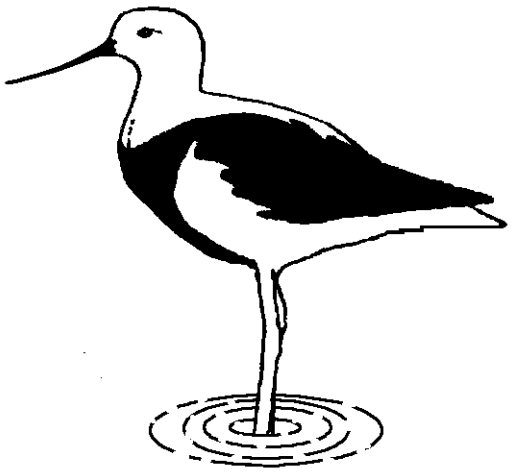
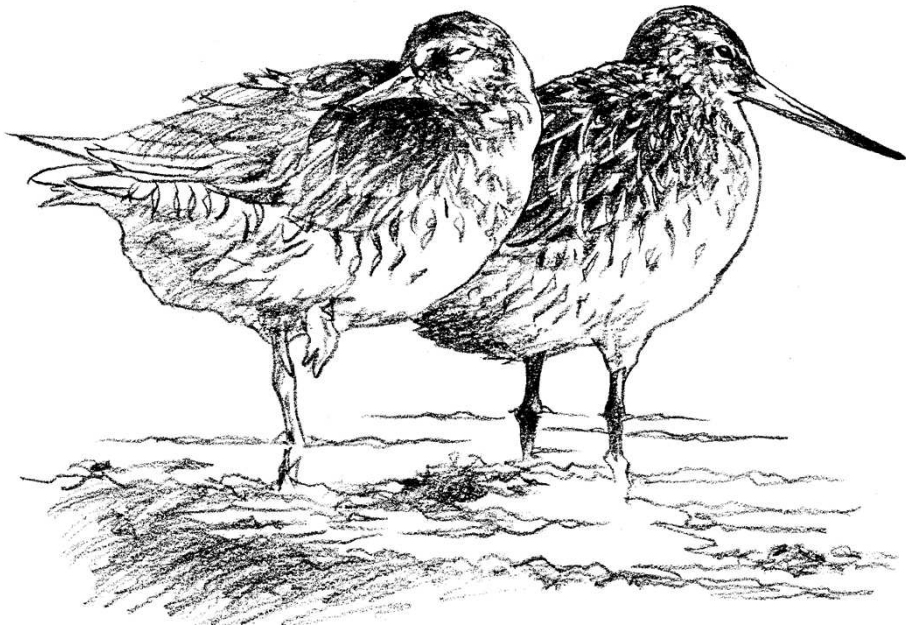
The Stilt



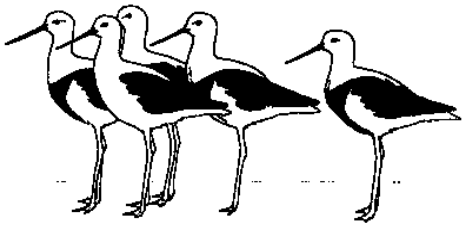
The Bulletin of the East Asian-Australasian Flyway



Australasian Wader Studies Group

A special interest group of Birds Australia

Number 49
Apr 2006



The Stilt

ISSN 0726-1888

MISSION STATEMENT

To ensure the future of waders and their habitats in Australia through research and conservation programmes and to encourage and assist similar programmes in the rest of the East Asian-Australasian Flyway.

OBJECTIVES

- To monitor wader populations through a programme of counting and banding in order to collect data on changes on a local, national and international basis.
- To study the migrations of waders through a programme of counting, banding, colour flagging and collection of biometric data.
- To instigate and encourage other scientific studies of waders such as feeding and breeding studies.
- To communicate the results of these studies to a wide audience through the *Stilt*, the *Tattler*, other journals, the internet, the media, conferences and lectures.
- To formulate and promote policies for the conservation of waders and their habitat, and to make available information to local and national governmental conservation bodies and other organisations to encourage and assist them in pursuing this objective.
- To encourage and promote the involvement of a large band of amateurs, as well as professionals, to achieve these objectives.

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@birdsaustralia.com.au

Annual Subscriptions:	Australia	A$35.00
	New Zealand	A$35.00
	Overseas	A$40.00
	Institutions	A$45.00

AWSG WEB SITE:
www.tasweb.com.au/awsg/index.htm

Cover Illustration: Rob Mancini

AWSG COMMITTEE FOR 2006 - 2008

The following people have been duly nominated and seconded in accordance with the Rules of the Group. As the nominations were sufficient to fill the vacant positions they are duly elected to the Committee. The Committee will take office from 1 June 2006 for a period of two years. It is pleasing to see some new faces on the Committee and we look forward to their contribution.

Chairman	Ken Gosbell	Vic
Vice Chairman	Phil Straw	NSW
Treasurer	Brian Speechley	NSW
Secretary	Penny Johns	Vic
Chair Scientific Committee	Danny Rogers	Vic
Editor Stilt	Ken Rogers (up to Issue 51)	Vic
	Roz Jessop (post Issue 51)	Vic
Communications	Hugo Phillips	Vic
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Committee Members	Chris Hassell	WA
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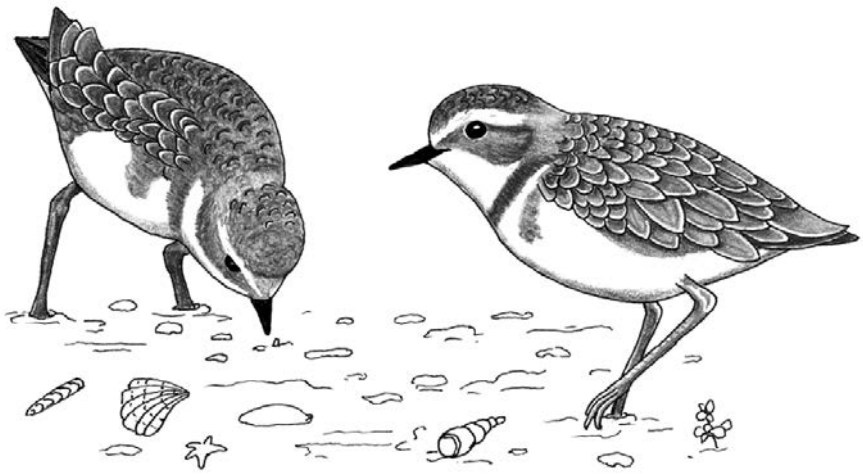
	David Close	SA
	Adrian Riegen	NZ
	Pete Collins	WA

Ken Gosbell, Secretary/ Treasurer



TREASURER'S REPORT FOR 2005

The Consolidated Accounts provided below show that income exceeded payments by $69,405.65 with a balance of $134,757.89. However this includes commitments for expenditure on contracts yet to be paid of $101,000.

Australian Wader Studies Group
Consolidated Accounts
Statement of Receipts and Payments
1 January 2005 - 31 December 2005

RECEIPTS

Item	2005	2004
		$
Balance B/f	65,352.24	59,750.54
Subscriptions	7,779.06	8,494.12
Contracts - Federal Govt	133,000.00	23,636.36
Contracts - State Govts	9,631.82	7,000.00
Contracts - Other	16,133.49	8,545.45
Sales	353.14	600.36
Donations	4,972.00	1,963.00
Conferences/ Meetings		1,242.73
TOTAL INCOME	**171,869.51**	**51,482.02**

PAYMENTS

Item	2005	2004
Stationary/Printing	25,883.87	10,307.52
Photocopying		34.18
Insurance	220.00	
Postage/Courier	2,244.76	2,836.07
Consultants/ contracts	53,969.23	11,434.95
Field Expenses		
Conferences/ Meetings	330.00	1,815.24
Phone/Fax	179.44	266.59
Equipmt (consumable)	1,274.43	787.18
Travel & Accomm.	17,090.95	12,728.27
Repairs & M'tce	189.18	185.00
Admin Fee (BA)	1,000.00	1,000.00
Depreciation	82.00	116.00
Sundry Transfer		4,369.32
TOTAL EXPENSES	**102,463.86**	**45,880.32**

BALANCE AT 31/12/05 **134,757.89**

The overall result, excluding one off contracts, is in accordance with the budget.

Research Fund

The Research Fund comprises Specific Donations and is included in the statement of accounts. In accordance with our Rules the following is a Report for the Fund as at 31 December 2005.

Brought forward from 31/12/04	$9,641.09
Donations 2005	$722.00 (1)
Total Research Fund 31/12/05	$10,363.09

Note (1) excludes special donation of $4250 utilised for nominated purpose.

Membership Statistics for 2005

The membership as at the end of 2005 was:

Australia/ New Zealand	189
Overseas (excl. NZ)	31
Institutions	17
Complimentary	64
TOTAL	310

I would like to express my thanks to the staff at Birds Australia who have again provided us with such excellent service in processing accounts and memberships.

Ken Gosbell, Secretary/ Treasurer

SHOREBIRDS WINTERING IN NORTHERN BOHAI BAY

H.Y. YANG[1] AND Z.W. ZHANG[2]

Key Laboratory for Biodiversity and Ecological Engineering, Beijing Normal University, Beijing 100875. Email: [1]boganick@163.com; [2]zzw@bnu.edu.cn

Surveys in Northern Bohai Bay from November 2003 to December 2004 recorded 36 species of shorebirds, of which 32 species were migrants, three occurred during both the migration period and the northern winter, and one occurred during migration and also bred in the study area. Our survey not only proved Bohai Bay to be an important stopover site for Eurasian Curlew *Numenius arquata*, Grey Plover *Pluvialis squatarola*, and Dunlin *Calidris alpina* but also showed for the first time that the study area is important for these species during the winter. The maximum wintering numbers of Eurasian Curlew (1,700) and Grey Plover (1,420) exceed respectively 5% and 1% of their estimated East Asian-Australasian shorebird flyway populations. It is therefore important to protect the coastal wetlands in Northern Bohai Bay for the conservation of these species. We suggest that more surveys of shorebirds should be conducted to inform on the winter distribution of shorebirds in the other parts of Bohai Bay.

INTRODUCTION

Bohai Bay is located in western Bohai and has a 300 km long coastline. Around the coastline there are extensive saline and freshwater wetlands, both natural and artificial, such as wide intertidal mudflats, numerous rivers and estuaries, large salt works, shrimp ponds and rice fields. These wetlands provide a wide variety of habitats which are suitable for shorebirds. Previous shorebird surveys have shown that Bohai Bay supports probably 250,000 shorebirds during the northward migration season (Barter *et al.* 2003), and it is therefore a very important staging site for migrating shorebirds in the East Asian-Australasian Shorebird Flyway.

Previous investigations into shorebird usage of northern Bohai Bay have focused mostly on northward migration (Spring) and seldom on southward migration (Autumn) but no studies have been carried out during the non-breeding period (Winter) (Li, X.T. 1996; Barter *et al.* 2001; Zhang, Sh.P. *et al.* 2002; Barter *et al*. 2003). Our study reports the results of a fourteen month investigation covering both migration periods and provides the first information on the importance of northern Bohai Bay for shorebirds during the winter period.

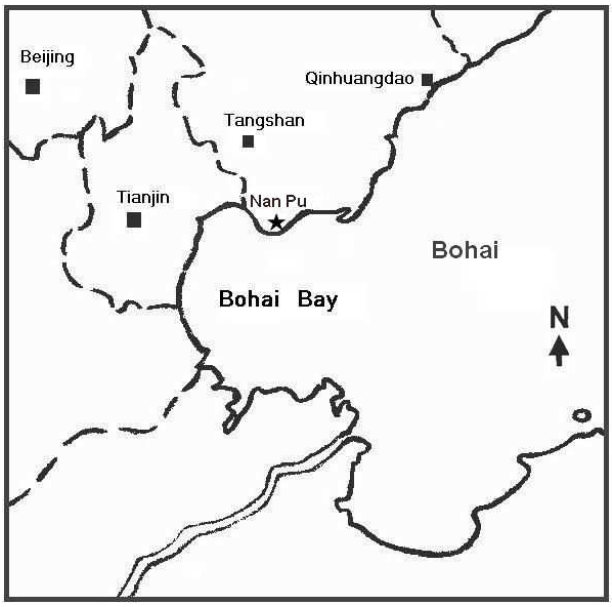


Figure 1. Location of survey on Northern Bohai Bay.

SITE AND METHODS

The study site is located in the Nan Pu region (37°2'N and 117°21'E) which has two estuaries and wide intertidal mudflats ranging from 3 to 5 km in width; extensive saltworks are located behind the sea wall (Figures 1 and 2). Little fresh water from the rivers reaches the sea as these are dammed. Tides are irregularly semi-diurnal with an average range of 2.5 m (ADB 2000).

The region has a temperate continental climate with cold, dry winters and hot, humid summers. The annual average temperature is between 11 ºC and 12 ºC. The average temperature in January is -4 ºC and in July is 26 ºC. Annual rainfall varies from 550 mm to 650 mm, with 75% falling in summer months. Fresh water areas, and sometimes the sea,

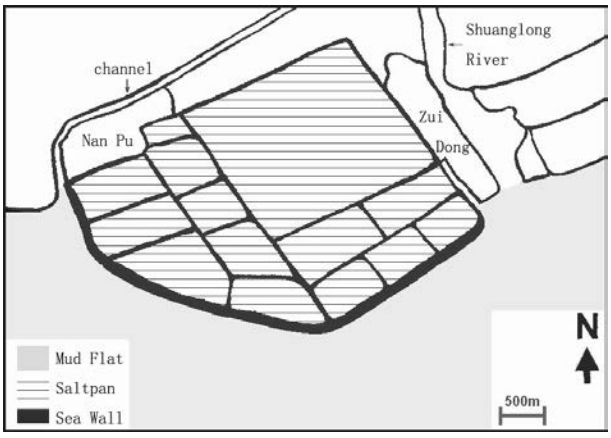


Figure 2. Habitat types within study site.

are frozen during a period of 3 to 4 months each year starting in December (PRC CDB 1993).

Sparse vegetation is located on the sea wall and on the earth banks between the salt pans. Most species are herbs; a few are small shrubs. The most common species belong to Compositae, Gramineae and Chico and include *Suaeda salsa*, *Suaeda glauca*, *Nitraria sibirica*, *Phragmites communis*, *Aeluropus littoralis varsinensis* and *Tripolium vulgare*.

The level of human disturbance in the study site is very high with many fishermen. Shellfish are farmed on the intertidal mudflats.

The intertidal areas are completely covered during the high tide period and shorebirds feeding in these areas during low tide are forced to roost in the salt pans behind the sea wall.

From November 2003 to December 2004, we visited the study area weekly during spring and autumn, once every two weeks during summer, and monthly during winter. We identified and counted shorebirds on the mudflats and in the saltpans from the 6 km long sea wall between Zuidong village and Nan Pu village using 10x42 binoculars and a 25x telescope. We counted all the shorebirds that occurred on the mudflats and saltpans.

RESULTS

During our investigation, we recorded a total of 36 shorebird species (Table 1), most of which are migrants. Interestingly, some Kentish Plover bred within the study site in summer. Three of the migrant species also occurred during the winter period (Eurasian Curlew, Grey Plover and Dunlin). The numbers of these species occurring throughout the study period are shown in Figure 3. It can be seen that these three shorebirds occurred in most months. Numbers of Eurasian Curlew and Grey Plover reached their peaks in December and January: we observed 1,700 Eurasian Curlew on 27 December, 2004 and 1,420 Grey Plover on 18 January, 2004.

From December 2003 to February 2004, there was a great deal of broken ice distributed around estuaries and on the shore beside the sea wall, and the salt pans were partly iced over. During this period the three wintering species were observed only on the mud flats. Most of them foraged

Table 1. Occurrence and habitat usage of shorebirds observed in Nan Pu from November 2003 to December 2004. Occurrence: M=Migrant; B=Breeding; W=Winter. Habitat use: M=Mud Flat; S=Saltpans.

Species	Occurrence	Habitat usage
Black-tailed Godwit *Limosa limosa*	M	M, S
Bar-tailed Godwit *Limosa lapponica*	M	M, S
Whimbrel *Numenius phaeopus*	M	M, S
Eurasian Curlew *Numenius arquata*	M, W	M, S
Eastern Curlew *Numenius madagascariensis*	M	M, S
Spotted Redshank *Tringa erythropus*	M	M, S
Common Redshank *Tringa totanus*	M	M
Marsh Sandpiper *Tringa stagnatilis*	M	M, S
Common Greenshank *Tringa nebularia*	M	M, S
Wood Sandpiper *Tringa glareola*	M	M, S
Terek Sandpiper *Xenus cinereus*	M	M, S
Common Sandpiper *Actitis hypoleucos*	M	M, S
Grey-tailed Tattler *Heteroscelus brevipes*	M	S
Ruddy Turnstone *Arenaria interpres*	M	M, S
Asian Dowitcher *Limnodromus semipalmatus*	M	M, S
Great Knot *Calidris tenuirostris*	M	M, S
Red Knot *Calidris canutus*	M	M, S
Sanderling *Calidris alba*	M	M, S
Red-necked Stint *Calidris ruficollis*	M	M, S
Sharp-tailed Sandpiper *Calidris acuminata*	M	M, S
Dunlin *Calidris alpina*	M, W	M, S
Curlew Sandpiper *Calidris ferruginea*	M	M, S
Broad-billed Sandpiper *Limicola falcinellus*	M	M, S
Ruff *Philomachus pugnax*	M	S
Eurasian Oystercatcher *Haematopus ostralegus*	M	S
Black-winged Stilt *Himantopus himantopus*	M	M, S
Pied Avocet *Recurvirostra avosetta*	M	M, S
Northern Lapwing *Vanellus vanellus*	M	S
Grey-headed Lapwing *Vanellus cinereus*	M	M, S
Pacific Golden Plover *Pluvialis fulva*	M	M
Little Ringed Plover *Charadrius dubius*	M	S
Grey Plover *Pluvialis squatarola*	M, W	M, S
Kentish Plover *Charadrius alexandrinus*	M, B	M, S
Lesser Sand Plover *Charadrius mongolus*	M	M, S
Greater Sand Plover *Charadrius leschenaultii*	M	M, S
Long-billed Plover *Charadrius placidus*	M	S

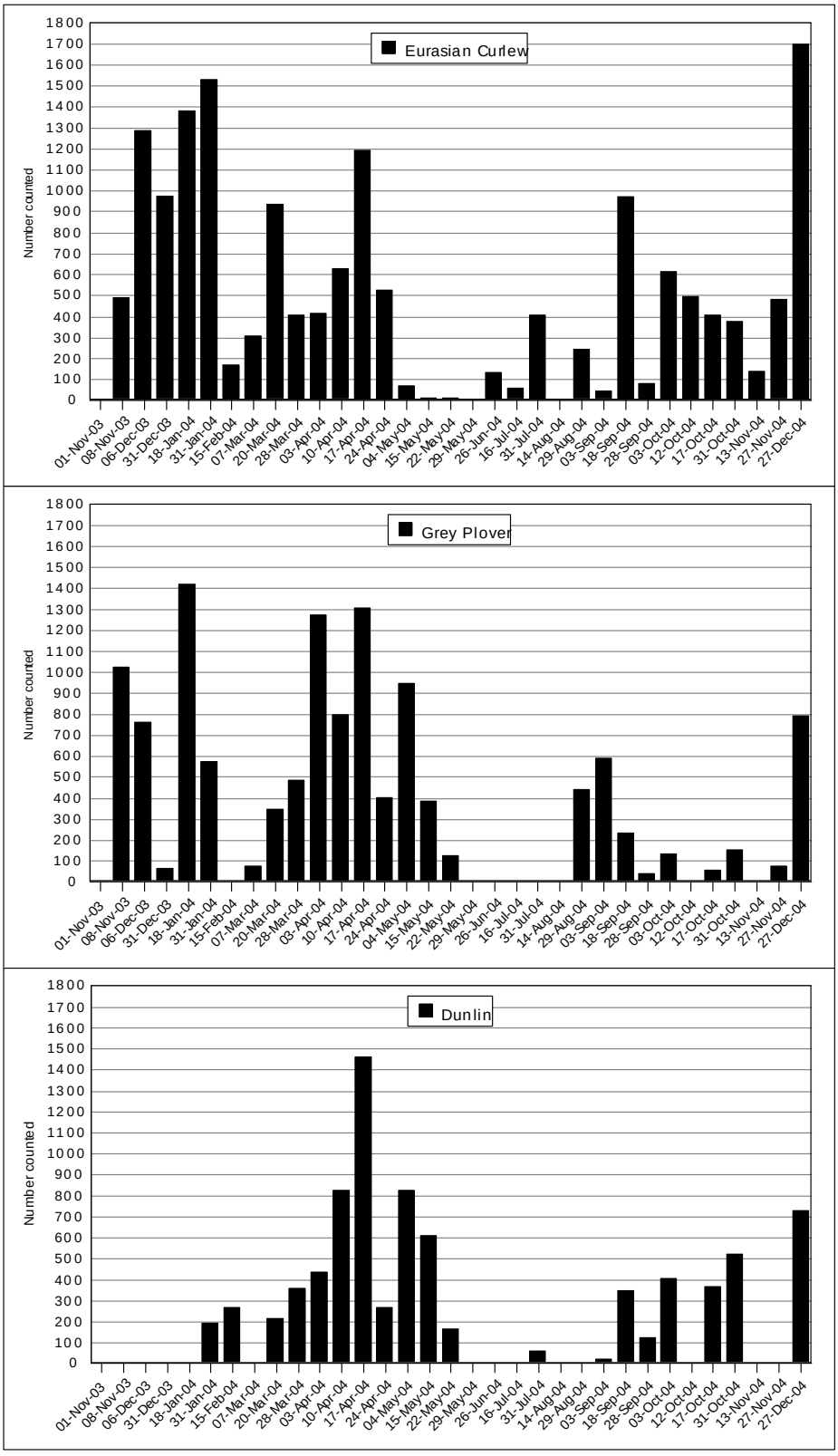


Figure 3. Numbers throughout the survey period of the three species which occur during the winter period. N.B. X-axis is not linear in time.

on exposed mud between ice blocks. Sometimes, small flocks roosted on the ice.

DISCUSSION

Eurasian Curlew, Grey Plover and Dunlin, which are protected under migratory bird agreements between China and Australia and China and Japan, are common shorebirds

in Chinese coastal wetlands. Only the Eurasian Curlew breeds in China, whilst the other two species breed in the tundra regions of the Russian Far East and Alaska (Hayman *et al*. 1986, MacKinnon and Phillips 2000, Zhao 2001). In winter, the recorded non-breeding area for Eurasian Curlew is from Tianjin Municipality (western Bohai Bay) southwards (Barter *et al*. 2003). Thus, our study confirms that Bohai Bay is a particularly important wintering ground for this species. To our knowledge no significant numbers of Grey Plover and Dunlin have previously been recorded north of the Yangtze estuary (Barter *et al*. 2004).

The results indicate that the maximum number of wintering Eurasian Curlew (1,700) and Grey Plover (1,420) exceeded 5% and 1% respectively of their estimated East Asian-Australasian shorebird flyway populations (Bamford *et al*. in prep.). Thus, Bohai Bay is internationally important for these two species during the winter period.

Peak migration numbers of Eurasian Curlew and Grey Plover appeared in the middle of April, and these accounted for 3% and 1%, respectively, of their estimated flyway populations.

The coastal wetlands of northern Bohai Bay are therefore of great value to these three species during both the migration and wintering periods. Because habitats in other parts of Bohai Bay are similar to those in our study area, it is very likely that large numbers of Eurasian Curlew and Grey Plover occur elsewhere in the Bay during winter. We suggest that winter surveys for shorebirds should be conducted in the other parts of Bohai Bay to extend our knowledge of the distribution of shorebirds in the non-breeding period.

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance of Mark Barter with this study and Chen Kelin, Director, Wetlands International-China Office for insightful suggestions. This research was supported in part by the Tanghai No. 7 Farm during the early period of the survey. We also thank Mr. Liu Yang and Qiao Yilun for field assistance.

REFERENCES

ADB. 2000. Annex A "Coastal Marine Environment and Living Resources" of the Coastal Resource Conservation and Environmental Management Project for the Bohai Sea. Asian Development Bank, Manila.

Bamford, M.J., Watkins, D.G., Bancroft, W. and Tischler, G. (in prep.). Migratory Shorebirds of the East Asian-Australasian Flyway: Population Estimates and Important Sites. Wetlands International, Oceania.

Barter, M.A., Li, Z.W. & Xu, J.l. 2001. Shorebird numbers on the Tianjin Municipality coast in May 2000. Stilt 39: 2-9.

Barter, M.A., Riegen, A. & Xu, Q. 2003. Shorebird numbers in Bohai Wan during northward migration. Stilt 44: 3-8.

Barter, M.A., Chen, L.W., Cao, L., & Lei, G. 2004. Waterbird Survey of the Middle and Lower Yangtze River Floodplain In Late January and Early February 2004. China Forestry Pulishing House, Beijing.

Hayman, P., Marchant, J., Prater, Y. 1986. Shorebirds. An identification guide to the waders of the world. Houghton Mifflin Company, Boston.

Li, X.T., Qian, F.W., Liu, G.Sh., Zhang, Q.L. & Wang, J.D. 1996. The diversity of the waders (Charadiiformes) and the effects of oil contamination on it during the migration season in the coast of Bohai Bay. Biodiversity Science 4(1): 43-45.

MacKinnon, J. & Phillipps, K. 2000. A Field Guide to the Birds of China. Oxford University Press.

PRC CDB. 1993. Peoples Republic of China Climate Data Bases 1841-1988. Obtainable from the Carbon Dioxide Information Center on ftp://cdiac.esd.ornl.gov/pub/tr055

Zhao, Zh.J. 2001. A Handbook of the Birds of China. Jilin Science and Technology Press, Jilin.

Zhang, Sh.P., Zhang, Zh.W., Xu, J.L., Sun, Q.H. & Liu, D.P. 2002. The analysis of waterbird diversity in Tanjin. Biodiversity Science 10(3), 280-285.

SHOREBIRD SURVEYS OF THE MALAYSIAN COAST NOVEMBER 2004-APRIL 2005

DAVID LI ZUO WEI[1], YEAP CHIN AIK[2], LIM KIM CHYE[3], KANDA KUMAR[4], LIM AUN TIAH[5], YANG CHONG[6] AND CHOY WAI MUN[7]

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INTRODUCTION

The extensive coastal area in Malaysia provides ideal habitat for many shorebird species during winter and the migration season. A total of 62 shorebird species have been recorded in the country (MNS-Bird Conservation Council 2005). Wetlands International conducted a comprehensive coastal waterbird survey from November 2004 to April 2005. This paper provides a summary of the count results of the shorebirds on the Malaysia coast. The aims of the survey were:

- To promote better understanding of the importance of coastal wetlands in Malaysia for shorebirds through comprehensive coastal waterbird surveys.
- To promote the conservation of shorebirds and their natural habitats by recommending appropriate conservation actions to relevant government agencies.

METHODS

A comprehensive survey for coastal waterbird species was carried out in Peninsular and East Malaysia over a period of 6 months from November 2004 to April 2005. The counts focused mainly on the wintering waterbird species up to February 2005; a few additional counts were made in March and April 2005. The survey areas included most of the potentially important coastal areas for shorebirds in Peninsular and East Malaysia. The types of wetland covered were intertidal mudflats, river mouths, estuaries, mangroves, and man-made power station ash ponds.

Standard site and count forms for the survey were designed and tested by Wetlands International. Most counts were conducted from the land but some were conducted from boats in areas where land access was limited. An aerial survey was also carried out at the Matang mangrove forest under a Wetlands International project; this focused on Milky Storks *Mycteria cinerea* in the area (Li 2005a). Only experienced counters were selected to lead the survey in each site to ensure high quality data. Discussions and consultations were made with the experienced counters before making a decision on doubtful counts. Some sites were counted during both the winter season (November-February) and over the northern migration period (March - April). Maximum counts were recorded for each period. In most cases, the sites were surveyed during the incoming tide period. When there was enough time for an extended survey, counts were undertaken under different tide conditions to ensure that the maximum possible number of waterbirds was recorded. However, considerable care was taken to avoid duplicating counts for feeding and roosting sites.

Binoculars and telescopes were used for identification and counting purposes. When there were two members in a team for the survey, one undertook the identification and counting and the other recorded the count details. Assessments of habitat conditions and threats were made and recorded for each site. These will be useful for management purposes and for developing future conservation strategies.

