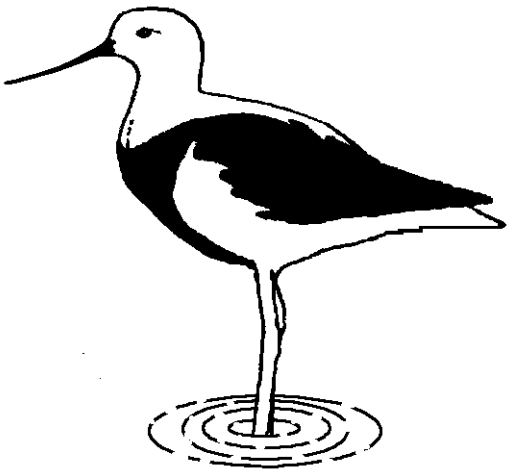
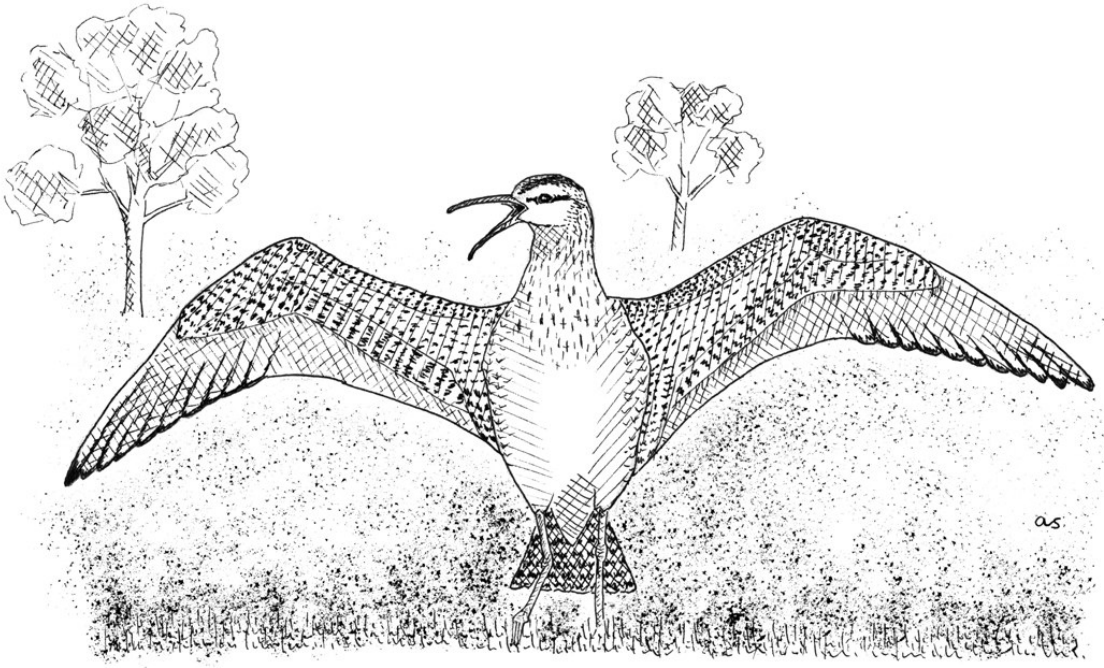
The Stilt



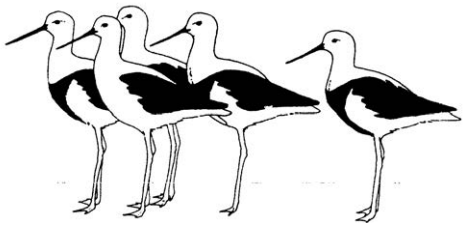
The Bulletin of the East Asian-Australasian Flyway



Australasian Wader Studies Group

A special interest group of Birds Australia

Number 46
October 2004



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

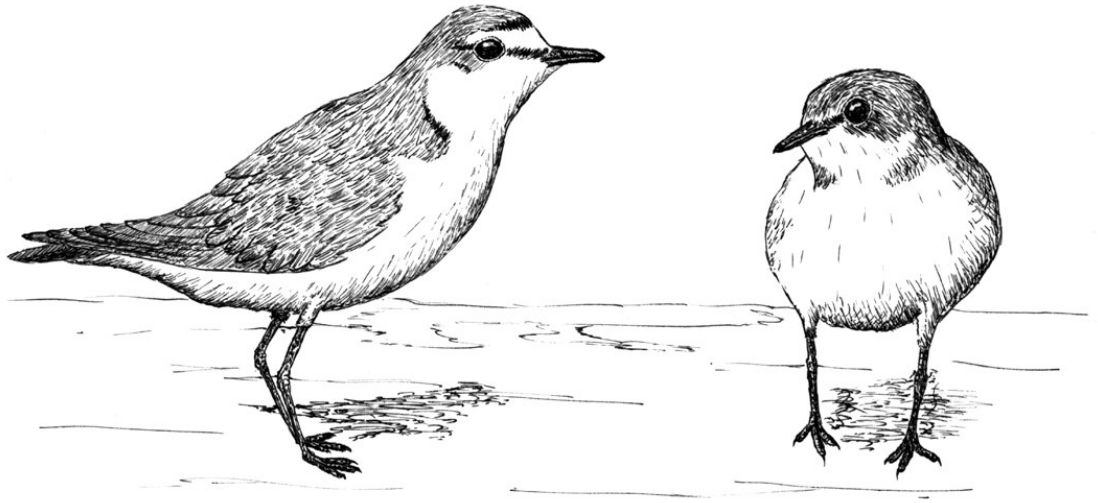
AWSG WEB SITE:
www.tasweb.com.au/awsg/index.htm

Cover Illustration: Andrew Silcocks

EDITORIAL

This issue of *Stilt* differs from its predecessors in two respects, one obvious and the other less so. The first difference is the page layout. By using a smaller font and a larger print area, more material can be accommodated without having to increase the number of pages and associated printing and mailing costs. Even so, this is a bumper issue, well above the usual maximum of 72 pages. The main reason for this is the clearing of the backlog of leg flag sighting reports. It is important to get these out speedily for three reasons: to acknowledge the efforts of those throughout the flyway who have recorded and reported their sightings, to allow readers to see the big picture resulting as the sum of individual sightings, and to encourage more birders to make and contribute sightings.

The less obvious change is that research papers and short communications are now independently refereed. The reasons for this change are to increase the quality of contributions and to widen the pool of contributors. It is not the intention to use refereeing to cut down the acceptance rate, currently running at a steady 100%. A part of the job of editor will, for the foreseeable future, be to help all contributors present their material in the most effective and acceptable form. The assistance provided to the editor by referees has been valuable in connection with this issue and will, no doubt, continue to be so into the future.



NORTHWARD SHOREBIRD MIGRATION SURVEYS IN 2004 AT THREE YELLOW SEA SITES IN JIANGSU AND SHANDONG PROVINCES

MARK BARTER[1] AND QIANG XU[2]

[1]*21 Chivalry Avenue, Glen Waverley, Vic 3150 Australia. markbarter@optusnet.com.au;* [2]*Wetlands International - China, Grand Forest Hotel, 19A Bei Sanhuan Zhonglu Road, Beijing 100029, China*

The shorebird surveys conducted in late-April and early May focused on three previously unsurveyed regions of intertidal areas, near-coastal salt works and mariculture ponds in northern Jiangsu and Shandong. A total of 33,628 shorebirds was counted in northern Jiangsu, 19,286 in Jiaozhou Wan and 53,463 in Laizhou Wan. The principal species in the saltworks were Spotted Redshank, Marsh Sandpiper, Wood Sandpiper, Red-necked Stint and Sharp-tailed Sandpiper. Contrary to earlier experience large numbers of Red-necked Stints were found on intertidal areas in Jiaozhou Wan. Bar-tailed Godwit represented 59% of the identified birds counted in Laizhou Wan, making the region the second most important discovered for this species in the Yellow Sea. The development of shorebird-unfriendly saltworks with plastic-lined evaporators will be of concern if these replace the widespread conventional saltworks which support hundreds of thousands of birds around the Yellow Sea. We also found extensive conversion of saltpans to fishponds in northern Jiangsu. More information on possible trends in saltworks design and conversion to fishponds should be obtained in order to assess the significance of these threats to important shorebird habitat. Levels of human disturbance in all three regions were very high, especially on the intertidal areas. Conversion of intertidal areas and near-coastal wetlands to saltworks and mariculture ponds was widespread and ongoing.

INTRODUCTION

Northward migration surveys have been conducted since 1996 at a number of places around the Chinese portion of the Yellow Sea (Barter 2002; Barter *et al* 2003; Barter & Riegen 2004) as part of a China - Australia cooperative programme of shorebird studies. This paper describes the results of the most recent surveys of new areas and includes information on the regions surveyed, survey methods used and conditions encountered.

METHODS

The shorebird surveys focused on the intertidal areas, near-coastal salt works and mariculture (cultivation of the seas resources for food) ponds in three regions located in northern Jiangsu and south-eastern and north-western Shandong (Figure 1).

Survey areas, counting techniques and coverage

Northern Jiangsu

The survey region consisted of four saltworks (SW) and the coastal area between the northernmost saltworks (Taibei SW) and the Jiangsu/Shandong border. Counting took place from 29 April to 2 May 2004.

The survey of the saltworks involved driving around on tracks between saltpans and counting birds mostly from ground level, although higher vantage points were occasionally available. On two days it was impossible to use a telescope due to exceptionally windy and rainy conditions; also access to Tainan SW was limited due to roadworks. It is estimated that we were able to cover about 50% of Taibei SW, 30% of Xuwei SW, and 20% of each of Tainan and Guanxi SWs. An indeterminate number of shorebirds were hidden behind saltpan bunds and, perhaps, only 50% of the birds present within the viewing area were counted. The intertidal areas outside the saltworks were generally steep and narrow and appeared to support few shorebirds.

The survey of the coast north of Taibei SW was relatively straightforward with counts being conducted in fine weather at eight sites along the 30 km of coastline, which allowed good coverage of the intertidal areas except for the northernmost part where access was limited. The intertidal areas were muddy and 2-3 km wide along the most southern part of the coast, but became sandier and narrower (c. 500 m) further north. High tide was in the mid-afternoon enabling counting to be conducted on the rising tide. It is estimated that possibly 80% of the coastal shorebirds were counted.

Jiaozhou Wan

This relatively small bay in south-eastern Shandong has intertidal areas along the south-west and north-west sides, which are backed by saltworks. The coastline around the entrance to the bay and on the southern and eastern sides is rocky and there is little intertidal habitat. Surveys were limited to the south-west and north-west parts of the bay and took place on 3 and 4 May 2004. The survey covered both the saltworks and the intertidal areas outside the saltworks. The intertidal zone was sandy and varied from 1-2 km in width.

