providing a lot more of this type of training.

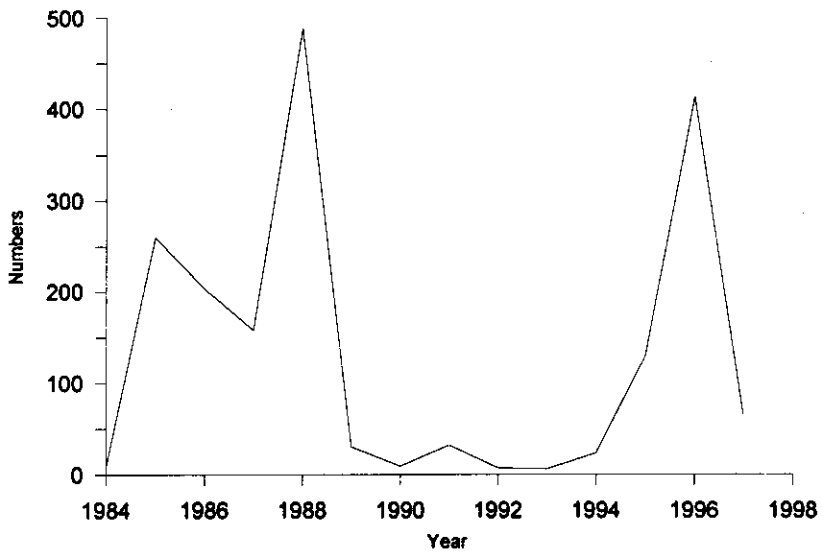

Figure 2. Annual fluctuations in the number of shorebirds banded in China between 1984 and 1997.

Table 5. Numbers of banded shorebirds recovered in China.

Species	Domestic recoveries	Foreign recoveries	Recoveries of foreign bands	TOTAL
Eurasian Woodcock	1			1
Bar-tailed Godwit	1	1	26	28
Whimbrel	2			2
Eastern Curlew			1	1
Common Redshank	1			1
Terek Sandpiper	1	1	10	12
Wandering Tattler	1			1
Grey-tailed Tattler			6	6
Ruddy Turnstone			2	2
Great Knot	4		81	85
Red Knot			22	22
Temminck's Stint			1	1
Red-necked Stint			20	20
Sharp-tailed Sandpiper			15	15
Dunlin	1			1
Curlew Sandpiper	1	2	37	40
Eurasian Oystercatcher	1			1
Kentish Plover			1	1
Lesser Sand Plover	1		3	4
Greater Sand Plover		1	2	3
Unknown			5	5
TOTAL	15	5	232	252

SIGHTINGS OF LEG-FLAGGED WADERS FROM NW AUSTRALIA:

REPORT NUMBER 5

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A yellow plastic leg-flag has been placed on the right tibia of most migrant and some resident waders banded in NW Australia (Broome, 80 Mile Beach, Port Hedland) since 1992.

Lists of sightings of yellow flagged birds away from the banding areas have been published in *The Stilt*, the last being in October 1997 (Issue Number 31).

This report is notable for the marvelous series of yellow flag sightings from Hong Kong (63 of 9 species by Geoff Carey and Paul Leader *et al.*), Republic of Korea (53 of 4 species, coordinated by Jin-Han Kim, Jeong-Yeon Yi and Jin-Young Park) and Japan (10 of 5 species coordinated by Minoru Kashiwagi). The efforts of these people, and many others who have sent in reports directly or indirectly are greatly appreciated.

Black-tailed Godwit

220497	Suz-Tsao, Tainan, Taiwan. 23° 01'N 120° 07'E.	Chinese Wild Bird Federation

Nice to get a sighting of this rarely banded wader (106 have been flagged).

Bar-tailed Godwit

030397 2 birds	Miranda, Firth of Thames, New Zealand	S. Davies
120397	Kaipara Harbour, New Zealand	G. Pulham
100498 4 birds	Mai Po Nature Reserve, Hong Kong 22° 29'N 114° 19'E	G. Carey & P. Leader
18 to 280497	Sone Tidal Flat, Kitakyushu, Fukuoke, Japan. 33° 49'N 130° 58'E	Samoto Kazuo
300797	Kanghwa Island, Republic of Korea. 37° 34'N 126° 23'E	Jin-Young Park
100897 4 birds	"	"
120897	"	"
250897 5 birds	"	"
010997 2 birds	Namyang Bay, Republic of Korea 37° 05'N 126° 45'E	Jin-Young Park
020997 3 birds	Asan Bay, Republic of Korea 36° 54'N 126° 54'E	Jin-Young Park
300997 2 birds	"	Jin-Young Park & Jeong-Yeon Yi
301197	"	K. Woodley *et al.*
280298	"	T. Harbraken
110498	"	Ki-Seop Lee, Ok-Sik Jung, Kyung-Kyu Lee
180498	Kanghwa Island, Republic of Korea. 37° 34'N 126° 23'E	Jeong-Yeon Yi

240498	"	N. Moores
260498	"	Jin-Young Park
250498	Namyang Bay, Republic of Korea 37° 05'N 126° 45'E	Jeong-Yeon Yi
280498 4 birds	Dongjin Estuary, Republic of Korea 35° 49'N 126° 42'E	Jin-Young Park
290498	Mankyung Estuary, Republic of Korea 35° 52'N 126° 43'E	Ok-Sik Jung
020598	Kochimam, Haenam, Republic of Korea 34° 25'N 126° 31'E	N. Moores
120598	"	Jeong-Yeon Yi
190598	Shuangtaizihekou Nature Reserve Liaoning Province, China. 40° 50'N 121° 34'E	M. Barter, J. Wilson
190598 2 birds	"	Jin-Young Park

A nice selection of Bar-tailed Godwit leg flag sightings. New Zealand again features even though the races occurring there and in NW Australia are thought to be different. The Mai Po birds were in a flock of 40 birds seen to arrive, presumably after a direct flight of 4500 km from NW Australia. The large number of Korean sightings (32) emphasises the key role of that country as a stopover site for NW Australian Bar-tailed Godwit.

Eastern Curlew

300997	Kanghwa Island, Republic of Korea. 37° 34'N 126° 23'E	Jeong-Yeon Yi
240498	Yongjong Island, Republic of Korea.	Jin-Young Park

Only 35 Eastern Curlew have been flagged in NW Australia so this is a good return rate.