The sequence and nomenclature of species used in this report largely follow Wetlands International (2002) and, for the sequence of families, del Hoyo *et al*. (1992; 1996).

International importance criteria

Wetlands International-Oceania (2000) adopted the criteria by the Convention on Wetlands for identifying sites of international importance for shorebirds. These require that a site:

- regularly supports more than 20,000 shorebirds (referred to here as C1); or,
- regularly supports more than 1% of the individuals in a population of one species of shorebirds (referred to here as C2); or
- supports appreciable numbers of an endangered or vulnerable population of shorebirds (referred to here as C3).

In addition, a staging sites criterion was adopted for identifying sites that meet internationally important sites for shorebirds during the migration period. This applies if the site:

- is a "staging site" supporting more than 5,000 shorebirds, or more than 0.25% of a population stage at the site during the migration period (referred to here as C4).

RESULTS

Seventy coastal sites in seven states (Figures 1a and 1b) were covered by the surveys, 63 during the winter season from November 2004 to February 2005 and 19 over the northward migration season from March to April 2005. Twelve sites were surveyed during both periods. Over the winter surveys, 41,888 shorebirds (Table 1) from 34 species were recorded at 58 sites. Over the northward migration period, 11,353 birds from 30 species were recorded at 18 sites. Summary details of each location surveyed and comments on species for which they are internationally important are given in Tables 2a through 2e.

Species recorded during wintering period

The 10 most numerous species recorded during the wintering period are the Common Redshank (8.7% of the estimated biogeographical population), Lesser Sandplover (5.8%), Pacific Golden Plover (2.8%), Whimbrel (4.7%), Greater Sandplover (2.4%), Eurasian Curlew (6%), Red-necked Stint (0.7%), Curlew Sandpiper (0.7%), Bar-tailed Godwit (0.8%) and Terek Sandpiper (2%).

Globally threatened species (BirdLife International 2004) recorded were the endangered Nordmann's Greenshank (38 individuals at Teluk Air Tawar-Kuala Muda coast, 4 at Kapar Power Station and 3 at Buntal Bay). Near-threatened species recorded were the Malaysian Plover (2 pairs at east coast of Johor) and Asian Dowitcher (24 at Teluk Air Tawar-Kuala Muda coast; 4 at Kapar Power Station).

A rare species for Malaysia was the Red-necked Phalarope which was recorded at Sungai Besar-Sungai Burung fish pond, northern coast of Selangor. One Spoon-billed Sandpiper *Eurynorhynchus pygmaeus*, one Ruff *Philomachus pugnax*, and two Spotted Redshanks *Tringa erythropus* were recorded in January at Teluk Air Tawar-Kuala Muda coast. These were treated as unidentified records due to the distance of the observers from the species and in consideration of the fact that none of the species has been recorded at the same site from January to April by any other surveyors although eight additional surveys have been carried out. Further survey work is needed to confirm the occurrence of these species.

Species recorded during northward migration

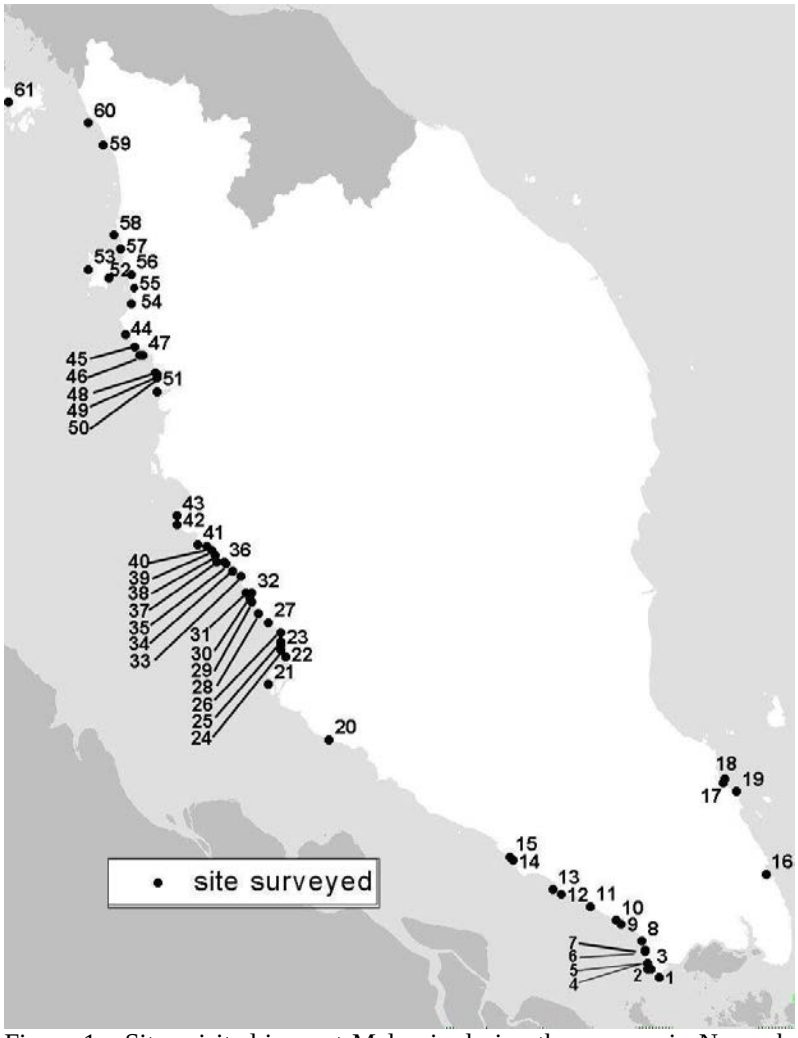

Figure 1a: Sites visited in west Malaysia during the surveys in November 2004 to April 2005

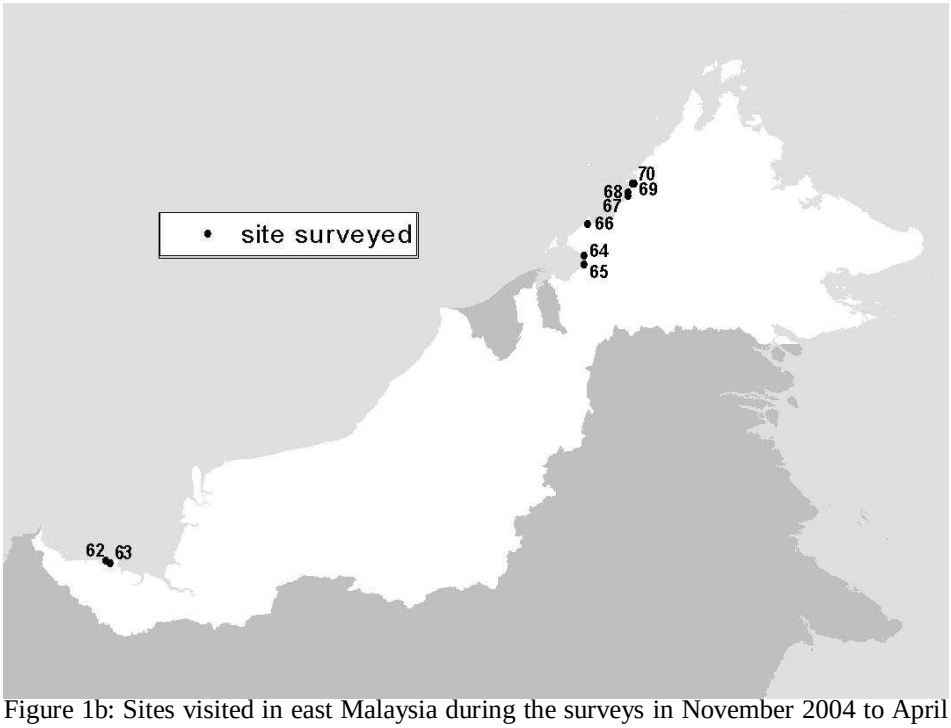

Figure 1b: Sites visited in east Malaysia during the surveys in November 2004 to April 2005

The seven most numerous species recorded during northward migration period were the Pacific Golden Plover (2% of the estimated biogeographical population), Common Redshank (1.4%), Lesser Sandplover (0.8%), Red-necked Stint (0.3%), Curlew Sandpiper (0.4%), Great Knot (0.14%), Whimbrel (0.8%) and Red Knot (0.16%).

Globally threatened species recorded were the endangered Nordmann's Greenshank (28 at Teluk Air Tawar-Kuala Muda coast and 3 at Bako-Semera coast). Near-threatened species recorded were Malaysian Plover (2 pairs at 2 km south of Tanjung Aru, Kota Kinabalu City, Sabah) and Asian Dowitcher (1 at Bako-Semera coastline).

A rare species observed was a Great Ringed Plover, the first confirmed record of this species in Sabah (Li 2005b). It was recorded at the coast, about 5 km south of Tanjung Aru, Kota Kinabalu City.

Results by State

Detailed site and count data are given in Table 2 and the locations of the sites are shown in Figure 1.

Penang State (Table 2a)

The Teluk Air Tawar-Kuala Muda coast (Site #57 in Table 2a) recorded far greater numbers of shorebirds (10,937) in January/February this year than in recent years (2,740 in 2003 and 1,112 in 2004; AWC database). This may due to the recent tsunami impacts on shorebird habitats in Sumatra possibly causing shorebirds in Sumatra to shift to the coast of Penang State. Against this, our comprehensive surveys covering the rest of the coasts of Penang and Kedah States did not locate unusually large numbers of shorebirds anywhere else.

The Teluk Air Tawar-Kuala Muda coast was extremely important for the endangered Nordmann's Greenshank. Second to the count of 31 individuals in December 2003 by David Li (Yeap *et al.* 2004), the highest number of this species is the 38 individuals recorded in February 2005; this is 6% of the estimated global population. Twenty four near-threatened Asian Dowitchers were also recorded in this survey.

Four species of shorebirds met the 1% criterion at Teluk Air Tawar-Kuala Muda, including the Pacific Golden Plover (2,000, 2%), Lesser Sandplover (2,100, 1.6%), Greater Sandplover (1,650, 1.6%) and Whimbrel (550, 1.1%). The count of the Common Redshank (885) was close to the 1% criterion of 1,000 individuals.

The site also supports more than 5,000 shorebirds (5,939 in March and April 2005); this total includes more than 0.25% of the Common Redshank (800, 0.8%), Red-necked Stint (900, 0.28%) and Curlew Sandpiper (700, 0.39%) during the northward migration period.

Perak State (Table 2b)

Matang Mangrove Forest and adjacent coastal areas, comprising 8 sub-sites (#44 to #51), was one of the most important shorebird sites in Malaysia during 1989 to 1992 when 14,000 to 16,000 shorebirds were counted regularly (AWC database). However, during the surveys in January and March 2005, only 785 and 462 shorebirds were recorded, and no species met the criteria for international importance. An aerial survey by a Cessna 172 on 12 January 2005 recorded no shorebirds at all at Kuala Gula. It is likely, however, that small numbers of shorebirds were unrecorded due to the difficulty of identifying them against the dark grey mudflat. A detailed study of the Matang Mangrove Forest (primarily for Milky Storks *Mycteria cinerea*) has shown

Table 1. List of shorebird species recorded from November 2004 to April 2005.

Species[1]	Total number of waterbirds recorded in winter season (Nov 2004 to Feb 2005, 63 sites surveyed)	Total number of waterbirds recorded in northern migration period (Mar to Apr 2005, 19 sites surveyed)	1% criterion of the Bio-geographical population[2]
Painted Snipe *Rostratula benghalensis*	4	0	250
Oriental Pratincole *Glareola maldivarum*	3	5	750
Black-winged Stilt *Himantopus himantopus*	1	18	1,000
Red-wattled Lapwing *Vanellus indicus*	27	0	250
Pacific Golden Plover *Pluvialis fulva*	2,830	2,054	1,000
Grey Plover *Pluvialis squatarola*	778	247	1,300
Great Ringed Plover *Charadrius hiaticula*	0	1	2,100
Little Ringed Plover *Charadrius dubius*	64	0	250
Kentish Plover *Charadrius alexandrinus*	15	4	1,000
Malaysian Plover *Charadrius peronii* (NT)	4	4	250
Lesser Sandplover *Charadrius mongolus*	7,532	1,118	1,300
Greater Sandplover *Charadrius leschenaultii*	2,367	14	1,000
unidentified Sandplovers	1,216	1,200	
Pintail Snipe *Gallinago stenura*	15	0	1,000
Unidentified snipes	14	0	
Asian Dowitcher *Limnodromus semipalmatus* (NT)	28	3	230
Black-tailed Godwit *Limosa limosa*	113	22	1,600
Bar-tailed Godwit *Limosa lapponica*	1,167	146	1,500
Whimbrel *Numenius phaeopus*	2,410	459	550
Eurasian Curlew *Numenius arquata*	2,167	33	350
Eastern Curlew *Numenius madagascariensis*	14	234	380
Common Redshank *Tringa tetanus*	8,715	1,414	1,000
Marsh Sandpiper *Tringa stagnatilis*	656	171	900
Common Greenshank *Tringa nebularia*	867	157	550
Nordmann's Greenshank *Tringa guttifer* (EN)	45	31	6
Wood Sandpiper *Tringa glareola*	70	8	1,000
Terek Sandpiper *Xenus cinereus*	1,088	120	500
Common Sandpiper *Actitis hypoleucos*	164	38	300
Grey-tailed Tattler *Heteroscelus brevipes*	1	6	400
Ruddy Turnstone *Arenaria interpres*	11	39	1,000
Great Knot *Calidris tenuirostris*	501	521	3,800
Red Knot *Calidris canutus*	482	348	2,200
Red-necked Stint *Calidris ruficollis*	2,088	947	3,200
Sanderling *Calidris alba*	0	1	220
Long-toed Stint *Calidris subminuta*	14	0	1,000
Curlew Sandpiper *Calidris ferruginea*	1,340	730	1,800
Broad-billed Sandpiper *Limicola falcinellus*	57	30	1,000
Red-necked Phalarope *Phalaropus lobatus*	1	0	1,000
Unidentified shorebirds	5,019	1,230	
Totals	**41,888**	**11,353**	

EN-Endangered; NT- Near Threatened. Status codes from BirdLife International (2004).
Biogeographical Population cited from Wetlands International (2002) and Bamford *et al*. (in prep.).

that the number of shorebirds has decreased since 1992, the highest count between 1999 and 2004 was only 1,379 shorebirds in 2002 (Li *et al*. 2006). The study concludes that a decline of waterbirds (mainly shorebirds) of 75% to 95% has occurred over a period of between 10 to 17 years.

Selangor State (Table 2c)

Four species of shorebirds at Kapar Power station (#22), the Lesser Sandplover (2650, 2%), Eurasian Curlew (1529, 7.3%), Whimbrel (733, 1.4%) and Common Redshank (2911, 2.9%) met the 1% criterion. Besides these species, four globally endangered Nordmann's Greenshank and four near-threatened Asian Dowitcher were recorded.

Table 2a. Results by site for Kedah State and Penang State.

No.	Site name	Wetland type	Area	Co-ordinates	Date(s) surveyed	Totals	International importance
Kedah State							
58	Kuala Muda	Estuary & mudflats	1km	5º35'N 100º20'E	21-Feb-05	71 (W)	
59	Kuala Kedah	Estuary & mudflats	1.5km	6º06´N 100º16´	21-Feb-05	23 (W)	
60	Kuala Sanglang	Estuary		6º14´N 100º11´E	21-Feb-05	2 (W)	
61	Padang matsirat Rice Field & River mouth, Langkawi	Estuary and rice field	100ha	6º21´N 99º43´E	27&28-Dec-04	39 (W)	
Penang State							
52	Bagan Maung-Jelutong	mudflats, estuary & flooded marsh	3km	5º20´N 100º18´E	16&25-Jan-05	578 (W)	
53	Pantai Acheh	Estuary & mudflats	2km	5º23´N 100º11´E	28-Jan-05	125 (W)	
54	Sungai Udang-Acheh	Estuary		5º11´N 100º26´E	23-Feb-05	0 (W)	
55	Bagan Tambun-Bagan Kawan	River bank near Estuary	1.5km	5º16´N 100º27´E	23-Feb-05	33 (W)	
56	Kuala Juru - Sungai Sem.	Estuary & mudflats	1km	5º21´N 100º26´E	16-Jan-05, 23-Feb-05	0 (W)	
57	Teluk Air Tawar-Kuala Muda coast	Estuary & mudflats	4km	5º30´N 100º22´E	12&19-Jan, 12-Feb-05, 16,29&30-Mar, 4,13 &15-Apr-05	10937 (W) 5939 (NM)	**C2**: Nordmann's Greenshank (38, 6%), Pacific Golden Plover (2,000, 2%), Lesser Sandplover (2,100, 1.6%), Greater Sandplover (1,650, 1.6%) and Whimbrel (550, 1%). **C3**: Endangered Nordmann's Greenshank (38), Near Threatened Asian Dowitchers (24). **C4**: More than 5,000 shorebirds recorded during Northern migration. Common Redshank (800, 0.8%), Red-necked Stint (900, 0.28%) and Curlew Sandpiper (700, 0.39%).

Sungai Janggut (#23), a coastal mudflat site north of Kapar Power Station, recorded a total of 6,736 shorebirds. This total includes 6,000 birds unidentified to species during the post-high tide survey. This site will most probably meet the internationally important criteria once detailed counts are obtained. The site is believed to be the pre- and post- high tide roost for the same group of shorebirds that roosts in Kapar Power Station Ash Pond (#22); accordingly only the other 736 shorebirds recorded during the high tide period are included in the total numbers for Selangor State and Malaysia.

Sungai Nibong (#33) held 2,689 shorebirds including a flock of 1,800 shorebirds which was too far away for species identification. Taej Mundkur and David Li (Yeap *et al*. 2004) recorded up to 1,300 Black-tailed Godwit (0.81% of the global population) at this site in January 2004. If the unidentified flock had been identified, it is highly likely that some species would have met the 1% criterion of international importance.

Pulau Tengah (#21; part of the Kelang islands) used to hold 10,000-14,000 shorebirds from 1986 to 1994 (AWC database). Only 772 shorebirds were recorded in January 2005. However, the 1% criterion was exceeded at this site for one species, Whimbrel (601, 1.1%). A survey carried out in January 2004 by Wetlands International was the first survey since 1994; it recorded 588 shorebirds at the site (Li *et al*. 2004, unpublished).

This survey recorded 21,390 shorebirds for Selangor State in winter. This is much lower than the total of 39,034 shorebirds recorded in 1985-1986 by Silvius *et al.* (1987) and indicates a decline of 30% over the last 20 years. The reduction is likely to be even larger as the 2005 survey covered the area from the coast of Sekinchan to Sungai Bernam which Silvius and his colleagues did not. Beside Pulau Tengah, a number of sites that used to record up to 5,000 shorebirds (Silvius *et al. 1987*) are no longer important for shorebirds today. These sites include Kuala Selangor (#27) and Tanjung Karang (#28). It is believed that loss of habitat due to economic development has contributed to the decline of the shorebird population.

Johor State (Table 2d)

Pontian Kecil (#8) had a count of 1,035 Lesser Sandplover, which is about 0.8% of the flyway population; this is just below the internationally important 1% level. The species was recorded at the high tide roost on reclamation land which will be lost in a few months time when the site will be converted into shopping area and a new bus station.

Hardly any shorebirds recorded at Tg. Sepenting/Batu Pahat River mouth (#13) and Sg. Ayam (#12) whereas 939 were recorded by Hawkins and Howes (1986) who refer to the site as Batu Pahat-Sungai Suloh Kecil. This was due to the coastal area only being visited during high tide when the mudflat was covered by water and high tide roost site not

Table 2b. Results by site for Perak State.

No.	Site name	Wetland type	Area	Co-ordinates	Date(s) surveyed	Totals	International importance
42	Sungei Tiang, Rungkup	River mouth		3º54´N 100º42´E	21&22-Jan-05	87 (W)	
43	Sungei Burung, Rungkup	River mouth		3º57´N 100º42´E	21&22-Jan-05	493 (W)	
44	Kuala Gula-Kuala Kurau-Tg. Piandang	coast mudflat	15km	5º00´N 100º24´E	10-Jan-05	38 (W) 150 (NM)	
45	Bang zhu kao Mudflat	Mudflat	100ha	4º56´N 100º27´E	24&26-Jan-05, 25&26-Mar-05	410 (W) 154 (NM)	
46	Pulau Kelumpang and Gula river	Mangrove Island	5km	4º53´N 100º29´E	12, 25-27 Jan-05, 24-Feb-05, 24&25-Mar- 05	182 (W) 94 (NM)	
47	Pulau Kelumpang Lake	Lake in Mangrove Island	20ha	4º53´N 100º30´E	12, 26&27-Jan-05, 24-Feb-05, 24-Mar-05	45 (W) 45 (NM)	
48	Pulau Sanga Kecil & Besar	Mangrove Island	5km	4º47´N 100º34´E	12 & 25-Jan-05, 25-Mar-05	2 (W) 10 (NM)	
49	Pulau Terong	Mangrove Island	2km	4º46´N 100º35´E	12 & 25-Jan-05, 25-Mar-05	5 (W) 2 (NM)	
50	Pulau Terong Lake	Lake in Mangrove Island	50ha	4º45´N 100º35´E	12 & 25-Jan-05, 23-Feb-05, 25-Mar-05	103 (W) 7 (NM)	
51	Pulau Pasir Hitam & South Sungai Kerang	Mangrove Island	5km	4º40´N 100º35´E	12-Jan-05	0 (W)	

being found. Also Sungai Suloh Kecil was not accessible by land and there was insufficient survey time to conduct a boat survey. The Sg. Pungor site (#11) was not visited by Hawkins and Howes in 1986; the current survey recorded more than 400 shorebirds in this area. Sg. Benut- Sg. Sanlang (#9) and Sg. Tapok-Sg. Benut (#10) recorded more than 350 shorebirds, more than the 151 reported by Hawkins and Howes (1986) who referred to this area as The Benut Forest Reserve. The Pulau Kukup-Kukup Village (#2, #3) and the Tanjung Piai (#1) areas held fewer shorebirds than in 1986.

Sarawak State (Table 2e)

Both the sites surveyed in Sarawak State held species which met the criteria for international importance for shorebirds. Buntul Bay (#62) regularly supports the endangered Nordmann's Greenshank and 3 individuals were recorded in the January 2005 survey. The counts were conducted in rainy and windy conditions; the total number of shorebirds (2,640) would probably have been higher if the weather conditions had been better (Anthony Sebastian, pers. comm.).

The count at Bako-Semera Coastline (#63) was conducted in April during the migration period, and recorded close to 423 shorebirds. At a turnover rate of 4 times, which is possible, the total shorebird use of this site would be close to 20,000 birds. The counts of unidentified Sandplovers (1,200), Far Eastern Curlew (230) and Whimbrel (178) exceed the 0.25 % criterion for staging sites for migratory shorebirds. This site also recorded three Nordmann's Greenshank and one Asian Dowitcher.

Other coastal sites in Sarawak, such as Pulau Bruit, have previously supported more than 10,000 shorebirds (Howes and NWPO 1986); they could not be surveyed on this occasion during to lack of funding.

Sabah State (Table 2e)

The coastline along Kota Kinabalu-Papar-Menumbok (#65 to #69) is mainly sandy beach which is generally characterized by a lack of food resources for shorebirds. A few points where land access is available were checked but hardly any shorebirds were seen. The number of shorebirds recorded at this survey was slightly higher than the 598 shorebirds recorded at the coastal wetlands from Kota Kinabalu to Beaufort in 1984 (Parish and Wells 1985). The site Weston-Lumbok-Menumbok (#64; also known as Klias Peninsula) recorded 902 shorebirds in November 2004 (Howes 2004) and 165 shorebirds in April 2005.

Internationally important sites

Overall, eight of the 70 sites surveyed were identified as being of international importance or of potential international importance for migratory shorebirds in the East Asian-Australasian Flyway (Figure 2).

Bamford *et al.* (in prep.) identify 19 internationally important sites in Malaysia for the migratory shorebirds. Sixteen of these sites were visited during this survey but only three of them met international importance criteria. Table 3 gives details for each site. A further three sites could possibly meet the international importance criteria; more frequent surveys during both northward and southward migration periods are needed to establish this.

The 2004-2005 surveys identified five new sites as being of international, or potential international, importance. These are: Pontian Kecil (#8) in Johor State, Sungai Janggut (#23) and Sungai Nibong (#33) in Selangor State, Teluk Air Tawar-Kuala Muda coast (#57) in Penang State, and Bako-Semera Coastline (#63) in Sarawak State.

Table 2c. Results by site for Selangor State.

No.	Site name	Wetland type	Area	Co-ordinates	Date(s) surveyed	Totals	International importance
20	Tg Tumbok	coast mudflat		2º39´N 101º35´E	08-Feb-05	415 (W)	
21	Pulau Tengah	Mangrove island, Mudflat	500ha	2º58´N 101º14´E	10-Jan-05	772 (W)	**C2**: Whimbrel (601, 1.1%).
22	Kapar Power Station Ash ponds	Ash ponds beside coast	300ha	3º08´N 101º20´E	15-Jan-05	12109 (W)	**C2**: Lesser Sandplover (2650, 2%), Eurasian Curlew (1529, 7.3%), Whimbrel (733, 1.4%), Redshank (2911, 2.9%) met the 1% criteria **C3**: Endangered Nordmann's Greenshank (4), Near threatened Asian Dowitcher (4)
23	Sungai Janggut	coast, River mouth	3km	3º10´N 101º18´E	12&13-Jan-05	6736 (W). among this, 6000 are duplication count with Kapar	**C2**: 6,000 unidentified shorebirds recorded at the site. It's very sure that the site will meet the 1% Criteria if the species had been identified.
24	Sungai Sembilang	coast, River mouth	1km	3º12´N 101º18´E	12-Jan-05	170 (W)	
25	Pantai Remis	coast, River mouth	2km	3º13´N 101º18´E	13-Jan-05	554 (W)	
26	Bagan Sungai Buloh	coast, River mouth	0.5km	3º16´N 101º18´E	12-Jan-05	14 (W)	
27	Kuala Selangor Nature Park	pond beside coast	1km	3º20´N 101º14´E	28-Nov-04, 12-Jan-05	116 (W)	
28	Tanjung Karang	coast, River mouth	1km	3º23´N 110º10´E	21-Feb-05	279 (W)	
29	Sungai Tengkorak	Coast,River mouth	2km	3º27´N 101º08´E	20&21-Feb 05	544 (W)	
30	Kg Parit Empat	Coast, River mouth	2km	3º28´N 101º07´E	28-Nov-04, 20-Feb-05	833 (W)	
31	Sekinchan coast	Coast	1km	3º30´N 101º06´E	28-Nov-04, 09-Jan-05	922 (W)	
32	Sekinchan - Parit Empat Rice field	Rice field	100ha	3º30´N 101º08´E	09-Jan-05	70 (W)	
33	Sungai Nibong	River mouth	3km	3º36´N 101º04´E	27-Nov-04, 8&9-Jan-05	2689 (W)	C2: 1,800 unidentified shorebirds recorded at the site, it's possible that a number of species will meet the 1% Criteria if the species had been identified.
34	Sungai Haji Dorani-Sungai Limau	River Mouth	3km	3º39´N 101º00´E	27-Nov-04, 9-Jan-05	308 (W)	
35	Sungai Besar	River mouth	2km	3º40´N 100º59´E	8&9-Jan-05	100 (W)	
36	Sungai Besar-Sungai Burung fish pond	Fish pond	2km	3º41´N 100º58´E	27-Nov-04, 9-Jan-05	29 (W)	
37	Sungai Burung	River mouth	2km	3º41´N 100º56´E	8&9-Jan-05	344 (W)	
38	Sungai Pulai	River mouth	1km	3º43´N 100º55´E	09-Jan-05	0 (W)	
39	Sungai Banting	River mouth	1km	3º45´N 100º54´E	08-Jan-05	107 (W)	
40	Bagan Nakhoda Omar	Coast	2km	3º46´N 100º52´E	08-Jan-05	221 (W)	
41	Beting Kepah to Bapar Telok Ru	coast	2km	3º47´N 100º49´E	08-Jan-05	58 (W)	

Habitat use and threats

Information on threats to shorebirds was obtained at 58 of the 70 sites surveyed (see Figure 3). Land reclamation development activities (e.g. for industries, housing, aquaculture, agriculture and tourism purposes), fishing, logging/destruction of mangroves, and pollution (e.g. domestic sewage, industrial waste, aquaculture waste) are some of the major threats to coastal areas. Natural threats include coastal erosion and drought. The open lakes in the

Table 2d. Results by site for Johor State.