High tides were in the early afternoon allowing counting to be carried out on the rising tide. Weather conditions were windy with light rain on the first day and excellent on the second. Relatively few birds were seen on the first day, but this was probably due to a lack of birds rather than the adverse weather. Counts of the intertidal areas were made from five sites around the 25 km of coastline. The coverage of intertidal areas was estimated to be around 75%, whilst 50%, at most, of the saltworks area was surveyed.

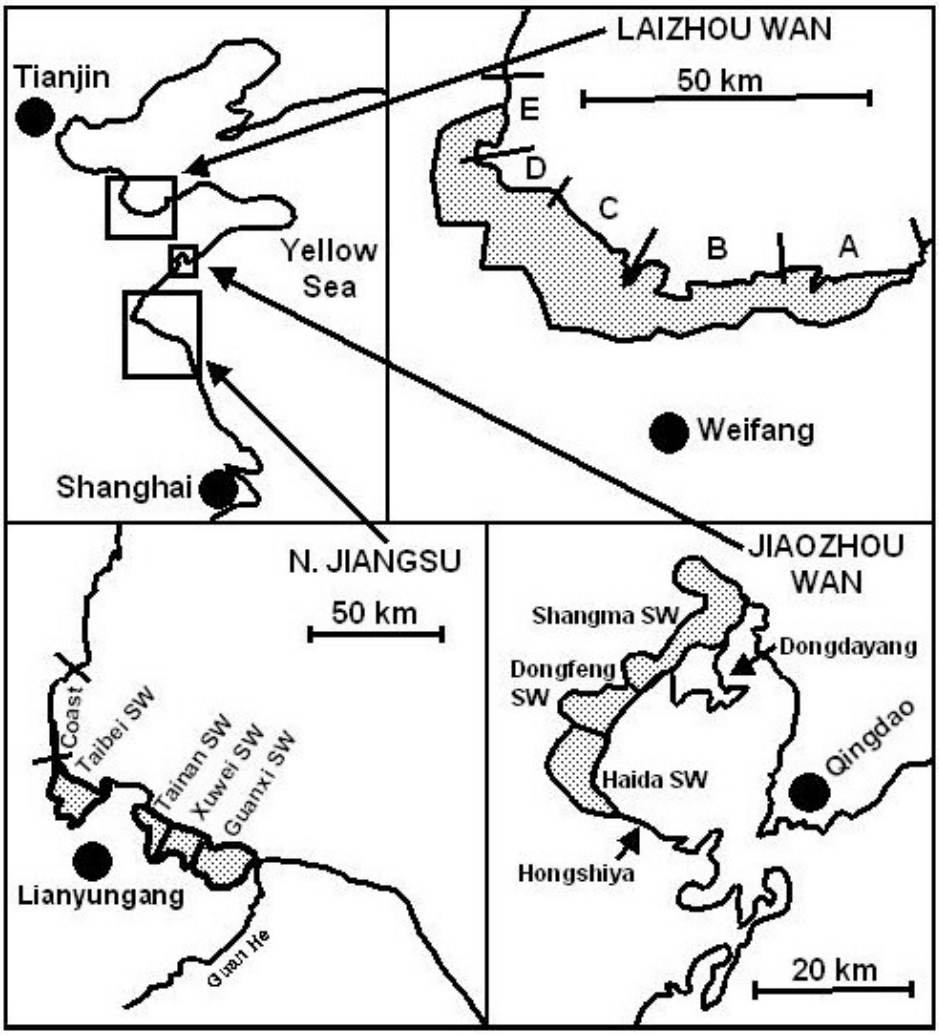


Figure 1. The locations of the three regions surveyed in 2004, with details of the count sites within each region.

Laizhou Wan

This is a very large bay bordered in the north-west by the Huang He National Nature Reserve (NNR) and in the east by the rocky Shandong Peninsula. The intertidal areas are sandy and wide (1-3 km), and are backed by very large saltworks (and some fish ponds) which extend around the whole coastline. The survey took place from 6 to10 May 2004. The survey mainly covered the intertidal areas, although we drove many kilometres through saltworks on the way to the coast. A total of 33 sites was counted along the 90 km of coastline. The saltworks were notable for the lack of birds compared with similar habitats elsewhere in the Yellow Sea (see Discussion). Often long detours were needed to by-pass river mouths. In a number of cases we had to drive 40-50 km in order to reach a point no more than 2-3 km from our starting point.

High tides varied from mid- to late morning allowing counting to take place on the rising and high tides. A neap tide on the last day probably greatly reduced the number of birds counted. The weather was good for four of the five survey days. Very few shorebirds were counted on the second day due to a strong off-shore wind holding the tide back and also causing poor visibility. Coverage of the intertidal areas was probably about 60%, whilst less than 10% of the saltworks area was visited.

RESULTS

Northern Jiangsu

A total of 33,628 shorebirds of 27 species was counted; 18,104 in the four saltworks, 15,453 on the intertidal flats and 71 in miscellaneous areas (Table 1). The principal species in the saltworks were Spotted Redshank, Marsh Sandpiper, Wood Sandpiper, Red-necked Stint and Sharp-tailed Sandpiper; few birds of these species were found in the intertidal areas. Along the coast Bar-tailed Godwit, Great Knot and Dunlin dominated.

Birds were spread fairly evenly, but thinly, in the saltworks; few large flocks were found. Large numbers of

Table 1. The number of shorebirds counted in northern Jiangsu from 29 April – 2 May 2004. See Figure 1 for locations of count areas. *Percentage of identified* is the species count as a percentage of the total number of birds identified.

Species	Taibei Saltworks	Xuwei Saltworks	Tainan Saltworks	Guanxi Saltworks	Coast	Misc.	TOTAL	Percentage of identified
Black-tailed Godwit *Limosa limosa*	33			4			37	0.1
Bar-tailed Godwit *Limosa lapponica*		50	2		1,880		1,932	7.7
Whimbrel *Numenius phaeopus*		3	1	5	22		31	0.1
Eastern Curlew *Numenius madagascariensis*		4			7		11	<0.1
Spotted Redshank *Tringa erythropus*	942	21	1	62		28	1,054	4.2
Common Redshank *Tringa totanus*	17	1		10			28	0.1
Marsh Sandpiper *Tringa stagnatilis*	704	109	11	184		2	1,010	4.0
Common Greenshank *Tringa nebularia*	16	6	12	4	24		62	0.2
Green Sandpiper *Tringa ochropus*		1	1				2	<0.1
Wood Sandpiper *Tringa glareola*	1,251	203	15	26		1	1,496	5.9
Terek Sandpiper *Xenus cinereus*	1		3	1			5	<0.1
Common Sandpiper *Actitis hypoleucos*				4			4	<0.1
Ruddy Turnstone *Arenaria interpres*	54	1	1	2			58	0.2
Great Knot *Calidris tenuirostris*					6,700		6,700	26.6
Red-necked Stint *Calidris ruficollis*	2,190	3,380	1,348	1,123			8,041	32.0
Temminck's Stint *Calidris temminckii*			3	1			4	<0.1
Long-toed Stint *Calidris subminuta*	12	18	25	11			66	0.3
Sharp-tailed Sandpiper *Calidria acuminata*	395	515	652	49	42		1,653	6.6
Dunlin *Calidris alpina*	820	212	109	62	1,250		2,453	9.7
Curlew Sandpiper *Calidris ferruginea*	6	47	7	108			168	0.7
Ruff *Philomachus pugnax*	6						6	<0.1
Black-winged Stilt *Himantopus himantopus*	20			81			101	0.4
Grey Plover *Pluvialis squatarola*	1	12	2	3	157		175	0.7
Kentish Plover *Charadrius alexandrinus*	2	6	3	2			13	<0.1
Lesser Sand Plover *Charadrius mongolus*	3	1		3	41		48	0.2
Greater Sand Plover *Charadrius leschenaultii*			2				2	<0.1
Oriental Pratincole *Glareola maldivarum*			1				1	<0.1
Unidentified shorebirds	2,228	591	53	225	5,330	40	8,467	33.7
TOTALS	**8,701**	**5,181**	**2,252**	**1,970**	**15,453**	**71**	**33,628**	

shorebirds were found as soon as we reached the coast some 5 km north of Taibei SW, but time limitations meant that we were unable to visit a potentially good area between this point and the saltworks. Shorebirds were present all the way up to the Jiangsu/Shandong border but numbers dropped off quickly as the intertidal areas became sandier and narrower. About 70,000 shorebirds may have been present in the four saltworks when allowances are made for the estimated survey coverage and the proportion of birds present which were actually seen. Similarly, perhaps a total of around 20,000 shorebirds were present along the coast.

Internationally important concentrations (by the 1% criterion of Wetlands International 2003) of Spotted Redshank, Marsh Sandpiper, Wood Sandpiper, Red-necked Stint and Sharp-tailed Sandpiper occurred in the saltworks, and of Great Knot on the intertidal areas. This is the first region in the Yellow Sea at which internationally important numbers of Wood Sandpiper have been recorded.

There was considerable human disturbance along the whole coast, with extensive shellfish harvesting involving the use of vehicles on the intertidal areas. There was evidence of large scale conversion of saltpans to fishponds. Qingkou SW, to the north of Taibei SW, had been completely converted, whilst much of Guanxi SW had been altered.

Jiaozhou Wan

A total of 19,286 shorebirds of 20 species was counted; 3,034 in the three saltworks, 15,539 on the intertidal flats and 713 in miscellaneous areas (Table 2). The five most common species were Spotted Redshank, Marsh Sandpiper, Red-necked Stint, Sharp-tailed sandpiper and Dunlin. As in northern Jiangsu, Spotted Redshank and Marsh Sandpiper only occurred in the saltworks but, in contrast, Sharp-tailed Sandpipers were only found in the intertidal areas and the great majority of Red-necked Stints also occurred in the intertidal areas. Dunlin were only found in intertidal areas. About 20,000 shorebirds may have been present around the coast and 6,000 in the saltworks when allowance is made for the estimated survey coverage.

The numbers of Red-necked Stint were the second highest recorded to date at Yellow Sea sites during northward migration and, unusually, were on the coast rather than within saltworks. Internationally important concentrations of Spotted Redshank and Marsh Sandpiper occurred in the saltworks and of Red-necked Stint on the intertidal areas.

Shorebird numbers in the saltworks were low, especially in Shangma SW which had a different type of construction to that seen previously in the Yellow Sea (see comments in Laizhou Wan below). As in northern Jiangsu, there was much shellfishing occurring on the intertidal areas.

Laizhou Wan

A total of 53,463 shorebirds of 21 species was counted (Table 3). Fewer than 1,000 birds were encountered in the extensive saltworks, these being mainly Spotted Redshank, Marsh Sandpiper and Red-necked Stint. Bar-tailed Godwit represented 59% of the identified birds counted. Although this species is widespread in the Yellow Sea it generally only occurs in small numbers. The numbers in Laizhou Wan are only exceeded at Yalu Jiang NNR, where 66,000 were counted in late-May 2004 and 52,000 in early-May 1999 (Barter & Riegen 2004).The only other Yellow Sea site carrying more than 10,000 birds during northward migration is the Huang He NNR, in north-eastern Laizhou Wan (Zhu *et al.* 2001).