Terek Sandpiper

160598	Sunchon Bay, Republic of Korea 34° 50'N 127° 30'E	N. Moores
190498	Mai Po Nature Reserve, Hong Kong 22° 29'N 114° 19'E	G. Carey & P. Leader
230498	"	"
020598	"	E.M.S. Kilburn
160598	Sunchon Bay, Republic of Korea 34° 50'N 127° 30'E	N. Moores
160598	Asan Bay, Republic of Korea 36° 54'N 126° 54'E	P. Collins & R. Jessop

South Korea experiences a strong passage of Terek Sandpipers. These are also the first yellow flag sightings for Hong Kong.

Grey-tailed Tattler

030897 2 birds	Yatsu Tida Flat, Chiba, Japan 35° 40'N 140° 0'E	Matsui Jun, Asako Akira
190897	Shiokawa Tidal Flat, Sugiyama-Cho, Toyohashi, Aichi, Japan. 30° 41'N 137° 17'E	Eriko Fujioka
19-200897 2 birds	Kamida River Mouth, Toyohashi, Aichi, Japan. 34° 41'N 137° 19'E	Tsunomura Kenichi
070997	Hanaine, Mitoyo, Kagawa, Japan.	Manabe Tetsuya

	34° 10'N 133° 40'E	

The strong link between Japan and Grey-tailed Tattlers that visit Australia is again shown by these six sightings.

Great Knot

010597	Yellow River Delta, China. (Guangli/Zima River Mouths)	M. Barter, D. Tonkinson
090797	near Magadan, Sea of Okhotok, NE Siberia. 59° 52'N 154° 13'E	A.V. Kondratyev
120897	Kanghwa Island, Republic of Korea. 37° 34'N 126° 23'E	Jin-Young Park
050997 4 birds	Dongjin Estuary, Republic of Korea 35° 49'N 126° 42'E	Jin-Young Park
030498	Mai Po Nature Reserve, Hong Kong. 22° 29'N 114° 19'E	G. Carey & P. Leader
040498	"	"
100498 15 birds	Mankyung Estuary, Republic of Korea 35° 52'N 126° 43E	Jeong-Yeon Yi & Jin-Young Park
110498 6 birds	Asan Bay, Republic of Korea 36° 54'N 126° 54'E	Kip-Seop Lee *et al.*
250498 3 birds	Namyang Bay, Republic of Korea 37° 05'N 126° 45'E	Jeong-Yeon Yi
260498 4 birds	"	Jin-Young Park Jeong-Yeon Yi
280498 4 birds	Dongjin Estuary, Republic of Korea 35° 49'N 126° 42'E	Jin-Young Park
290498 4 birds	"	Ok-Sik Jung & Jin-Young Park
190598	Shuangtaizihekou Nature Reserve Liaoning Province, China. 40° 50'N 121° 34'E	M. Barter, J. Wilson

A great series of sightings from South Korea, China, Siberia and Hong Kong. The 42 reports from South Korea illustrate its key importance as a stop-over site for this species.

Red Knot

200197	Miranda, Firth of Thames, NZ	R. Mavor
170997	"	K. Woodley
191097	"	T. Habraken
231097	Manawatu Estuary, New Zealand	I. Saville
161197	"	"
151197	Manukau Harbour, NZ	P. Agnew
060298	Karewa, Te Whanga Lagoon, Chatham Islands, New Zealand 43° 43'N 176° 27'E	Mike Bell
280298	"	T. Harbraken
190598	Shuangtaizihekou Nature Reserve Liaoning Province, China. 40° 50'N 121° 34'E	M. Barter, J. Wilson
080598	Mai Po Nature Reserve, Hong Kong. 22° 29'N 114° 19'E	G. Carey & P. Leader
100598 2 birds	"	"
140798	Barry Beach, Vic. Australia	P. Collins *et al.*

The number of New Zealand sightings continues to grow even though New Zealand and NW Australian Red Knot are considered different races. The sighting on the Chatham Islands is remarkable. The sighting in Victoria is the first of a Red Knot from NW Australia and presumably relates to an immature bird.

Sanderling

100897	Kajukuri Beach, Sousa, Chiba, Japan 35° 37'N 140° 34E	Tatso Sato
240897	Ichinomiya Estuary, Chiba, Japan. 35° 23'N 140° 24'E	Tomio Tanaka

These are the first reports of Sanderling from NW Australia. Only 52 birds have been flagged.

Red-necked Stint

100896	Nanko Bird Sanctuary, Suminoe, Osaka, Japan. 34° 38'N 135° 28'E	Oonishi Toshikazu
240398	Cape Arid, N.P., 120 km east of Esperance, WA	Alan Rose
100498	Mai Po Nature Reserve, Hong Kong. 22° 29'N 114° 19'E	G. Carey & P. Leader
190498	"	"
200498	"	"
250498	"	"
270498 3 birds	"	"
280498	"	"
080598	"	"

A surprisingly limited number of sightings. The series in Hong Kong is the result of daily counts/watches throughout the migration season.

Sharp-tailed Sandpiper

200498	Mai Po Nature Reserve, Hong Kong. 22° 29'N 114° 19'E	J.G. Holmes

This is the first overseas sighting of a Sharp-tailed Sandpiper from NW Australia.

Curlew Sandpiper

240897	Suz-Tsao, Tainan, Taiwan. 23° 01'N 120° 07'E	Chinese Wild Bird Federation
120498	Mai Po Nature Reserve, Hong Kong. 22° 29'N 114° 19'E	G. Carey & P. Leader
130498 2 birds	"	"
190498 2 birds	"	"
200498 6 birds	"	"
230498	"	"
240498	"	"
250498	"	"
260498	"	"
270498 6 birds	"	"

280498	"	"
010598 3 birds	"	"
020598	"	"
080598	"	"
100598	"	"
1605978	"	Wei Pang Lam

A real bonanza of 29 sightings from Hong Kong as a result of systematic observations there. Note the lack of sightings on southward migration.

Broad-billed Sandpiper

040997	Mankyung Estuary, Republic of Korea 35° 52'N 126° 43E	Jeong-Yeon Yi.
190498	Mai Po Nature Reserve, Hong Kong. 22° 29'N 114° 19'E	G. Carey, P. Leader
200498	"	"
230498 2 birds	"	"
270498	"	"
280498 2 birds	"	"

A nice series of sighting, including the first from South Korea.