No.	Site name	Wetland type	Area	Co-ordinates	Date(s) surveyed	Totals	International importance
1	Tanjung Piai	mudflat	1km	1º16´N 103º30´E	3-Nov-04, 16-Jan-05	73 (W)	
2	Pulau Kukup	Mangrove Island	1km	1º19´N 103º26´E	2&30-Nov-04, 25-Apr-05	27 (W) 2 (NM)	
3	Kukup Village	mudflat	1km	1º19´N 103º27´E	2&30-Nov-04, 16&17-Jan-05, 25-Apr-05	56 (W) 23(NM)	
4	Sungai Buntu	river mouth, mudflat	1km	1º21´N 103º26´E	17-Jan-05	1 (W)	
5	Teluk Kerang	coast	0.5km	1º25´N 103º25´E	1-Dec-04	1 (W)	
6	Prt Serong	coast	0.5km	1º25´N 103º25´E	1-Dec-05	1 (W)	
7	Sungai Rambah	river mouth, mudflat	1km	1º26´N 103º25´E	1-Dec-04, 17-Jan-05	100 (W)	
8	Pontian Kecil	river mouth, mudflat	3km	1º29´N 103º24´E	1-Dec-04, 16-Jan-05, 25-Apr-05	1172 (W) 260 (NM)	**C2**: close to 1% of the Lesser Sandplover (1035, 0.8%)
9	Sungai Benut-Sungai Sanlang	river mouth, mudflat	2km	1º35´N 103º17´E	16-Jan-05	260 (W)	
10	Sungai Tapok-Sungai Benut	river mouth, mudflat	5km	1º36´N 103º15´E	16-Jan-05	117 (W)	
11	Sungai Pungor	river mouth, mudflat	3km	1º41´N 103º06´E	15-Jan-05	436 (W)	
12	Sungai Ayam	river mouth, mudflat	1km	1º45´N 102º56´E	15-Jan-05	0 (W)	
13	Tg. Sepenting/Batu Pahat River mouth	river mouth, mudflat	1km	1º47´N 102º53´E	15-Jan-05	1 (W)	
14	Parit Jawa	river mouth, mudflat	2km	1º57´N 102º39´E	30-Jan-05	551 (W)	
15	Sungai Balang-Sungai Sarang Buaya	river and grass land		1º58´N 102º38´E	30-Jan-05	86 (W)	
16	Sedili -KG Sri Gading	river mouth, mudflat		1º52´N 104º07´E	16&24-Jan-05	190 (W)	
17	Telok Iskandar	river mouth, mudflat		2º24´N 103º52´E	24&25-Jan-05	407 (W)	
18	Sungai Mersing Estuary	river mouth, mudflat		2º25´N 103º53´E	25-Jan-05	302 (W)	
19	Tanjung Sekakap	mudflat		2º21´N 103º57´E	25-Jan-05	2 (W)	

Matang Mangrove Forest, which serve as habitat for roosting shorebirds, were totally dry from February to March 2005.

CONCLUSIONS

The coasts of Malaysia provide important wintering habitats for shorebirds. With an overall 45,000 shorebirds counted in this survey, we estimated that 60,000 to 100,000 shorebirds use the coastal wetlands of Malaysia during the winter (non-breeding) season if the entire coasts of Sarawak and Sabah are included.

Malaysia provides extremely important habitat for the globally endangered Nordmann's Greenshank, with approximately 90-120 individuals (about 15-20% of the global population) using Malaysian coasts during the non-breeding season.

The shorebird numbers on the west coast of Peninsular Malaysia have declined dramatically. This applies particularly to Perak State and Selangor State of which the former has suffered a decline of 80% to 94% and the latter one of 50% over the last twenty years. Shorebird numbers have declined severely at number of sites, particularly, Kuala

Figure 2. Distribution of internationally important sites for shorebirds identified in surveys from November 2004 to April 2005.

Table 2e. Results by site for Sarawak State and Sabah State.

No.	Site name	Wetland type	Area	Co-ordinates	Date(s) surveyed	Totals	International importance
Sarawak State							
62	Buntal Bay	coast		1º42´N 110º21´E	13-Jan-05	2640 (W)	**C3**: Endangered Nordmann's Greenshank (3)
63	Bako-Semera Coastline	mudflats	27km	1º41´N 110º24´E	10-Apr-05	4423 (NM)	**C3**: Endangered Nordmann's Greenshank (3), Near Threatened Asian Dowitchers (1). **C4**: close to 5,000 shorebird recorded during north migration season. Unidentified Sandplover (1,200, more than 0.25 % of the sandplover population), Far Eastern Curlew (230, 0.6%), Whimbrel (178, 0.32%)
Sabah State							
64	Weston-Lumbok-Menumbok coastline	Mangrove, Nipah coast	10km	5º11´N 115º33´E	8-13 Nov-04, 2&3-Apr-05	902 (W) 165 (NM)	
65	Sipitang	sandflats	2km	5º05´N 115º33´E	04-Apr-05	4 (NM)	
66	Tasik Sitomipok	Mangrove Lagoon	500ha	5º32´N 115º35´E	04-Apr-05	0 (NM)	
67	5km south Tanjung Aru, Kota Kinabalu	sandflats	0.5km	5º51´N 116º02´E	5&8-Apr-05	24 (NM)	
68	2km south Tanjung Aru, Kota Kinabalu	sandflats	0.5km	5º53´N 116º02´E	5&8-Apr-05	21 (NM)	
69	Kota Kinabalu bird sanctuary	mangrove	300ha	5º59´N 116º05´E	5-Apr-05	29 (NM)	
70	Likas Lagoon	lagoon	10ha	5º59´N 116º06´E	6-8 Apr-05	1 (NM)	

Gula in Perak and Pulau Tengah in Selangor which used to be the most important sites in Malaysia.

Land developments for housing, aquaculture, agriculture, tourism and fishing are the major threats to Malaysia's coastal shorebird habitats. The loss of safe high tide roost areas has been a significant impact, and an increasing threat, to shorebirds at many sites.

Shorebird numbers at Teluk Air Tawar-Kuala Muda (Penang) were unusually high during this survey period compared to previous years. Regional-scale impacts of the 26 December 2004 tsunami near Sumatra may have caused the shorebirds to shift from other locations to sites such as Teluk Air Tawar-Kuala Muda. If this is the case, it demonstrates the importance of maintaining a regional

Table 3. Status of shorebird sites that meet internationally importance criteria as identified by Bamford *et al*. (in prep). The site names of this table are those of this report, not Bamford *et al*.

State	Internationally important sites identified by Bamford et al.	Current Status (2004-2005 survey)
Johor	Kuala Mersing (Sungai Mersing Estuary)	Did not meet the criteria during the survey. But the site and near by site Telok Iskandar together recorded 709 shorebirds. The site might still meet the international importance criteria but more surveys are needed in the north or south migration periods to establish this.
	Sungai Batu Pahat - Sungai Suloh Kechil (Tg. Sepenting/Batu Pahat River mouth and Sungai Ayam)	Only few shorebirds recorded. However, the count was only made during high tide and may not give a realistic figure of shorebirds using the area.
Perak	Sungai Betul-Bagan Tiang	These sites are all part of the Kuala Gula-Kuala Kurau-Tg. Piandang and Bang zhu Kao Mudfalt visited during this survey. The 20 km coastline is no longer suitable for shorebirds due to heavy coastal erosion.
	Parit 30	
	Sungai Air Hitam	
	Sungai Larut to Port Weld	
	Kuala Gula	
	Kuala Kelumpang (Pulau Kelumpang and Gula River)	Low number of shorebirds recorded; did not meet criteria.
Selangor	Pantai Rasa Sayang (Kg Parit Empat)	Did not meet the criteria, but 833 shorebirds (including 760 Common Redshanks) were recorded. The site could still meet the international importance criteria; more surveys in north and south migration period needed to establish this.
	Tanjong Karang	Low number of shorebirds were recorded, did not meet criteria
	Kuala Selangor Nature Park	Low number of shorebirds were recorded, did not meet criteria
	Pulau Tengah (Klang Islands)	Only 772 shorebirds recorded, but the number of Whimbrel still meets 1% criteria. The site no longer supports more than 10,000 shorebirds as in early 1990s although there are still large areas of mudflat present during the survey. Shorebirds may have found other better pre-high tide roosts and high tide roosts to replace the site.
	Kapar Power Station	A total of 12,109 shorebirds was recorded. Four species meet the 1% international importance criterion.
Penang	Batu Maung (Bagan Maung-Jelutong)	A total of 578 shorebirds was recorded. The site could still meet the international importance criteria; more surveys in north and south migration period needed to establish this.
Kedah	Kuala Kedah to Kuala Sungai (Kuala Kedah)	Very low numbers of shorebirds recorded; did not meet criteria.
Sarawak	Pulau Bruit	Not visited. However a recent visit to the site in November 2005 recorded less than 1,000 shorebirds. The coast had been badly eroded in the past 20 years.
	Bako-Buntal Bay	Still meets international importance criteria

network of safe feeding and roosting habitats for these populations.

RECOMMENDATIONS

Threats to shorebird feeding and roosting sites in coastal Malaysia are increasing at alarming rates, and some critical habitats are immediately impacted. There is an urgent need to establish new protected areas/national parks, extend current protected areas, and implement habitat restoration at the major and potential wintering areas for shorebirds. These include sites at:

- north-west Johor coast (including Pontian Kecil);
- north-central Selangor coast (including Kelang Islands and Pulau Tengah, coast along Sungai Janggut and Sungai Nibong);
- Matang mangrove forest of Perak State;
- Teluk Air Tawar -Kuala Muda coast of Penang State;
- Buntal Bay and Bako-Semera Coastaline of Sarawak State; and
- Weston-Lumbok-Menumbok coastline of Sabah State.

Encourage state governments to nominate the Teluk Air Tawar-Kuala Muda (Penang state) and Buntal-Bako-Semera Coastline (Sabah State) to the Shorebird Site Network

The known important areas that were not covered by this survey, such as Sarawak coast from Semera to Pulau Bruit, should be covered in the future to understand the importance of the area for migratory shorebirds.

Special study of the habitat changes need to be carried out at Kuala Gula and Pulau Tengah, the two most important shorebird sites in the 1990s. Both sites have recorded very few numbers of shorebirds in recent years. The study should

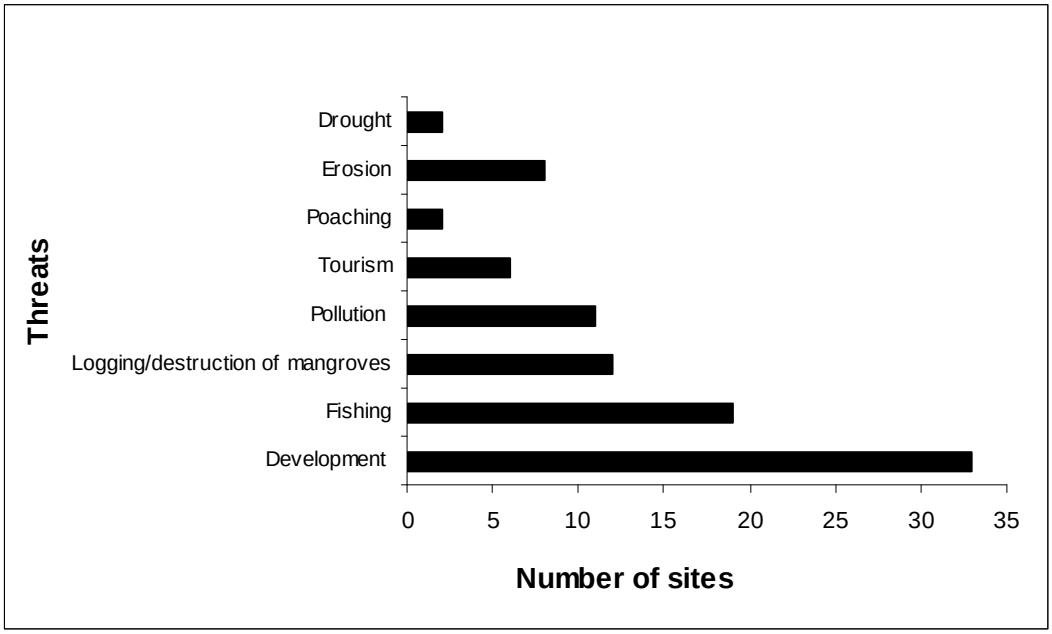

Figure 3. Type of threats recorded at number of sites during the survey.

aim to determine how the habitats have changed and propose activities to restore the wetlands for shorebirds.

Public awareness programmes should be initiated and awareness material should be made available to promote the conservation of the internationally important sites, with focus on Teluk Air Tawar -Kuala Muda (Penang) and Buntal Bay and Bako-Semera coast (Sarawak) as a priority.

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REFERENCES

AWC database. No date. Asian Waterbird Census database: 1987-2004. Wetlands International – Malaysia.

Bamford, M., Watkins, D., Bancroft, W., Tischler, G. and Wahl., J. (in prep.) Migratory Shorebirds of the East Asian-Australasian Flyway: Population Estimates and Important Sites. Wetlands International Oceania, Canberra, Australia. Wetlands International Global Series. International Wader Studies.

BirdLife International. 2004. Threatened Birds of the World 2004. Cambridge, UK: BirdLife International. In CD-Rom.

del Hoyo, J., Elliot, A. and Sargatal, J. (eds.). 1992. Handbook of the Birds of the World. Vol. 1. Ostrich to Ducks. Lynx Edicions, Barcelona.

del Hoyo, J., Elliot, A. and Sargatal, J. (eds.). 1996. Handbook of the Birds of the World. Vol. 3. Hoatzin to Auks. Lynx Edicions, Barcelona.

Hawkins A.F.A. and Howes J.R. 1986. Preliminary Assessment of coastal wetlands and shorebirds in south-west Peninsular Malaysia. Interwader Publication No:13.

Howes, J. 2004. Specialist Input to the Klias Conservation Plan: Assessment of Indicators in managing Biodiversity. Report produced under the UNDP/GEF Funded Project MAL/99/G31.

Howes, J. R. and NWPO. 1986. Evaluation of Sarawak Wetlands and their Importance to Waterbirds. Report 3: Pulau Bruit. Interwader Publication No. 10, Kuala Lumpur, Malaysia.

Li, Z. W. D. 2005a. Preliminary report for the ecological assessment of Malaysia's last remaining wild population of the globally threatened Milky Stork *Mycteria cinerea.* Wetlands International, Kuala Lumpur, Malaysia. Unpublished.

Li, Z. W. D. 2005b. First confirmed record of Common Ringed Plover *Charadrius hiaticula* in East Malaysia. Submitted to Editorial Committee of Suara Enggang, the Bimonthly Bulletin of the Malaysian Nature Society Bird Conservation Council.

Li, Z.W.D., Mundkur, T., Ariffin, R., Zakariah and Anzmi. 2004. Report on waterbird survey at Pulau Tengah on 8 and 10 January 2004. (Unpublished)

Li, Z. W. D, Siti Hawa Yatim, Howes, J. and Rahmah Ilias. 2006. Status and recommendations for the conservation of Milky Stork *Mycteria cinerea* in Malaysia. Wetlands International and the Department of Wildlife and National Parks. Kuala Lumpur, Malaysia.

MNS-Bird Conservation Council. 2005. A checklist of the Birds of Malaysia. Malaysian Nature Society, Kuala Lumpur, Malaysia.

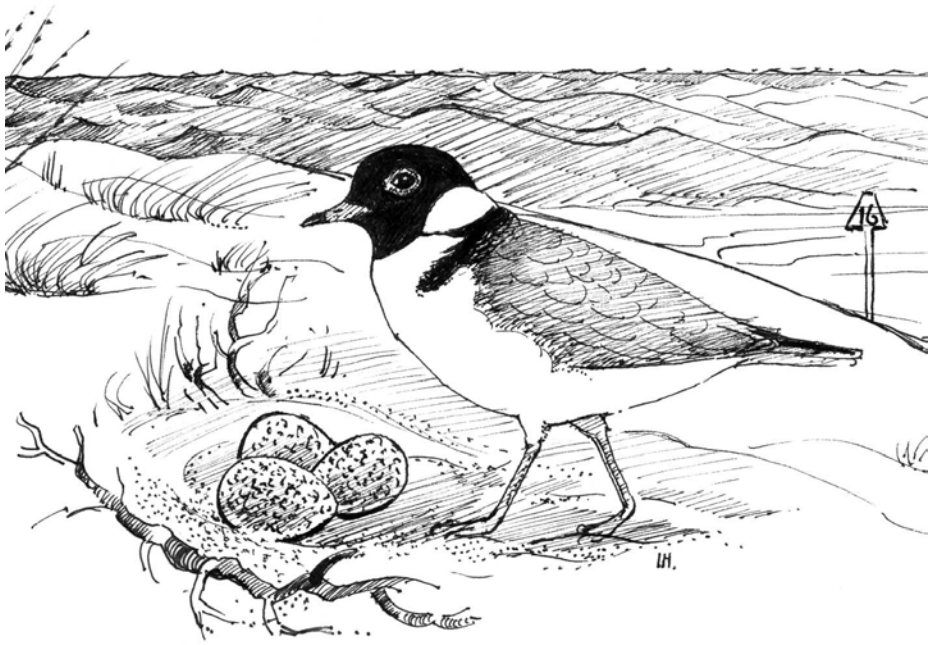
Parish, D and Wells, D.R. (eds.). 1985. Interwader 1984 Report. Kuala Lumpur: Interwader.

Silvius, M. J., Chan, H. T., Ibrahim, S. 1987. Evaluation of Wetlands of the West Coast of Penisular Malaysia and their Importance for Natural Resource Conservation. A joint project of World Wildlife Fund Malaysia, Forest Research Institute of Malaysia, University of Malaysia and Interwader. WWF-Malaysia, Kuala Lumpur, Malaysia.

Wetlands International-Oceania. 2000. Guidelines for the Preparation of Site Nominating Documentation for the East Asian-Australasian Shorebird Site Network.

Wetlands International. 2002. Waterbird Population Estimates – Third Edition. Wetlands International Global Series No. 12, Wageningen, The Netherlands.

Yeap, C. A., Sebastian, A. and Siti Hawa Yatim. 2004. The Asian Waterbird Census 2004 Country Report: Malaysia. Kuala Lumpur: Malaysian Nature Society. (Unpublished)



OBSERVATION OF WADERS ABUNDANCE DURING NORTHWARD MIGRATION IN CHAR KUKRI MUKRI, BANGLADESH

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A comprehensive wader census was conducted from February to April 2005 in Char Kukri Mukri, an island off the central coast of Bangladesh. A total of 46 species of waders (39 migratory, 7 resident) was recorded during the survey. Little Ringed Plover and Kentish Plover contributed over 80% of birds counted. Numbers of all migratory species declined over the period of the survey and there was evidence of the use of the island as a staging site by several species.

INTRODUCTION

Char Kukri Mukri (N21º100.0' E90º63.2'), with an area of about 30 km^2, is one of many small islands in the mouth of the Lower Mehgna river in the Bay of Bengal (see Figure 1). The water dynamics forming this island are quite different from those at the confluence of the Padma and the Upper Meghna rivers (Islam and Khan 2005). Here the river has widened, which has resulted in an increase in the char area. Extensive grasslands are ideal grazing land for cattle. The main occupations of the local people are agriculture and fishing.

A vast spread of mangroves along the marine, freshwater, and terrestrial boundaries form an important ecosystem; the tangled mass of roots from the mangrove trees provide safe havens for the larvae of a large number of fish and crustaceans, including shrimp. Among the large number of birds observed on Char Kukri Mukri are the globally vulnerable Lesser Adjutant (*Leptoptilos javanicus*) and Imperial Eagle (*Aquila heliaca).* There are several birds of prey that coexist here, including the Osprey (*Pandion haliaetus*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), and Grey-headed Fish-eagle (*Ichthyophaga ichthyaetus*). The island is an important staging and wintering area for migratory birds, which include several species of ducks, shorebirds, gulls, and terns. Increasing human disturbance and habitat loss are the major threats to the waterbirds here. A major factor in the degradation and loss of habitat is the collection of wild shrimp fry at unsustainable levels to supply the local shrimp farming industry.

This report presents the results of weekly surveys of the Char conducted from February to April 2005 to establish the importance of the area to migratory shorebirds. No systematic scientific work has been conducted previously on waterbirds here due to the area's extreme remoteness.

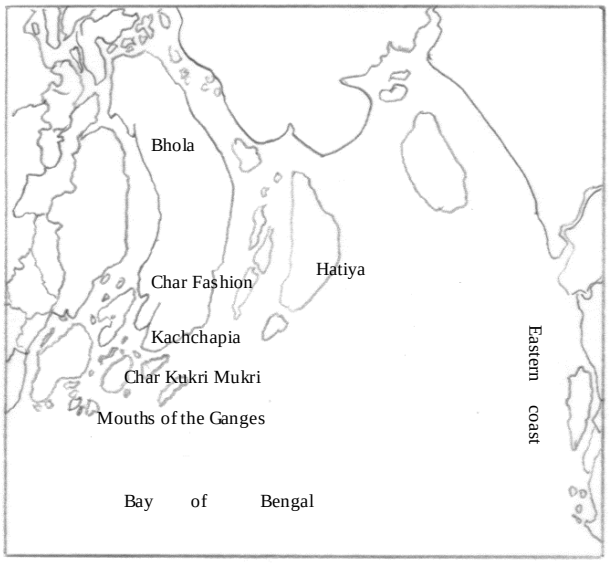

Figure 1. Location of Char Kukri Mukri

METHODOLOGY

Two transect lines were selected for this study. Transect 1 was drawn from the north east of the mangrove forest (N22º54.6' E90º66.0') to the mouth of the canal Daiar Khal (N21º94.0' E 90º64.0'). The 3.5 km long transect line covers intertidal sandy shores, mudflats, tidal creek, sand dunes, agricultural fields, and mangrove swamp. Transect 2 extends from the south-west mangrove swamp (N21º100.0' E90º63.2') to the south-west intertidal sandy shore (N22º0.1' E90º62.0'). The 3 km long transect line covers intertidal sandy zones, sand dunes, creeks, and mangrove forest. Figure 2 shows the locations of the transect lines and the main areas where the different groups of birds were counted. A fishing boat with a 26 HP engine was used for parts of the surveys. Birds flying over the transects were included in the counts. Each transect was surveyed once in each week from February to April. A full day was required to count each transect.

RESULTS

Forty six wader species, of which 39 were migratory, were recorded during this survey. They represent the families Rostratulidae, Charadriidae, Barhinidae, and Glareolidae. Overall, 51,114 individual waders were recorded but many individuals would have been counted in more than one survey. A better picture of a species usage of the survey area is given by the maximum of the twelve weekly counts of the two transects combined. The sum of these maxima is 15,303 birds. This total is dominated by two species, Little Ringed Plover and Kentish Plover which contributed 55.2% and 25.2% respectively. Six other species had maxima of over

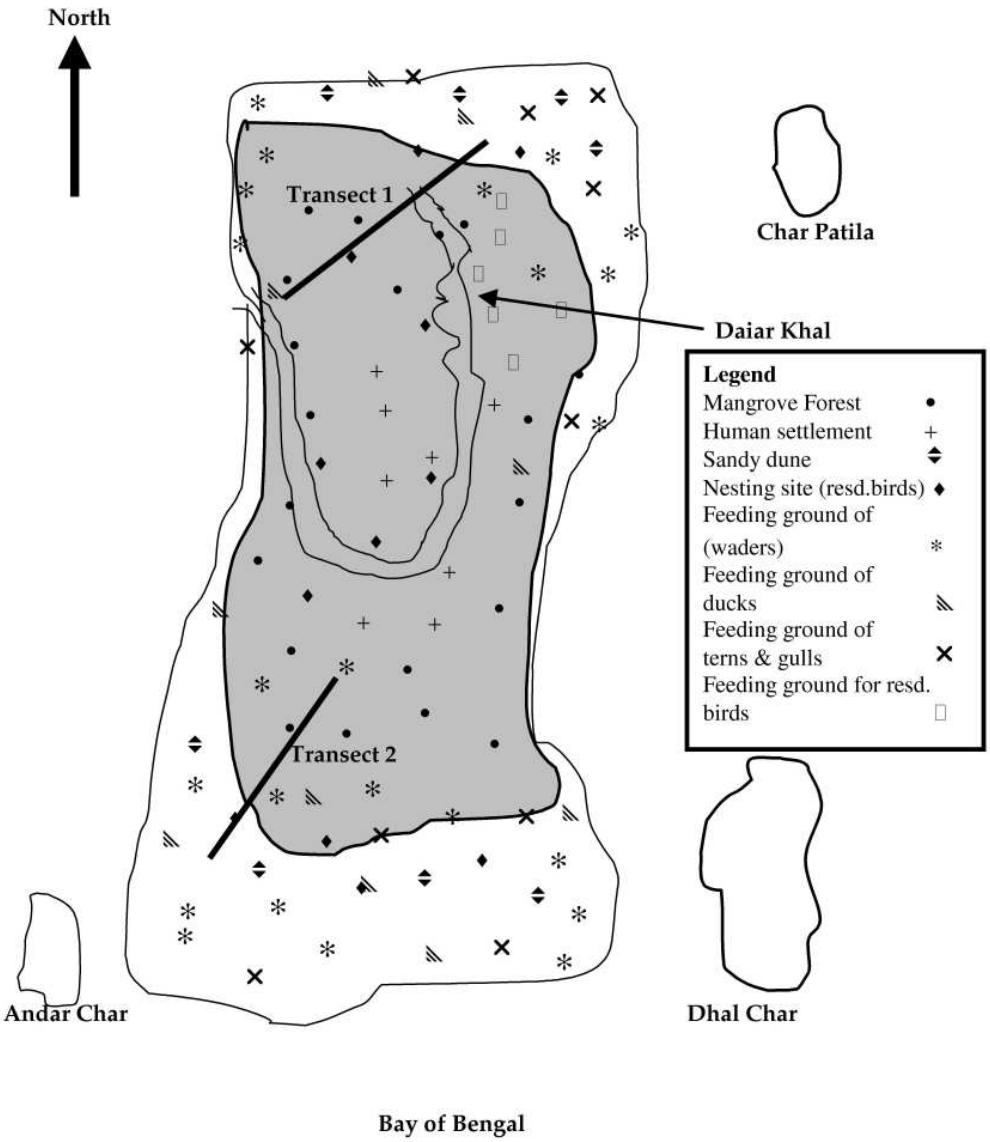

Figure 2. Map of Char Kukri Mukri showing the ornithological survey area and important sites for resident and migratory waterbirds.

150 birds: Little Stint (3.5%), Temminck's Stint (3.0%), Lesser Sand Plover (2.1%), Pacific Golden Plover (1.6%), Black-tailed Godwit (1.2%), and Small Pratincole (1.0%). The next most common species was Whimbrel with 90 birds (0.6%). Weekly totals for all species are given in Table 1. The species notes below comment on how the counts for individual species vary over time.

Species notes

N.B. The 12 surveys are indicated in these notes by the month and week in which they were made e.g. March 2 refers to the survey in the second week in March. Species order follows Wetlands International (2002).

Greater Painted-Snipe
Two birds in April 3.
Crab Plover
Two birds in February 2.
Black-winged Stilt
Low numbers to March 2 then nothing apart from a single count of 7 in April 4.
Pied Avocet
One bird in February 2.
Great Stone Plover
Seen on three counts only with a maximum count of 2.
Collared Pratincole
Small numbers counted March 1 to March 3.
Small Pratincole
Fewer than 55 birds up to March 2 after which three peaks, possibly due to birds on passage.
River Lapwing
Very small numbers in February 1 and 2 and then from March 3 onwards.
Grey-headed Lapwing
Very small numbers up to March 3 then not seen again.
Red-wattled Lapwing
Very small numbers from February 3 onwards.