On the basis of the estimated survey coverage, perhaps 90,000 shorebirds were present in the survey area during the count period. The number of Grey Plover present was the fourth highest encountered to date in the Yellow Sea during northward migration. Internationally important concentrations (Wetlands International 2003) of Bar-tailed Godwit, Grey Plover and Lesser Sand Plover (*mongolus* group) occurred in the bay.

Very few shorebirds were found within saltworks, despite their extensive nature. The design of saltworks in most of this region was different to that experienced elsewhere around the Yellow Sea in that ponds were small (generally about 80m x 80m), brick-walled with a continuous plastic membrane starting at the wall and extending across the bottom of the pan. Thus, there was no substrate suitable for the benthic food eaten by shorebirds. Extensions to existing saltworks of the same design were being built at a number of places.

Human disturbance was widespread on the intertidal areas around the bay. Reclamation of intertidal and near-coastal areas is very extensive and ongoing. Some regions around the estuary of the Guangli and Zima Rivers, which supported tens of thousands of shorebirds in the late 1990s, are now fully reclaimed as fishponds. Access to the northernmost part of the survey region was much easier than in 1997 and 1998 as a road had been built for 20 km along the shoreline; this allowed easy viewing of the intertidal area.

DISCUSSION

The presence of large numbers of Red-necked Stints on intertidal areas in Jiaozhou Wan contrasts with their usual preference for saltworks. Although this species is one of the commonest in the East Asian-Australasian Flyway, we have a less than comprehensive understanding of its northward migration strategy. Barter (2000) states that the Yellow Sea supports around 30% of the estimated flyway population; relatively few have been found elsewhere during the northward migration period. It is possible that new data will lead to an upward revision of the Yellow Sea estimate, but it is unlikely to exceed 50% of the population.

The Curlew Sandpiper is another common species for which we have little migration information. We counted a total of 228 birds in the three regions. As with the Red-necked Stint, it is possible that new data will lead to an upward revision of the estimate that the Yellow Sea supports about 10% of the population at this time of the year (Barter 2002), but this adjustment will probably only be minor. Our lack of knowledge about the northward migration strategy of this species is of particular concern given the significant

Table 2. The number of shorebirds counted in Jiaozhou Wan from 3-4 May 2004. See Figure 1 for locations of count areas. *Percentage of identified* is the species count as a percentage of the total number of birds identified.

Species	Hongshiya	Haida Saltworks	Dongfeng Saltworks	Caohai	Shangma Coast	Shangma Saltworks	Dongdayang	Misc.	TOTAL	Percentage of identified
Bar-tailed Godwit *Limosa lapponica*	20			30			7		57	0.4
Whimbrel *Numenius phaeopus*				2	1		76	12	91	0.6
Eastern Curlew *Numenius madagascariensis*				2	1			2	5	<0.1
Spotted Redshank *Tringa erythropus*		530	427					3	960	5.9
Marsh Sandpiper *Tringa stagnatilis*		520	512			184		67	1,283	7.9
Common Greenshank *Tringa nebularia*		2	5	3	3	2		1	16	0.1
Wood Sandpiper *Tringa glareola*			1					25	26	0.2
Terek Sandpiper *Xenus cinereus*					1			2	3	<0.1
Common Sandpiper *Actitis hypoleucos*					5				5	<0.1
Ruddy Turnstone *Arenaria interpres*		4							4	<0.1
Great Knot *Calidris tenuirostris*	20								20	0.1
Red-necked Stint *Calidris ruficollis*		45	420	4,700	2,000			405	7,570	46.8
Long-toed Stint *Calidris subminuta*								2	2	<0.1
Sharp-tailed Sandpiper *Calidria acuminata*				100	700			60	860	5.3
Dunlin *Calidris alpina*				3,900	1,000				4,900	30.3
Curlew Sandpiper *Calidris ferruginea*		20		40					60	0.4
Black-winged Stilt *Himantopus himantopus*								35	35	0.2
Grey Plover *Pluvialis squatarola*	40	3		80	80			28	231	1.4
Kentish Plover *Charadrius alexandrinus*		8						6	14	0.1
Lesser Sand Plover *Charadrius mongolus*				28	10				38	0.2
Unidentified shorebirds	20		351	2,670				65	3,106	19.2
TOTALS	**100**	**1,132**	**1,716**	**11,555**	**3,801**	**186**	**83**	**713**	**19,286**	

Table 3. The number of shorebirds counted in Laizhou Wan from 6 – 10 May 2004. See Figure 1 for locations of Sections A – E. *Percentage of identified* is the species count as a percentage of the total number of birds identified.

	SECTION						Percentage
Species	**A**	**B**	**C**	**D**	**E**	**TOTAL**	**of identified**
Bar-tailed Godwit *Limosa lapponica*	7,584		13,357	4,500	520	25,961	59.2
Whimbrel *Numenius phaeopus*	91	1	110	12	4	218	0.5
Eurasian Curlew *Numenius madagascariensis*	78					78	0.2
Eastern Curlew *Numenius arquata*	12		1			13	<0.1
Curlew sp.	4		1			5	<0.1
Spotted Redshank *Tringa erythropus*	40			104	32	176	0.4
Marsh Sandpiper *Tringa stagnatilis*	10		200	106	41	357	0.8
Common Greenshank *Tringa nebularia*	149		35	12	9	205	0.5
Green Sandpiper *Tringa ochropus*				2		2	<0.1
Wood Sandpiper *Tringa glareola*	1				1	2	<0.1
Terek Sandpiper *Xenus cinereus*	5		1	1		7	<0.1
Great Knot *Calidris tenuirostris*	1		350			351	0.8
Red Knot *Calidris canutus*	25					25	0.1
Red-necked Stint *Calidris ruficollis*	18		170			188	0.4
Sharp-tailed Sandpiper *Calidria acuminata*	38					38	0.1
Dunlin *Calidris alpina*	1,680		4,100	3,500	150	9,430	21.5
Eurasian Oystercatcher *Haematopus ostralegus*	2					2	<0.1
Black-winged Stilt *Himantopus himantopus*	37			4	7	48	0.1
Grey Plover *Pluvialis squatarola*	1,043		3,158	1,500	100	5,801	13.2
Kentish Plover *Charadrius alexandrinus*	8	3	22	7	16	56	0.1
Lesser Sand Plover *Charadrius mongolus*	17		460	400		877	2.0
Oriental Pratincole *Glareola maldivarum*					1	1	<0.1
Unidentified shorebirds	1,095	300	1,628	40	60	3,123	7.1
Unidentified shorebirds – large	2,000			4,500		6,500	14.8
TOTALS	**13,938**	**304**	**23,593**	**14,688**	**940**	**53**	

population crash that has occurred in recent years (Wilson 2001; Gosbell *et al.* 2002).

Laizhou Wan supported a similar species composition to the nearby Huang He NNR at the same period during northward migration (Zhu *et al.* 2001), with the major difference being that Great Knot were much less common in Laizhou Wan. The sandy nature of the substrate in Laizhou Wan may be the reason for this difference as Great Knot prefer muddy intertidal areas (D. Rogers pers. comm.) Laizhou Wan supported high shorebird numbers at the time of the survey, and the region would undoubtedly carry well in excess of 100,000 birds during the northward migration period. Species counted in low numbers during this survey, e.g. Eurasian Curlew, Eastern Curlew, Dunlin and Kentish Plover, had probably already moved further north.

The significance of saltworks as shorebird habitat is demonstrated by the estimate that the saltworks visited supported approximately 76,000 birds. The count results confirm previous observations about the importance of saltworks for species such as Spotted Redshank, Marsh Sandpiper, Wood Sandpiper, Red-necked Stint and Sharp-tailed Sandpiper (Barter 2002; Barter *et al.* 2002; Barter *et al.* 2003). It appears that such habitats are particularly vital for these species and, therefore, the development of saltworks with plastic-lined evaporators will be of concern if these replace the widespread conventional saltworks which support hundreds of thousands of shorebirds around the Yellow Sea. We also found extensive conversion of saltpans to fishponds in northern Jiangsu. One saltworks (Qingkou SW) we wanted to survey had been fully converted, whilst much of Guanxi SW now consists of fishponds. Fishponds are a far less suitable habitat for shorebirds as the water is generally too deep to support foraging birds. More information on possible trends in saltworks design and conversion to fishponds should be obtained in order to assess the significance of these threats to important shorebird habitat.

The levels of human disturbance at all three sites were very high, especially on the intertidal areas. The generally sandy nature of the substrate made it easy to walk, cycle and drive across the flats. The numerous shellfishermen mainly used vehicles to access the flats and transport their catches. Conversion of intertidal areas and near-coastal wetlands to saltworks and mariculture ponds was widespread and ongoing. This was particularly obvious in Laizhou Wan.

ACKNOWLEDGEMENTS

We are particularly grateful to the Australian Government for providing funding to cover travel and accommodation cost through the Natural Heritage Fund.

REFERENCES

Barter, M.A., Du, J.J., Wang, H., Chen, Y.Q., Gao, Cheng, H. & Li, C.R. 2002. Shorebird numbers in the Yancheng National Nature Reserve during the 2001 northward migration. Stilt 41, 27-34.

Barter, M.A. 2002. Shorebirds of the Yellow Sea – Importance, threats and conservation status. Wetlands International Global Series 9, International Wader Studies 12, Canberra, Australia.

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

Barter, M.A. & Riegen, A. 2004. Northward shorebird migration through Yalu Jiang National Nature Reserve. Stilt 46, 9-14.

Gosbell, K., Collins, P. & Christie, M. 2002. Wader surveys in The Coorong and coastal lakes of southeastern South Australia during February 2002. Stilt 42, 10-29.

Wetlands International. 2003. Guidelines for the Nomination of Sites for the Shorebird Site Network. Wetlands International – Oceania, Canberra.

Wilson, J.R. 2001. Wader Surveys in the Coorong. January and February 2001. Australasian Wader Studies Group, 26pp.

Zhu, S.Y., Li, Z.W., Lu, J.Z., Shan, K. & Barter, M.A. 2001. Northward migration of shorebirds through the Huang He delta, Shandong Province, in the 1997-1999 period. Stilt 38, 33-38.