Greater Sand Plover

020498	Mai Po Nature Reserve, Hong Kong 22° 29'N 114° 19'E	G. Carey & P. Leader
030498	"	G. Carey & P. Leader
100498	"	I. Tyzzer
110498 2 birds	"	R.W. Lewthwaite & C. Ma, G. Carey, P. Leader
220698	Changbin, Taiwan. 22° 08'N 120° 26'E.	Wei-Ting Liu

Note the early return date of the bird sighted in Taiwan. Many thousands of Greater Sand Plover were seen at Mai Po in late June and July. Large numbers of adults arrived in NW Australia before the end of July 1998.

EMPIRE POINT ROOST: A PURPOSE BUILT ROOST SITE FOR WADERS

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INTRODUCTION

Expanding population and increased use of coastal areas throughout the east coast of Australia has led the Queensland Wader Study Group to investigate the possibility of a purpose built roost site for waders in the Moreton Bay region. Over 50,000 waders use Moreton Bay during their annual migration (Davie 1998). The unique geography of Moreton Bay supports many different habitats which has led to a remarkable biological diversity (Davie 1998). This diversity is being lost to the needs the increasing human population (2.2 million people in 1996), with population growth expected to increase to between 3.0 and 3.2 million by the year 2011 (Anon a 1998). The coast of south-east Queensland is a heavily built-up area with canal estates, marinas, residential areas and parks. These developments have resulted in a loss of available high tide roosting sites. This loss is becoming critical for birds using this part of the East Asian-Australasian Flyway. Even though Moreton Bay is listed under the United Nations Convention on Wetlands of International Importance (Ramsar Convention) which advocates the "wise use" of wetlands, open spaces needed by waders are diminishing. Moreton Bay is situated in south-east Queensland, halfway on the Australian eastern coast between 26 49' S and 27 58' S.

Raby Bay

Historically, one of the most significant roost sites in the central Moreton Bay area was Raby Bay on the northern shore of Cleveland peninsular (Amiet 1957). This was a diverse area of salt marsh, open mud flats, seagrass and mangroves that was sheltered from south-east winds and an important site for wader feeding and roosting. In 1994, during the construction of the canal estate the Queensland Wader Study Group made submissions to both the Redland Shire Council and the developer, Civic Projects (Raby Bay) Pty. Ltd. to reserve part of the development as a roost site. A suggestion also arose to create an artificial island offshore. These submissions did not gain Council support and were unsuccessful.

With the loss of this major roost imminent, and the birds still persisting in the final stages of development, Queensland Wader Study Group approached the Council with a plan for creating an artificial roost elsewhere in the Shire. Final discussions favoured two sites, Oyster Point to the south of Raby Bay and Empire Point to the north. QWSG preferred Oyster Point as it was, and still is, heavily used by waders at varying high tide levels. Empire Point was less popular and mainly used as a staging site (Fig.1).

Empire Point

The proposed site at Empire Point was preferred by Redland Shire Council for reasons of accessibility and being in less danger from erosion and siltation. The site was a previously disturbed area, situated between the outer edge of mangroves and the high tide level. It could be easily approached by heavy machinery and was not an area commonly used by many people. Empire Point was acceptable to Queensland Wader Study Group, though not a first choice (Lawler 1995). It is within two nautical miles of the original site at Raby Bay and has a real chance of being accepted by birds in the future.

Practical advantages of Empire Point were:

1. The area was currently without an effective landuse plan and in need of management;
2. Most construction material was available on site;
3. The low environmental impact of construction (minimal interference with tidal land);
4. The low cost of construction because of sheltered position (no rock work required);
5. A low disturbance level but accessible for public education/ecotourism. Driscoll (unpublished).

In August 1996, Queensland Wader Study Group was granted $21,690 under the 1995-96 Coastcare program for the project entitled "Bird Hide and Boardwalk - Empire Point". The Redland Shire Council agreed to the roost construction and to assist the project.