Table 1. Weekly count totals by species

Species (M – Migrant; R – Resident)	**February**				**March**				**April**				**Max**	**% of Total Max**
	1	2	3	4	1	2	3	4	1	2	3	4		
Greater Painted-Snipe *Rostratula benghalensis* (R)	-	-	-	-	-	-	-	-	-	-	2	-	2	0.0%
Crab Plover *Dromas ardeola* (M)	-	2	-	-	-	-	-	-	-	-	-	-	2	0.0%
Black-winged Stilt *Himantopus himantopus* (M)	9	2	19	8	7	10	-	-	-	-	-	7	19	0.1%
Pied Avocet *Recurvirostra avosetta* (M)	-	1	-	-	-	-	-	-	-	-	-	-	1	0.0%
Great Stone Plover *Esacus recurvirostris* (R)	-	-	2	-	-	-	1	-	2	-	-	-	2	0.0%
Collared Pratincole *Glareola pratincola* (R)	-	-	-	-	5	6	8	-	-	13	-	-	13	0.1%
Small Pratincole *Glareola lactea* (R)	26	45	14	7	48	57	156	28	88	7	56	130	156	1.0%
River Lapwing *Vanellus duvaucelii* (R)	2	3	-	-	-	-	2	2	-	3	1	2	3	0.0%
Grey-headed Lapwing *Vanellus cinereus* (M)	3	3	4	1	3	4	3	-	-	-	-	-	4	0.0%
Red-wattled Lapwing *Vanellus indicus* (R)	-	-	3	5	4	5	3	2	4	5	2	3	5	0.0%
Pacific Golden Plover *Pluvialis fulva* (M)	246	15	164	142	58	54	40	45	14	37	12	18	246	1.6%
Grey Plover *Pluvialis squatarola* (M)	26	14	46	20	32	20	15	6	5	-	8	-	46	0.3%
Ringed Plover *Charadrius hiaticula* (M)	-	-	-	-	200	12	48	45	22	8	-	-	200	1.3%
Long-billed Plover *Charadrius placidus* (R)	30	-	-	-	-	-	-	-	3	-	-	-	30	0.2%
Little Ringed Plover *Charadrius dubius* (M)	2515	2000	3210	1254	8450	1236	120	800	85	110	38	50	8450	55.2%
Kentish Plover *Charadrius alexandrinus* (M)	3852	3541	2458	2485	1468	1258	1000	456	350	125	145	90	3852	25.2%
Lesser Sand Plover *Charadrius mongolus* (M)	328	302	20	128	213	200	144	85	65	30	25	20	328	2.1%
Greater Sand Plover *Charadrius leschenaultii* (M)	9	23	5	25	78	41	-	22	30	2	11	7	78	0.5%
Jack Snipe *Lymnocryptes minimus* (M)	1	-	-	-	-	-	-	-	-	-	-	-	1	0.0%
Pin-tailed Snipe *Gallinago stenura* (M)	-	2	-	-	-	-	-	-	-	-	-	-	2	0.0%
Common Snipe *Gallinago gallinago* (M)	3	2	1	-	1	-	-	-	1	-	-	-	3	0.0%
Asian Dowitcher *Limnodromus semipalmatus* (M)	5	8	6	-	-	-	-	-	-	-	-	-	8	0.1%
Black-tailed Godwit *Limosa limosa* (M)	125	147	80	42	12	42	22	14	125	177	2	-	177	1.2%
Bar-tailed Godwit *Limosa lapponica* (M)	39	28	17	12	12	10	9	8	18	4	8	-	39	0.3%
Whimbrel *Numenius phaeopus* (M)	90	80	56	47	45	24	16	14	34	20	25	15	90	0.6%
Eurasian Curlew *Numenius arquata* (M)	50	45	53	20	32	25	20	10	10	8	4	5	53	0.3%
Spotted Redshank *Tringa erythropus* (M)	43	10	-	-	20	-	16	-	2	-	-	-	43	0.3%
Common Redshank *Tringa totanus* (M)	33	21	5	24	27	20	16	12	4	3	-	-	33	0.2%
Marsh Sandpiper *Tringa stagnatilis* (M)	36	29	24	-	15	20	-	16	8	-	-	-	36	0.2%
Common Greenshank *Tringa nebularia* (M)	11	3	-	26	20	28	14	10	17	15	7	-	28	0.2%
Nordmann's Greenshank *Tringa guttifer* (M)	4	-	-	-	-	-	-	-	-	-	-	-	4	0.0%
Green Sandpiper *Tringa ochropus* (M)	14	7	15	10	10	15	9	20	2	5	-	-	20	0.1%
Wood Sandpiper *Tringa glareola* (M)	12	1	3	29	42	2	38	5	16	35	6	21	42	0.3%
Terek Sandpiper *Xenus cinereus* (M)	28	20	16	30	-	-	-	-	7	9	7	-	30	0.2%
Common Sandpiper *Actitis hypoleucos* (M)	52	27	36	20	35	25	20	17	17	22	20	7	52	0.3%
Ruddy Turnstone *Arenaria interpres* (M)	50	-	25	5	45	13	8	7	50	-	8	5	50	0.3%
Great Knot *Calidris tenuirostris* (M)	8	5	-	-	-	-	-	-	-	-	-	-	8	0.1%
Red Knot *Calidris canutus* (M)	-	7	8	2	-	-	-	-	-	-	-	-	8	0.1%
Sanderling *Calidris alba* (M)	5	-	-	10	-	-	-	-	-	-	-	-	10	0.1%
Red-necked Stint *Calidris ruficollis* (M)	30	8	3	-	-	-	-	-	-	-	-	-	30	0.2%
Little Stint *Calidris minuta* (M)	536	22	100	165	87	65	77	40	87	65	77	40	536	3.5%
Temminck's Stint *Calidris temminckii* (M)	458	436	440	23	30	-	28	8	30	-	10	8	458	3.0%
Long-toed Stint *Calidris subminuta* (M)	-	12	10	-	-	-	-	-	-	-	-	-	12	0.1%
Curlew Sandpiper *Calidris ferruginea* (M)	36	20	10	8	-	20	-	6	-	20	-	-	36	0.2%
Broad-billed Sandpiper *Limicola falcinellus* (M)	8	7	12	10	-	-	-	-	-	-	-	-	12	0.1%
Ruff *Philomachus pugnax* (M)	35	45	18	45	25	8	12	10	18	10	8	11	45	0.3%
Unidentified waders	1400	22	255	503	300	90	480	182	-	215	8	27	2	0.0%

Pacific Golden Plover

Maximum count of 250 in February 1. Numbers dropped quickly to just over 50 in March 1 (with inexplicable very low count of 15 in February 2) before declining gradually to 18 in April 4.

Grey Plover

Numbers increased to a peak of 46 in February 3 and then declined steadily. No birds seen after April 1.

Ringed Plover

Absent throughout February. then 200 in March 1, but nothing over 50 until February 2; not seen thereafter.

Long-billed Plover
Count of 30 in February 1 and another of 3 in April 1.
Little Ringed Plover
Numbers declined steadily from 2,515 birds throughout survey period to a minimum count of 50 at the end of April. This decline was interrupted by a massive passage in March 1 when 8,450 were counted.
Kentish Plover
Numbers declined steadily from 3,852 birds throughout survey period to a minimum count of 90 in April 4.
Lesser Sand Plover
Over 300 birds in first two counts, then fell to nearly nothing before gradually increasing to maximum of c. 200 in March 1 and 2 before declining steadily to 20 birds in April 4
Greater Sand Plover
Numbers low until high count of 78 in March 1 followed by fairly rapid decline to February 2. None counted in March 3. Possibly due to non-overlapping passages.
Jack Snipe
One bird in February 1.
Pin-tailed Snipe
Two birds in February 2.
Common Snipe
Very small numbers up to April 1.
Asian Dowitcher
Small numbers up to February 3 then not seen again.
Black-tailed Godwit
Average of 135 in February 1 & 2. Then rapid decline. Numbers steady February 4 through March 4. Then a fast passage (maximum 177 in March 2) with only 2 birds in April 3 and none thereafter.
Bar-tailed Godwit
Numbers decreasing throughout study period with greatest reductions in February.
Whimbrel
Steady decline from 90 birds in February 1 to 14 in March 4, after which three small peaks, possibly of birds on passage.
Eurasian Curlew
Steady decline over survey period.
Spotted Redshank
Only seen in five weeks, only February 1 and 2 contiguous. Maximum count of 43 in February 1. Presumably most birds counted were on passage.
Common Redshank
Steady decline over survey period except for unaccountably low numbers in February 3.
Marsh Sandpiper
Steady decline over survey period. Not seen in February 4, March 3, or after April 1.
Common Greenshank
Low numbers in February 1 and 2; none in February 3. Then higher numbers from February 4 to March 2 followed by steady decline. None seen in April 4.
Nordmann's Greenshank
A single count of 4 birds in February 1.
Green Sandpiper
Numbers steady to March 4 then sudden drop. None seen after April 2.
Wood Sandpiper
Four peaks with very few (< 10) birds between.
Terek Sandpiper
More than 15 birds in February 1 through 4, then only small numbers (<10) in April 1 through 3.
Common Sandpiper
Steady decline over survey period.
Ruddy Turnstone
Numbers small except for two peaks of 45 and 50 birds in March 1 and April 1.
Great Knot
Small numbers up to February 2 then not seen again.
Red Knot
Small numbers only in February 2 to February 4 then not seen again.
Sanderling
Small numbers in February 1 and February 4 then not seen again.
Red-necked Stint
Small numbers reducing in February 1 through 3, then not seen again.
Little Stint
Big decrease from 536 birds in February 1. Then fairly steady at an average count of 75 birds, numbers possibly reducing gradually.
Temminck's Stint
Count steady at c. 450 until February 3. Then dropped suddenly and stayed steady at c. 20 birds for remainder of survey period.
Long-toed Stint
Small numbers counted February 2 to February 3.
Curlew Sandpiper
Numbers reduced steadily up to February 4 after which no more were seen.
Broad-billed Sandpiper
Small numbers up to February 4 then not seen again.
Ruff
A couple of peaks over 40 birds in February 1 and 3. Then never more than 20 birds counted.

DISCUSSION

Two things are very clear from the count data presented. These are the diminution in the numbers of over-wintering migrants as they depart on northward migration to their breeding grounds. The second thing is the use of Char Kukri Mukri as a staging ground on their way northward of several species which have spent the non-breeding season elsewhere. Counts of staging birds provide a poor estimate, often very poor, of the numbers of birds that pass through a staging site (see for example Robinson *et al*. 2005). It is not possible therefore to give an estimate of the number of birds which use Kukri Mukri. What is clear, however, is that a large number of species, over a half of those present in the flyway, use the Char and that, given the small area of the island relative to the amount of similar habitat at the Ganges mouth, the area as a whole must be of immense importance for migrating waders.

A further indication of the importance of the area is provided by the number of species under threat, not only waders, which were recorded in this survey. Among the

birds recorded from Char Kukri Mukri, Lesser Adjutant *Leptoptilos javanicus*, Black-bellied Tern *Sterna acuticauda* and Indian Skimmer *Rynchops albicollis* are globally vulnerable and a further four species (Asian Openbill *Anastomus oscitans*, Black-headed Ibis *Threskiornis melanocephalus*, Grey-headed Lapwing, and Asian Dowitcher) are at lower risk globally. Among the raptors Imperial Eagle *Aquila heliaca* is globally vulnerable and Grey-headed Fishing Eagle *Ichthyophaga ichthyaetus* is at lower risk. Nordmann's Greenshank is globally endangered and it and Imperial Eagle *Aquila heliaca* are included in CITES Schedule II as is Eurasian Spoonbill *Platalea leucorodia*.

Human disturbance on the Char was higher in Transect 1 than Transect 2. A vast area of intertidal sandy zone comprising sand dunes exists in the southern part of the island. It is the most important nesting ground for resident terns, gulls and pratincoles. Hunting of migratory ducks and shorebirds by outside interests occurs there. Trapping and shooting of migratory shorebirds and resident waterbirds (e.g. moorhen, watercock, egrets and herons) for food and sale also occurs. Reports from the local community indicate that noise pollution created by hunters inside the mangroves is a major source of disturbance to both resident and migratory species.

The vast stretch of coastal wetlands at the Bay of Bengal and the Ganges - Brahmaputra - Meghna rivers floodplains play a key role for nearly 73 species of shorebirds in resting, roosting, feeding, refueling and as a staging ground during the winter quarter (Khan, 1997). In shrimp fry collection, the targeted fry species are retained and all the bycatch is thrown away as debris and unwanted. This practice inadvertently destroys the future stock of other estuarine fish species and reduces the food available to shorebirds. There is an urgent need for continuous population monitoring to inform conservation of the tremendous Ganges Delta and the significant number of migratory shorebirds (Islam, 2001) which it supports.

ACKNOWLEDGEMENTS

I would like to thank the British High Commision, Dhaka for their financial support for this study. Thanks too to Ken Rogers for his valuable review. I am also very grateful to local assistants on Char Kukri Mukri for logistical help and other support.

REFERENCES

Islam, M. S. and Khan, M. A. 2005. Shorebird Abundance in the Western Part of Char Bahauddin during northward Migration, *The Stilt*, 41: 22-26.

Khan, M. A. 1996. CITES: A Handbook for Bangladesh. Nature Conservation Movement, (NACOM), Dhaka, Bangladesh.

Khan, A. 1997. Bangladesh: A case study on shorebird conservation network. Australasian Wader Studies Group.

Robinson, R.A., N.A. Clark, R. Lanctot, S. Nebel, B., J.A. Clark, J.A. Gill, H. Meltofte, D.I. Rogers, K.G. Rogers, B.J. Ens, C.M. Reynolds, R.M. Ward, T. Piersma, & P.W. Atkinson. 2005. Long term demographic monitoring of wader populations in non-breeding areas. Wader Study Group Bull. 106: 17-29.

Wetlands International. 2002. Waterbird Population Estimates – Third Edition. Wetlands International Global Series No. 12, Wageningen, The Netherlands.

MID-WINTERING SHOREBIRD POPULATION STATUS AND THREATS ALONG THE COX'S BAZAR TO TEKNAF BEACH, BANGLADESH

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Mid-winter population counts of shorebirds were conducted along the beach from Cox's Bazar to Teknaf in December 2005 and January 2006. In December, 575 individuals from 25 species were counted with 90 unidentified; in January 680 birds from 27 species were counted with 45 unidentified. This represents a massive reduction in numbers over the last 10 to 15 years. Reasons for the decline are examined.

INTRODUCTION

Cox's Bazar District has an area of 2,492 km^2 and is bounded by Chittagong District to the north, the Bay of Bengal to the west, and Bandarban District, Myanmar and the Naf River to the east. Annual average temperatures range from 14.8 ºC to 32.5 ºC; annual rainfall is 3,378 mm. Being a coastal region, the district often suffers from sea storms and tidal bores during cyclones. Hilly evergreen forest runs from Cox's Bazar to Teknaf. The shoreline was gazetted by the government in 1999 as an Ecologically Critical Area (ECA) under the Environmental Conservation Act of 1995. The shoreline ECA covers not only this seashore but also the bounding forest and the whole peninsular land from Teknaf to Sahporir Dwip between the Naf river and the Bay of Bengal. The ECA management plan is operated by the "Coastal & Wetland Biodiversity Management Project"; this project reports to the Department of Environment.

Winter bird flocks occur in several areas along the shoreline. Areas where birds have been recorded before this survey include Daria Nagar (7 km south-south-east of Cox's Bazar), Pechar Dwip (17 km), Inani (24 km), Swankhali (34 km), and Monkhali (40 km). Bird concentrations have been mostly occurred near river mouths. In this regard Inani canal[1], Reju canal, Swankhali canal, and Monkhali canal are important. Pechar Dwip, located 20 km south of Cox's Bazar along the sea beach, is a potential site for small waders, terns, and gulls. Teknaf is a small township on the Naf River at the end of the hilly region. It is 80 km south-south-east of Cox's Bazar and is a beautiful place facing Myanmar across the Naf which is also a very suitable site for several species of migratory waterbirds.

Arguably the most attractive tourist resorts of the country are located on a low range of sand hills between the river Bakkhali and the Bay of Bengal adjacent to a long open beach. The unbroken beach south of Cox's Bazar is sandy with a gentle slope and only a slight rise and fall of the tide. No water bird census has previously been made of the whole beach. Indeed, there have been few studies on shorebirds in this region. Information on the population abundance of migratory shorebirds in south-eastern coast along with their importance is presented in NCSIP-1 (2001), Islam (2001) and Islam and Islam (2002).

[1] "Canal" refers to a narrow waterway which can be man made or natural.

MATERIALS AND METHODS

Wader censuses were conducted starting on 12 December 2005 and 14 January 2006 along the beach from Cox's Bazar (N21º24.7' E91º59.0') to Teknaf (N20º51.1' E92º16.1'). Gulls and terns were also counted. Each census took five days. Counting started in the late morning and continued to evening. Counts were adjusted when birds moved between areas. Even at high tide, much of the intertidal mudflats was uncovered and the counting technique involved walking just inland of the tide edge and counting roosting and feeding birds. Binoculars and a telescope with tripod were used for field observations. Birds over-flying the count area were included in the count. A four-wheel drive (at a speed of 10 km per hour) was also used. Weather conditions throughout the count period were generally favourable but one early morning was slightly foggy. Several pictorial field guides were used for confirmation of species identification. Secondary information from the literature informed on other records.

RESULTS

A total of 1,390 birds from 29 species was counted; this total includes 135 unidentified waders (Table 1). An obvious feature of the table is the high correlation between the two counts ($R = 0.966$, $N = 29$, $P < 0.00001$). This arises because essentially the same birds are counted, there being little movement of birds in the non-breeding season. Statistically, counts of waders are estimates of the number present; exact counts are rarely possible. Differences between two surveys can arise from a variety of reasons outside the control of the counter (e.g. birds being further away in one count, flying birds being harder to count, some roosting flocks consisting of dense concentrations of birds). The best estimate of the number of each species present is therefore taken to be the larger of the two counts as shown in Table 1.

Table 1. Observed number of individuals of waders with their percentage distribution

English Name	Scientific Name	Dec	Jan	Max	% of Total Max
Bronze-winged Jacana	*Metopidius indicus*	3	3	3	0.4%
Black-winged Stilt	*Himantopus himantopus*	-	11	11	1.5%
Eurasian Curlew	*Numenius arquata*	2	-	2	0.3%
Whimbrel	*Numenius phaeopus*	6	8	8	1.1%
Black-tailed Godwit	*Limosa limosa*	17	22	22	2.9%
Curlew Sandpiper	*Calidris ferruginea*	9	11	11	1.5%
Terek Sandpiper	*Xenus cinereus*	16	16	16	2.1%
Broad-billed Sandpiper	*Limicola falcinellus*	1	8	8	1.1%
Wood Sandpiper	*Tringa glareola*	4	3	4	0.5%
Common Sandpiper	*Actitis hypoleucos*	7	17	17	2.2%
Sanderling	*Calidris alba*	-	14	14	1.8%
Temminck's Stint	*Calidris temminckii*	20	26	26	3.4%
Red-necked Stint	*Calidris ruficollis*	56	78	78	10.3%
Little Stint	*Calidris minuta*	10	33	33	4.4%
Grey Plover	*Pluvialis squatarola*	16	20	20	2.6%
Pacific Golden Plover	*Pluvialis fulva*	66	39	66	8.7%
Greater Sand Plover	*Charadrius leschenaultii*	25	34	34	4.5%
Lesser Sand Plover	*Charadrius mongolus*	234	204	234	30.9%
Little Ringed Plover	*Charadrius dubius*	2	22	22	2.9%
Kentish Plover	*Charadrius alexandrinus*	30	46	46	6.1%
Small Pratincole	*Glareola lactea*	11	9	11	1.5%
Common Snipe	*Gallinago gallinago*	-	4	4	0.5%
Pintail Snipe	*Gallinago stenura*	2	-	2	0.3%
Common Redshank	*Tringa totanus*	13	15	15	2.0%
Common Greenshank	*Tringa nebularia*	7	5	7	0.9%
Great Knot	*Calidris tenuirostris*	3	-	3	0.4%
Ruddy Turnstone	*Arenaria interpres*	3	8	8	1.1%
Red-wattled Lapwing	*Vanellus indicus*	12	4	12	1.6%
Grey-headed Lapwing	*Vanellus cinereus*	-	20	20	2.6%
Unidentified waders		90	45		
	Totals	575	680	757	
	Unidentified Percentage	13.5%	6.2%		

A total of 658 individuals were observed in December and 732 individuals for January. Unidentified waders were 13.5% of the December count and 6.2% of the January count. Based on the maximum counts of birds identified to species, the four most abundant species were Lesser Sand Plover (30.9%), Red-necked Stint (10.3%), Pacific Golden Plover (8.7%) and Kentish Plover (6.1%). Counts of the remaining 25 species were all less than 5% of the total. The six species of plover recorded during the survey contributed 55.7% of the total count, six sandpiper species contributed 9.2%, and three species of stints contributed 18.1%.

Two species of gull and five species of tern were observed in both counts (Table 2). Maximum counts of gulls and terns totaled 1,004 birds, making them more numerous than waders. Counts were dominated by Brown-headed Gull (57.8%) and Little Tern (20.4%).

DISCUSSION

The attractions of Cox's Bazar include a marine drive and tourist resort development along the sandy beach. The area is under increasing pressure from development activity and tourism. Population pressure on the area further increased with the influx of the mass influx of refugees who came from Myanmar to get shelter during 1991 and 1992. The huge population influx settled along the shoreline for an easy livelihood from shrimp fry collection; this added significantly to population pressure.

A huge amount of fishing activity was observed during the surveys from the area Monkhali to Teknaf. All were beach seine fishing with teams of 20 to 25 fishermen. Birds of several tern and gull species have a good record of coexisting with fishermen. Fifteen years ago, when human impacts were low, gull and tern flocks of several thousand birds were recorded. For example, 2,146 gulls and 3,540 terns were counted December 1991 at northern side of Teknaf Beach. (Islam 1991). Numbers have declined severely to today's level.

Seashore habitat is drastically changed by tourism development but the seashore is still a suitable habitat for many resident and migratory waders, gulls, and terns. Due to time constraints we could not make a detailed survey of human activities along the seashore. The major impacts we observed were: the use of the beach for motor driving by

Table 2. Observed number of terns and gulls with their percentage distribution

English Name	Scientific Name	Dec	Jan	Max	% of Total Max
Brown-headed Gull	*Larus brunnicephalus*	504	580	580	57.8%
Pallas's Gull	*Larus ichthiaetus*	64	83	83	8.3%
Gull-billed Tern	*Gelochelidon nilotica*	21	19	21	2.1%
Lesser Crested Tern	*Sterna bengalensis*	79	94	94	9.4%
Little Tern	*Sterna albifrons*	183	205	205	20.4%
Whiskered Tern	*Chlidonius hybridus*	9	12	12	1.2%
Common Tern	*Sterna hirundo*	5	9	9	0.9%
	Totals	865	1002	1004	

tourists and locals; beach developments like shrimp hatchery installation and road construction; disturbance due to tourism; and shrimp fry collection by thin monofilament netting perpendicular to shore line that inadvertently traps birds. Perhaps the major threats to beach bird flocks are tourists with four wheel drives driving through roosting gull and tern flocks for recreation and photography.

The current situation is that the shorebird population has declined drastically in the last 10 to 15 years due to extreme human interference and habitat alteration along the shoreline. Yet the peninsular seashore is under further threat from future infrastructure development. Many areas of land along the seashore between Teknaf and Cox's Bazar have been sold to outside business interests for shrimp hatchery and hotel resort development.

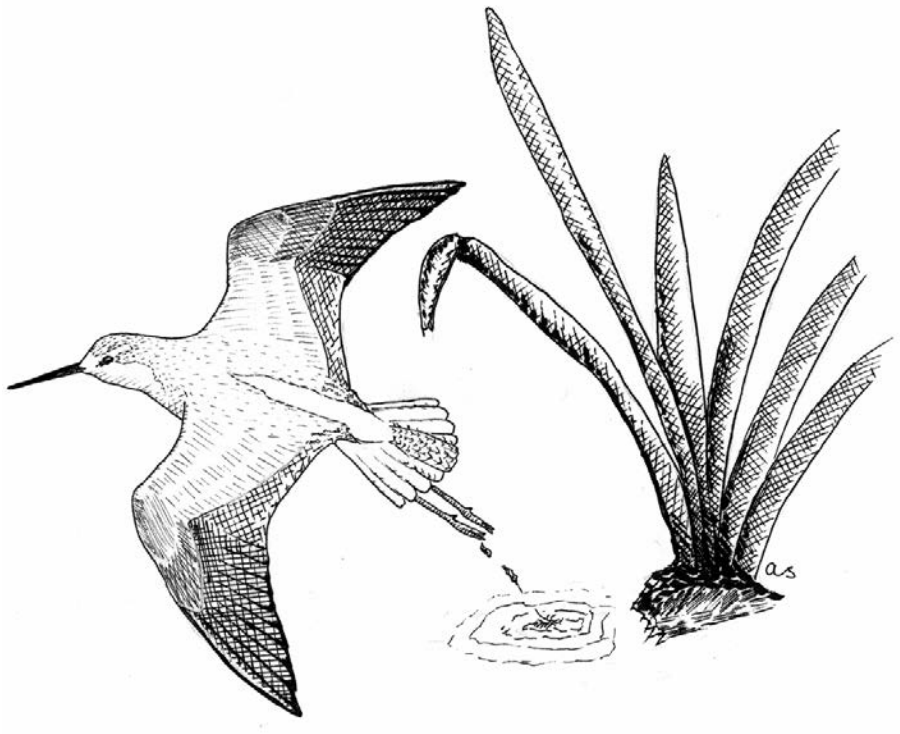
REFERENCES

Islam, M. Z. 1991. Survey on wildlife diversity along Teknaf, Nhila, and Whykeong. Survey Report. December 1991.

Islam, M. S. 2001. Southward Migration of Shorebirds in the Ganges Delta, Bangladesh, *The Stilt*, 39 (2001): pp. 31-36.

Islam, M. S. and Islam, M. Z. 2002. Abundance of Migratory Shorebirds on the Coast of Bangladesh, *The Stilt*, 41: 22-26.

NCSIP-1. 2001. Survey of Fauna. National Conservation Implementation Project 1. Ministry of Environment & Forest. Dhaka.



BANDING AND FLAGGING OF SHOREBIRDS IN CHONGMING DONGTAN WETLAND DURING THE NORTHWARD MIGRATION OF 2005

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INTRODUCTION

Chongming Dongtan Nature Reserve (CDNR) is located on the eastern edge of Chongming Island, in the mouth of the Yangtze River, 46 km north-east of Shanghai Municipality. It was announced as a nature reserve especially for migrant birds in November 1998 by the Shanghai Municipal Government. In January 2002, the CDNR gained official status under the International Ramsar Convention, conforming to five terms of the Criteria for Identifying Wetlands of International Importance (http://www.wetlands.org/RDB/Ramsar_Dir/China/CN008D02.htm).

Historically, this site was successfully used by generations of local hunters for catching migratory shorebirds for food. Hunting was officially banned when the reserve was established. Anybody now caught hunting illegally will be punished by the local courts. In consequence, poaching of migrant shorebirds has almost completely ceased. The habitats for shorebirds in the reserve consist of fresh and brackish marshes, tidal creeks and extensive tidal mudflats. The tidal mudflat is still steadily increasing in size due to accretion from the huge volumes of silt flushing down the Yangtze River. The tidal flats created by the silt are rich in invertebrates and make it an ideal location for migratory shorebirds to stop, rest, and 'refuel' before continuing their northward migration to their breeding sites.

The traditional methods of the hunters are now used to catch the shorebirds for migration studies. Since September 2002, shorebird banding activity has been conducted by the staff of CDNR; the colour leg flagging program started in April 2003. Up to the end of 2004, more than 4,000 shorebirds have been banded and about 3,200 of these have been flagged. The peak periods of activity are from March through to early May on northward migration and late August through to early October on southward migration. This paper reports on the banding conducted during the northern migration of 2005.

METHODS

The banding and colour flagging was conducted at the south eastern portion of the tidal flat in CDNR at 31°27.5'N 121°55.5'E. Banding started most days at 6 a.m. and continued until 5 p.m. Bird catching was done by two experienced traditional hunters using two clap-nets. Basically, the clap net is employed with live decoys tethered close to the net and shorebird models made out of the skins of dead birds placed directly in the catching area. The hunters sit 30 m from the net and use a homemade bamboo flute/whistle to call the birds into the catching area. They demonstrate incredible skills and can differentiate the species of birds by call or by sight extremely quickly. The birds that are most likely to be caught are migratory shorebirds that are looking for a stopping-off point on their migration. Generally most of the migratory shorebirds arrived in the morning; catch rates tailed off markedly in the afternoons. The catching sites were about 500 m to 1 km away from the banding site, the exact location depending on tidal variation. When the hunters made a catch, they kept the birds in a bamboo cage from which we collected them and took them back to the banding site. Banding and flagging was conducted from 15 March 2005 to 13 May 2005. Bad weather prevented us from working on 19 and 21 March.