NORTHWARD SHOREBIRD MIGRATION THROUGH YALU JIANG NATIONAL NATURE RESERVE

MARK BARTER[1] AND ADRIAN RIEGEN[2]

[1]21 Chivalry Avenue, Glen Waverley, Vic 3150 Australia. markbarter@optusnet.com.au; [2]231 Forest Hill Road, Waiatarua, Auckland 8, New Zealand

Comprehensive shorebird counts of the Yalu Jiang National Nature Reserve, located on the Chinese coast in the northern Yellow Sea, have been conducted three times during northward migration: in late-April, early-May and mid-May. Highest numbers occurred in late-April (166,000) with marginally fewer being present in early-May (153,000); the lowest numbers occurred in mid-May (93,000) when many birds had left for the breeding grounds. The most common species encountered, based on total numbers recorded over the three counts, were Bar-tailed Godwit, Great Knot, Dunlin, Grey Plover, Eurasian Curlew and Eastern Curlew. Although 34 different shorebird species were recorded over the three periods, these six species comprised more than 96% of the total counted. Such dominance by a few species is unusual in the Yellow Sea. Yalu Jiang is the second most important region in the Yellow Sea, after the Saemangeum area, for shorebirds during northward migration, supporting around 1,000 birds km^{-2} of intertidal area. The Reserve is the most important site yet discovered in the Yellow Sea for Bar-tailed Godwit, Eurasian Curlew and Eastern Curlew, the second most important for Grey Plover, the third for Great Knot and the fourth for Dunlin. It is estimated that approximately 44% of the *baueri* breeding population were present at Yalu Jiang during the late-April count. The timing of movements through Yalu Jiang, and the n. Yellow Sea, is related to the accessibility of the breeding areas. The more southerly breeding species pass through by mid-May, whilst those breeding at higher latitudes migrate later.

INTRODUCTION

Yalu Jiang National Nature Reserve (NNR) is located on the Chinese coast in the northern Yellow Sea, next to North Korea (Figure 1). Information on the Nature Reserve, including what little previous ornithological data are available, is presented in Barter *et al.* (2000a). The intertidal mudflats of the Yellow Sea are the final staging site for large numbers of shorebirds heading for the breeding grounds in northern China, the Russian Far East and Alaska (Barter 2002).

Comprehensive shorebird counts of the Yalu Jiang NNR have been conducted three times during northward migration. The results of the first count from 2-9 May 1999 were described in Barter *et al.* (2000a). Since then a further two counts have been made from 16-23 May 2000 and 20-25 April 2004. Two other sites in the northern Yellow Sea have been counted at different times during northward migration: Shuangtaizihekou NNR in late-April and mid-May (Barter *et al.* 2000b), and Huang He NNR in early-April, late-April and early-May (Zhu *et al.* 2001). Locations of these sites are shown in Figure 1. The three counts at Yalu Jiang NNR provide information on the importance of the Reserve for shorebirds and, when combined with the count results from Shuangtaizihekou and Huang He NNRs, provide very useful data about the migration strategies of shorebirds through the northern Yellow Sea.

METHODS

Count area

The shorebird surveys focused on the intertidal regions and near-coastal aquaculture ponds along the 55 km length of coastline (Figure 2). Opportunistic counts were made in ponds and reed beds as we drove through these on the way to the sea wall. In 2004 we also made counts in wetlands close to the new management station at Gushan. The Reserve has been split up into five sections (Figure 2), each of which can be counted in a day using two teams.

Count periods

Counts were carried out from 20-25 April (2004), 2-9 May (1999) and 16-23 May (2000). These periods are called late-April, early-May and mid-May from here on. Good weather and the availability of skilled counters enabled the 2004 count to be completed in less time than the previous counts.

Counting technique

At Yalu Jiang, most high tides reach the sea wall and the birds are forced to roost in the near-coastal ponds during the high-tide period. We have learnt from experience that the most effective technique is to count birds when they collect at pre-roosts on the upper intertidal flats as the tide approaches the sea wall. The pre-roosts are located at the last places to be covered by the incoming tide, generally in bays or at river and channel mouths. On neap tides, the birds roost well out on the mudflats and are difficult to count accurately.

Counts of birds roosting in the ponds at high tide are generally incomplete due to the difficulty of locating all the birds in the area. Counting on the falling tide is complicated by the fact that many birds do not leave their high tide roosts in the ponds until the tide edge has receded some distance from the wall, making it difficult to get accurate species counts. In the first survey, when we were new to the Reserve, counts were mainly of pre-roosting birds, but we did make some counts on the falling tide and also carried out check counts on birds roosting in ponds. In 2000 and 2004,

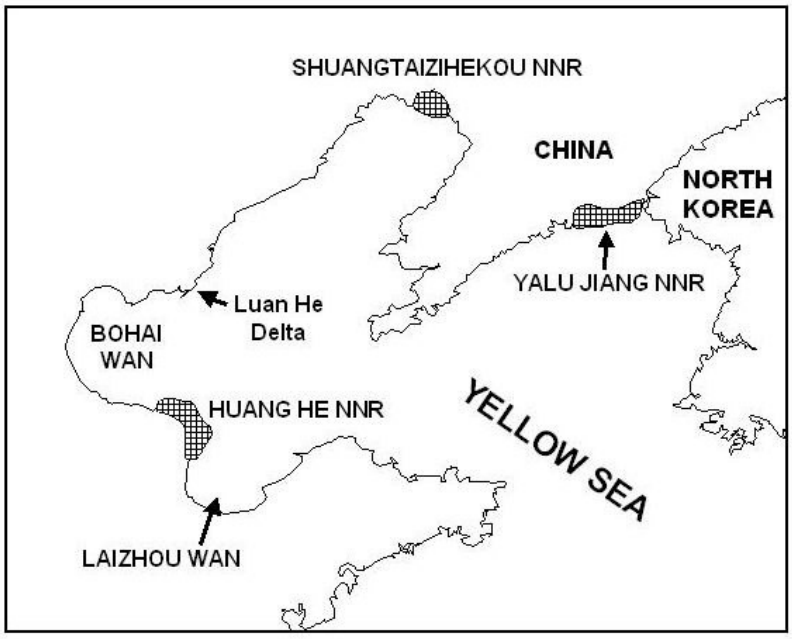


Figure 1. The northern Yellow Sea, showing the locations of Yalu Jiang, Shuangtaizihekou and Huang He National Nature Reserves, and other places referred to in the text.

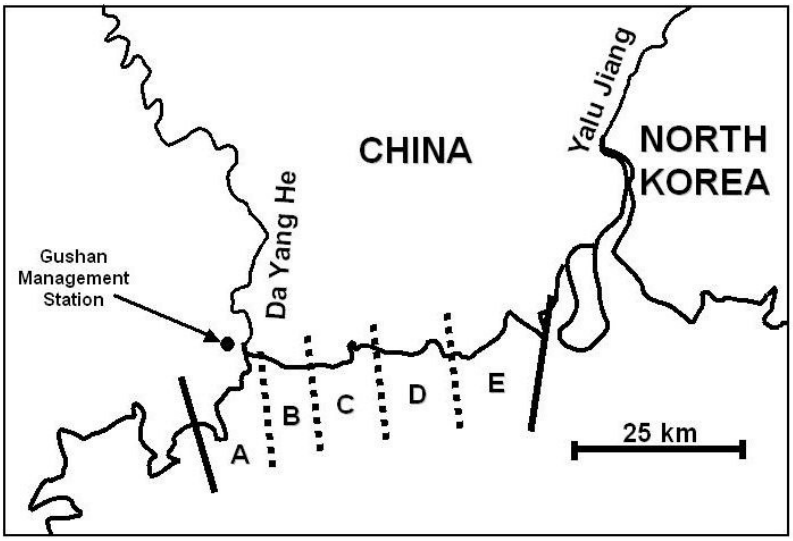


Figure 2. Yalu Jiang NNR (between filled lines) and count areas (A to E).

we relied almost exclusively on counts made at the 15 pre-roosts previously identified as being used by the great majority of birds before they moved to the ponds. As the tide comes in quickly, and there can be very large numbers of birds present, it is necessary for teams to be in place well before high tide, generally at least two hours before high tide, depending on the state of the tide cycle and weather conditions.

Count accuracy

We believe that all three surveys resulted in reasonably complete counts of the shorebirds present. If anything, counts would tend to be underestimates of the numbers present due to missed birds. Counts were adjusted when birds moved between pre-roosts or count sections.

Estimation of breeding population sizes

The true importance of a site such as Yalu Jiang for a species on northward migration is most appropriately measured by the proportion of the flyway breeding population it is supporting, as immature birds of many species mostly remain on or near the non-breeding areas during the migration periods and breeding season. The flyway breeding populations of Bar-tailed Godwit, Eurasian Curlew, Eastern Curlew, Great Knot and Grey Plover have been calculated approximately by assuming that breeding adults comprise 80% of these species' estimated flyway populations (after Wilson & Barter 1998). The 80% factor is probably too high for most species and its use will result in an underestimate of the proportion of the flyway breeding population using a site.

A factor of 100% has been used for Dunlin, which breed in their first year (del Hoyo *et al.* 1996).

RESULTS

Numbers and general distribution

The species numbers and count totals for the three periods are listed in Table 1. Highest numbers occurred in late-April (166,000) with marginally fewer being present in early-May (153,000); the lowest numbers occurred in mid-May (93,000) when many birds had departed for the breeding grounds.

The most common species encountered, based on total numbers recorded over the three counts, were Bar-tailed Godwit, Great Knot, Dunlin, Grey Plover, Eurasian Curlew and Eastern Curlew. Although 34 different shorebird species were recorded over the three periods, these six species comprised more than 96% of the total counted. This dominance by a few species is unusual; in most regions that have been surveyed on the Chinese side of the Yellow Sea it normally requires the cumulative total of the top ten or more species to reach 95% of the count total.

Birds occurred in large numbers throughout the Reserve's intertidal areas, although the highest concentrations occurred in the sections closest to the two rivers at either end of the reserve (Yalu Jiang and Da Yang He) with section E supporting more than 33% and sections A and B more than 25% of the total count. Relatively few birds were found in the near-coastal ponds, except at high tide. However, these ponds are important for species such as Whimbrel and Common Greenshank, which are significantly under-counted as we were unable to survey the ponds adequately. Similarly, few birds were recorded in reed beds due to a lack of systematic coverage. These areas are undoubtedly important for species such as Wood Sandpiper, Long-toed Stint and Sharp-tailed Sandpiper. In 2004, we located a flock of Little Curlew in recently flooded cut reed beds, close to the Gushan Management Station.

Common species at Yalu Jiang

Bar-tailed Godwit

Bar-tailed Godwit is the most common species. Numbers were highest in late-April at 66,000, fell to 52,000 in early-May and to 26,000 in mid-May.