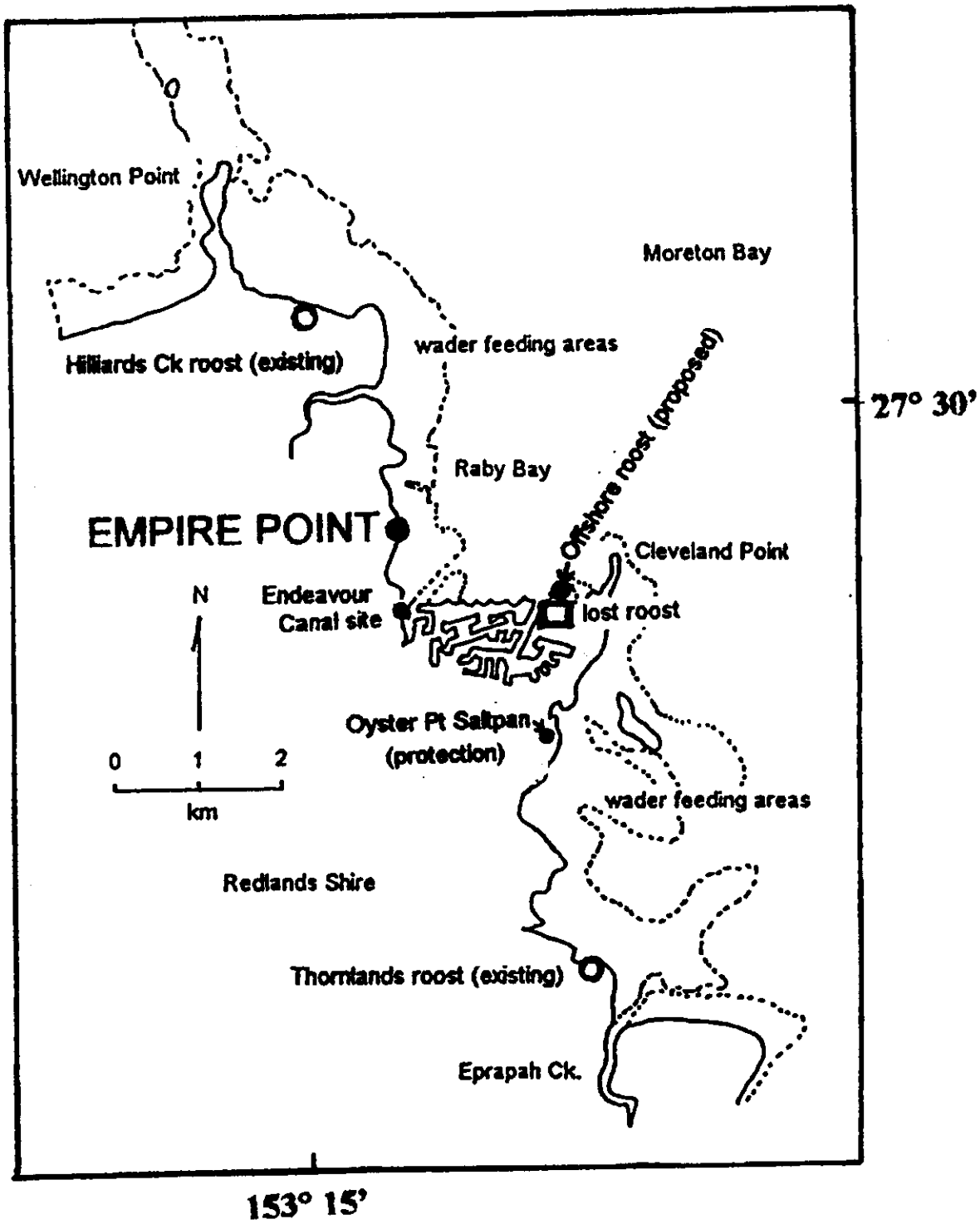

Figure 1. A map of Empire Point and Raby Bay area of Moreton Bay from Lawler (1995).

Coastcare

Coastcare is an initiative of the Australian Government under the Ocean and Clean Seas Program to make funds available from the National Heritage Trust to address problems of pollution and other issues of environmental degradation in the coastal region. Funds can be applied for by community groups for various projects and should be made with the co-operation of the local management agency. Submissions are made jointly by the community group and the local authority. A successful application requires an agreement to be signed and project reports to be submitted, including accounting records of project costs both in cash and in kind contributions (Anon b 1998).

Table 1. Permits granted to enable an artificial wader roost to be constructed.

Government department	Permit required
Dept. of the Environment (Qld)	Permission to Conduct an Activity in Moreton Bay Marine Park Permit granted- 30/1/98 *(Marine Parks Act 1982)*
Dept. Primary Industries (Qld)	to Construct Works on Tidal Lands or Waters for other than Private Use (*Harbours Act*) Permit to Remove, Destroy or Damage Marine plants &/or Perform Works or related activity in a Declared Fish Habitat Area (*Fisheries Act 1994*). Marine Plant Permit removal granted for the period - 16/1/1998 to 15/1/2001
Dept. of Natural Resources (Qld)	Potential Acid Soil (PASS) QASSIT
Dept. of Transport (Qld)	re. navigation hazards

Application for permits to construct the roost were obtained from various government departments (Table 1). A plan was drawn up by the Redland Shire Council to execute the engineering work and Council applied for the permits. As well as obtaining the range of approvals needed, there was the initial matter of Council obtaining responsibility for the site. Also, the task of ensuring the project succeeded as intended, needed close and consistent supervision by a Queensland Wader Study Group member.

Construction

The site consisted of a claypan with an extension of two banks separated by a channel (Fig.2). To construct the roost, a moat was excavated around the claypan and this material was used to raise a central area to create a pad for roosting birds (Fig.3). The remaining section of the banks was retained as birds used the outer edge of these for roosting and it was hoped that roosting birds would recognise the mound as a safe alternative to the banks. The moat provides protection from predators (foxes, cats and dogs) and security from human disturbance. To emulate natural roosts, for as a wide a range of species as possible, the plan intended the surface texture be even, soft to firm with some protection from strong winds. The digging of the moat was estimated to take two weeks working at low tides. Acid sulphate soil treatment required the spreading of 25 tonne of lime.

A final permit for the construction of an artificial wader bird roost by excavation and filling was granted on 26th January 1998 by the Queensland Department of Environment (Permit No.QSE97/339).

The construction of the roost was completed in less than a week in August 1998. It has a gradual slope on the east and south to allow for some tidal inundation (Fig.3). The need to reduce this gradient is being considered as the different needs of the waders become evident. Some levelling and surfacing may be required as evidence is gained of tidal impacts. Work will be done while birds are absent during the southern winter. The roost was officially opened by Mayor of Redland Shire on 5th December 1998.

RESULTS

Counts of waders show that birds are still using the surrounding area (saltpan, mangroves banks and mudflats) although not in large numbers (Table 2), with a gradual increase in birds using the built roost. The Queensland Wader Study Group will monitor the effectiveness of the roost which will be inspected and birds counted on a regular basis. Data collected is incorporated into QWSG count database. Indications are that birds are beginning to recognise and use the roost. It will not fully replace the original roost site at Raby Bay but will provide a safe alternative for some species.

Major species to use Empire Point have been Grey-tailed Tattler *Tringa brevipes*, Bar-tailed Godwit *Limosa limosa*, Terek Sandpiper *Xenus cinereus*, Whimbrel *Numerenius phaeopus* and Eastern Curlew *Numenius madagascariensis*. Some other wader species that have been seen at Empire Point include Lesser Sand Plover *Charadrius mongolus*, Red-capped Plover *Charadrius ruficapillus* and Pied Oystercatcher *Haematopus longirostris*. Few records are available and numbers of birds have been low but the number of birds using the site appears to be increasing (Table 2).

CONCLUSION

Without the large amount of data collected by the volunteer members of Queensland Wader Study Group and other groups throughout Australia the need for high tide roost protection may not have been discovered.