Birds were banded with a metal ring on the left tibia and white over black leg flags were placed on the right tibia. Total-head length, bill length, wing length, tarsus length, and body weight recorded for nearly all birds caught. We also estimated every bird's age using primary moult and plumage characteristics and recorded the percentage of breeding plumage, the amount of body fat, and the primary moult. When we had large numbers of birds to deal with, some of these data were not taken.

RESULTS

In all, 3,825 shorebirds of 32 species were banded and flagged. Table 1 gives the details. Six species (Great Knot, Whimbrel, Dunlin, Bar-tailed Godwit, Sharp-tailed Sandpiper and Terek Sandpiper) accounted for 84% of the birds processed. There was, however, considerable day to day variability in the proportions of the different species caught.

The daily banding totals are shown in Figure 1. The largest number banded in a day was 348 birds from seven species on 3 April. The largest number of individual birds caught was over the period from 29 March to 4 April but the peak in the number of species caught occurred, with considerably fewer birds, near the end of the banding project on 12 May when 114 birds of 16 species were banded. The daily variation in species and bird numbers is a consequence of differences in the departure time and flight speeds of species from the places where they spend the non-breeding period. This is illustrated by the daily banding totals of the six most numerous species (Figure 2).

During the banding process, we caught 43 banded birds. These comprised: 38 controls, i.e. recaptures of birds originally banded in other countries; four recaptures of birds originally banded at CDNR; and one recovery of a bird found dead that had been banded overseas (Table 2). Full details of these re-encounters are given in Table 3.

Table 1. Shorebird banding totals

Species	Latin Name	Number Banded
Great Knot	*Calidris tenuirostris*	1873
Whimbrel	*Numenius phaeopus*	396
Dunlin	*Calidris alpina*	267
Bar-tailed Godwit	*Limosa lapponica*	244
Sharp-tailed Sandpiper	*Calidris acuminata*	224
Terek Sandpiper	*Xenus cinerea*	207
Red Knot	*Calidris canutus*	115
Red-necked Stint	*Calidris ruficollis*	92
Common Greenshank	*Tringa nebularia*	61
Grey-tailed Tattler	*Heteroscelus brevipes*	60
Curlew Sandpiper	*Calidris ferruginea*	59
Redshank	*Tringa totanus*	42
Sanderling	*Calidris alba*	34
Grey Plover	*Pluvialis squatarola*	30
Turnstone	*Arenaria interpres*	25
Spotted Redshank	*Tringa erythropus*	20
Kentish Plover	*Charadrius alexandrinus*	14
Lesser Sand-plover	*Charadrius mongolus*	11
Greater Sand plover	*Charadrius leschenaultii*	10
Broad-billed Sandpiper	*Limicola falcinellus*	10
Eastern Curlew	*Numenius madagascariensis*	6
Wood Sandpiper	*Tringa glareola*	6
Marsh Sandpiper	*Tringa stagnatilis*	5
Common Sandpiper	*Actitis hypoleucos*	3
Eurasian Curlew	*Numenius arquata*	2
Nordmman's Greenshank	*Tringa guttifer*	2
Black-tailed Godwit	*Limosa limosa*	2
Little Ringed Plover	*Charadrius dubius*	1
Little Curlew	*Numenius minutus*	1
Golden Plover	*Pluvialis fulva*	1
Long-toed Stint	*Calidris subminuta*	1
Common Snipe	*Gallinago gallinago*	1
Totals	32 species	3825

DISCUSSION

In the 2004 northern migration banding season, we caught 14 Great Knot and 5 Bar-tailed Godwit. Of these, all but one Great Knot were marked with yellow leg flags showing that they had been banded in north-west Australia (NWA). Table 3 shows that all the 35 Great Knots and Bar-tailed Godwits caught during the 2005 northward migration season were also from NWA. From this, we conclude that most, if not all, of these two species, Great Knot and Bar-tailed Godwit, which are caught in CDNR spend their non-breeding season in NWA. If this were not the case we would expect to catch birds from Victoria and New Zealand where many thousands of birds have been marked. Up to 2005, only one New Zealand marked Red Knot has been caught.

Previous studies have shown that the larger species on the flyway like Great Knot, Bar-tailed Godwit and Red Knot could fly non-stop from NWA to CDNR (Barter & Wang 1990, Tulp *et al*. 1994). Most of the migrant shorebirds consume all of their fat resources during this flight and have to re-supply their fat stores before continuing their migration. The period between capture in north-west Australia and recapture in Chongming Dongtan and Hangzhou Bay of two Great Knots and two Bar-tailed Godwits ranged from 7 to 12 days (Barter & Wang 1990). In view of the unknown time between banding and departure, as well as between arrival and recovery, the actual flight time from NWA to CDNR of the shorebirds is likely to be less than seven days.

Green and Piersma (in press) give an average air speed of 61.3 k.p.h. for the migration of Bar-tailed Godwits from northern Europe to their breeding grounds and also estimate that flight times are reduced by about 25% by migrating when assistance is given by tailwinds. They also show that birds fly faster at the start of a migratory flight because they are heavier than they are at the end of the flight.

The flight from north-west Australia to western China is much longer than that from Texel to arctic Russia and the reducing weight effect is likely to be greater for the longer flight. This is presumably the reason why Battley and Pennyquick (2002) give a lower true airspeed for Great Knot of 56.9 k.p.h. for this passage. Assuming the same size tailwind effect of Green and Piersma (in press), which would be consistent with Tulp *et al.* (1994), the resulting average ground speed is 75.8 k.p.h. and the direct flight time to

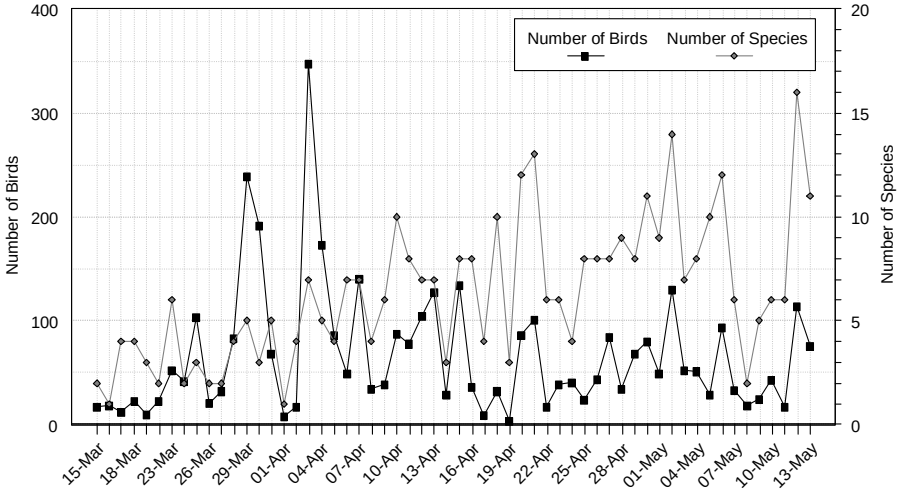


Figure 1. Daily variation in numbers of birds and species.

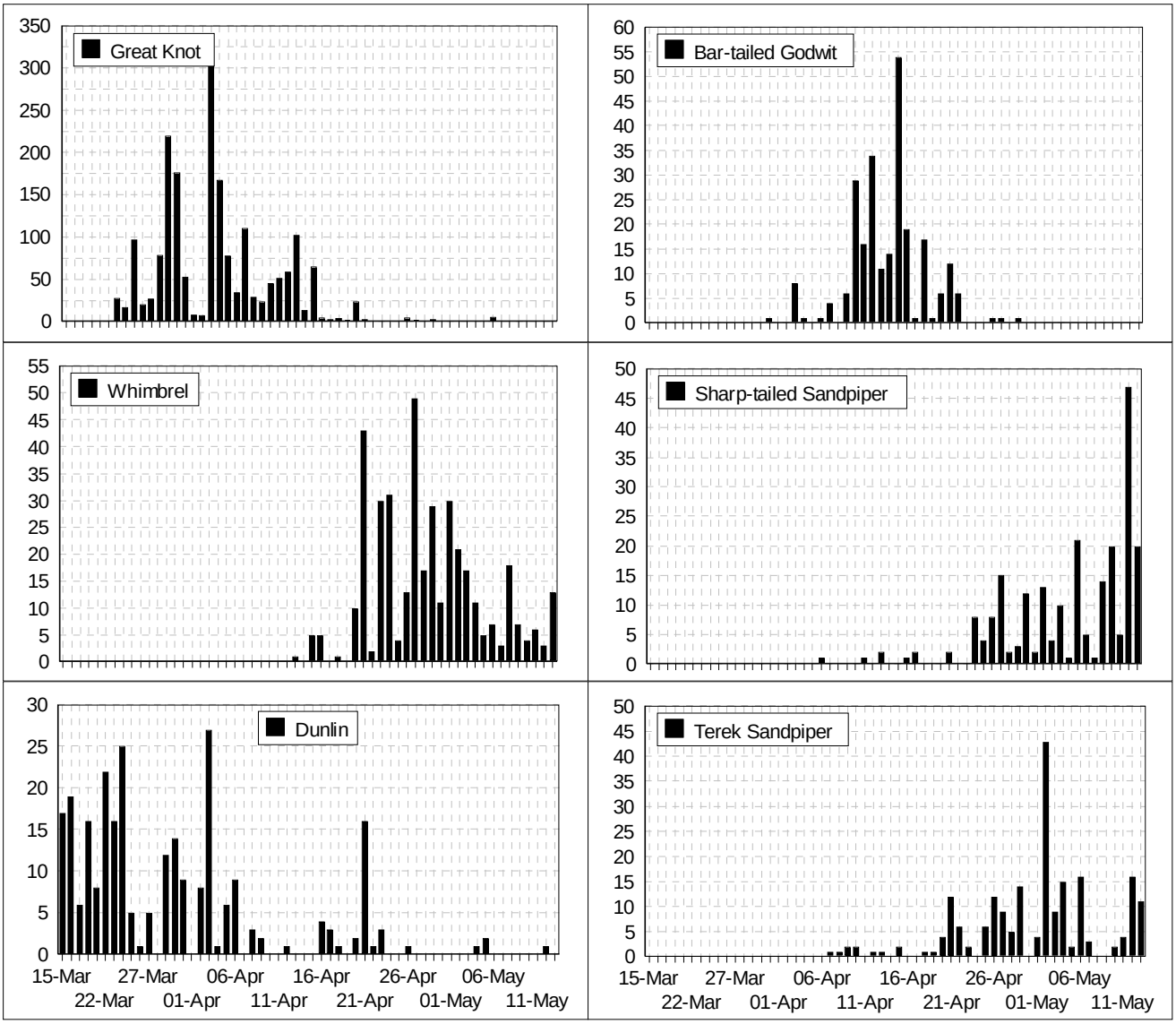


Figure 2. Daily numbers of birds banded of the six most numerous species.

Chongming Dongtan is 72.5 hours, i.e. three days, for the 5,500 km flight. Departures from Roebuck Bay are invariably in the late afternoon (Tulp *et al*. 2004) and arrivals in Chongming Dongtan are usually in the morning (see above). This means that half a day should be added to give the average time between leaving Australia and arrival at Chongming Dongtan.

The flight time of 3½ days presupposes that all goes well with migration. This may not always happen. Expected tail winds may not be met and unexpected headwinds, which slow the birds, may be. Tulp *et al*. (1994) suggest that non-stop flight to western China may not be possible without sufficient tail wind assistance. Involuntary staging to fuel the remainder of the flight would slow the passage down even more. Conversely, sometimes exceptionally favourable tailwinds are met. This could account for the observation of Barter and Wang (1990) that some Great Knot fly directly to the Yellow Sea without staging at Chongming Dongtan. It is likely that much of the difference between the seven days between capture and recapture, the latter being believed to be soon after arrival at Chongming Dongtan, is due to delays caused by unfavourable wind conditions in parts of the long

Table 2. Summary of re-encounters

Species	Controls	Recaptures	Recovery
Great Knot	30 from NWA	3	1 from NWA
Bar-tailed Godwit	4 from NWA	3	
Red Knot	2 from Victoria, Australia		
	1 from New Zealand		
Dunlin	1 from China (Taiwan)		
Totals	38	6	1

Table 3. Details of birds re-encountered birds. The following leg flag codes apply: YLF = Yellow Leg Flag; WBLF = White/Black Leg Flag; OLF = Orange Leg Flag;
WLF = White Leg Flag; Y/R = Yellow/Red; W/R = White/Red; NLF = No Leg Flag

Species	Original Band Number	Banding Date	Leg Flag detail	New Band Number	Re-encounter Date
Great Knot	062-71495	10-Jun-01	YLF	F03-5891	23-Mar-05
Great Knot	062-77012	07-Dec-02	YLF	F03-5935	23-Mar-05
Great Knot	062-78154	09-Feb-04	YLF	F03-5860	23-Mar-05
Great Knot	062-76962	09-Feb-04	YLF	F03-5921	25-Mar-05
Great Knot	062-79527	26-Feb-05	YLF	F03-5948	25-Mar-05
Great Knot	062-57522	30-May-00	YLF	F03-6591	28-Mar-05
Great Knot	062-44631	03-Oct-98	YLF	F03-6590	28-Mar-05
Great Knot	062-72714	09-Oct-01	YLF	F03-9266	29-Mar-05
Great Knot	062-44964	12-Oct-98	NLF, add W/B	F03-9216	29-Mar-05
Great Knot	062-33593	13-Aug-98	YLF	F03-5958	29-Mar-05
Great Knot	F03-1196 (Damaged, replaced with new band)	04-Apr-04	W/BLF	F03-9588	29-Mar-05
Great Knot	062-75858	11-May-02	YLF(2U Engraved)	F03-9592	29-Mar-05
Great Knot	062-58585	27-Aug-00	YLF	F03-9595	29-Mar-05
Great Knot	062-72809	09-Oct-01	YLF	F03-9557	29-Mar-05
Great Knot	062-33844	21-Aug-98	YLF	F03-7715	30-Mar-05
Great Knot	062-71313	23-Sep-01	YLF	F03-7940	30-Mar-05
Great Knot	062-56241	28-Oct-98	NLF, add W/B	F03-7938	30-Mar-05
Great Knot	062-57663	31-May-00	YLF	F03-7977	31-Mar-05
Great Knot	062-71960	30-Sep-00	YLF	F03-9383	31-Mar-05
Great Knot	062-43032	25-Aug-98	YLF	Killed by poacher	31-Mar-05
Dunlin	B31411	20-Nov-03	Taiwan bird, only blue on right tarsus and replaced with W/B	C17-7189	02-Apr-05
Great Knot	062-71819	30-Sep-01	YLF	F03-9398	03-Apr-05
Great Knot	062-78800	17-Feb-05	YLF(T9 Engraved)	F03-6961	03-Apr-05
Great Knot	F08-8468	30-Mar-04	W/BLF	F03-6932	03-Apr-05
Great Knot	062-76969	09-Feb-04	YLF	F03-6975	03-Apr-05
Great Knot	062-43151	29-Aug-98	YLF	F03-6908	03-Apr-05
Great Knot	062-57818	31-May-00	NLF, add W/B	F03-9324	03-Apr-05
Great Knot	062-79662	02-Mar-05	YLF(B8 Engraved)	F03-6976	03-Apr-05
Great Knot	062-72033	01-Oct-01	YLF	F03-6991	03-Apr-05
Great Knot	062-72180	04-Oct-01	YLF	F03-7126	03-Apr-05
Great Knot	062-71399	24-Sep-01	YLF	F03-7544	04-Apr-05
Great Knot	062-16092	08-Aug-98	YLF	F03-7032	04-Apr-05
Great Knot	F03-4478 (Damaged, replaced with new band)	09-Apr-04	W/BLF	F03-7468	06-Apr-05
Bar-tailed Godwit	072-55492	20-May-95	YLF	G06-0585	10-Apr-05
Great Knot	062-71181	23-Sep-01	YLF	F03-6304	11-Apr-05
Bar-tailed Godwit	072-81918	11-May-02	YLF	G06-0511	12-Apr-05
Bar-tailed Godwit	072-56099	24-Mar-96	YLF	G06-0533	12-Apr-05
Bar-tailed Godwit	072-81764	01-Nov-01	YLF	G06-0780	15-Apr-05
Bar-tailed Godwit	G05-0678 (Damaged, replaced with new band)	13-Apr-04	W/BLF	G06-0658	15-Apr-05
Great Knot	062-78646	08-Aug-04	YLF	F03-6447	15-Apr-05
Red knot	051-60507	18-Oct-97	OLF	F03-7656	06-May-05
Red Knot	052-22850		OLF	F03-7632	06-May-05
Red knot	C72183	02-Oct-04	Right: WLF with Y/R ring; Left: W/R ring	F03-6238	23-Mar-05

migratory flight.

Since the end of last century, about 4,100 ha of the marshland along the Dongtan beach had been reclaimed. The last two reclamations occurred in 1998 and 2001. Most of the reclaimed land previously provided good habitat for shorebirds to roost and feed. Yet Chongming Dongtan remains a crucial staging site for migratory shorebirds in the East Asian—Australasian shorebird flyway. Up to one

million shorebirds are estimated to use the area during northward migration as birds travel to their north Asian and Arctic breeding grounds (Scott 1989). It is currently the only place where the banding and flagging of migrant shorebirds is carried on regularly in China. Year to year changes in the tidal flat area and its environmental quality probably account for the diversity of shorebird species and numbers staging during the migrant seasons. Much remains to be learned about the role in the flyway of Chongming Dongtan, especially the relationship with north-west Australia. This requires the continued banding and flagging of shorebirds throughout the whole migratory season.

REFERENCES

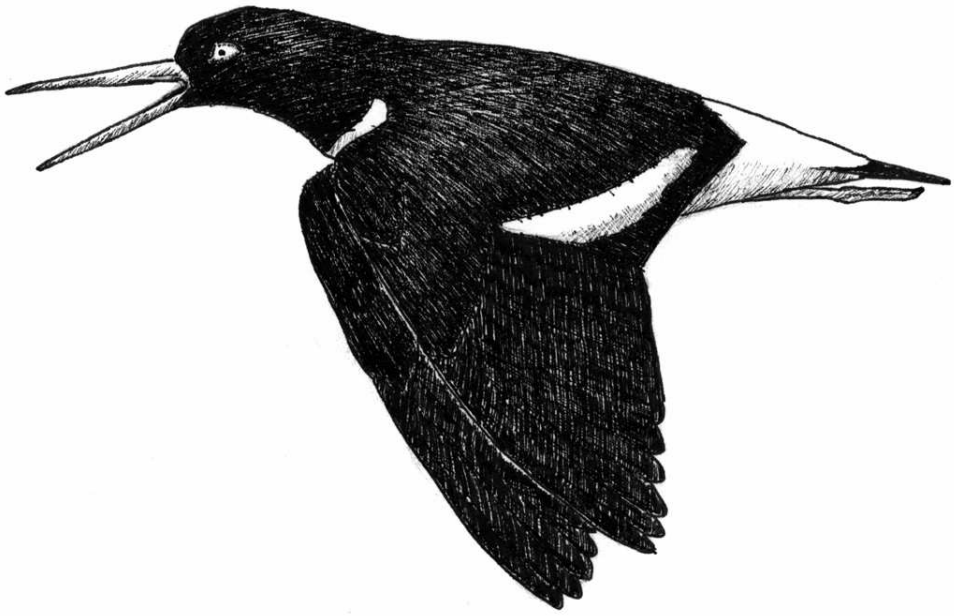
Barter, M. & T.H. Wang. 1990. Can waders fly non-stop from Australia to China? The Stilt 17: 36-39.

Battley and Pennyquick. In Battley, P. 2002 Behavioural ecophysiology of migrating Great Knots. Ph.D. Thesis. Australian School of Environmental Studies, Griffith University.

Green, M. and T. Piersma. In press. It pays to be choosy: waders migrating from Europe to Siberia fly on days with favourable winds and decrease travel costs substantially. Ibis.

Scott, D. A. (Ed). 1989. A Directory of Asian Wetlands. IUCN, Gland, Switzerland, and Cambridge, U.K.

Tulp, I., S. McChesney, & P. de Goeij. 1994. Migratory departures of waders from north-western Australia: behaviour, timing and possible migration routes. Ardea 82: 201-221



ARCTIC BREEDING SUCCESS IN 2005, BASED ON JUVENILE RATIOS IN WADERS IN AUSTRALIA IN THE 2005/2006 AUSTRAL SUMMER

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INTRODUCTION

A principal objective of the catching and banding programs of the Victorian Wader Study Group (in Victoria and South Australia) and the Australasian Wader Studies Group (in north-west Australia) is to catch a sufficient sample of each of the main wader species each austral summer to enable an annual index of breeding success to be determined. This index is the percentage of juvenile/first year birds in catches. The monitoring program started in south-east Australia in 1978/79, initially on a limited range of species, and has been undertaken systematically in north-west Australia since 1998/99, although some data were collected in earlier years.

Australia is well placed to undertake a breeding success monitoring role on migratory waders from the northern hemisphere because it is the terminus of migration for most species, with relatively static populations of both adult and juvenile birds in the period from November to mid-March. By standardising sampling techniques as much as possible potential biases in the results from year to year are minimised, with the result that both annual and longer term variations in breeding success are more likely to be detectable and meaningful.

The percentage juvenile results for each year since 1999 have been published in the Arctic Birds Newsletter (e.g. see Minton *et al.* 2005a) and more recently in The Stilt (e.g. see Minton *et al.* 2005b). A comprehensive paper on monitoring juvenile percentages in south-east Australia from 1978/79 has now also been published (Minton *et al.* 2005c). Attempts to correlate the findings with Arctic breeding conditions such as temperatures, date of snow melt and predation levels have also been made (Soloviev *et al*. in press, Boyd *et al.* 2005); these identified some associations between weather conditions, predation risk, and breeding success.

This paper gives the percentage juvenile results for the 2005/06 austral summer in both south-east and north-west Australia. These are an indication of the breeding success of the different wader populations in the Arctic summer of 2005.

METHODS

As usual, fieldwork was programmed to try and obtain a number of samples of each species at their principal locations in each study area. The catches are made at a similar time of year at each location. This is not always possible. In north-west Australia, mainly for climatic and logistical reasons, the main monitoring effort in the 2005/06 non-breeding season was brought forward to November/ early December from the late January/early March period employed in the two previous years. Only waders caught by cannon netting are included in the results presented. Last year some supplementary information on birds caught by mist netting was included but too few birds were mist netted this year.

The tables of results are presented in a similar form to previous years except that in the detailed catch information for the 2005/06 season in south-east Australia the long term median percentage juvenile figure is used as the yardstick for assessing breeding success. The average is however still used for judging the north-west Australia data because there is an insufficiently long data set for the median to be estimated reliably. The tables also give a subjective overall assessment of breeding success for each species, these categorisations being arrived at in a similar manner to those presented in Minton *et al.* 2005c. Average percentage juvenile figures, for the last eight years, are also still used in Tables 3 and 4.

RESULTS

The Victorian Wader Study Group spent 27 days in the field in the mid-November to 20 March monitoring period and made 32 cannon net catches which contributed to the south-east Australia data. In north-western Australia 23 days were spent in the field, with 20 cannon net catches – all except three of these being in a concentrated period between 13 November and 2 December. All this fieldwork is undertaken by volunteers, usually with a team of 10 to 20 people involved on each day. The main effort in north-west Australia was carried out during the AWSG expedition in November and December 2005.

The detailed results for the 2005/06 monitoring are presented in Table 1 for south-east Australia and Table 2 for north-west Australia. Data in these tables are for species for which 29 or more birds were caught. Tables 3 and 4 allow comparison of the 2005/06 results with those for the previous seven years.

Satisfactory catch totals were obtained for the seven species for which annual monitoring is attempted in south-east Australia. A much better sample of Curlew Sandpipers was obtained than in recent years, principally due to one excellent catch of 393 birds, when some 2,500 Red-necked Stints walked out of the catching area leaving the Curlew Sandpipers in it. The Red Knot sample was also better than usual because of a particularly good catch of 232 birds at the

Table 1. Percentage of juvenile/first year waders in cannon-net catches in south-east Australia in 2005/2006.

Species	Total Caught	Juv./1st year (#)	Juv./1st year (%)	S.E. (% pts)	Median Juv %	Assessment of breeding success
Red-necked Stint *Calidris ruficollis*	4034	299	7.4	0.41	14.0 (28 yrs)	Poor
Curlew Sandpiper *Calidris ferruginea*	558	149	26.7	1.87	10.0 (27 yrs)	Very good
Bar-tailed Godwit *Limosa lapponica*	274	109	39.8	2.96	14.3 (17 yrs)	Exceptionally good
Red Knot *Calidris canutus*	273	200	73.3	2.68	41.8 (15 yrs)	Very good
Ruddy Turnstone *Arenaria intepres*	223	63	28.3	3.01	9.9 (16 yrs)	Very good
Sanderling *Calidris alba*	185	115	62.2	3.57	12.6 (15 yrs)	Exceptionally good
Sharp-tailed Sandpiper *Calidris acuminata*	155	40	26.7	3.51	10.7 (25 yrs)	Very good
Great Knot *Calidris tenuirostris*	29	5	17.2	7.01	-	(Good)

Note. All birds cannon-netted in period 15 Nov to 28 Feb except for Red-necked Stint, Ruddy Turnstone, and Sanderling, for which catches up to 20 Mar are included.

Table 2. Percentage of juvenile/first year waders in cannon-net catches in north-west Australia in 2005/2006.

Species	Total Caught	Juv./1st year (#)	Juv./1st year (%)	S.E. (% pts)	Assessment of breeding success
Great Knot *Calidris tenuirostris*	673	82	12.2	1.26	Average
Bar-tailed Godwit *Limosa lapponica*	479	52	10.9	1.42	Average
Red-necked Stint *Calidris ruficollis*	478	97	20.3	1.84	Average
Red Knot *Calidris canutus*	139	79	56.8	4.2	Exceptionally good
Curlew Sandpiper *Calidris ferruginea*	95	35	36.8	4.95	Exceptionally good
Ruddy Turnstone *Arenaria intepres*	38	8	21.1	6.61	Good
Sanderling *Calidris alba*	29	4	13.8	6.4	-
Non-Arctic northern migrants					
Greater Sand Plover *Charadrius leschenaultii*	433	41	9.5	1.41	Very poor
Terek Sandpiper *Xenus cinereus*	273	36	13.2	2.05	Average
Grey-tailed Tattler *Heteroscelus brevipes*	242	37	15.3	2.31	Average
Common Greenshank *Tringa nebularia*	41	4	9.8	4.64	-
Whimbrel *Numenius phaeopus*	30	0	0	-	-

Note. All birds cannon netted in period 1 Nov to mid-Mar (actually all in period 13 Nov 2005 to 19 Feb 2006).

main Red Knot location in Corner Inlet. Unusually, three good catches of Bar-tailed Godwits were made, giving a larger than normal sample for this species.

Sampling in north-west Australia was more typical of other years with the usual species dominating catches, although a greater than normal sample of Red Knots was obtained. It was difficult to obtain a good sample of Curlew Sandpipers because, at their current reduced population level, they are dispersed thinly throughout flocks of other waders and it took 13 samples to accumulate a total of only 95 birds.

DISCUSSION

South-east Australia

Overall the 2005 Arctic breeding season for wader populations which spend the non-breeding season in south-east Australia appears to have been the best since 1991 and the second best in the 28 years over which these populations have been monitored. Bar-tailed Godwits and Sanderling had exceptional breeding success and that for Curlew Sandpiper, Red Knot, Ruddy Turnstone and Sharp-tailed Sandpiper was very good. Only Red-necked Stint fared poorly.

There is no obvious explanation of the mechanism which caused such poor breeding success for our most common species whilst other species had such good breeding years. A possible cause, not previously considered, could derive from the high breeding success in recent years. This was in fact the second consecutive poor breeding year for Red-necked Stint, with the 7.4% juveniles being even lower than the 10% of the previous year. These years follow four very good breeding performances in the previous six years (two at record levels). It is likely that the Red-necked Stint breeding populations in both 2004 and 2005 contained a greater proportion of young birds than normal. Young birds in most species tend to be less successful in their initial breeding attempts than older, more experienced, birds. Red-necked Stints breed for the first time towards the end of their second year. It is interesting to note from Table 3 that there was a marked reduction in breeding success two years after the exceptionally high breeding success of 1998. However this was not apparent two years after the other high breeding success year in 2001. Again poor breeding success in 2004 was two years after low breeding productivity in 2002, but the 2005 low breeding output did follow two years after good recruitment in 2003. These conflicting results appear to indicate that it is unlikely that a higher than normal level of inexperienced young birds in the breeding population was the prime cause of the very low breeding success in 2005,

Table 3. Percentage of first year birds in wader catches in South-east Australia 1998/1999 to 2005/2006.