Two subspecies occur in the Yellow Sea - *Limosa lapponica baueri,* breeding in northern and western Alaska, and *L. l. menzbieri,* breeding in the Russian Far East from the Kolyma Delta east to Chaun Gulf (McCaffery & Gill 2001). Visual observations, based on rump appearance, indicated that the great majority of the godwit present in late-April are of the *baueri* subspecies, whilst those in mid-May are *menzbieri*. Analysis of leg-flag sightings in the late-April count, when a total of 93 marked birds from the *baueri* and *menzbieri* populations were seen, indicates that the proportion of *baueri* present was 82%. The calculation was based on estimates of the number of flagged birds expected to be alive in late-April 2004 and assumed (a) that all flagged birds present were equally likely to be seen; and (b) that birds flagged in north-west Australia were *menzbieri* and those in south-east Australia and New Zealand were *baueri*. All eight flagged birds seen in mid-May were *menzbieri.*

The earlier migration of *baueri* is consistent with arrival times in Alaska, where birds start to appear on the Alaskan Peninsula in late-April and on the core western Alaska breeding grounds from early to mid-May (McCaffery & Gill 2001). Birds breeding in northern Alaska arrive in late-May to early-June (McCaffery & Gill 2001) and *L. l. menzbieri* arrives on the breeding grounds in late-May (Higgins & Davies 1996) so both these populations would be expected to be still present in the Yellow Sea in mid-May.

It seems that approximately 44% of the *baueri* breeding population was present at Yalu Jiang during the late-April count if it is accepted that 82% of the godwits present were *baueri* and that the *baueri* population is 155,000 (Bamford *et al.* in prep).

Eurasian Curlew

This species is the fourth most common in late-April with more than 13,000 individuals present, representing almost 50% of the estimated breeding population. By mid-May, numbers had fallen to a few hundred, probably comprising mainly non-breeding birds. The departure timing is in agreement with that observed at Shuangtaizehekou NNR (Barter *et al*. 2000b) and Huang He NNR (Zhu *et al*. 2001) and is to be expected for a species that breeds at relatively low latitudes in southern Russia.

Eastern Curlew

Numbers of Eastern Curlew approached 4,000 in both late-April and early-May, but had declined to 700 by mid-May. The decline in numbers is similar to that observed at Shuangtaizehekou NNR (Barter *et al*. 2000b) and Huang He NNR (Zhu *et al*. 2001). Eastern Curlew start arriving in mid-April in the southernmost part of their breeding range (A. Antonov pers. comm.), whilst they reach the more northern and most distant parts on the Kamchatka Peninsula during May (Higgins and Davies 1996). Judging by the numbers still present in mid-May, it seems that at least some of the birds passing through Yalu Jiang may breed in the more northerly regions such as Kamchatka.

Great Knot

The second most common species. Numbers increased from 33,000 in late-April to 55,000 in early-May, and then declined to 26,000 in mid-May. Counts in Shuangtaizehekou NNR (Barter *et al.* 2000b) and Linghekou (Barter *et al*. 2000c) indicate that Great Knot start arriving in the northern Yellow Sea in large numbers in late-April. Peak numbers occurred at Huang He, a little further south, in early-May (Zhu *et al.* 2001).

The count data show that birds continue to arrive during late-April, peak in the first half of May, and then leave for the breeding grounds in the mountains of far east Russia where they start arriving from 22 May onwards (Tomkovich 1996), with peak passage through the Moroshechnaya estuary, Kamchatka occurring from 26-27 May (Gerasimov & Gerasimov 2000). The early arrivals would have to leave Yalu Jiang by 19-20 May in order to fly the 2,700 to 4,500

Table 1. Summaries of the three counts. (INT. IMP. = internationally important; criterion is the threshold 1% of the estimated flyway population that establishes species presence in internationally important numbers. 1% criterion for Lesser Sand Plover is for combined populations of *mongolus* and *stegmanni* populations only).

Species	**20-25 April** (2004)	**2-9 May** (1999)	**16-23 May** (2000)	**INT.** IMP.
Common Snipe *Gallinago gallinago*	2	-	-	1 ,000
Snipe sp.	-	5	-	
Black-tailed Godwit *Limosa limosa*	2	-	17	1,600
Bar-tailed Godwit *Limosa lapponica*	66,134	51,918	26,169	3,250
Little Curlew *Numenius minutus*	1,183	-	-	1,800
Whimbrel *Numenius phaeopus*	414	286	232	550
Eurasian Curlew *Numenius arquata*	13,136	234	563	350
Eastern Curlew *Numenius madagascariensis*	3,874	3,744	731	380
Curlew sp.	1,407	20	130	
Spotted Redshank *Tringa erythropus*	171	162	10	250
Common Redshank *Tringa totanus*	18	49	44	650
Marsh Sandpiper *Tringa stagnatilis*	1	0	0	1,000
Common Greenshank *Tringa nebularia*	165	351	258	550
Spotted Greenshank *Tringa guttifer*	-	-	3	10
Green Sandpiper *Tringa ochropus*	5	-	-	250
Wood Sandpiper *Tringa glareola*	465	490	123	1,000
Terek Sandpiper *Xenus cinereus*	56	153	326	500
Common Sandpiper *Actites hypoleucos*	3	5	23	300
Grey-tailed Tattler *Heteroscelus brevipes*	-	6	19	400
Ruddy Turnstone *Arenaria interpres*	9	44	194	310
Great Knot *Calidris tenuirostris*	32,880	55,178	26,093	3,800
Red Knot *Calidris canutus*	33	1,499	61	2,200
Sanderling *Calidris alba*	7	-	13	220
Red-necked Stint *Calidris ruficollis*	20	299	541	3,150
Long-toed Stint *Calidris subminuta*	3	24	-	250
Sharp-tailed Sandpiper *Calidris acuminata*	35	61	97	1,600
Dunlin *Calidris alpina*	34,841	25,181	22,482	9,500
Curlew Sandpiper *Calidris ferruginea*	1	-	2	1,800
Spoon-billed Sandpiper *Eurynorhynchus pygmaeus*	-	-	1	30
Broad-billed Sandpiper *Limicola falcinellus*	12	729	723	250
Eurasian Oystercatcher *Haematopus ostralegus*	224	70	189	100
Black-winged Stilt *Himantopus himantopus*	14	38	-	250
Pacific Golden Plover *Pluvialis fulva*	9	147	-	1,000
Grey Plover *Pluvialis squatarola*	4,628	4,005	7,232	1,250
Kentish Plover *Charadrius alexandrinus*	43	12	17	1,000
Lesser Sand Plover *Charadrius mongolus*	171	306	647	600
Unidentified shorebirds	6,111	7,702	6,050	
TOTALS	166,471	152,718	92,990	

km to the breeding grounds by the 22 May, i.e. depart during the middle of the mid-May survey period.

Dunlin

The third most common species. Numbers are highest in late-April (35,000) and decline to 25,000 in early-May and, further, to 22,000 in mid-May. Similarly, Dunlin numbers at Huang He NNR were higher in late-April (20,000) than in early-May (13,500) (Zhu *et al.* 2001), although at Shuangtaizehekou NNR numbers increased between late-April (7,500) and mid-May (16,000) (Barter *et al.* 2000b).

There are four subspecies in the Flyway (three common: *arcticola, sakhalina*, and *kistchinski;* one rare: *actites*). Peak arrivals of *arcticola* on the Alaskan North Slope breeding grounds occur from 2-6 June (Warnock & Gill 1996), whilst *sakhalina* arrive on their breeding grounds in Chukotka in late-May (Higgins & Davies 1996). Earliest arrival dates in Kamchatka are from 8 May in the south to 20 May in the north-west, with active migration in the SW occurring around 10 May (Gerasimov & Gerasimov 2001). It seems that the earlier arrivals are probably *kistchinski*, the subspecies breeding on Kamchatka, whilst those birds arriving later are on their way to Chukotka and Alaska. Thus,

it is possible that those Dunlin departing early from the northern Yellow Sea are from the *kistchinski* subspecies.

Grey Plover
Numbers are stable during late-April (4,600) and early-May (4,000), and then increase (to 7,200) in mid-May. At Shuangtaizihekou NNR, numbers are similar in late-April (4,300) and mid-May (4,300) (Barter *et al.* 2000b). Grey Plovers would be expected to remain in the Yellow Sea until the second half of May as they do not arrive on the breeding grounds until late-May/early-June (Marchant & Higgins 1993).

Less common species at Yalu Jiang (fewer than 2,000 individuals)

Little Curlew
Almost 1,200 birds were located in newly flooded reed beds during the late-April count. These beds, which are cut during the winter months and then flooded in the spring to encourage growth, also provide excellent habitat for a number of other species during the northward migration period, including Wood Sandpiper, Long-toed Stint and Sharp-tailed Sandpiper. Little Curlew have only been found in numbers at two other sites in the Yellow Sea: Huang He NNR (Barter et al. 1999) and the Luan He Delta (RSPB Sabbatical Report 2002). Barter (2002) concluded that most of the estimated population of 180,000 use inland migration routes during northward migration. More attention to surveying near-coastal areas around the Chinese side of the Yellow Sea may yet find significant concentrations of this species in the region.

Common Greenshank
The maximum number counted was 351 in mid-May. During the surveys we walked and drove past hundreds of aquaculture ponds which, almost invariably, had at least one Greenshank present, and sometimes two or three. We estimate that there were about 1,500 ponds within the Reserve, which would have held, conservatively, in excess of 1,000 individuals. This number comfortably exceeds the 1% international importance threshold for Common Greenshank of 550.

Terek Sandpiper, Ruddy Turnstone, Red-necked Stint, Sharp-tailed Sandpiper, Lesser Sand Plover, and Broad-billed Sandpiper
Numbers of these six species increased from late-April to mid-May, indicating that they are late migrants through this region – an observation which is confirmed by counts at Shuangtaizihekou NNR (Barter *et al.* 2000b) .

Red Knot
Although the estimated combined flyway population of the two subspecies occurring in the Yellow Sea (*rogersi* and *piersmai*) is 220,000, implying around 180,000 breeding birds, relatively small numbers of this obligate coastal species have been found in the Yellow Sea. The major concentrations recorded to date have been in Bohai Wan. It does not appear that the Yalu Jiang region is an important staging area for this species.

Internationally important species

Ten species were present in internationally important numbers (Wetlands International 2003) during at least one of the counts: Bar-tailed Godwit, Eurasian Curlew, Eastern Curlew, Common Greenshank, Great Knot, Dunlin, Broad-billed Sandpiper, Eurasian Oystercatcher, Grey Plover and Lesser Sand Plover. It is probable that Whimbrel and Wood Sandpiper also occur in internationally important numbers. The number of Internationally important species is relatively low compared to other sites in the region: Huang He NNR has 16 (Zhu *et al.* 2001), Shuangtaizihekou NNR has 11 (Barter *et al.* 2000b), and Bohai Wan has 20 (Barter *et al.* 2003).

DISCUSSION

Yalu Jiang NNR is the second most important region in the Yellow Sea after the Saemangeum area (Mangyeung and Dongjin estuaries in western South Korea) for shorebirds during northward migration. It supports around 1,000 birds km^{-2} of intertidal area which, along with Saemangeum, is the highest density yet recorded in the Yellow Sea. This density is much higher than that found at many major shorebird sites in the East Atlantic Flyway (Table 2).