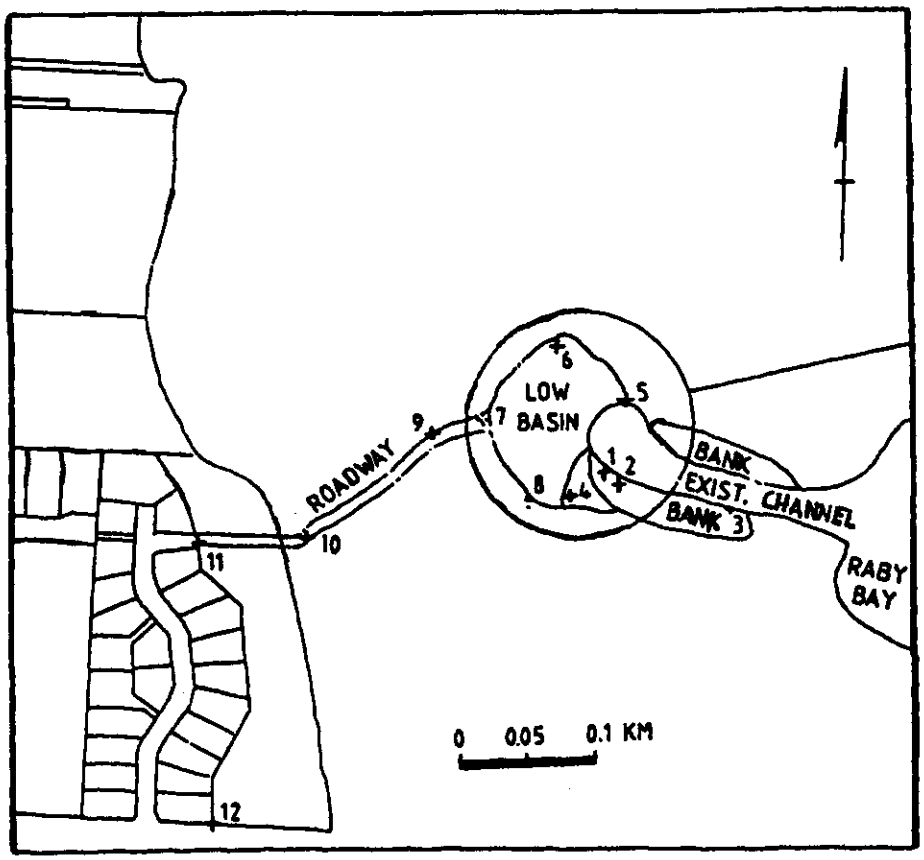

Figure 2. A map of the layout of the original claypan prior to constructing the roost (from Redland Shire Council plans).

Voluntary organisations are vital components of environmental protection in Australia. The effectiveness of the roost will be more clearly known after the 1999 breeding season and when the waders return during future seasons. The need to build artificial roost sites would be reduced if local government enacted conservation provisions that protected these places before development plans were proposed. The Redland Shire Council has recognised the similar value of the Thornlands roost further south in Moreton Bay in its planning document (Anon c 1998). It is shown here that both community and government can work together for the benefit of waders when funds are made available. A Coastcare project does however, need the commitment of a dedicated person to report on and manage the tasks.

ACKNOWLEDGMENTS

We thank the officers of Redland Shire Council who have shown a willingness to care for the needs of migratory waders and Coastcare for being considerate of project delays.

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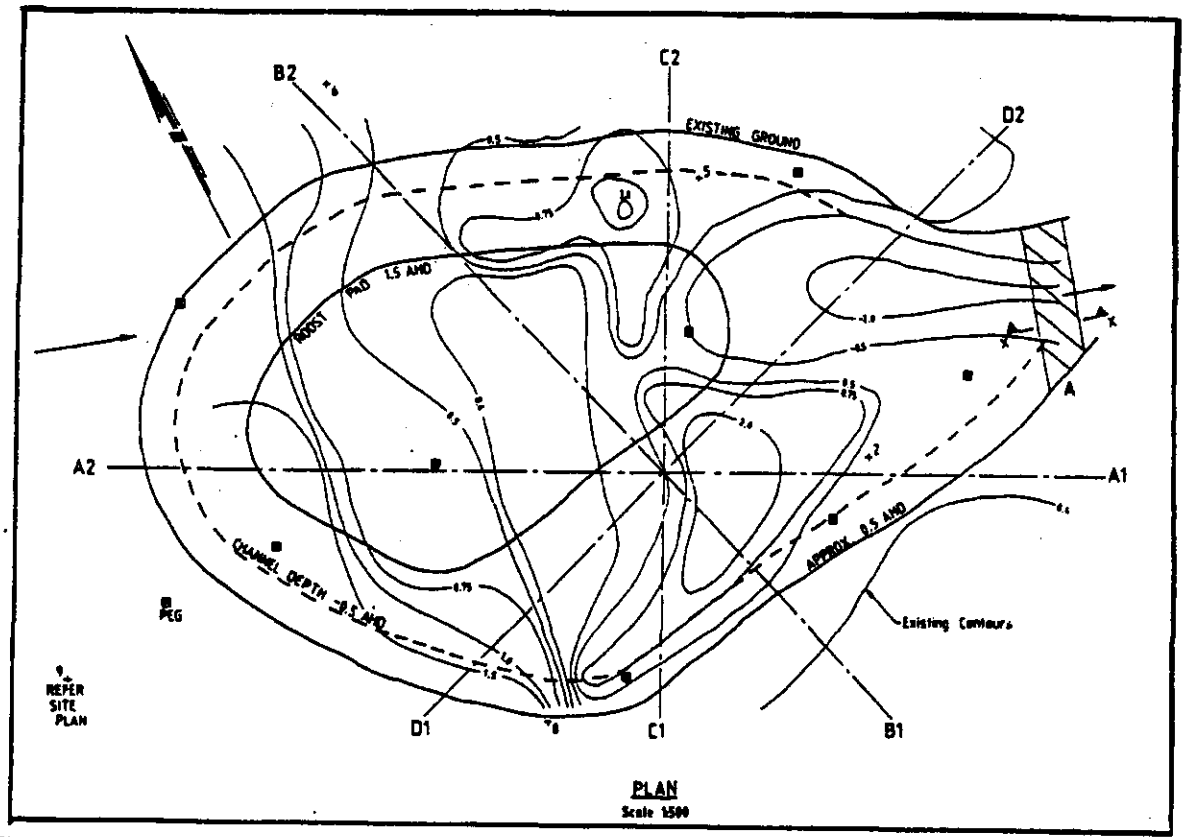


Figure 3. A map of the design of the new roost (courtesy of Redland Shire Council).

Table 2. Wader counts recorded at Empire Point by the Queensland Wader Study Group (pre and post roost completion).