Species	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	Average 98/99 to 05/06
Ruddy Turnstone	6.2	29	10	9.3	17	6.7	12	28	14.8
Red-necked Stint	32	23	13	35	13	23	10	7.4	19.5
Curlew Sandpiper	4.1	20	6.8	27	15	15	22	27	17.2
Sharp-tailed Sandpiper	11	10	16	7.9	20	39	42	27	21.6
Sanderling	10	13	2.9	10	43	2.7	16	62	20.0
Red Knot	(28)	38	52	69	(92)	(86)	29	73	52.2
Bar-tailed Godwit	41	19	3.6	1.4	16	2.3	38	40	20.1

All birds cannon-netted between mid-November and third week in March (except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only). Averages (for last eight years) exclude figures in brackets (small samples).

Table 4. Percentage of first year birds in wader catches in North-west Australia 1998/1999 to 2005/2006.

Species	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	Average 98/99 to 05/06
Red-necked Stint	26	46	15	17	41	10	13	20	*23.5*
Curlew Sandpiper	9.3	22	11	19	15	7.4	21	37	*17.7*
Great Knot	2.4	4.8	18	5.2	17	16	3.2	12.2	*9.9*
Red Knot	3.3	14	9.6	5.4	32	3.2	(12)	57	*17.8*
Bar-tailed Godwit	2.0	10	4.8	15	13	9.0	6.7	11	*8.9*
Non-Arctic northern migrants									
Greater Sand Plover	25	33	22	13	32	24	21	9.5	*22.4*
Terek Sandpiper	12	(0)	8.5	12	11	19	14	13	*12.8*
Grey-tailed Tattler	26	(44)	17	17	9.0	14	11	15	*15.6*

Note. All birds cannon-netted in the period 1 November to mid-March. Averages (for last eight years) exclude figures in brackets (small samples).

though it may have been a contributing factor. A detailed examination of environmental factors, such as weather conditions and predation, will be made but, given the overlap in breeding ranges and habitats between Red-necked Stints and other species, it would be very surprising if a single temperature, snowmelt, predation, or other factor can be found which might have affected Red-necked Stints only.

The very good breeding season experienced by Curlew Sandpipers in 2005 followed good breeding success in the previous year also. This is particularly welcome as it may herald the beginning of a population turnaround for this species which has declined markedly over the last 20 years.

Sharp-tailed Sandpipers had a third consecutive very good breeding year. The figures for 2005/06 were not quite as high as in the two exceptional years preceding but were well above the long term median and average. This run of good breeding success has noticeably and markedly increased Sharp-tailed Sandpiper populations from the low level they had reached after a long period of decline. The most recent result has consolidated the improvement.

Perhaps the most successful species in 2005/06 was the Bar-tailed Godwit. Despite the actual figure (39.8%) not being significantly higher than that of the previous year, all the indications from observations in the field suggest that juvenile Bar-tailed Godwits were far more numerous and widespread in the 2005/06 non-breeding season than in any other year in recent times. Data from the breeding areas of these birds in Alaska (Brian McCaffery pers. comm.) also indicated that 2005 was an exceptionally good breeding season for the Bar-tailed Godwit populations breeding in the north and west of Alaska. It is particularly interesting that the ratio between his 2005 figure and the average of other recent years was the same (about 3:1) as a similar ratio in south-east Australia. In absolute terms the juvenile percentage in Australia is higher than the Alaskan figure, in whole or in part because of the "New Zealand effect" in which some juveniles, which will ultimately join the New Zealand Bar-tailed Godwit populations, spend their first non-breeding season in Australia.

This New Zealand effect is most pronounced in the Red Knot. Very few first year birds of this species travel as far as New Zealand. This greatly increases the annual percentage juvenile figures for Red Knot in south-east Australia. Nevertheless the 73.3% juveniles recorded this year would still be classed as a very good breeding outcome for the Red Knot.

Sanderling was the other species which had an exceptionally good breeding season in 2005. The full extent of the breeding grounds of the Sanderling population which comes to south-east Australia is not known and therefore linking this outcome to particular factors will be difficult. The only breeding season recovery of a south-east Australian banded Sanderling was in the New Siberian Islands so it is interesting that the Red Knot population from there, which mainly spends the non-breeding season in north-west Australia, also experienced an exceptionally good breeding season in 2005. At the main location in Victoria, the size of the flock in the non-breeding season, 600 to 800 birds, was almost double the normal level for a while because of the huge numbers of juveniles present. This high concentration later dispersed because Sanderling move quite widely between different locations on the coast in the non-breeding season.

North-west Australia

The overall outcome of the 2005 breeding season for wader populations which spend the non-breeding season in north-west Australia was above average, but not quite so good as in south-east Australia. There are some interesting similarities and contrasts. Curlew Sandpiper and Red Knot both had exceptionally good breeding seasons, not dissimilar to the very good performance of both these species in south-east Australia. This is in spite of the fact that two different subspecies of Red Knot are concerned. The north-west Australian population is predominantly subspecies *piersmai* which probably breeds mainly in the New Siberian Islands; the south-east Australian population is predominantly subspecies *rogersi* which probably breeds mainly in Chukotka in the far northeast of Siberia. The breeding location of Curlew Sandpipers from north-west Australia is not known but probably overlaps significantly with that of birds from south-east Australia (mainly northern Yakutia); it could even be in the New Siberian Islands which would account for its high breeding success in 2005.

The figure of 56.8% juveniles for Red Knot in north-west Australia is exceptional as the "New Zealand effect" does not apply there. The high figure may, in part or in whole, be an artifact of sampling relatively early in the non-breeding season when there is a greater tendency for juvenile birds to occur in separate flocks; later in the season, they become more integrated with the general population.

Red-necked Stints from north-west Australia had a noticeably higher juvenile percentage than did those from south-east Australia in 2005. Recoveries and flag sightings on or near the breeding grounds indicate that there is wide overlap in breeding areas between these populations. It might be expected that their juvenile percentages would follow similar patterns over time. It is therefore a little surprising that the data for the last eight years (Tables 3 & 4) show no evidence this.

The Bar-tailed Godwits which spend the non-breeding season in north-west Australia (subspecies *menzbieri*) breed in northern Yakutia. They only had an average breeding season in 2005, much lower than the Bar-tailed Godwits from Alaska (subspecies *baueri*) which go to south-east Australia (and New Zealand).

The Greater Sand Plover was the exception in 2005/06 with a very poor breeding outcome – the lowest juvenile percentage recorded for this species. The reason or reasons for such an apparently poor breeding season are unknown. This species breeds further south than the other species monitored, is not subject to the high predation risks of Arctic breeders, and could well have experienced unusually adverse weather conditions at a critical stage of its breeding cycle and over a widespread part of its breeding range. Another possibility is a catastrophic first southward migration of the year's juveniles.

FUTURE WORK

It is by now well known that many wader species are in decline. Higher mortality or reduced breeding success are the only factors which can lead to reductions in population numbers. The effects of changes in these factors cumulate from year to year and there is a real need to monitor them in order to gain an understanding of the underlying causes of any population changes that might be occurring. Monitoring breeding success on the breeding grounds is impracticable. Australia, being at the end of the flyway is the natural place to study variations in breeding success as indicated by the proportion of juveniles in cannon net catches and has been in the forefront of this monitoring effort. The VWSG's database on juvenile percentages is the longest such series in the world. It is imperative that it continue.

The intensive VWSG monitoring program will be resumed in mid-November 2006 and continued until mid-March 2007. Juvenile percentages in north-west Australia will again be monitored as part of a special expedition, which will take place from 4 to 25 November in 2006.

ACKNOWLEDGEMENTS

The dedication and efforts of the teams who put so much time into the fieldwork activities in order to obtain comprehensive data are very greatly appreciated. Quite often such teams are assembled at short notice in order to take advantage of a perceived sampling opportunity. Land owners and licensing authorities are also thanked for facilitating access and approving banding and catching activities.

REFERENCES

Boyd, H., C. Minton, & K. Rogers. 2005. Has the timing of snowmelt in eastern Siberia affected the numbers of juvenile waders wintering in south-east Australia? The Stilt 48: 2-9.

Minton, C., R. Jessop, P.Collins, & C. Hassell. 2005a. Arctic breeding success in 2004, based on juvenile ratios in waders in Australia in the 2004/2005 austral summer. Arctic Birds 7: 46-50.

Minton, C., R. Jessop, P.Collins, & C. Hassell. 2005b. Juvenile percentages of migratory waders in the 2004/05 Australian summer. The Stilt 47: 10-14.

Minton, C., R. Jessop, P.Collins, & K. Gosbell. 2005c. Monitoring wader breeding productivity by the proportion of first year birds in wader populations in S. E. Australian non-breeding areas. Status and Conservation of Shorebirds in East Asian-Australasian Flyway. Proceedings of the Australian Shorebirds Conference, Canberra, Dec. 2003. IWSG Special Publication 17 and Wetlands International Global Series 18 pp. 73-85.

Soloviev, M.Y., C. Minton, & P.S. Tomkovich. In press. Breeding performance of tundra waders in response to rodent abundance and weather from Taimyr to Chukotka, Siberia. Proceedings of the Waterbirds Around the World Conference, Edinburgh, 2004.

NORTH-WEST AUSTRALIA WADER AND TERN EXPEDITION 12 NOVEMBER TO 3 DECEMBER 2005

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INTRODUCTION

This was the second AWSG Expedition to north-west Australia (NWA) in 2005 and the twenty-fifth since detailed wader studies started there in 1981. Weather conditions were favourable throughout with temperatures being less hot than in previous expeditions and there were few thunderstorms. The majority of the principal objectives were met. This report has been prepared as a permanent record of events. It starts with a summary of the main results relating to each of the objectives specified in the pre-expedition brochure and to other objectives which were added later.

ACHIEVEMENTS IN RELATION TO SPECIFIED OBJECTIVES

a) A total of 3,012 waders of 24 species were caught in 19 cannon net catches and one mist netting session (Table 1). This is marginally higher than the total of birds caught on other recent three week long NWA expeditions. Birds were caught at Roebuck Bay, Broome (1,727), Eighty Mile Beach (1,271), and on Anna Plains Station (14 mist netted). The average cannon net catch was 158 birds. The largest catch was 530 on 1 December.

Great Knot (639), Red-necked Stint (455), Bar-tailed Godwit (438), and Greater Sand Plover (405) dominated the catches as in previous years. Terek Sandpiper (273) and Grey-tailed Tattler (242) were also caught in reasonable numbers together with a better than usual total of 138 Red Knot. Because of the dry conditions inland an unusually large number of Red-capped Plover (127) were caught. Yet again Curlew Sandpipers were hard to come by and the meagre total of 93 was made up of contributions from 12 different catches.

Just over 10% (316 birds) of the wader catch already carried bands. Several were from elsewhere in Australia but four were carrying bands put on at Chongming Dao (CMD) near Shanghai in China. Zhang Kejia, who had banded these in China, was a member of the expedition team. The three Great Knot were all banded in early April 2005; two caught on the same day (18 November) at Eighty Mile Beach were banded together on the same day (3 April) at CMD. One of these was previously banded at Eighty Mile Beach in October 2001 before being caught in China. The Bar-tailed Godwit was originally banded at CMD on 13 April 2004.

b) Useful catches of some of the less frequently caught species were made including 30 Whimbrel (all in the first catch), 41 Common Greenshank, 38 Ruddy Turnstone and 29 Sanderling. We failed to catch any Black-tailed Godwits, only caught seven Little Curlew (the Plains were too dry after the previous poor wet season), and five Oriental Pratincole which had barely appeared over the horizon before the end of the expedition so only five were caught. Catching 12 Marsh Sandpipers was unexpected.

c) The timing of this expedition in November/December proved much more suitable for tern studies than the January to early March period. Huge flocks of Common and Roseate Terns (probably more than 5,000 of each) were located (by Broome resident George Swann) roosting on the beaches at Coulomb Point, about 70 km north of Broome. The fieldwork program allowed only one visit, but two catches were made – 136 Common Terns and 48 Roseate Terns. In total, 237 terns, of eight species, were caught during the expedition (Table 1).

Scanning the tern flocks at Coulomb Point by Adrian Boyle, Chris Hassell and Danny Rogers produced the exciting sighting of one carrying an engraved leg flag from Taiwan. This is the first proof that Roseate Terns from the Northern Hemisphere breeding populations visit north-west Australia during the non-breeding season.

d) The percentage juvenile figures indicate that most of the wader populations spending the non-breeding season in north-west Australia had experienced an average or above average breeding success in the Arctic summer of 2005 (Table 1). Two species, Red Knot and Curlew Sandpiper, had exceptionally high figures (56.5% and 37.6% juveniles respectively). Most of the Red Knot in north-west Australia are thought to be of the *piersmai* subspecies which breeds in the New Siberian Islands. It is interesting that the Sanderling in south-east Australia, which are thought to breed in the same area, also had an exceptionally good breeding result in 2005. The high Curlew Sandpiper figure may indicate that many of the NWA Curlew Sandpipers also come from that location though (surprisingly) there are not yet any recoveries or flag sightings of NWA-marked Curlew Sandpipers

Table 1. NWA Nov/Dec 2005 – Species Catch Totals and % Juveniles

WADERS	**to 11Nov06**	**12-Nov-06 to 03-Dec-06**					
	Total	**Catch Totals**			**Juveniles**		
Species	**New**	**New**	**Retrap**	**Total**	**No.**	**%**	**Comments**
Great Knot	17457	584	55	639	79	12.4	Average
Red-necked Stint	13344	406	49	455	93	20.4	"
Bar-tailed Godwit	10316*****	349	89	438	51	11.6	"
Greater Sand Plover	9653	375	30	405	39	9.6	Lowest ever
Terek Sandpiper	5862	249	24	273	36	13.2	Average
Grey-tailed Tattler	5723	211	31	242	37	15.3	"
Red Knot	5236	123	15	138	78	56.5	Very high
Red-capped Plover	1023	124	3	127	1	0.8	
Curlew Sandpiper	9319	87	6	93	35	37.6	Very high
Common Greenshank	230	40	1	41	4	9.8	
Ruddy Turnstone	1498	33	5	38	8	21.0	Good
Whimbrel	275	28	2	30	-	0.0	
Sanderling	650	28	1	29	4		
Marsh Sandpiper	200	12	-	12	1		
Eastern Curlew	182	7	-	7	1		
Little Curlew	1254	7	-	7	-		
Pied Oystercatcher	242	4	3	7	-		
Oriental Plover	459	6	-	6	1		
Sharp-tailed Sandpiper	1442	4	1	5	-		
Lesser Sand Plover	419	5	-	5	-		
Oriental Pratincole	467*****	5	-	5	5		
Pacific Golden Plover	30	4	-	4	-		
Grey Plover	286	2	1	3	2		
Broad-billed Sandpiper	1252	3	-	3	1		
Waders (24 species)		**2696**	**316**	**3012**			

* These totals include 18 Bar-tailed Godwit and 1 Oriental Pratincole banded after 03-Dec-05 and before 01-Jan-06.

TERNS		**Catch totals**			**Juveniles**	
Species		**New**	**Retrap**	**Total**	**No.**	**%**
Common Tern		135	1	136	11	8.1
Roseate Tern		47	1	48	1	2.1
Whiskered Tern		22	-	22	-	
Gull-billed Tern		13	1	14	-	
Crested Tern		8	-	8	-	
Lesser Crested Tern		3	-	3	-	
White-winged Black Tern		3	-	3	-	
Little Tern		3	-	3	1	
Terns (8 species)		**234**	**3**	**237**		

GRAND TOTAL (32 species)	**2930**	**319**	**3249**

in the breeding locations to indicate exactly where they come from.

Greater Sand Plovers appear to have had a disastrous breeding season in 2005 with only 9.6% juveniles. Normally they head the list of the species regularly monitored in NWA, with the figure only being below 20% once in the previous seven years.

Detailed comments on juvenile percentage monitoring are in Minton (2006).

e) The expedition was most successful in adding another 1,210 engraved flags to waders at Roebuck Bay, Broome (Table 2). It was particularly pleasing that the highest totals were achieved for the four species which are the prime target in Alice Ewing's PhD survival rate studies (Bar-tailed Godwit, Great Knot, Greater Sand Plover and Grey-tailed Tattler). Overall, 2,430 birds have now been marked with these individually engraved flags at Broome.

The initial results of this project are highly encouraging. At the time the expedition started some 70% of the 1,220 birds marked earlier in 2005 with engraved flags had been resighted by Alice Ewing and other locally based observers such as Chris Hassell, Adrian Boyle and members of the Broome Bird Observatory staff. Most of these sightings were within Roebuck Bay but two birds had moved to Eighty Mile Beach and eight had been seen in Asia during

Table 2. Engraved flags applied in NWA

SPECIES	Feb/Mar 2005 Expedition	NWWSG 2005	Nov/Dec 2005 Expedition	TOTAL (Feb-Dec 2005)
Great Knot	368	43	272	**683**
Bar-tailed Godwit	128	60	381	**569**
Greater Sand Plover	119	54	169	**342**
Grey-tailed Tattler	125	1	125	**251**
Red Knot	24	47	119	**190**
Terek Sandpiper	108	7	40	**155**
Ruddy Turnstone	23	1	33	**57**
Black-tailed Godwit	50	1	0	**51**
Common Greenshank	5	35	10	**50**
Whimbrel	0	0	30	**30**
Curlew Sandpiper	0	0	19	**19**
Marsh Sandpiper	0	14	0	**14**
Eastern Curlew	0	3	7	**10**
Pacific Golden Plover	0	0	4	**4**
Grey Plover	0	3	1	**4**
Asian Dowitcher	1	0	0	**1**
Total	**951**	**269**	**1210**	**2430**

northward migration in April 2005. It is remarkable that seven of these eight birds have subsequently been resighted back at Broome after they had returned on southward migration.

Expedition members took every opportunity to scan for engraved leg flags during the expedition and one day at Broome was specifically set aside for this purpose. More than 200 sightings were added to the total.

f) During the expedition 70 birds were seen which had been flagged away from north-west Australia (Table 3); 61 of these, including 36 Great Knot and 20 Bar-tailed Godwits, were banded at Chongming Dao in China. This is an indication of the phenomenal banding success there in the last three years.

The most notable flag sightings were the first flagged Grey Plover from China to be seen in Australia, a Bar-tailed Godwit from only eight flagged in South Australia, and the first Grey Plover and only the fifth Great Knot from Victoria.

There have been 1,495 overseas sightings and 176 sightings elsewhere in Australia of waders flagged in north-west Australia. Of the overseas sightings, 96.9% have been in six countries: Hong Kong (30.4%), mainland China (16.6%), Korea (15.9%), New Zealand (15.1%), China (Taiwan) (13.7%), and Japan (5.3%). The ten species, comprising 96.2% of overseas sightings were: Bar-tailed Godwit (18.1%), Great Knot (17.7%), Red Knot (14.9%), Curlew Sandpiper (14.4%), Red-necked Stint (9.7%), Grey-tailed tattler (8.0%, Greater Sand Plover (5.8%), Terek Sandpiper (4.1%), Sanderling (2.1%), and Black-tailed Godwit (1.4%)

g) The systematic collection of a feather from a representative sample of each species and age group at each location is now part of the AWSG (and VWSG) fieldwork program. The C13 and N15 isotope signatures found by analysing wader feathers depend on the location where each feather was grown. By collecting a greater covert from the outer part of the wing, which in most waders is grown at the principal non-breeding area, it will in due course be possible to identify individuals from the various non-breeding areas. Also signatures on juvenile waders may help in determining their natal area.

This is a long term project where the full picture can only be established once a collection of feathers from the main areas used by that species has been assembled. So far analysis has only started on the Red Knot, where our contribution is part of a worldwide study on this species.

h) On most recent expeditions, and intermittently on earlier expeditions back to 1981, veterinary specialists have joined us to take advantage of having waders in the hand to collect blood samples and cloacal swabs for examination for avian borne diseases. The intensity of effort, and interest in the results, has escalated recently since the increased world-wide awareness of Avian Flu. John Curran and a small team from the Australian Quarantine Inspection Service again joined us for several days during our visit to Eighty Mile Beach. This time they collected over 500 cloacal swabs. Testing so far has not revealed the presence of the H5N1 Avian Flu virus or its antibodies, a negative result similar to that found elsewhere in Australia.

Testing over the years has established that only a very small percentage of waders (less than 1%) carry any form of avian flu virus (there are many different strains) or have previously been exposed to one. Since most principally spend their time on intertidal shores they are relatively unlikely to come into contact with domestic poultry (Avian flu is principally a poultry disease, not a disease of wild birds). The long non-stop migrations, often lasting several days, employed by most waders visiting Australia is also another potential

Table 3. Flag sightings made during NWA Nov/Dec 2005 expedition of birds banded outside north-west Australia.

	China (mainland)	Taiwan (China)	Australia		
Species	**Chongming Dao**	**ChiShan Is**	**SA**	**VIC**	**Total**
Bar-tailed Godwit	20		1		**21**
Terek Sandpiper	2				**2**
Great Knot	36			1	**37**
Red Knot	1			1	**2**
Red-necked Stint	1			2	**3**
Curlew Sandpiper				2	**2**
Grey Plover	1			1	**2**
Roseate Tern		1			**1**
Total	**61**	**1**	**1**	**7**	**70**

safeguard against the H5N1 virus reaching Australia via migratory waders. An infected bird would be fairly unlikely to successfully achieve such an arduous journey.

Facilitating blood and cloacal swab monitoring of waders by AQIS staff will continue to be a regular component of future NWA expeditions.

i) One of the original stated objectives of the expedition was to carry out population counts. Comprehensive counts of Roebuck Bay, Bush Point, and the northern 60 km of Eighty Mile Beach are currently being made biannually as part of the AWSG's MYSMA project obviating the need for the expedition to undertake these counts. The expedition team did, however, make relevant counts and population estimates at all locations visited. Particularly noticeable on this expedition was the very low numbers of Oriental Plover and Little Curlew on Anna Plains and Roebuck Plains. The poor wet season in early 2005 meant that there was no standing water in either of these areas and that much of the pasture land was too bare and dry to provide a good food supply. The good 2005/06 wet season following the expedition will hopefully result in much more favourable habitat conditions and better populations of these pastureland species during the next NWA expedition in November 2006.

OTHER MATTERS

Participants

Twenty five people from five different countries participated: 12 from Australia (6 Victoria, 3 Western Australia, 2 New South Wales, 1 South Australia); 10 from Great Britain; and one from each of Japan, China, and USA (Alaska). It has been a long term feature of NWA expeditions that approximately half the participants are from overseas.

Itinerary

As planned, ten days were spent at Broome (based at Broome Bird Observatory), eight days at Eighty Mile Beach (based at Anna Plains Station) and two days were spent on travelling between locations.

Finances

Income/expenditure details are shown below. Income includes a $500 donation by AQIS for facilitating their collection of samples for testing for avian borne diseases. Expenditure on food was less than anticipated – we plan to be a little more generous with "nibbles" and some other items next time! Equipment costs are not yet complete, with significant new items still to be paid (replacement engraved flags, new small mesh cannon net). Nevertheless it is expected that there will still be a small surplus to be carried forward to the November 2006 expedition.

NWA 2005 (14 Nov. to 3 Dec.) Interim Accounts

Income			
Payments by participants	Food & other costs	11350	
	Transport	9370	20720
AQIS			500
	TOTAL INCOME		**21220**
Expenditure			
Food			4574
Transport	Fuel	2154	
	Servicing & repairs	4397	
	Hertz rental	1554	8105
Equipment			3275*
Miscellaneous			516
	TOTAL EXPENDITURE		**16470**
	Interim Surplus (carried forward to next expedition)		**4750**

*Other items still to come (engraved flags, new net)

Habitat maintenance

The pool around one of the hot bores near Anna Plains Station, which was created with our guidance a few years ago and which is regularly used by species such as Little Curlew and Brolga, was becoming too overgrown with shrubs and rushes around its perimeter. We were fortunate to

have a heavy machinery driver, Les George, from the Lake Macleod Saltworks near Carnarvon in Western Australia with us as a member of the team. John Stoate, the owner of Anna Plains Station, kindly loaned a small bulldozer and gave permission to clear parts of the perimeter of the pond. This was a full half day's work by a small team but the improved habitat was immediately recognised and appreciated with additional waterbirds (ducks) arriving the very next day.

It is intended to maintain this habitat in future years in a suitable condition for use by a variety of species, especially Little Curlew and Brolga. John Stoate has also offered to create an open lagoon area suitable for these and other species out on the plain itself at a location where there is an unutilised water supply about 25 km southwest of the station itself. This will hopefully attract many more birds to the plains and could even be a high tide roosting site for some coastal species, especially in rough weather. This proposal will be followed up further during the next expedition, when initial excavations may also be commenced.

BANDING SUMMARY FOR NWA

Table 1 shows that 101,012 waders have now been caught in the 25 years between August 1981 and December 2005. Of these, 87,458 have been banded during special expeditions and over 13,487 by the locally based team (NW Wader Study Group) in conjunction with Broome Bird Observatory. Over 90% of waders were caught at Roebuck Bay, Broome (59.7%) and Eighty Mile Beach (30.6%). The remainder were caught at Port Hedland Saltworks (5.7%) and on Roebuck Plains (2.8%) and Anna Plains (1.1%) stations. The leading species are Great Knot (19,561), Red-necked Stint (15,255), Bar-tailed Godwit (11,847), Greater Sand Plover (11,282) and Curlew Sandpiper (10,267). More than 1,000 have been caught of eight other species. In total 8852 were retraps – about 9% of birds caught.

NEXT EXPEDITION

This expedition confirmed that November is a good time to carry out the annual percentage juvenile monitoring and other objectives of NWA expeditions. It does not have quite the extremes of weather as can occur in the late December to mid-March period. The next expedition to NWA will therefore take place from 4 to 25 November 2006. Full details can be obtained from Clive Minton or Roz Jessop. It is hoped to have a team of around 22 people in the field throughout the three week period.

ACKNOWLEDGEMENTS

The success and enjoyment of the expedition was dependent on many people. Special thanks go to everyone involved with Broome Bird Observatory (BBO) including Helen Macarthur (the Chairperson, but also the advisor on catering), Stuart Young (the acting warden) and Rhyllis and John (who ran the BBO campsite). John Stoate is thanked enormously for permission to visit Anna Plains and for providing a marvellous house as our base as well as giving us assistance in numerous other ways. His staff - Geoffrey, John, Deborah and Andy - are all also greatly thanked for their assistance and friendliness.

ChungYu Chiang is especially thanked for organising the manufacture of our engraved leg flags in Taiwan.

CALM Kimberley is thanked for their financial support of Zhang Kejia for flights and expedition costs and to the BBO for free accommodation.

The Australian Bird Banding Office and CALM provided the appropriate licenses for carrying out our banding activities as well as providing support in a number of other ways.

Thanks most of all though go to the hard working and harmonious team that achieved so much, while still enjoying themselves in the, at times, hot and humid climate in NWA. Maureen Christie was a wonderfully efficient catering manager. Names of the expedition participants follow.

The following persons participated in all or the majority of the 22 day expedition:

Clive Minton
Patrick Guay
Prue Wright
Chris Hassell
Les George
Graham Fry
Anthony Roberts
Mike Lofthouse
Brian Little
Daphne Watson
Naoko Takeuchi
Steve Kendall
Peter Collins
Alice Ewing
Maureen Christie
Frank O'Connor
Alan Leishman
Holly Sitters
Vivian Roberts
Wendy Lofthouse
Keith Grant
Mike Watson
Cath Watson
Kejia Zhang

In addition the following assisted for shorter periods or on an ad hoc basis when the expedition was based at Broome:

Liz Rozenberg
Danny Rogers
Adrian Boyle
Andrea Spencer
Steve Young

REFERENCE

Minton, C., R. Jessop, P. Collins, & C. Hassell. 2006. Arctic breeding success in 2005, based on juvenile ratios in waders in Australia in the 2005/2006 austral summer. Stilt 49: 32-35.

A CENSUS OF THE BREEDING POPULATION OF PIED OYSTERCATCHERS *HAEMATOPUS LONGIROSTRIS* IN CORNER INLET, VICTORIA

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A survey of breeding Pied Oystercatchers in Corner Inlet in south-east Victoria indicated that numbers may have increased since the previously less comprehensive census in 1996. The 446 pairs represent 15% of the estimated Australian breeding population. There was a strong preference for breeding on fox-free islands. An additional 286 Pied and 160 Sooty Oystercatchers were counted in non-breeding flocks during the survey.