The Reserve is the most important site yet discovered in the Yellow Sea for Bar-tailed Godwit, and Eurasian and Eastern Curlews, the second most important for Grey Plover, the third for Great Knot, and the fourth for Dunlin. These six species are widely distributed throughout the Yellow Sea and it is estimated that more than 90% of breeding Bar-tailed Godwit, Eurasian Curlew, Eastern Curlew, Great Knot and Grey Plover, and around 70% of breeding Dunlin, stage through the region on northward migration (Barter 2002).

The dominance of these six species, representing 96% of the shorebirds recorded during the three surveys, is not a counting artefact as the three counts were spread throughout the peak of the migration period and it is very unlikely that any major assemblages of other species would have been missed, with the exception perhaps of some birds using the near-coastal wetlands. The reason for this dominance is not clear as the usual prey species of these birds are varied in nature and are presumably abundant since they support so many birds. Benthic fauna and feeding studies may provide an explanation.

Bar-tailed Godwit only occur in very large numbers, more than 10,000 birds, at Yalu Jiang NNR, Huang He NNR with 11,000 (Zhu *et al*. 2001), and Laizhou Wan with 26,000 (Barter & Xu 2004). Yalu Jiang is by far the most important site for this species discovered to date.

The timing of movements through Yalu Jiang and the northern Yellow Sea is related to the accessibility of the breeding areas. The more southerly breeding species, such as Eurasian and Eastern Curlews, *baueri* Bar-tailed Godwit, Great Knot and, maybe, *kistchinski* Dunlin pass through by mid-May, whilst those breeding at higher latitudes, such as *menzbieri* Bar-tailed Godwit, Grey Plover, *arcticola* and *sakhalina* Dunlin, Terek Sandpiper, Ruddy Turnstone, Red-necked Stint, Sharp-tailed Sandpiper, Lesser Sand Plover, and Broad-billed Sandpiper, migrate later.

Table 2. Areas of intertidal mudflats along the East Atlantic flyway at important shorebird sites.

Intertidal areas	Area (km^2)	Number of shorebirds	Density (No. km^{-2})	Reference
West Iceland	343	285,854	833	1
Waddensee (Holland, Germany & Denmark)	4,000	200,000	500	2
Wash (UK)	298	203,826	684	3
Morecombe Bay (UK)	337	168,275	499	3
Solway Firth (UK)	277	84,708	306	3
Banc D'Arguin (Mauritania)	540	2,247,500	4,160	4
Guinea-Bissau	1,570	979,490	625	5

References: (1) Gudmundsson & Gardarsson 1992; (2) Smit & Wolf 1981; (3) Davidson *et al.* 1991, Cranswick *et al.* 1995; (4). Zwarts *et al.* 1990; (5) Zwarts 1988.

Some species for which other areas of the Yellow Sea are important are absent or only present in small numbers at Yalu Jiang; these include Black-tailed Godwit, Spotted Redshank, Marsh Sandpiper, Grey-tailed Tattler, Asian Dowitcher, Sanderling, Curlew Sandpiper, Black-winged Stilt, Pied Avocet, and Kentish Plover.

ACKNOWLEDGEMENTS

The counts would not have been possible without assistance from the management and staff of the Dandong Bureau of the State Environment Protection Administration (SEPA) and the Gushan Management Station, who helped with the planning of the programme, provided advice on and arranged access to count sites, and organised accommodation. In particular, we wish to acknowledge the help and hospitality of Yu Lian Sheng (Director, Dandong SEPA), Ms. Yan Meifang (Director, Yalu Jiang NNR) and Wang Tao (Vice Director, Yalu Jiang NNR). Five volunteers from the Miranda Naturalists' Trust helped greatly with the 2004 survey. We thank the Australian Government for providing funding to cover participants' travel and accommodation costs through its Natural Heritage Fund. Chen Kelin, Li Zuo Wei, Xu Qiang, Doug Watkins and Warren Lee Long of Wetlands International assisted significantly with organisation of the surveys.

REFERENCES

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

Barter, M.A., Tonkinson, D.A., Wilson, J.W., Li, Z.W., Lu, J.Z., Shan, K. & Zhu, S.Y. 1999. The Huang He Delta – An important staging site for Little Curlew *Numenius minutus* on northward migration. Stilt 34, 11-17.

Barter, M.A., Wilson, J.R., Li, Z.W., Dong, Z.G., Cao, Y.G. & Jiang, L.S. 2000a. Yalu Jiang National Nature Reserve – A newly discovered internationally important site for northward migrating shorebirds. Stilt 37, 14-21.

Barter, M.A., Wilson, J.R., Li, Z.W., Li, Y.X., Yang, Y.C., Li, X.J., Liu, Y.F. & Tian, H.S. 2000b. Northward migration of shorebirds in the Shuangtaizihekou National Nature Reserve, Liaoning Province, China in 1998 and 1999. Stilt 37, 2-10.

Barter, M.A., Wilson, J.R., Li, Z.W., Li, Y.X. & Tian, H.S. 2000c. Shorebird numbers in the proposed Linghekou Provincial Nature Reserve, Liaoning Province, China, during the 1999 northward migration. Pp. 85-97. *In:* Chen *et al.* (Eds.) Shorebird Survey in China (1999). Wetlands International-China Program, Beijing, and Wetlands International-Oceania, Canberra. 116 pp.

Barter, M.A. 2002. Shorebirds of the Yellow Sea – Importance, threats and conservation status. Wetlands International Global Series 9, International Wader Studies 12, Canberra, Australia.

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

Barter, M.A. & Xu, Q. 2004. Northward shorebird migration surveys in 2004 at three Yellow Sea sites in Jiangsu and Shandong provinces. Stilt 46: 2-8.

Cranswick, P.A., Walters, R.J., Evans, J., & Pollitt, M.S. 1995. The wetland bird survey 1993-94: wildfowl and wader counts. BTO/WWT/RSPB/JNCC, Slimbridge.

Davidson, N.C., Laffoley, D. d'A., Doody, J.P., Way, L.S., Gordon, J., Key, R., Pienkowski, M.W., Mitchell, R. & Duff, K.L. 1991. Nature conservation and estuaries in Great Britain. Peterborough. Nature Conservancy Council.

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

Gerasimov, Yu.N. & Gerasimov, N.N. 2000. Information on the northward migration of Great Knot in Kamchatka, Russia. Stilt 36, 35-38.

Gerasimov, Yu.N. & Gerasimov, N.N. 2001. Records of northward migration of Dunlin *Calidris alpina* through Kamchatka, Russia. Stilt 39, 37-40.

Gudmundsson, G. & Gardarsson, A. 1992. Numbers, geographic distribution and habitat utilisation of waders (Charadrii) in spring on the shores of Iceland. Ecography 15.

Higgins, P.J., & Davies, S.J.J.F. (Eds) 1996. Handbook of Australian, New Zealand and Antarctic Birds. Volume 3: Snipe to Pigeons. Oxford University Press, Melbourne.

Marchant, S. & Higgins, P.J. (Eds.) 1993. Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings. Oxford University Press, Melbourne.

McCaffery, B., & Gill, R. 2001. Bar-tailed Godwit (*Limosa lapponica*). *In:* A. Poole & F. Gill (Eds.). The Birds of North America, No. 581, The Birds of North America, Inc., Philadelphia, USA

RSPB Sabbatical Report 2002. R. Thorpe (Ed.). *Shorebird Counts Gulf of Bohai – Hebei Province, China*. Royal Society for the Protection of Birds, Belfast.

Smit, C.J. & Wolff, W.J. 1981. Birds of the Wadden Sea. Balkema, Rotterdam.

Tomkovich, P.S. 1996. A third report on the biology of the Great Knot *Calidris tenuirostris.* Stilt 28, 43-45.

Warnock, N.D & Gill, R.E. 1996. Dunlin (*Calidris alpina*). *In:* A. Poole & F. Gill (Eds.). The Birds of North America, No. 203, The Birds of North America, Inc., Philadelphia, USA.

Wetlands International 2003. Guidelines for the Nomination of Sites for the Shorebird Site Network. Wetlands International – Oceania, Canberra.

Wilson, J.R. & Barter, M.A. 1998. Identification of potentially important northward migration staging areas for long-jump migrant waders in the East Asian-Australasian flyway. Stilt 32, 16–27.

Zhu, S.Y., Li, Z.W., Lu, J.Z., Shan, K. & Barter, M.A. 2001. Northward migration of shorebirds through the Huang He delta, Shandong Province, in the 1997-1999 period. Stilt 38, 33-38.

Zwarts, L. 1988. Numbers and distribution of coastal waders in Guinea-Bissau. Ardea 76, 42-55.

Zwarts, L., Blomert, A-M., Bruno, J.E., Hupkes, R. & van Spanje, T.M. 1990. Why do waders reach high feeding densities on the intertidal flats of the Banc d'Arguin, Mauritania. Ardea 78, 39-52.

LITTLE CURLEW AND OTHER MIGRATORY SHOREBIRDS ON FLOODPLAINS OF THE CHANNEL COUNTRY, ARID INLAND AUSTRALIA, 1999-2004

ROGER JAENSCH

Wetlands International, c/- Queensland Herbarium, Mt Coot-tha Road, Toowong Qld 4066, Australia.
roger.jaensch@epa.qld.gov.au

New information is presented on occurrence of five species of migratory shorebird, some in substantial numbers, in floodplain wetlands of the Channel Country, in arid inland Australia. Until recently, Little Curlew and Oriental Pratincole had rarely been recorded in this bioregion.

INTRODUCTION

Knowledge of the occurrence, habitats, abundance and migration of shorebirds in the interior of the Australian continent is incomplete and is inadequate for conservation planning. In the Channel Country bioregion (DEH 2004), within the Lake Eyre Basin of arid inland Australia, records of migratory shorebirds have been opportunistically collected (e.g. Higgins & Davies 1996, Barter & Harris 2002). Commonly these records are from the southward migration period (September-November), partly because wetland habitats are relatively accessible at that time. In contrast, much of this region is typically inhospitable and/or inaccessible in the summer (December-February) and northward migration (March-April) periods.

From March 1999 to April 2004 I was engaged in waterbird surveys in middle reaches of the Eyre Creek (lower Georgina River), Diamantina River, and Cooper Creek floodplains in the Queensland part of the Channel Country. The surveys were infrequent and at irregular intervals but several surveys were in March-April following moderate to major floods in the river systems. During the survey program I witnessed several occurrences of substantial numbers of migratory shorebirds and some apparent northward migration.

OBSERVATIONS

Little Curlew *Numenius minutus*

On the Eyre Creek (Georgina) floodplain, the Little Curlew was recorded at 14 sites and in three flood seasons.

On 10 March 1999, I recorded a number of flocks, in total about 1400 birds, in a ground survey of a small portion (24°49.0'S, 139°51.0'E) of the south-eastern sector of a large (c. 20,000 ha) open lake that lies on the Eyre Creek floodplain. (The name of the lake has been withheld at the landholder's request.) The lake was drying back, with less than half of its bed under water. The birds were in sparse, stunted tussock grassland of rat's tail couch *Sporobolus mitchellii*, which covered the dry and muddy bed of the lake, or in the outermost shallow water. Given that similar habitat was extensive around unsurveyed parts of the lakebed and that flocks of Little Curlew were visible in every direction, much higher numbers were undoubtedly present.