Species	Pre/Post Construction	DATE	COUNT	Behaviour
Bar-tailed Godwit	Pre	4/2/95	62	roosting in shallow water near mangroves
	Pre	8/3/95	11	
	Pre	20/11/97	20	
	Post	5/12/98	8	roosting on new roost
	Post	19/12/98	6	roosting on new roost
	Post	13/2/99	55	roosting on new roost
	Post	22/3/99	48	roosting on new roost
Grey-tailed Tattler	Pre	8/3/95	37	
	Pre	20/11/97	40	
	Pre	31/8/98	7	on northern bank
	Post	29/10/98	20	on new roost
	Post	12/11/98	3	on northern bank
	Post	22/3/99	81	Roosting on new roost
Eastern Curlew	Pre	4/2/95	10	roosting in shallow water near mangroves
	Pre	20/11/97	2	
	Pre	31/8/98	18	roosting on southern bank
	Post	29/10/98	12	roosting on new roost
	Post	12/11/98	30	roosting on northern bank
	Post	13/2/99	11	roosting on new roost
	Post	22/3/99	3	roosting on new roost

REPORT ON POPULATION MONITORING COUNTS, 1998

Ken Harris, 59 Strickland Drive, Wheelers Hill, 3150 Vic. AUSTRALIA.

Result of the Summer 1998 Wader Count	Cairns	Tnsvlle	Mcky	Gldstn	Moretn Bay	Lockyer Valley	Tweed Est	Richmnd Est	Clrnce Est	Hunter Est	Tuggerah Lakes	Parr Est	Botany Bay	Shlhvn Est	Shallow/ CnrInlet	Wstnpt* Bay	East PtPhilip	Altona	Wrbee Avalon
Latham's Snipe			N		1	N	1		N	N		6					5		
Swinhoe's Snipe			O			O			O	O									
Black-tailed Godwit			T		878	T			T	T				1					16
Bar-tailed Godwit	132	111		826	8230		221	283			182	188	568	280	11285	381			
Little Curlew			C			C			C	C									
Whimbrel	16	88	O	81	554	O	88	67	O	O			32		36	30			
Eastern Curlew	18	22	U	220	2263	U	216	91	U	U	3		268	7	1104	2251			1
Spotted Redshank			N			N			N	N									
Marsh Sandpiper	17	3	T	63	53	T	70		T	T								69	88
Common Greenshank	35	7	E	85	340	E	98	17	E	E	7	6			240	139	1	81	128
Wood Sandpiper			D			D			D	D									1
Terek Sandpiper	15				22		2	18							1				
Common Sandpiper	2				1							1						1	1
Grey-tailed Tattler	16	10		198	380		77	119			9				1	14			
Wandering Tattler																			
Tattler sp.																			
Ruddy Turnstone					134			55			27		15		20	182			1
Asian Dowitcher																			
Great Knot	96	1000		141	677			36			6			1	210				
Red Knot					22									31	2100	25			
Sanderling					6			62					1		164				
Red-necked Stint	289			56	768			120			280		22	90	9600	5603		2490	7753
Long-toed Stint																			
Pectoral Sandpiper					1									1					5
Sharp-tailed Sandpiper	65	42			371		13	15			151	22			100	263	180	313	3843
Curlew Sandpiper	93			293	675		24	105			124	18	13	1	880	4661		1153	2869
Broad-billed Sandpiper																			
Ruff/Reeve																			
Bush Stone-curlew																			
Beach Stone-curlew	2	2																	
Pied Oystercatcher	2	9		3	717		3	5			2		59	2	630	221			51
Sooty Oystercatcher				4	1		2				7				177				
Black-winged Stilt		16		147	429		115	28			53	245						217	262
Banded Stilt					10													78	162
Red-necked Avocet																		102	303
Pacific Golden Plover	6	7		7	91		27	124			47	12	5	73		43			36
Grey Plover					45										400				
Red-capped Plover	4	3		7	271			9						6	8	60	4	43	54
Double-banded Plover																1	3		
Lesser Sand Plover	51	2			587			15							30	1			
Greater Sand Plover	21	6			173			62							10				
Oriental Plover																			
Black-fronted Dotterel	2	1			3		4					6					5		7
Hooded Plover															10				
Red-kneed Dotterel												1							4
Banded Lapwing		2																	
Masked Lapwing	29	6		10	102		20	11				37			28	136	100	127	381
Unidentified small																			50
Unidentified medium																			
Unidentified large																			
Total Number	911	1337	0	2141	17805	0	981	1242	0	0	898	542	983	493	27034	14011	298	4674	16016
Total Species	20	18	0	15	29	0	16	19	0	0	13	11	9	11	21	16	7	11	21