INTRODUCTION

Corner Inlet is an extensive coastal embayment in South Gippsland, Victoria. Nearly all of its shores and waters are included in Nooramunga Marine and Coastal Park (MCP) to the east and Corner Inlet Marine and Coastal Park (MCP) to the west. In 1996, an aerial survey of Nooramunga MCP provided the first comprehensive results on the distribution of Pied Oystercatchers in eastern sector of the Inlet (Minton 1997). This survey confirmed the impression from previous counts, undertaken in those areas of the park accessible by boat and ground-based counters, of the importance in both Victoria and Australia of Corner Inlet as a breeding area for Pied Oystercatchers. This work also established the effectiveness of a helicopter for conducting a comprehensive survey of the Inlet where access to many areas by either boat or across land is difficult and time-consuming. Another significant finding was the importance of the area for non-breeding Pied Oystercatchers during the breeding season.

With one exception, other counts of Oystercatchers undertaken in the Inlet have not differentiated between breeding and non-breeding birds. The exception is a three-year study conducted from 2000/01 to 2002/03 by the Victorian Wader Study Group (VWSG), on the breeding effort by Pied Oystercatchers on two of the barrier islands in Nooramunga MCP, that included a count of breeding pairs (Collins *et al*. 2003).

The current survey was undertaken in response to recommendations of the report on the 1996 survey to undertake a count of the entire Corner Inlet area and to continue monitoring Pied Oystercatchers during the breeding season to document any trends in the population.

METHOD OF AERIAL SURVEY

The survey was conducted by helicopter along the shores of all the islands and mainland coastline of Nooramunga MCP on the 30 October 1995 and of Corner Inlet MCP on the 31 October 1995. Weather conditions on both days were fine, dry and calm, resulting in excellent visibility. As in 1996, on both days flights took place at high tide to ensure breeding pairs were on their territories and close to nest sites during the survey.

Both the numbers and locations of birds were marked on a large-scale map. Most non-flocking Pied Oystercatchers were in obvious breeding pairs, standing in close proximity. In some instances one member could be seen either sitting on, or just leaving a nest. Two individuals standing only a short distance apart were counted as a pair. Single birds on suitable breeding habitat and appearing to maintain territory were also considered as part of a pair (and two birds were recorded although the second was unseen).

RESULTS

The survey results for Nooramunga MCP and Corner Inlet MCP are shown in Tables 1 and 2.

Breeding pairs

The total number of breeding pairs of Pied Oystercatcher counted was 446, with 402 (90%) sighted in Nooramunga MCP. Of these 402 pairs, 352 (88%) were located on the numerous islands within the park with the largest concentration of 115 pairs (26%) on Sunday Island. The remaining 50 pairs (12%) were located on the mainland coast. Forty-four pairs (10% of the total) were sighted in Corner Inlet MCP, with 30 of these pairs (68%) located along the mainland coast and only 14 pairs (28%) found on islands. This marked difference in distribution between the eastern and western sectors of Corner Inlet reflects the greater occurrence of sandy spits and beaches and muddy inlets lined by saltmarsh, used as nesting sites by Pied Oystercatchers, on the islands and the mainland coast of Nooramunga MCP. In contrast, much of the mainland coastline and islands of Corner Inlet MCP are either rocky or cliffed or dominated to a greater extent by mangrove shrubland.

Throughout the inlet, pairs were distributed along virtually all areas of sandy shoreline and saltmarsh-lined, muddy inlets observed during the survey. The exception to this was the low numbers counted on Snake Island and Little Snake Island. Snake Island is the largest island in Corner Inlet. This poor usage by Pied Oystercatchers in what appears to be suitable nesting habitats is likely to have been influenced by the presence of foxes, which infest both of these islands. This conclusion is supported by the high

Table 1. Results of the Pied and Sooty Oystercatcher aerial survey. Nooramunga MCP, Corner Inlet (October 2005). Bracketed numbers are the sub-totals counted on the islands named.

Location		Pied Oystercatcher breeding pairs	Pied Oystercatcher (non-breeding birds)	Sooty Oystercatcher (non-breeding birds)
Toora Beach- Port Welshpool		13	7	4
Port Welshpool- Port Albert	Coast Islands	23 28 Snaggy (12) One Tree (6) Inland of One Tree (2) Sheep (1) Scrubby and offshore (7)	28 25	0 0
Port Albert- Manns Beach	Coast Islands	(Inc. Hunter Island) 5 8 Horn (2) Dog (4) Mangrove Root (1) One Tree (1)	20 48 Dog (48)	1 17 Dog (17)
Manns Beach- McLoughlins Beach	Coast Islands	7 30 Margaret (8) East Scrubby (15) Little (7)	5 0	0 8 Little (8)
End of Ninety- Mile Beach		2	0	0
Dream Island		26	0	0
Box Bank		49	0	0
Clonmel Island		52	75	4
Rescue Island		6	0	0
Old Man Clumps		8	0	0
Shag Island		9	0	1
Snake Island Inc. Clonmel Banks		20	30	12
Little Snake Island		1	0	0
Sunday Island		115	0	0
Total		**402**	**238**	**62**

numbers of Oystercatchers (115 pairs) seen on Sunday Island, the only island in the inlet considered free of foxes and other introduced predators such as cats. High numbers of breeding pairs were also recorded on barrier islands such as Box Banks and Clonmel, where in recent years foxes are suspected to be only present sporadically.

The number of breeding pairs is significantly higher than the 250 counted in Nooramunga MCP in the 1996 survey (Minton 1997). Comparison of location counts shows that, in general, counts along the mainland coast were similar while counts on islands were higher. The exception to this was both Snake and Little Snake Islands where numbers were similar (i.e. very low) in both surveys.

Flocks

Totals of 286 non-breeding Pied Oystercatchers and 160 Sooty Oystercatchers were counted during the survey. Most Pied Oystercatcher were counted in Nooramunga MCP (83% of total) while the opposite occurred with Sooty Oystercatcher with 61% counted in Corner Inlet MCP. Count totals for both species were similar to that of the 1996 count (Minton 1997). The range of flock sizes and pattern of distribution around Nooramunga MCP were also consistent with those observed in the 1996 survey.

DISCUSSION

The results of this survey further confirm the importance of Corner Inlet as both a breeding and non-breeding area for Pied Oystercatchers in Australia. Minton (1997) estimated the national breeding population at 3,000 pairs. Based on this figure, in the last breeding season Corner Inlet provided habitat for nearly 15% of this total. The overall number of Pied Oystercatchers (1,624) also represents 16% of the total Australian population as estimated by Watkins (1993) at 10,000 birds.

The count of breeding Pied Oystercatchers is a significant increase over previous surveys. Minton (1997) considered that data from ground counts of selected locations prior to the 1996 aerial survey indicated that figure of 250 pairs was a slight underestimate of the annual population. It appears therefore that an increase in the population has occurred over the last decade but to a lesser extent than the results necessarily indicate. A continued monitoring

Table 2. Results of the Pied and Sooty Oystercatcher aerial survey. Corner Inlet MCP, Corner Inlet (October 2005). Bracketed numbers are the sub-totals counted on the islands named.

Location		Pied Oystercatcher breeding pairs	Pied Oystercatcher (non-breeding birds)	Sooty Oystercatcher (non-breeding birds)
Toora-Port Franklin		2	0	0
Port Franklin-Foster Beach		7	11	6
Foster Beach-Roussac Beach	Coast Islands	2 2	0 0	17 4
Roussac Beach-Duck Point		4	0	4
Duck Point-Millers Landing	Coast Islands	2 7 Long Island (7)	1 0	19 0
Millers Landing-Chinamans Swamp	Coast Islands	11 5 Low Island (4) Bennison (1)	36 0	34 0
Chinamans Swamp-Entrance Point		2	0	18
Total		**44**	**48**	**98**
Combined total		**446**	**286**	**160**

program is required to confirm the long-term, sustained numbers of breeding pairs in the Inlet.

The results of this survey may reflect the complexities of implementing successful programs to control introduced predators in an area like Corner Inlet. Following the 1996 survey, Parks Victoria, the managing agency for both Nooramunga and Corner Inlet MCP, has periodically undertaken fox control works on a number of barrier islands. The increased breeding activity recorded by this survey on several of these islands may, in part, result from successful suppression of predation. This conclusion is given some support by a comparison of counts of breeding pairs of Pied Oystercatchers on Dream Island and Box Bank in 1996, prior to the start of fox control works, and again in 2002 and this study (see Table 3). These islands are small and are surrounded by deep water channels that are presumed difficult for foxes to cross successfully. In contrast, Snake and Little Snake Islands are relatively large and, at very low tides, are separated from the mainland, and each other, by shallow channels. The lack of any observable increase in breeding activity highlights the difficulties associated with achieving eradication of foxes on larger islands, especially those more accessible to recolonisation.

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REFERENCES

Collins, P., P. Anton, L. Beasley, A. Ewing, B. Hansen, & J. Deleyev. 2003. Report on the Corner Inlet Pied Oystercatcher Breeding Success Study 2002/3. Unpublished report to Coast Action/Coastcare, DSE, Yarram, Victoria.

Minton, C. 1997. Breeding season census of Pied Oystercatchers *Haematopus longirostris* in Corner Inlet, Victoria. The Stilt 30:35-38.

Watkins, D. 1993. National Plan for Shorebird Conservation in Australia. RAOU Report 90.

Table 3. Comparision of numbers of breeding pairs of Pied Oystercatchers counted on Dream Island and Box Bank, Nooramunga MCP between 1996 and 2005.

Location	Number of breeding pairs by year of survey		
	1996 (Minton 1997)	**2002/3 (Collins et al., 2003)**	**2005**
Dream Island	-	16	26
Box Bank	30	54	49

POSSIBLE TERRITORIAL BEHAVIOUR OF COMMON SANDPIPER ON NON-BREEDING GROUNDS

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Common Sandpipers *Actitis hypoleucos* are easily seen during the Australian summer months on the embankments of the sewage ponds at Leanyer, a northern suburb of Darwin in Australia's Northern Territory. Often solitary during its non-breeding visit to Australia (Lane 1987), we have on many occasions observed interactions between two, and on at least one occasion, three Common Sandpipers that may represent territorial defence of feeding areas.

On 16 September 2005, we observed a Common Sandpiper with its tail fanned and dragging on the ground as it strutted around another which was sitting low. The strutting individual circled the crouched bird several times. When the first bird ceased strutting and started to move away, the second bird slowly got to its feet and moved in the opposite direction, doing so hesitantly while looking back at the first bird, only to again crouch when the first bird came back towards it. This happened a few times in a couple of minutes before they moved well apart in opposite directions and ignored each other.

We noted a second form of interaction on 4 October 2005. Two Common Sandpipers stood facing each other, following which both fanned their tails and jumped into the air about 25-30 cm, touching bills at the peak of the jump. They repeated the sequence two or three times, before flying straight up about 2 m and landing. They then walked parallel to each other about 50 cm apart, both birds fanning their tails sideways towards each other and showing the white tips to the upper side of the tail feathers. When they reached the edge of the embankment, both birds sat down side on to each other, facing the pond. After about a minute, one walked away and then the other walked away in the opposite direction.

On 30 October 2005, we observed an individual engage in both forms of interaction when two other Common Sandpipers entered the area in which it had been foraging. In response to fanning its tail and strutting around, one "intruder" crouched. The displaying bird then turned its attention to the other "intruder". The two birds faced each other and jumped and touched bills in mid-air several times as described above until the "intruder" flew off. During this interaction, the bird that had been crouched retreated. The entire event lasted about one minute. Interestingly, as the confrontation between the three birds unfolded, a Yellow Wagtail *Motacilla flava* continued to feed within 1-2 m of the quarrelling birds, unperturbed by it all.

We have noted similar behaviour to that described here on other occasions throughout the non-breeding season at the sewage ponds and at other sites in the Darwin area, but with an evident decrease in frequency and intensity from late October.

During its non-breeding stay in Australia, the Common Sandpiper disperses widely along river banks, margins of tidal inlets and rocky shores, where it is mostly solitary (Lane 1987). Whether they occupy fixed foraging territories at favourable sites during this time is unknown. We interpret the observed interactions as aggression triggered by the unusual concentration of individuals in a rich habitat, possibly relating to competition for foraging space or foraging territories. The strutting/crouching combination of behaviour may be expressions of dominance and submission, while the leaping behaviour and associated displays may be a way of establishing dominance amongst nearly-equal rivals.

In support of our interpretation that the behaviour is territorial, we note that these observations were made within the first three months of the return of Common Sandpipers to the Darwin area (Shurcliff 1993). Similar behaviour has been reported around the same time of year in Singapore by Gibson-Hill (1948), who also interpreted them as aggressive interactions. A seasonal decline in intraspecific interactions has been observed in the Eastern Curlew *Numenius madagascariensis*. Zharikov *et al.* (2004) argued that this behaviour may be important in determining foraging territory size at the start of a season but not at season's end when a social hierarchy may have been formed and the higher-ranking birds have seized the patches yielding higher intake rates.

We thank a referee for comments on an earlier draft of this note and Don Franklin for his help in finalising this note.

REFERENCES

Gibson-Hill, CA. 1948. Common Sandpipers displaying in winter quarters. British Birds 41:57-58.

Lane, B.A. 1987. Shorebirds in Australia. Nelson: Melbourne.

Shurcliff, K.S. 1993. Seasonal patterns of wader populations in Darwin, Northern Territory, 1974-1987. Northern Territory Naturalist 14: 10-18.

Zharikov, Y., Gregory, A. & Skilleter, A. 2004. A relationship between prey density and territory size in non-breeding Eastern Curlews *Numenius madagascariensis*. Ibis 146: 518-521.

AUSTRALASIAN SHOREBIRD CONFERENCE ABSTRACTS NELSON, NEW ZEALAND. 11-13 DECEMBER 2005.

The ASC in Nelson, New Zealand, was an excellent event in which to review recent findings and current knowledge about the status and biology of shorebirds in Australasia and along the East Asian-Australasian Flyway (EAAF). The EAAF spreads from central Siberia to western Alaska, funnels through eastern Asia and terminates in Australia and New Zealand. It is one of the world's lesser-known flyways but is also one of the most threatened by development. While the state of knowledge about the species using the EAAF is improving it still lags behind that of other major flyways. Two primary reasons for this are that the while a third of the world's human population lives within the EAAF, a disproportionately small number of shorebirders do so (mostly in Australasia), and most are volunteers. Accordingly, more work has been done on shorebirds on the non-breeding grounds than on migration or during breeding, and there have been few government- or university-based long-term research programmes on shorebirds.

Nevertheless, successful research has been done in Australasia on a number of species including Red and Great Knots, Bar-tailed Godwits and Eastern Curlews. In an opening address, I discussed the successes of these projects and the challenges to taking such endeavours further on both the non-breeding and staging grounds. These include the ubiquitous issue of finding money for conservation-oriented work but also unpredictable issues such as SARS and Poultry Flu outbreaks that can interfere with the best-laid plans. New research initiatives include detailed demographic monitoring on the non-breeding grounds. We can only hope that this information can be used to argue for conservation measures, rather than document species declines. The abstracts that follow give the flavour of the conference, which covered a wide range of species and topics, from southern endemics to long-distance migrants, biology, to monitoring and management. I am sure we all look forward to an equally stimulating meeting in 2007.

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Snipe – New Zealand's bird of myth and mystery

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New Zealand's snipes (genus *Coenocorypha*) are arguably the most characteristic birds of the New Zealand region, formally occurring throughout the mainland and most outlying island groups, and all-but confined to the region. Paradoxically, they are one of New Zealand's least familiar birds, now restricted to remote islands free of introduced predators, and generally inhabiting areas of dense vegetation. Comparisons of *Coenocorypha* breeding ecology with that of Common Snipe (*Gallinago gallinago*) revealed many differences indicating high intraspecific competition for food. Along with their small clutch size, large eggs, shared incubation and prolonged parental care, *Coenocorypha* snipes are the only scolopacids known to perform courtship feeding. Long considered not to perform aerial displays, at least five populations of *Coenocorypha* snipes are now known to have displays homologous with drumming or bleating displays of *Gallinago* snipes. These dramatic nocturnal displays were greatly feared by Maori, and formed part of the hakawai/hokioi legend, a mythical bird that featured in Maori proverbs and song.

At least five taxa of *Coenocorypha* snipes have become extinct following introductions of predatory mammals, particularly rats. The most recent and best documented extinction was that of Stewart Island snipe (*C. aucklandica iredalei*) in 1964 following an irruption of Ship Rats (*Rattus rattus*) on Big South Cape Island. The tragic loss of snipe and hakawai from the southern muttonbird islands was somewhat offset by the remarkable discovery of a previously unknown *Coenocorypha* snipe on a 19 ha rat-free islet off subantarctic Campbell Island in 1997. Management actions following this discovery include a trial at holding Chatham Island Snipe (*C. pusilla*) in captivity, and translocation of 30 Snares Island Snipe (*C. a. huegeli*) to a restored muttonbird island near Big South Cape Island.

Discovery and description of New Zealand endemic shorebirds: an historical overview

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The first descriptions of New Zealand endemic shorebirds were based on specimens of the Variable Oystercatcher (*Haematopus unicolor*), Shore Plover (*Thinornis novaeseelandiae*) and Southern New Zealand Dotterel (*Charadrius obscurus obscurus*) that were collected at Dusky Sound in 1773 in the course of James Cook's second voyage round the world. Reinhold Forster, the official naturalist on the voyage, described those species in Latin under the names *Haematopus unicolor*, *Charadrius torquatula*, and *Charadrius glareola*, respectively, in his manuscript *Descriptiones Animalium* that was

compiled on the voyage. Two of those birds, the Shore Plover and the Southern New Zealand Dotterel, were painted by his son George who was on the voyage as an assistant naturalist and natural history draughtsman. These paintings formed the sole basis of Latham's 1785 descriptions in English of the New Zealand Plover and the Dusky Plover, which names were latinised by Gmelin in 1789 as *Charadrius novaeseelandiae* and *Charadrius obscurus*. The birds depicted in the two Forster paintings are therefore the holotypes of *Thinornis novaeseelandiae* (Gmelin, 1789) and *Charadrius o. obscurus* Gmelin, 1789. The specimens themselves do not exist. The Variable Oystercatcher was not validly named until 1844 when Lichtenstein published a slightly-edited version of Forster's *Descriptiones Animalium*. No type specimen of *Haematopus unicolor* exists. Dusky Sound has always been accepted, correctly, as the type locality of both *Haematopus unicolor* and *Charadrius o. obscurus*. The correct type locality of *Thinornis novaeseelandiae* is also Dusky Sound, not Queen Charlotte Sound as hitherto believed.

Increasing South Island Pied Oystercatcher populations: where to from here?

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Data gathered during census work by the Ornithological Society of New Zealand show that South Island Pied Oystercatcher (*Haematopus ostralegus finschi*) numbers increased dramatically between 1960 and 1995 with a concurrent change of breeding habitat use and breeding range. Factors that allowed or limited this change are discussed. Known and potential impacts of this change are considered. What is the probability of this change continuing?

Chatham Island Oystercatcher population responds to conservation management

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The Chatham Island Oystercatcher (*Haematopus chathamensis*) is an endangered species that breeds only on the Chatham Islands. One of the main factors limiting population growth is low productivity. Of 19 nest failures seen on film, 13 were caused by cats eating the eggs. The population was estimated at 103 birds in 1987 and 142 in 1998, and this increase may partly have been a response to sporadic predator control in northern Chatham Island, where an average of 0.53 chicks were produced per pair per year. In 1998-2004 more intensive trapping of introduced predators (mainly feral cats and weka) occurred each summer along 16 km of coast. Farm stock were excluded from nesting areas and eggs laid close to the high tide mark were moved further up the beach. An increasing breeding population (16-35 pairs) in the managed areas produced 18-35 chicks per year (at an average of 1.04 chicks per pair) and an increasing population (9-19 pairs) in nearby areas produced 0-12 chicks (0.34 chicks per pair). Survival of colour-banded juveniles was very high (0.94 for the first year), for example of 17 chicks in the 1998 cohort, 14 (82%) survived 6 years and bred from 2-5 years of age. This recruitment accelerated the population increase in northern Chatham Island and boosted total numbers. A minimum count in 2004 of 266 birds on most of the coast of four islands in the Chathams group represented a population of 310-325 birds. Management has been highly successful and the Recovery Plan goal of increasing the population to >250 birds by the year 2011 was achieved 8 years early. A longer term goal is to improve nesting habitat. Introduced marram has reduced the availability of safe nest sites so that eggs are vulnerable to high seas. Therefore, dune restoration trials were conducted to reduce the future need for active management of nests.

Monitoring shorebird numbers during migration at Saemangeum, South Korea: documenting or averting a crisis?

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The Saemangeum land-claim project in South Korea is in the process of destroying what is arguably the single most important coastal site for shorebirds in Asia. A 33-km long seawall is under construction, and will eventually enclose 41,000 ha of tidal flat and shallow water, which would otherwise have hosted perhaps 400,000 birds through the year including significant numbers of the endangered Spoon-billed Sandpiper and Nordmann's Greenshank. One of the arguments being

used to justify the land-claim is that the birds will simply relocate elsewhere. We are planning a coordinated international counting expedition to Saemangeum in April-May 2006 in order to gather rigorous, defendable data on the numbers and origins of birds using this complex and other sites in coastal South Korea. The aims of the work are to (1) determine accurately peak counts of birds through the migration season, (2) use sightings of marked birds, visible departures, and identification of 'cohorts' of migrants to get first estimates of turnover through the season, and (3) assess shorebird numbers at other sites that birds could potentially relocate to if Saemangeum was to become unavailable to them. The data will have two possible uses, depending on political will. They will more fully establish the importance of Saemangeum in the context of the East Asian-Australasian Flyway and be of use in arguing for the protection of this area. Alternatively, if seawall closure occurs, we have a baseline with which to compare future abundances and habitat use and to document the impacts on migratory shorebirds. The survey work will rely on Korean and experienced international volunteers, and AWSG members are ideal. We will be seeking funds to cover costs within South Korea, but volunteers would have to pay their own way to Korea. We are open to suggestions on any aspects of the program, and encourage birders in the East Asian-Australasian Flyway to become involved, in the hope that this work really can make a difference.

Monitoring Yellow Sea Migrants in Australia: the AWSG program in the North-west

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Many migratory shorebirds are believed to be declining, and there is a need to assess their population trends. It is conventional to attempt shorebird monitoring through regular high-tide counts (when shorebirds congregate in a small number of roost sites) on the non-breeding grounds (when counts are least likely to be influenced by migratory movements). Many shorebird enthusiasts carry out regular counts on Australian non-breeding grounds, but there has been no comprehensive analysis; it is quite likely that the data being collected are only sensitive enough to detect large population changes over quite long periods of time. Concern over the limitations of the shorebird count program in Australia has been increasing because of the current reclamation of Saemangeum, a major shorebird staging site in Korea used by a large proportion of the flyway's shorebirds, including over 20% of the Great Knot population. Will the loss of this site cause a decline in shorebird populations, and if so, will we be able to detect it?

In this presentation we describe progress on two broad objectives of the "MYSMA" project – Monitoring Yellow Sea Migrants in Australia:

(1) To initiate a powerful and repeatable count program in North-western Australia, which holds more Yellow Sea migrants than any other region within Australia but has not been monitored adequately in the past. We describe the count methodologies we have settled on at three key locations, the reasoning behind them, and some results from the first surveys.

(2) Investigate methodological approaches that will increase the sensitivity of population monitoring on the non-breeding grounds. We contend that the key is developing realistic estimates of variance in a count, and that this variance has three components: Observer error, site-specific error and area error. Building on a Dutch methodology, we give estimates of error in North-western Australian counts (to be tested in subsequent fieldwork) and some guidelines that we hope can be applied to other sites. In particular, we argue that "calibration" of a shorebird site, with repeated same-season counts, and recording of subflock totals, can greatly improve the sensitivity of population monitoring.

We conclude with some thoughts on the state of population monitoring of shorebirds in Australia. We argue that a full-time employed count-coordinator is needed to revitalise the population monitoring program.

Estimating observer error in wader counts using digital photography

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The inherent difficulty of counting migratory waders is widely accepted. These difficulties include the sheer number of birds recorded at sites, variations in plumage at the different moult stages, their sometimes cryptic habits, differences in observer platforms and even the background colour of the roost. In spite of these difficulties, counts at high tide roosts still form the basis of estimates of wader populations at over-wintering sites across Australia and New Zealand. The need to quantify the

level of observer error recorded during wader counts is essential for making comparisons across long term data sets and fundamental to detecting real changes in wader populations. In this study, digital photographs were used to compare 'actual' bird numbers to estimates from observers during boat and ground-based surveys at two major roost sites in the Hunter estuary, New South Wales. These results are discussed in view of the degree of inter- and intra-observer variability associated with each count type, and its potential application for calculating correction factors for trend analyses.

What has been happening to waders in Moreton Bay, Queensland?

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Moreton Bay is a large semi-enclosed embayment on the central east coast of Australia adjacent to the Queensland state capital, Brisbane (population > 1M). It has been estimated to support between 40 – 80,000 waders, with internationally significant numbers of 10 species. The Queensland Wader Study Group (QWSG) has been monitoring waders at high tide roosts in Moreton Bay since 1991. Wader counts are made at over 40 of the 116 known roosts and other large (> 1000 birds) less accessible roosts are counted several times each year. Analysis of these counts shows the benefits of regular monthly monitoring at important roost sites. Changes in the distribution and abundance of waders within the bay are easily detected and can provide good biological indicators of local ecosystem health. I will illustrate some of the trends by showing what has been happening to four species, Black-tailed Godwit, Grey-tailed Tattler, Great Knot and Red-necked Stint.

One of the factors affecting the distribution and abundance of several species of wader is the large Port of Brisbane reclamation at the mouth of the Brisbane River. The reclamation commenced in 1976 and will be ongoing until 2025. The dredge ponds provide attractive feeding and roosting habitat for Red-necked Stint, while > 500 Grey-tailed Tattler roost on the retaining walls. The creation of this artificial habitat has led to a contraction in the distribution of both species within Moreton Bay and now the majority of the Red-necked Stint population feeds and roosts within the reclamation site. Enlightened Port management have recognized the significance of the reclamation site to waders (> 13,000 birds during summer). A shorebird management plan has been produced, waders numbers and habitat use are monitored monthly by the QWSG and a 12 ha artificial roost with viewing hides has been constructed. This roost attempts to recreate the mix of habitats within the rest of the reclamation so that some habitat will remain for the majority of species when the development is completed in 2025.

The other benefit of regular monthly counts by QWSG is that it has shown that Moreton Bay is not the final destination of several wader species, whose numbers peak in Moreton Bay during migration. Passage migrants such as Grey-tailed Tattler are more abundant during both southward and northward migration. QWSG counts in Moreton Bay show that the numbers of passage migrants have dropped dramatically while the numbers spending the non-breeding season in Moreton Bay have remained stable since 1991. As Moreton Bay is near the species southern limit of its distribution in eastern Australia, Grey-tailed Tattler may be in early population decline as its distribution contracts northwards. Monthly counts at large numbers of roosts also allow for the effects of other factors such as weather, tides and observers on count accuracy and precision to be taken into account. They provide better insight into the overall health of the population and can give an early warning of the next species of conservation concern.

On the conservation management value of predictive GIS modelling and free public data for stop-over sites and flyways: the example of migratory shorebird populations in the Sea of Okhotsk, Russian Far East as a global template.

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Latest developments in GIS mapping, coastal environmental databases, public access to digital information online, Remote Sensing and computational decision-support offer entirly new approaches to shorebird and habitat research and conservation management. Predictive spatial modeling allows us to present the relative probability of occurrence for species of interest at specific localities for a specific time window, e.g. during migration stop over. This new approach proves particularly useful for large areas which are unknown or poorly studied, as well as for large-scale studies to obtain an overall picture.

The Sea of Okhotsk in Russian Far East consists of a huge coastline along the East Asian-Australasian (EAA) Flyway. Detailed shorebird survey data, turn-over and population estimates are usually missing for this region, and therefore we use 'presence only' information and confirmed absence from our own seven years of field work and from our larger Russian Literature Review (summarized in a GIS database). This allows to help predicting the occurrence of shorebirds (Great Knot, Red Knot and Bar-tailed Godwit) during fall and spring migration. For habitat predictors we used tidal range, river type and

size, surrounding substrate type and mudflat size obtained from Remote Sensing layers, software tools, hardcopy maps and others. A progressive modeling approach is presented using GIS and statistical linear and non-linear modeling algorithms such as GLMs, CART and MARS. Accuray assessment of pedictions with alternative data is crucial. Linking the predicted migration sites with known and assumed turn-over estimates from our fieldwork and from scenarios can be used in this new spatial modelling context in order to match and to evaluate relevant estimates of the overall population along the flyway. The model and data are described as FGDC NBII Metadata online. We believe that our GIS approach has even more merit when combined with capture-mark-recapture demography and telemetry, and when implementing sighting databases of leg-flags.