On 14 January 2001, four birds were seen in narrow shallow margins in the south-west of the same lake, which had filled beyond its normal capacity due to a particularly large, recently-peaked flood in the Georgina system. During aerial surveys on 22-23 March 2001, when water had extended far down the Eyre Creek floodplain and begun to dry back, I recorded nine flocks of 5-30 Little Curlew totalling 149 birds. They were on wide, bare drying mudflats and sparsely vegetated lignum *Muehlenbeckia florulenta* shrub swamps at sites between Bedourie, Queensland, and Goyder Lagoon, South Australia. During subsequent ground surveys, I saw four birds at a shallow marginal pool (24°51.3'S, 139°31.4'E) on the drying floodplain on 18 April 2001 and one at a muddy inlet of the above-mentioned lake on 19 April. The latest date for persistence of substantial numbers of Little Curlew in Australia, principally in northern coastal habitats, is 15 April (Rogers *et al.* 2001, Collins & Jessop 2001).

Most recently, on 23-24 March 2004, I tallied 295 Little Curlew from scattered flocks, either flying low (invariably in an upriver direction) or feeding in marshy margins of the Eyre Creek floodplain (Jaensch 2004). Most of these birds were seen in a small portion (24°52.8'S, 139°43.9'E) of the south-western sector of the large lake, which was well below half full because only minor floods occurred in the summer of 2003/04. They were at the sparsely vegetated edges of lush, dense grass-sedge swamp and flocks were noted throughout the area surveyed so much higher numbers probably were present around the entire lakeshore.

On the broad Diamantina River floodplain, Little Curlews were seen in two flood seasons, at the same site. Two birds were observed at the swampy edge of the floodplain (25°41.8'S, 140°16.2'E) on 13 January 2001, between minor flood pulses. A major but short-lived flood passed through this site in late January 2004. During a brief ground survey at the site on 25 March 2004 (Jaensch 2004), I witnessed an obvious migration of many flocks of Little Curlew along the treeless, swampy edge of the floodplain through the middle part of the day. All flocks were heading upriver on the same flight path; though bearing to the east at that point, by following the floodplain they would soon turn to the north. Some flocks, numbering many hundreds of Little Curlew, stopped to rest and preen in bare clay ponds with shallow water; others stopped in sparse low shrubland of wet samphire *Halosarcia* sp. Flocks passed by, at heights of up to 30 m, throughout the 2.5 hour observation period. A total of 4,200 birds was tallied and there was no reason to

doubt that this migration also occurred before and after the survey and thus involved thousands more birds. At this time, floodwater had receded from vast areas of the Diamantina floodplain around the site, leaving short green meadows. Habitat further downriver, especially below Birdsville, was likely to comprise meadows as well as bare flats of wet and recently dried mud. Feeding habitat for Little Curlew on the middle and lower Diamantina therefore was extensive in summer 2004.

I have only one record from the Cooper Creek floodplain in Queensland. On 5 March 2004, a flock of 70 Little Curlew was observed during an aerial survey over floodplain downriver of Windorah, in wet meadow and muddy channels (25°33.5'S, 142°18.4' E) with sparse shrub cover dominated by northern bluebush *Chenopodium auricomum* (Jaensch 2004). A moderate flood ran through this area in late January 2004.

There have been few if any previous records of Little Curlew in the Queensland Channel Country and until now large numbers have not been recorded in Australia outside the tropics (Blakers *et al.* 1984, McFarland 1992, Watkins 1993, Barrett *et al.* 2003). The above records demonstrate that the Little Curlew does occur in this bioregion, on all three of the major floodplains. The species occurs in substantial numbers (many thousands), particularly in March but probably throughout the duration of summer-autumn floods. Northward migration via the river corridors has been documented. It is possible that the migrating birds stopover near the Gulf of Carpentaria (due north of some of the Channel Country sites), where sudden arrival of many thousands has been noted in late March on the Karumba Plains (M. Barter pers. comm.), before continuing to their breeding grounds in Asia.

Habitats frequented by Little Curlew in the Channel Country include swamps, meadows, mudflats and lakebeds that are either shallowly inundated (drying) or have recently become dry. Such habitats occur extensively on all three floodplains. Short grasslands of Mitchell grass *Astrebla* spp. occur on some of the arid upland surrounding these floodplains and, as I have observed elsewhere, may provide additional foraging habitat for Little Curlews. Figures 1 and 2 show two of the habitats in which Little Curlew were seen.

Black-tailed Godwit *Limosa limosa*

On 17 April 2001, I observed a flock of 152 Black-tailed Godwit in a shallow drying pool (24°51.3'S, 139°31.4'E) near the outer edge of a frequently inundated part of the Eyre Creek floodplain. The muddy pool was associated with a semi-permanent waterhole and merged into drying lignum swamp and recently dried meadows. Many of the godwits were in full breeding plumage. Only two godwits were present there 24 hours later. Conceivably, most of the flock had migrated upriver/northwards. This species is occasionally recorded in the Channel Country (e.g. 6 in October 1999: Barter & Harris 2002) and other inland wetland systems (e.g. 112 in December 1993, Lake Sylvester, Northern Territory: Jaensch 2003).

Sharp-tailed Sandpiper *Calidris acuminata*

On 18 and 19 April 2001, at and within a few kilometres of the godwit site on Eyre Creek (see above), I recorded flocks of 40-100 Sharp-tailed Sandpipers on seven separate occasions, flying low and fast over the drying floodplain wetlands. Most were travelling upriver and thus to the east at that point, but would soon turn to the north. Some additional birds were flushed from muddy pools among lignum shrubland and from wet meadows on the floodplain. The main branch of the Georgina system originates far to the north-north-west in the Northern Territory and it is possible that the sandpipers were using the local wetlands for feeding before migrating northwards along the river corridor. Cross-continent migration is documented for this species and most individuals leave Australia by the end of April (Higgins & Davies 1996, p. 301).

On the same floodplain on 23-24 March 2004, a tally of 450 Sharp-tailed Sandpipers was realised after counts at sites on the south-west side of the large open lake (see Little Curlew account above) and a few kilometres downriver (Jaensch 2004). Total numbers on the floodplain probably were much higher given the vast extent of drying swamps and of lakeshore with wet mud and short, sparse, grass-sedge habitat.

These records are not the only substantial counts of this species from this lake or from other lakes and swamps in the Queensland Channel Country during 1999-2004 (e.g. Barter & Harris 2002) but they demonstrate that the species uses floodplains of this region during northward migration.

Oriental Pratincole *Glareola maldivarum*

Another migratory shorebird that has rarely been recorded in substantial numbers in the Channel Country is the Oriental Pratincole (Blakers *et al.* 1984, McFarland 1992, Watkins 1993, Barrett *et al.* 2003). Movements of this species within Australia are often associated with thunderstorms; the bird is typically an aerial feeder, capturing flying insects (Higgins & Davies 1996).

During the passing of a band of intense thunderstorms in January 2001, flocks of Oriental Pratincole were seen by the author in the Channel Country. On the middle reaches of the Diamantina River floodplain (25°41.8'S, 140°16.2'E), 725 Oriental Pratincole flew in to rest in an area of tree-less shallow pools and islets at the floodplain edge during intensely hot weather on 12 January 2001. On 14 January, at the peak of a major Georgina flood, 507 birds were counted along c. 2 km of the south-western shore of the large lake on the Eyre Creek floodplain (see Little Curlew account above). These birds were resting at or near the stony edge of the lake, which was full. On the same day, at a large claypan (25°3.0'S, 139°36.0'E) just south of and separate from the Eyre Creek floodplain, 205 Oriental Pratincole were hawking insects over shallowly inundated, grass-shrub swamp at dusk.

Figure 1. Little Curlews in swamp and sand-hill country, Diamantina floodplain, south-western Queensland (R. Jaensch, Wetlands International).

I did not see any Oriental Pratincole in the Channel Country in March-April 2001 or March 2004. Although the floodplains were wet, there were no thunderstorms during these later surveys.

Australian Pratincole *Stiltia isabella*

Though migratory to parts of Indonesia, the Australian Pratincole is generally thought to be nomadic in the arid zone of Australia (Higgins & Davies 1996). However, a recent observation lends weight to the idea that some seasonal migration may occur at least in the Channel Country.

On 25 March 2004, I recorded flocks of many tens to many hundreds of Australian Pratincole moving upriver along the Diamantina floodplain, associated with flocks of Little Curlew (see above) (Jaensch 2004). Often, when a flock of Little Curlew came past, a flock of Australian Pratincole was flying underneath. Over the 2.5 hour survey, 1,200 Australian Pratincole were counted and this is likely to have been only part of the total movement that day.

Otherwise, during surveys from 1999 to 2004, at varied stages of the flood cycle, it was not uncommon to count groups of several hundred Australian Pratincoles on the Diamantina and Georgina floodplains, especially at large lakes. Totals represented only a portion of the probable total number present.

CONCLUSIONS

In conclusion, recent surveys have revealed that both Little Curlew and Oriental Pratincole occur in substantial numbers in the Queensland Channel Country, well south of the principal Australian haunts of these migrants. The surveys have thus contributed to addressing the relatively poor understanding of the ecology of these species in Australia (Bellio *et al*. 2004). Probably these species have been overlooked in the past because access and survey conditions on the floodplain habitats have usually been difficult when the birds have been present.

Secondly, since summer/autumn floods occur in at least one of the Channel Country rivers every few years, the region can be considered a key feeding and migration stopover area for (several) shorebirds in the arid zone of Australia. This applies to major and moderate floods, which provide habitat that covers hundreds of thousands of hectares, but to some extent also to minor floods.

In regard to sustaining shorebird use of Channel Country floodplains, I contend that the principal management issue is to ensure that all river and overland water flows are neither reduced nor hindered. This should permit floodwaters to reach their full extent and reinvigorate shorebird feeding habitat both on the higher floodplain margins (important during northward migration) and in lower lying areas and lakes where water persists (important especially during southward migration). As this inland region experiences low rainfall (annual mean < 300 mm), shorebird habitat would be scarce but for the habitat provided by the inflowing river systems.

ACKNOWLEDGMENTS

Most of the author's fieldwork was made possible by contributions from Wetlands International and the Queensland Environmental Protection Agency. One of the aerial surveys was supported by the ARIDFLO project, which was funded by the Natural Heritage Trust and managed by the South Australian Department of Water, Land and Biodiversity Conservation. Help with observations and/or logistics was provided by many people, with special mention to Jon Cobb, Garth Tully, Derek Trapp, Tom Elliott, Don and Lyn Rowlands, Chris Mitchell, Julian Reid, Alan Macdonald, Kathy Stephens, Jimmie Crombie, and Brian Dayes. Greg Campbell, Garth Tully, Julian Reid, Mark Barter and Maria Bellio provided comments on a draft of this article.