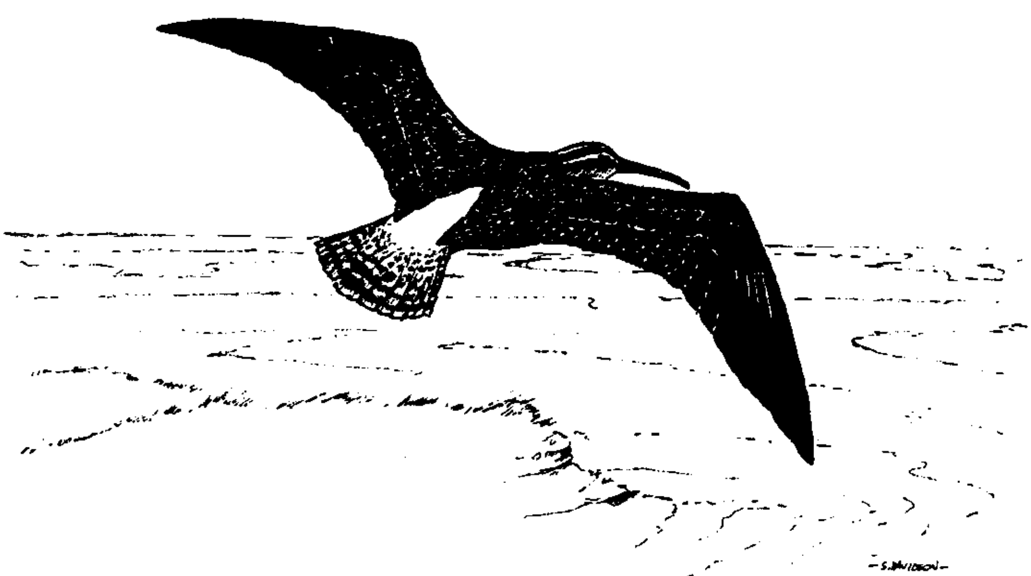
Result of the Summer 1998 Wader Count	BllrneP/ Mud Isl	EDerw Pittw	Marion Bay	Cape Portland	NWCst Tas	SECst SA	West EyrePen	StVinc Gulf	Albany	Swan	80 Mile	Broome	Dwin	TOTAL
Latham's Snipe	214						N	N					N	227
Swinhoe's Snipe							O	O					O	0
Black-tailed Godwit							T	T			13	1065	T	1973
Bar-tailed Godwit	6	57	2		61				7		5738	5071		33629
Little Curlew							C	C			175		C	175
Whimbrel	1	6	2				O	O				99	O	1100
Eastern Curlew	118	85		1	186		U	U	1		79	167	U	7101
Spotted Redshank							N	N					N	0
Marsh Sandpiper	117						T	T			81		T	561
Common Greenshank	211	74			75	11	E	E	317	6	421	3	E	2302
Wood Sandpiper							D	D					D	1
Terek Sandpiper	1				2						593	108		762
Common Sandpiper												8		14
Grey-tailed Tattler				2	5	6					936	581		2354
Wandering Tattler														
Tattler sp.									5					5
Ruddy Turnstone	31			91	2450	448			2		88	185		3729
Asian Dowitcher											1	5		6
Great Knot					10				503	68	13722	6316		22786
Red Knot					820				135	5	2403	895		6436
Sanderling						66								299
Red-necked Stint	6416	1451	75	1071	4430	295			3859	1105	985	30		46788
Long-toed Stint														
Pectoral Sandpiper	3				1									11
Sharp-tailed Sandpiper	2848	1		1	68	286			1118	63				9763
Curlew Sandpiper	3488	800		55	1870	106			652	349	394	286		18909
Broad-billed Sandpiper											1	1		2
Ruff/Reeve					1						1			2
Bush Stone-curlew														
Beach Stone-curlew														4
Pied Oystercatcher	61	789	60	17	415	8			51	46	9	38		3198
Sooty Oystercatcher	1	13		35	240				3			14		497
Black-winged Stilt	391								519	387	80			2889
Banded Stilt	3650								767	4				4671
Red-necked Avocet	121								1253					1779
Pacific Golden Plover	22	25		67	162	91					5	2		852
Grey Plover					95				57	27	335	36		995
Red-capped Plover	436	104	18	135	58	20			496	243	207			2186
Double-banded Plover				3	1									8
Lesser Sand Plover	1			3	27						6	18		741
Greater Sand Plover									30		2948	525		3775
Oriental Plover														0
Black-fronted Dotterel	24													52
Hooded Plover		4	3	19	45									81
Red-kneed Dotterel														5
Banded Lapwing				8										10
Masked Lapwing	429	180		6	13	78								1693
Unidentified small	200										2000			2250
Unidentified medium	200										2000			
Unidentified large	100										4000	3000		
Total Number	19090	3589	160	1514	11035	1415	0	0	9775	2303	37221	18453	0	193921
Total Species	25	13	6	15	22	11	0	0	19	11	26	22	0	

Result of the Winter 1998 Wader Count	Cairns	Tnsville	Mcky	Gldstn	Moretn Bay	Lockyer Valley	Tweed Est	Richmnd Est	Clrnce Est	Hunter Est	Tuggerah Lakes	Parr Est	Botany Bay	Shlhvn Est	Shallow/ CnrInlet	Wstnpt * Bay	East PtPhllp	Altona	Wrrbee Avalon	BllrneP/ Mud Isl	EDerw Pittw	Marion Bay
Latham's Snipe										N												
Swinhoe's Snipe										O												
Black-tailed Godwit					1					T										10		
Bar-tailed Godwit	80	59			1242		47	45	252		26	31	129	18	552	129			1	38	12	3
Little Curlew					12					C												
Whimbrel	25	62			156		12	9	9	O						1				1		1
Eastern Curlew	39	34		77	737		25	19	52	U			65	2	156	162				11	10	
Spotted Redshank										N												
Marsh Sandpiper	1									T									2	42		
Common Greenshank	2	1	1		5					E					10	40		7	15	41	7	1
Wood Sandpiper										D												
Terek Sandpiper	7	1														2				1		
Common Sandpiper		2																				
Grey-tailed Tattler	27		7		548		18	17			3											
Wandering Tattler																						
Tattler sp.		10																				
Ruddy Turnstone					6		1	14			9				1	35			15	70		
Asian Dowitcher																						
Great Knot	55				15				36						10							
Red Knot					1				2						340	2				12		
Sanderling								11														
Red-necked Stint	27		90		25			23			16				760	404		234	433	503	78	70
Long-toed Stint																						
Pectoral Sandpiper																						
Sharp-tailed Sandpiper					16															1		
Curlew Sandpiper	6				99										10	115		88	560	158	11	1
Broad-billed Sandpiper																						
Ruff/Reeve																						
Bush Stone-curlew																						
Beach Stone-curlew	1	8																				
Pied Oystercatcher	4	15	15		238		6	1	8		2			7	766	308			17	52	685	47
Sooty Oystercatcher					2			5			9				370	1				1	65	
Black-winged Stilt	8	11	85		2096		309	25	111		19	62	8				22	194	313	456		
Banded Stilt																				88		
Red-necked Avocet					33				8									77	295	569		
Pacific Golden Plover	2				5																	
Grey Plover															1				5			
Red-capped Plover	26	88	15		211			12			9			2	10	107		56	136	227	285	46
Double-banded Plover					37		37	51			32		60	184	392	676		520	247	506	190	60
Lesser Sand Plover	10	180			39			1														
Greater Sand Plover		23			13																	
Oriental Plover																						
Black-fronted Dotterel	9	3			19		4				6	45					36		91	15	6	
Hooded Plover		18			91		1								4					17	2	19
Red-kneed Dotterel												23							117			
Banded Lapwing																						
Masked Lapwing	100	26	9		133		11	2			70				10	66	45	12	147	296	172	
Unidentified small																						
Unidentified medium																						
Unidentified large																						
Total Number	429	541	222	77	5780	0	471	235	478	0	201	161	262	213	3392	2048	103	1188	2394	3115	1523	248
Total Species	18	16	7	1	25	0	11	14	8	0	11	4	4	5	15	14	3	8	15	22	12	9