After a thorough assessment and constant data and model improvment, it is suggested that such approaches are becoming a standard for the management of other migrants and flyways world-wide. An outlook is given which data sets are still lacking, and how these methods can be applied for conservation management and policy sustaining the future of shorebirds and their habitats.

The distribution and conservation of waders in the Bay of Plenty, New Zealand, 1984-2003

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For the last two decades waders (Order *Charadriiformes*) have been counted during summer and winter at high tide roosts on harbours, estuaries and beaches in the Bay of Plenty, New Zealand. Here we describe the distribution of each species and changes in their abundance, (i) between seasons, and (ii) over the study period (1984 to 2003) from 24 study sites. During summer an average of 163,000 waders (1984-1994) comprising predominantly northern hemisphere migrants (139,000) along with native species (24,000) was recorded around the New Zealand coastline. Northern hemisphere waders in the Bay of Plenty comprised 8% (11,150) and native waders 3.5% (840) of these totals. During winter an average of 130,000 (1984-1994) mainly native waders (112,000) and fewer Northern hemisphere migrant waders (18,000) were present on New Zealand shores. Of these totals 3.8% occurred in the Bay of Plenty, comprising predominantly native 3.2 % (3,600) with some migrants 7.6% (1,370). More than 1% of the total national population of some wader species use Bay of Plenty harbours, estuaries and beaches at certain times of the year. They are Eastern Bar-tailed Godwit, Variable Oystercatcher, Northern New Zealand Dotterel, Pacific Golden Plover, Banded Dotterel, Turnstone, Pied Stilt, Wrybill and South Island Pied Oystercatcher.

Tauranga Harbour held more than 1% of the national population of Northern New Zealand Dotterel, Eastern Bar-tailed Godwit, Turnstone, Banded Dotterel, Wrybill Variable Oystercatcher and Pied Stilt. This harbour hosts 12 uncommon and rare migratory wader species. It was the only site to annually host the critically threatened Black Stilt. Ohiwa Harbour held more than 1% of the national population of Northern New Zealand Dotterel, Eastern Bar-tailed Godwit, Variable Oystercatcher, Pacific Golden Plover and Banded Dotterel. Ohiwa regularly hosts small flocks of Eastern Curlew and Whimbrel. Kaituna River Mouth/Maketu Estuary held more than 1% of the national population of Pacific Golden Plover and just less than 1% of the Northern New Zealand Dotterel. This estuary hosts an additional 18 species of uncommon and rare migratory northern hemisphere wader species. It also hosts the largest summer and winter concentrations of Spur-winged Plover in the region. Waihi Estuary/Pukehina Spit held more than 1% of the national population of Northern New Zealand Dotterel.

Northern New Zealand Dotterel numbers increased substantially in the region due to the protection programme on Matakana Island and to a lesser extent at the Waiaua River Estuary. Wrybill, Turnstone and Red Knot numbers declined in the region over the study period. These and other trends are discussed. Counts of uncommon and rare arctic migrant and native waders are also provided.

Site fidelity in the non-breeding season of the Pied Oystercatcher in Victoria, Australia.

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The Pied Oystercatcher (*Haematopus longirostris*) population of Australia is only about 10,000 individuals with 1,500 in Victoria. The Victorian Wader Study Group has been conducting a study of Pied Oystercatchers in Victoria since early 1979. Oystercatchers have been banded at various localities in Port Phillip Bay, Western Port and the Corner Inlet complex. During the 24-year period up to July 2003, 2127 Pied Oystercatchers were banded and 1160 re-traps made. Of these 2077 were colour marked with unique colour combinations (since 1989). About 4000 sightings of colour marked birds have been

reported. These data have been analysed to investigate the site fidelity of over wintering oystercatchers, timing of movements between wintering locations and breeding areas, and distances moved.

Movements of Pied Oystercatchers were much more extensive, and variable, than previously envisaged. Birds moved between different non-breeding flocks during the same year, usually within the same embayment eg Western Port. Some birds moved from non-breeding flocks to breeding grounds along the coast as far west as the mouth of the Murray River (South Australia) a distance of over 1,800 km and as far north as Botany Bay and Newcastle (New South Wales) a distance of about 1,800 km before returning the following winter. Other birds which moved to distant breeding areas remained there for the rest of their lives. Movements were recorded to the Bass Strait islands and to the northern and western coasts of Tasmania.

Southward migration of Shorebirds through Moroshechnaya Estuary, Far East Russia, August 2004

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During 9 – 21 August 2004 an international team of ornithologists visited the mouth of the Moroshechnaya River, Kamchatka (the most northern Shorebird Network Site in the East Asian- Australasian Flyway). The expedition was organized to gather additional baseline information on shorebirds utilizing this site during southward migration. Earlier studies by Gerasimov and Huettmann pointed to the importance of this estuary during northward and southward migration. The expedition carried out the following program:

(i) Quantitative monitoring of populations during southward migration during seven surveys on the estuary and ocean beach. The most common shorebird species detected were Dunlin (*Calidris alpina),* Red-necked Stint (*C. ruficollis),* Whimbrel *(Numenius phaepus),* Bar-tailed Godwit *(Limosa lapponica)* and Great Knot *(C. tenuirostris).* Maximum number of shorebirds on one day was about 15,000. Dunlin was the most numerous species; an estimated 18,000 – 26,000 birds passed through during the expedition.

(ii) A total of 227 shorebirds were captured. For the first time, yellow/ black leg flags were used according to the flyway scheme.

(iii) Blood samples for DNA were taken from Dunlin to determine subspecies utilizing the area (lead by Liv Wennerberg).

(iv) Feather samples were taken for stable isotopes (C/N and others) mainly to investigate the origin of birds (lead by Falk Huettmann).

(v) Faecal samples from 88 individual shorebirds of 5 species, mostly juvenile Dunlin and Red-necked Stint, confirmed the absence of avian influenza viruses (lead by Paul Selleck, Australian Animal Health Laboratory).

Overall, our estimates of shorebird numbers using the area support the importance of the estuary during southward migration, but do not agree with higher numbers as reported by Gerasimov and Gerasimov (1997). This could be due to different assumptions in estimating parameters such as turn-over rates.

Differential migration of Australasian waders

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Most shorebirds are long-distance migrants that breed in the Arctic and spend the non-breeding season at temperate or tropical latitudes. Intra-specific differences in choice of non-breeding site regarding age or sex are common among migratory birds, but in shorebirds using the East-Asian-Australasian Flyway, information remains scarce. Sex-biased differential migration has, however, important implications for conservation management, as the disproportionate loss of members of one sex will significantly reduce effective population size. Because habitat loss in the non-breeding range is a major threat to shorebirds, differential migrants need to be identified and managed accordingly. Here, we provide an overview of what has been published to date on this topic and present new results based on biometric data collected by the Victorian and the Australasian Wader Studies Groups.

Status of waders in Timor-Leste (East Timor) and the Nusa Tenggara region

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Knowledge of the status of waders in the Timor region is poor. From August 2002 to October 2005 data on wader numbers and species composition were collected in Timor-Leste, with additional surveys at Kupang Bay (Indonesian West Timor). Additionally, records from Ashmore Reef and sites on Sumba and Flores islands were reviewed.

In Timor-Leste, there were 2,461 records of 43 shorebird species; one additional species the Asian Dowitcher was recorded once by a colleague. Of the 44 shorebirds known from Timor island, six species are resident (Comb-crested Jacana *Irediparra gallinaceae*, Malaysian Plover *Charadrius peronii*, Red-capped Plover *Charadrius ruficapillus*, Greater Painted Snipe *Rostratula benghalensis*, Black-winged Stilt *Himantopus himantopus* and Beach Thick-knee *Esacus neglectus*), 36 species are Palearctic migrants, one is an Austral winter migrant (Australian Pratincole *Stiltia isabella*), and the Masked Lapwing *Vanellus miles* is an austral vagrant (newly reported for Timor Island). Twenty Palearctic migrants typically winter on Timor and 16 species occur as brief transients especially during the southward migration.

The eight most frequently occurring Palearctic migrants were Common Sandpiper *Actitus hypoleucos*, Common Greenshank *Tringa nebularia*, Red-necked Stint *Calidris ruficollis*, Marsh Sandpiper *Tringa stagnatilis*, Wood Sandpiper *Tringa glareola*, Pacific Golden Plover *Pluvialis fulva* and Whimbrel *Numenius phaeopus* (each with > 100 records), contrasting with rarely occurring species such as Little Curlew *Numenius minutus*, Red Knot *Calidris canutus*, Kentish Plover *Charadrius alexandrinus*, Pectoral Sandpiper *Calidris pectoralis*, Broad-billed Sandpiper *Limicola falcinellus*, Ruff *Philomachus pugnax* and Spotted Redshank *Tringa erythropus* that each had fewer than seven records. Flock sizes in Timor-Leste were generally small with just eight shorebirds recorded in groups of 100 or more birds: Grey Plover *Pluvialis squatarola* (maximum of 100 birds), Red-capped Plover (300), Red-necked Stint (240), Red-necked Phalarope *Phalaropus lobatus* (700), Common Greenshank (156), Black-winged Stilt *Himantopus himantopus* (338), Oriental Pratincole *Glareola maldivarum* (3,000) and Australian Pratincole (150).

Patterns in the seasonality, species composition and abundance of migrant shorebirds in Timor-Leste are similar to selected sites on Sumba and Flores. Kupang Bay is a large wetland which has greater numbers of shorebirds including records of up to 10,000 Australian Pratincole. Perhaps only Australian Pratincole and Oriental Pratincole occur in internationally significant numbers (reaching the 1% criterion) in Nusa Tenggara. This contrasts with nearby Ashmore Reef where at least nine shorebirds occurring in internationally significant numbers.

Expedition Report to the Russian Far East – Chukotka 2005

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Since 1988, the Russian Academy of Science, in cooperation with conservation NGOs (Goose, Swan and Duck Study Group of Northern Eurasia and Russian Wader Research Group), has run research expeditions focused on threatened species of birds in the Russian Arctic. Mixed international teams of about 15 researchers, students and volunteers join the expeditions under the leadership of Dr. Evgeny Syroechkovskiy, Jr. In 2005 an expedition to Chukotka Peninsula in easternmost Russia took place.

Chukotka hosts many of the shorebirds that occur in New Zealand and Australia. The rolling tundra state is about three times the size of New Zealand but with less than 100,000 people. The capital Anadyr is a 9-hour flight from Moscow. The expedition of 2005 visited coastal areas between the Anadyr and the border with Koryakia in the south. Surveys of potential Spoon-billed Sandpiper breeding areas (aided by Landsat satellite images) and monitoring of known breeding areas were the principle objectives. This globally threatened species has only about 300-500 breeding pairs left and is declining. During visits to known and potential Spoon-billed Sandpiper breeding areas the general status of all other breeding birds was recorded. Where possible adult and juvenile waders were caught on the nest and marked with light green colour-flags (the

code for South Chukotka). Breeding and foraging seabirds were also recorded during boat trips. Migration started at the end of July and efforts were made to locate leg-flagged waders.

Sexual conflict and the evolution of breeding systems in shorebirds

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Sexual conflict, i.e. different evolutionary interests of males and females, is a pervasive evolutionary force. The objective of this presentation is to evaluate the effects of sexual conflict, phylogenetic constraints and ecology on shorebird breeding systems. First, I show that shorebirds that feed their young exhibit less variable breeding systems than those with precocial young, probably because the demand of young limits the intensity of sexual conflict. Second, evolutionary changes in parental care by the male and the female are consistent with predictions of sexual conflict. Finally, I discuss how these processes may influence macroevolution: speciation and extinction rates of shorebirds.

Estimating population size and trends in the Wrybill (*Anarhynchus frontalis*)

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The Wrybill (*Anarhynchus frontalis*) is a threatened shorebird endemic to New Zealand. It breeds exclusively in braided rivers east of the main divide in the South Island. Almost the entire population migrates to the North Island after breeding, with about 85% of birds wintering in the large harbours around Auckland. Determining population size accurately has proven difficult. Counts of the whole population on the breeding grounds are impractical. Counts of wintering flocks suggest a population size of about 5000 individuals, but counts are variable from year to year and trends are not clear. A third option is to use demographic data to calculate the capacity of the population for increase. Data from a study in the Tasman and Tekapo Rivers, South Canterbury, from 1997-2000 are presented. Survival and productivity (and therefore calculated population trends) varied substantially between sites and years. There were large differences in productivity between unmanaged sites in the two rivers. Mammalian predators (particularly stoats *Mustela erminea*) had a major impact in an unmanaged area in the Tasman River; from 1997-2000, stoat density was high and Wrybill productivity and survival were very low. When stoat density fell in 2002/03, Wrybill productivity rose in the absence of any management. These temporal and geographical differences were substantial, and suggest that short-term studies in one location are unlikely to provide a reliable indication of overall trends in the Wrybill population.

Assessing the resource base for waders on Farewell Spit, New Zealand

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Numbers of Red Knots (*Calidris canutus*) have declined on the undisturbed, protected Scientific Reserve of Farewell Spit, NW Nelson. This decline is not mirrored at other major sites, suggesting that local factors may be involved, but a lack of baseline information on the sediment-invertebrate-bird relationships makes understanding any changes in bird numbers impossible. Accordingly, we conducted a large-scale survey of the ~10,000 ha tidal flats in March 2003. 192 stations were sampled, 500 m apart down transects every kilometre along the 29 km of the spit. At each site triplicate benthos core samples, a single sediment sample and eelgrass (*Zostera meulleri*) surface cover estimates were taken. 91 taxa of differing taxonomic levels were identified. Six taxa dominated the samples numerically, accounting for almost 70% of individuals recorded: the cockle (*Austrovenus stutchburyi*) spionid polychaetes, pipi (*Paphies australis*), amphipods, a barnacle (*Eliminius modestus*), and isopods. Most taxa were quite widely distributed and there was evidence of an increase in species diversity with increasing *Zostera* cover. Translating this information into something meaningful for the distribution of shorebirds over such a vast area is difficult, but there is some evidence that numbers of birds at high tide match the resources available on the adjacent tidal flats. We suggest that the intertidal ecosystem of Farewell Spit is dominated by the role of

eelgrass, and that while bare sand and dense eelgrass beds may both be good for foraging knots, intermediate eelgrass levels may not be.

The feeding behaviour and diet of an endangered waterbird, the Black-necked Stork (*Ephippiorhynchus asiaticus*)

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The feeding behaviour and diet of the Black-necked Stork (*Ephippiorhynchus asiaticus*) were studied as part of a larger study on the ecology, conservation and management of the species. Field studies were carried out on the north coast of New South Wales, Australia during the period 25.04.03 to13.05.05. A total of 59 foraging bouts were observed, covering 37.5 hours. Birds observed comprised adult males, adult females, immatures and juveniles. Eight foraging techniques were noted with a number of these being used consecutively in the one foraging bout. The technique recorded in most feeding events involved a bird walking in water and visually searching, recorded during 51 (86%) bouts. The second most common technique employed involved a bird standing still and scanning the water. This was observed during 44 bouts (75%). The time spent employing each foraging technique and the depth of water used by foraging storks are presented. Items in the diet were fish (eels *Anguilla* sp., Australian Bass *Percalates novemaculeatus*, Sea Mullet *Mugil cephalus*), birds (Australasian Grebe *Tachybaptus novaehollandiae*), reptiles (Eastern Long-necked Tortoise *Chelodina longicollis*), frogs (*Limnodynastes* sp.) and small unidentified animals, possibly insects, molluscs and/or tadpoles. Small unidentified animals were recorded during 14 successful feeding bouts, while eels and frogs were the next most frequent items, (10 bouts and 7 bouts respectively).

The impact of disturbance on Pied Oystercatcher (*Haematopus longirostris*) breeding behaviour and success in northern NSW: preliminary results from two seasons' monitoring

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With ever increasing pressure being placed on our coastal environments by recreational users and developers, the need for understanding the impact of threatening processes upon species and protecting biodiversity has never been greater. We investigated the impact of disturbance on nesting and parental behaviour of Pied Oystercatcher along a 270 km stretch of the northern NSW coast during 2003/04 and 2005/06. During both non-school holiday and holiday periods pairs were disturbed by vehicles, pets or humans. However during holiday periods pairs were more frequently disturbed. The distance a disturbance approached before birds were forced from nests ranged from 300 metres in highly defensive parents to 45 metres in less defensive parents. Time lost incubating ranged from 1 continuous minute to 1 hour and 24 continuous minutes. Factors attributing to highest mean time off nests were people on both the high and mid beach zones and people walking with dogs. The approach of a slow moving vehicle along the shore had little effect on incubating birds. Eggs did not hatch from one nest where parents were frequently flushed for periods of 30 minutes or greater. While no eggs or chicks were crushed by vehicles the risk was high. Vehicles were found to directly impact on adult survivorship and indirectly on chicks. We conclude that management plans should incorporate a buffer zone of 150 metres surrounding nests if hatching success is to be increased. That along with signage, fencing areas may be necessary. This buffer should be maintained until chicks have fledged and should extend to the water's edge, also allowing for the protection of foraging adults. Furthermore, that dog exercise areas within estuaries be restricted to sand-flat habitat with no vegetation, and that on-leash areas be enforced.

A policy analysis of Ramsar: learning from the history of shorebirds and habitats for the future

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The Ramsar convention was signed 1971 and went in force 1975. At that time it was an innovative and hopeful legislation in the international setting. However, over the last 40 years major changes have occurred in the world, including a human

growth and ecological development never experienced in the history of man kind, as well as a revolution in computational and information technologies.

The wide acceptance and ratification of Ramsar is hailed by some governments, NGOs and even parts of the public as a big international conservation success story safeguarding wetlands and migratory species. The number of Ramsar sites often gets used as a national and international benchmark measure regarding progress in environmental issues on the globe.

Ramsar centres on the conservation, not protection, of migratory species and their habitats. Here an analysis is shown how Ramsar performs on the ground using migratory shorebird habitat as an example. Selected case studies in Russia, Europe, North America, China, Korea and Africa are discussed. The analysis shows that Ramsar lacks relevant enforcement, is underfunded, has no truly global and strategic coverage, nor are many of its protected sites efficient in size and number to deal appropriately with shorebirds, habitats and flyways. Although Ramsar needs to be science-based, exact migration strategies, population estimates and turn-over rates are often unknown; spatial and population modeling is virtually absent nor legally required. It gets presented that Ramsar, as many other international conservation treaties so far, has slowed, but not stopped, habitat and population loss and transition at any significant level and world-wide. Ramsar does not halt pressures brought by human development, nor does it deal with global change really; relevant digital approaches are not implemented in the legislative text. Believing under the current global regime that Ramsar would safeguard a relevant amount of habitat and shorebirds, and that it would provide a safe legal mechanism for the future, remains doubtful and likely needs a revision.

Therefore, a call is made (i) to enforce and update Ramsar, e.g. through the inclusion of binding and quantitative thresholds, detailed species inventories, computational decision-support and with high resolution mapping products for Ramsar as well as for non-Ramsar sites, and also (ii) to re-define, promote and emphasize our vision and policy action regarding the future of shorebirds, habitats and conservation contributing to global biodiversity maintenance.

A Flyway Partnership - international collaboration for shorebird conservation beyond 2005

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The past decade of international collaborative effort in shorebird conservation for the East Asian-Australasian Flyway has been coordinated under the Asia Pacific Migratory Waterbird Conservation Strategy and its associated Shorebird Action Plan. A new framework is being developed to improve the opportunities for, and implementation of, international conservation efforts for migratory shorebirds.

Government agencies and NGO's have recognised the value in updating the approach to respond to the changed circumstances of 2006. Key elements to be addressed in the new framework will be:

1. linking shorebird conservation activities more strongly to sustainable development and global agendas (eg Millennium Development Goals)
2. developing greater commitment from all countries in the Flyway, and
3. building on the strengths developed in the Action Plans to deliver a program for all migratory waterbirds rather than for separate species-groups.

A East Asian-Australasian 'Flyway Partnership' - recognised under the World Summit for Sustainable Development (WSSD) and as a regional initiative under the Ramsar Convention - is being promoted as the new framework.

The Flyway Partnership provides a 'sign-on' process for government and non-government organisations. It is anticipated that this mechanism will promote greater engagement and commitment to collaborative work across the Flyway.

Shorebird activities under the Flyway Partnership will be integrated with other waterbird groups to make full use of the synergies that exist across waterbird groups, in regard to research, habitat management, surveying and monitoring and, education and awareness. A single migratory waterbird network is proposed, to replace the 3 separate networks currently operating, to simplify and strengthen networking among sites across the flyway.

The Partnership Text and Action Plan are being drafted by a working group with a diverse membership drawn from across the flyway. It is planned to launch the Flyway Partnership in late 2006.

The importance of community in shorebird conservation – the experience of a national community-based shorebird conservation project

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The challenges facing the conservation of shorebirds in Australia and along the East Asian-Australasian flyway are diverse and include climate change, reclamation of coastal and inland wetlands, alteration to wetland hydrology, invasive weeds, introduced predators, coastal development and human-related disturbance. The effort required to manage and mitigate adverse impacts on shorebird populations involves a combination of stakeholders working in collaboration. Research contributes to our understanding of impacts and informs management, while land management (government and private), community interest and user groups and individuals contribute to the implementation, monitoring and observance of management interventions.

In Australia, the Natural Heritage Trust supports biodiversity conservation and sustainable natural resource management. The contribution of community to conservation is regarded a priority of the Trust and investment is allocated to community capacity building, whereby the community is provided with the understanding and skills to make and implement informed decisions resulting in conservation. The Shorebird Conservation Project (SCP) is NHT funded and aims to facilitate community involvement in on-ground management and abatement of threats at 10 important shorebird sites in Australia. 'Community' includes individuals, interest, user and management groups.

During the past four years the SCP has initiated 31 site-based projects involving 52 stakeholder groups across seven broad categories – Natural Resource Management Bodies, Local Government, State Agency, Traditional Owner, Interest, User and National Conservation Organisations. Thirty two groups were new recruits to shorebird conservation. Activities undertaken by community groups were a combination of education and awareness raising, on-ground habitat management, management planning and advocacy, and survey and monitoring.

Four case studies are evaluated in terms of the key management issues, target audience, implementation group(s) and outcomes. The importance of community is demonstrated, in particular community values and interests, in driving decision-making that delivers outcomes for shorebird conservation. Some activities were easily integrated and others were more challenging for communities, requiring ongoing management and monitoring.

Shorebird Network Sister Sites: consolidating links along the flyway

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Yalu Jiang National Nature Reserve (YJNNR) on the northern Yellow Sea coast of China is a highly significant site for shorebirds during northward migration from New Zealand and eastern Australia. Approximately 50% of the *baueri* subspecies Bar-tailed Godwit population in the East Asian Australasian Flyway stage at Yalu Jiang. The Firth of Thames in New Zealand supports internationally significant numbers of Arctic-breeding shorebirds, in particular Bar-tailed Godwit and Red Knot as well as New Zealand breeding species such as Pied Oystercatcher and Wrybill.

On 26 April 2004 a Memorandum of Understanding between the Miranda Naturalists' Trust and YJNNR was signed in Dandong, China. This ceremony marked the establishment of a sister-site partnership between the two East Asian Australasian Shorebird Network sites. Three initial priority areas for cooperation between Yalu Jiang and Miranda are:

- Training local staff in bird banding techniques
- Assisting with public awareness and education programmes on shorebirds and shorebird habitats
- Facilitating research on Bar-tailed Godwit

Migratory species require a high level of international cooperation, and this sister-site partnership is the first link in providing a joint effort between China and New Zealand in meeting the obligations of each country under the terms of the Bonn Convention on Migratory species. Background, objectives and future directions for the sister-site partnership are discussed.

Previously unknown *Coenocorypha* snipe discovered on Campbell Island

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A population of *Coenocorypha* snipe was discovered on Jacquemart Island, a rat-free 19 ha islet adjacent to Campbell Island in the New Zealand subantarctic, in November 1997. This was the first evidence of *Coenocorypha* snipe occurring in the Campbell Island group, which is believed to have been infested by Norway rats (*Rattus norvegicus*) before the first naturalists visited in 1840. Rats were eradicated from 11,268 ha Campbell Island by the New Zealand Department of Conservation in July 2001. Two snipe were seen, and one caught, on Campbell Island adjacent to Jacquemart Island in March 2005. The bird

caught was a fully-feathered chick, indicating successful breeding on Campbell Island. The Campbell Island snipe remains undescribed and critically endangered.

Sharing the shoreline: shorebird population monitoring & habitat management at the Shoalhaven River Estuary, South Coast, New South Wales, Australia

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Dept. Environment and Conservation, National Parks and Wildlife Service staff, in conjunction with interested community people have conducted census surveys of shorebirds at the nationally significant Shoalhaven River estuary at Comerong Island Nature Reserve and adjoining crown land for the previous 3.5 years.
Since 2001 DEC has initiated:

- periodic census of the site in collaboration with the 'Adopt an Estuary' project of the NSW Wader Study Group funded under the National Heritage Trust (NHT) program;
- active conservation management of Little Tern, Pied Oystercatcher and Red-capped Plover breeding events;
- extensive liaison with the beach dog-walking fraternity regarding respect for shorebird-sensitive areas;
- design and implementation with Shoalhaven City Council of a shorebird-friendly and informative car park and site trackhead involving landscaping, shorebird signage and infrastructure;
- habitat monitoring by photopoint technique, particularly the coastal saltmarsh where Grey mangrove *Avicennia marina* & the exotic spiny rush *Juncus acutus* appear to be colonising the low *Sarcocornia quinqueflora* dominated saltmarsh;
- Pest control of *Juncus acutus* plants invading the saltmarsh potentially displacing wader roosts and skulking areas.
- The greatest sustainability challenge is engendering community awareness and respect of the importance of the area for shorebirds and appropriate behaviour within and around their habitat.

Ecological constraint on parental care in the Kentish Plover

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Rich resources are often assumed to allow females to desert and lay a new clutch with a second partner ('classic polyandry'). Here we investigate a precocial shorebird, the Kentish Plover *Charadrius alexandrinus*, and show that abundant resources have an opposite effect on female desertion to that expected. This small shorebird exhibits variable patterns of brood care: the chicks may be raised only by the male, by the female or by both parents. The timing of female desertion varies across broods: some broods are deserted by the female at hatching of the eggs, whereas in others the female stays until the chicks fledge. In our study site in Southern Turkey the Kentish Plovers raise their broods in two habitats: saltmarsh and lakeshore. Food intake was higher on the lakeshore than in the saltmarsh, and the broods moved toward the lakeshore as the season proceeded. As the density of plovers increased on the shore the parents spent more time defending their young, and desertion by female was delayed probably to assist the male in defending the chicks. Taken together, our results are consistent with the hypothesis that seasonal changes in the ecology of brood-rearing habitats influence the movement of broods, which in turn impact upon their breeding system.

Modelling habitat suitability for the Madagascar plover (*Charadrius thoracicus*)

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The Madagascar Plover is a shorebird endemic to wetlands of Western Madagascar. Surveys in 2002, 2003 and 2004 produced 1442 sightings in 27 wetland regions. This wader has a restricted habitat requirement since it only breeds on coastal grasslands and saltpans. We use bird locations and Landsat TM imagery to model habitat suitability across Western Madagascar with ecological niche factor analysis (ENFA). This yielded an estimate of maximum global population size of 2679 ± 350 Madagascar Plovers. These data are substantially lower than previous maximum population estimate (up to 6,000 individuals).

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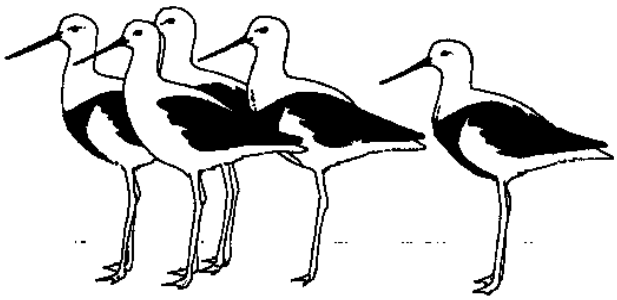

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