Result of the Winter 1998 Wader Count	Cape Portland	NWCst Tas	SECst SA	West EyrePen	StVinc Gulf	Albany	Swan	80 Mile	Broome	Dwin	TOTAL
Latham's Snipe				N	N	N					0
Swinhoe's Snipe				O	O	O					0
Black-tailed Godwit				T	T	T			210		221
Bar-tailed Godwit	4							849	5390		8907
Little Curlew				C	C	C					12
Whimbrel				O	O	O		4	335		615
Eastern Curlew				U	U	U		126	325		1840
Spotted Redshank				N	N	N					0
Marsh Sandpiper				T	T	T					45
Common Greenshank	1			E	E	E		123	40		294
Wood Sandpiper				D	D	D					0
Terek Sandpiper								3	150		164
Common Sandpiper											2
Grey-tailed Tattler	1		2					301	225		1149
Wandering Tattler											
Tattler sp.											10
Ruddy Turnstone	149	90	6				2	20	110		528
Asian Dowitcher											0
Great Knot								22	7070		7208
Red Knot									430		787
Sanderling							1	12	200		224
Red-necked Stint	49	45	133				32	450	2885		6257
Long-toed Stint											
Pectoral Sandpiper											0
Sharp-tailed Sandpiper			1								18
Curlew Sandpiper	44		19					151	1150		2412
Broad-billed Sandpiper									1		1
Ruff/Reeve											0
Bush Stone-curlew											
Beach Stone-curlew											9
Pied Oystercatcher	34	675	8				4	4	350		3246
Sooty Oystercatcher	33	291	6						19		802
Black-winged Stilt							17		480		4216
Banded Stilt											88
Red-necked Avocet											982
Pacific Golden Plover									1		8
Grey Plover								37	216		259
Red-capped Plover	61	132	16				2	430	2180		4051
Double-banded Plover	159	7	9								3167
Lesser Sand Plover	2										232
Greater Sand Plover									3660		3696
Oriental Plover											0
Black-fronted Dotterel	5										239
Hooded Plover	18	5									175
Red-kneed Dotterel											140
Banded Lapwing	16										16
Masked Lapwing	51	353	14								1517
Unidentified small											0
Unidentified medium											
Unidentified large											
Total Number	627	1598	214	0	0	0	58	2532	25427	0	53537
Total Species	15	8	10	0	0	0	6	14	21	0	

ACKNOWLEDGEMENTS

The AWSG thank Bird Observers Club for providing the count data for Westernport Bay, Victoria.



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]

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[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.

Multi-authored papers: Dann, P., R.H. Loyn & P. Bingham 1994. Ten years of water bird counts in Westernport Victoria 1973-83. II. Waders, gulls and terns. Aust. Bird Watcher 15, 351-67.

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.

Authors should look at previous issues of *The Stilt* for the formatting of other reference combinations.

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

per day. Lists of species names in tables should follow the common and scientific names and taxonomic order of Christidis and Boles (1994). Where a species has not been recorded in Australia, the order and names in Hayman *et al.* (1986) should be used.

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.

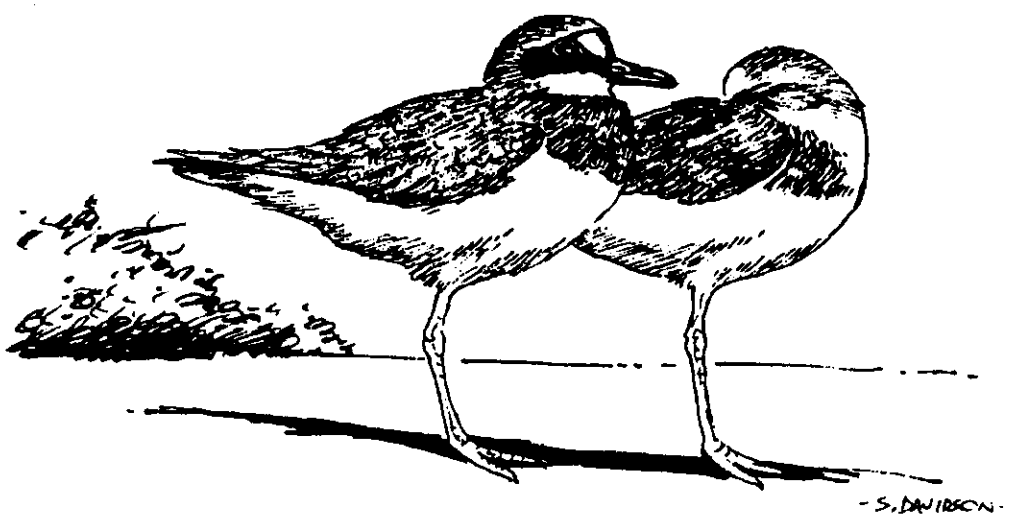
Other figures should have axis numbers and labels of sufficient size to be at least 1.5 mm high after 50% reduction. This usually corresponds to 14 - 16 pt or larger. Multi-graph figures should all be separately identified as (a), (b) etc. Legends should be located at the outer edge of a graph at the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

SHORT COMMUNICATIONS and REPORTS usually are not subdivided like RESEARCH PAPERS and do not have a separate abstract. These sections usually include less technical material, often of a non-scientific nature. For example, unusual behaviours, leg-flag sightings or conservation issue statements. Authors are encouraged to look at the format of articles in these sections of previous issues of *The Stilt*.

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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- Views and opinions expressed in *The Stilt* are those of the author(s) and not necessarily those of the AWSG or RAOU.
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- The AWSG holds copyright to *The Stilt*.
- The Editorial Team does its best to ensure the accuracy of information published in the *Stilt*, but it is recommended that anyone wishing to cite material within the *Stilt* contact the relevant authors.

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All volumes of *The Stilt* are available as back issues. Costs of volumes 1-28 (subject to review), including surface postage, are:

	Australia and New Zealand	**Other countries**
Single copies	$Aus 6.00	$Aus 7.00
Complete set	$Aus 90.00	$Aus 125.00

The cost of back issues for volumes 29 and later are currently being determined. Payment should be forwarded as a bank draft or money order in Australian currency or by *Visa/Bankcard* etc. (not *American Express*). All inquiries should be directed to the Secretary-Treasurer.

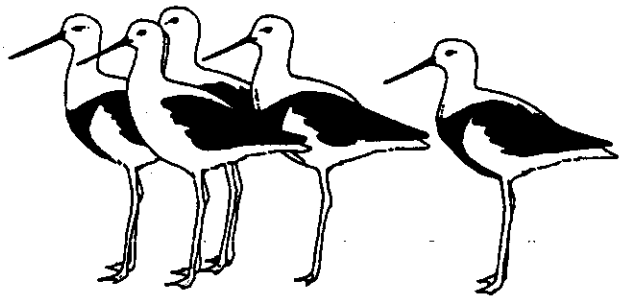
Indexes:

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.



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