Wetlands mentioned in this article, and the surrounding country, support active cattle grazing enterprises. As these operations are conducted on Queensland leasehold land, access may be secured only through negotiation with the property managers, with appropriate notice.

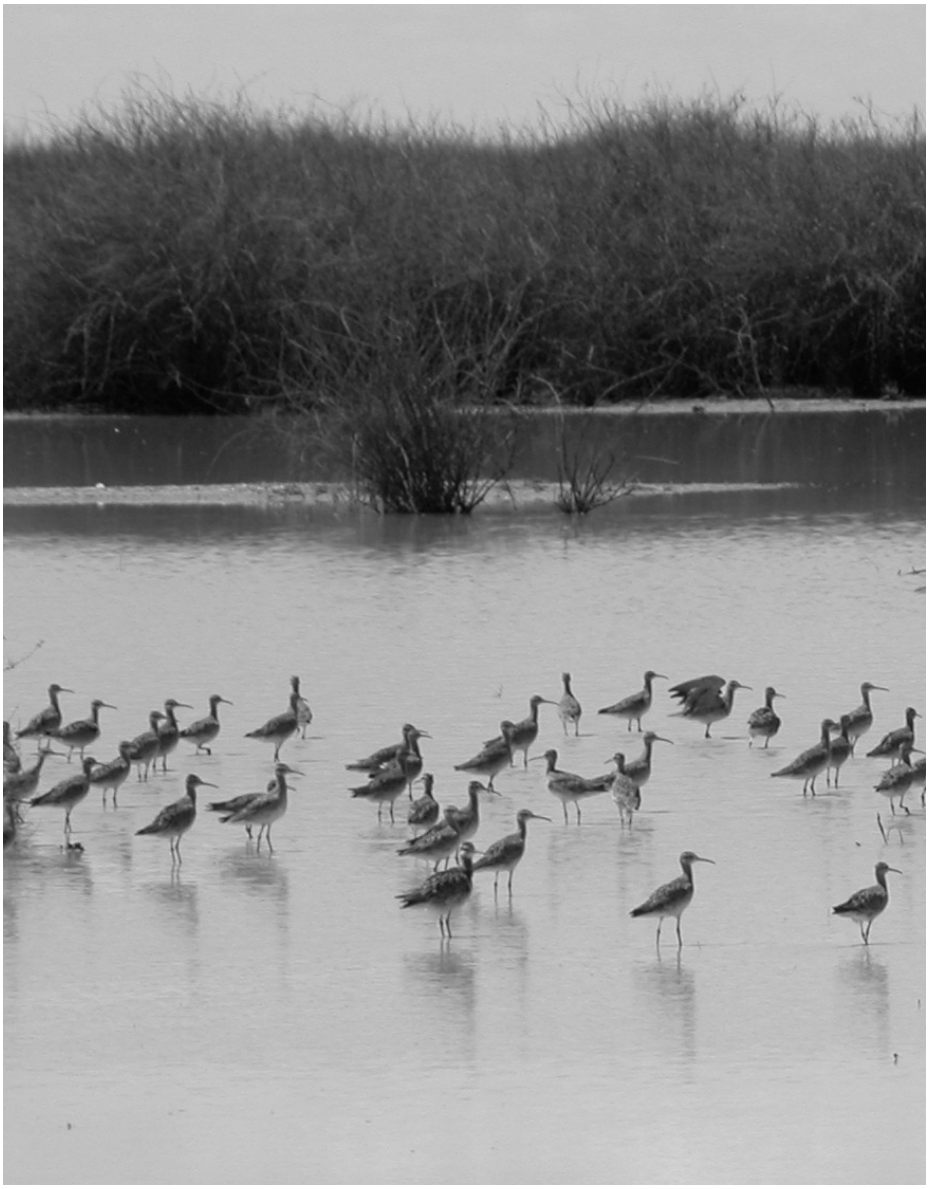


Figure 2. Little Curlews in claypan at edge of Diamantina floodplain, south-western Queensland (R. Jaensch, Wetlands International).

REFERENCES

Barrett, G., A. Silcocks, S. Barry, R. Cunningham, and R. Poulter. 2003. The New Atlas of Australian Birds. Birds Australia, Hawthorn East, Melbourne.

Barter, M.A. and K. Harris. 2002. Occasional Count No 6. Shorebird counts in the NE South Australia-SW Queensland region in September-October 2000. The Stilt 41, 44-47.

Bellio, M.G., P. Bayliss, S. Morton, and R. Chatto. 2004. Status and conservation of the Little Curlew (*Numenius minutus*) on its over-wintering grounds in Australia: open questions. Poster presented at the Conference Waterbirds around the World, 4-8 April 2004, Edinburgh, UK.

Blakers, M., S.J.J.F. Davies, and P.N. Reilly. 1984. The Atlas of Australian Birds. Melbourne University Press, Melbourne.

Collins, P. and R. Jessop. 2001. Arrival and departure dates and habitat of Little Curlew *Numenius minutus* at Broome, north-western Australia. The Stilt 39, 10-12.

Department of the Environment and Heritage. 2004. Interim Biogeographic Regionalisation for Australia Version 5.1. http://www.ea.gov.au/parks/nrs/ibra/version5-1/index.html, 26 May 2004.

Higgins, P.J. and S.J.J.F. Davies. (Eds) 1996. Handbook of Australian, New Zealand and Antarctic Birds. Volume 3: Snipe to Pigeons. Oxford University Press, Melbourne.

Jaensch, R.P. 2003. Records of northern waterbirds in the Barkly wetlands, Northern Territory, 1993-2002. Northern Territory Naturalist 17, 20-30.

Jaensch, R.P. 2004. Waterbird breeding colonies, populations and migration in the Channel Country, south-western Queensland, in the 2004 flood season. Unpublished report to the Environmental Protection Agency, Brisbane.

McFarland, D. 1992. Fauna of the Channel Country biogeographic region, south west Queensland. Unpublished report to Queensland National Parks and Wildlife Service.

Rogers, D.I., A. Boyle, C. Hassell. 2001. Occasional Counts No 5: Wader counts on Kidneybean Claypan and adjacent Roebuck Plains, northwestern Australia. The Stilt 38, 57-63.

Watkins, D. 1993. A national plan for shorebird conservation in Australia. Australasian Wader Studies Group, Royal Australasian Ornithologists Union and World Wide Fund for Nature. RAOU Report No. 90.

AGE STRUCTURE, BIOMETRICS, AND MOULT OF THE PIED OYSTERCATCHER *HAEMATOPUS LONGIROSTRIS* IN NORTH-WEST AUSTRALIA

FEMMIE J.L. KRAAIJEVELD-SMIT[1], CLIVE MINTON[2], ROSALIND JESSOP[3] AND PETER COLLINS[4]

[1]Leiden University, Section Animal Ecology, Institute Biology Leiden, Postbus 9516, 2300 RA Leiden, The Netherlands. kraaijeveld@rulsfb.leidenuniv.nl; [2]165 Dalgetty Rd, Beaumaris, 3193 Vic Australia; [3]Phillip Island Nature Park, PO Box, Cowes, 3922 Vic Australia; [4]RMB 4009, Cowes, 3992 Vic Australia

A total of 230 Pied Oystercatchers *Haematopus longirostris* have been caught in North West Australia (NWA) over the past thirteen years by the Australasian Wader Studies Group. This paper discusses the age structure, biometrics and moult of these birds. A comparison is made with Pied Oystercatchers from Victoria (southern Australia) in relation to these characteristics. Of the NWA birds caught, 73% were adults, 11% second year, 15% first year, and 1% were unaged. The proportion of second and first year birds varies considerably across years. Sexing criteria were developed for birds in all three age classes, based on bill length. Females have significantly larger bills, head-bills and wing lengths compared to males in all age classes. Females are also heavier than males, but this difference is not significant. The adult sex ratio is male biased, but over-estimated at 71%, whereas this bias does not occur in first and second year birds (41 % and 51 % respectively). First and second year birds had smaller wings and weighed less than adult birds. Adult weights appear to increase from February to May and decrease from July. Adults start their primary moult in October and the moult duration is around 150 days. Moult for second year birds does not seem to be restricted to this period, with moulting birds being recorded in January, February, April, and July to October. The most striking differences between oystercatchers from NWA and Victoria are (1) NWA birds have relatively smaller body sizes and relatively much larger bills, (2) moult duration in NWA is approximately 20 days longer, and (3) immature birds in NWA do not have a particular moulting period whereas in Victoria moulting in immature birds occurs two months before the adults start moulting.

INTRODUCTION

The Pied Oystercatcher *Heamatopus longirostris* occurs mainly in Australia, although vagrants have been reported in southern areas of New Guinea. Their preferred habitat is sandy beaches and they are distributed round the entire coastline including offshore islands, except where cliffs replace sandy beaches (Marchant & Higgins 1993, Lauro & Nol 1995). The population is estimated to be 10,000 birds and their status is classified as uncommon (Marchant & Higgins 1993, Watkins 1993). The species is under threat from habitat destruction, human disturbance, and native and non-native predators, such as foxes. Eggs and chicks are particularly vulnerable to these problems (Marchant & Higgins 1993, and Lainie Berry pers. comm.). Adults start breeding at the age of 4 to 6 years old (Newman 1992). High tides and strong winds may flood or bury nests, further reducing breeding success (Collins *et al.* in prep., Lauro & Nol 1993, Newman 1992).

The distribution of Pied Oystercatchers along the coast is almost continuous. Marchant & Higgins (1993) say, based on few birds, that geographical variation is slight but bill length increases in the north of its range. They also report that little is known of movements of north-west Australian (NWA) birds. In south-east Australia (SEA), movements of several types have been recorded. Whilst some breeding pairs are sedentary, there are seasonal movements by part of the population including much movement between flocks in the non-breeding season and some long distance movements (up to 470 km), but there is no evidence of juvenile dispersal or evidence of movements between SEA and NWA populations. Breeding in the north occurs between June and September, whereas the breeding period in the south is between September and January.

Since 1991 the Australasian Wader Studies Group (AWSG) has caught small numbers of Pied Oystercatchers in the course of a long-term banding and counting study program in north-west Australia. Here we report on the biometrics, moult and age-structure of the northern Pied Oystercatchers. We have previously reported similar data for Pied Oystercatchers from Victoria in south-eastern Australia (Kraaijeveld-Smit *et al.* 2001) and this paper will compare the two data sets.

Pied Oystercatchers cannot be sexed on plumage, as both males and females are similar in appearance. However, females are larger than males and bill length can be used to develop sexing criteria for Pied Oystercatchers (Zwarts *et al.* 1996a, Kraaijeveld-Smit *et al.* 2001). Furthermore, females usually feed on softer substrates compared to males, further accentuating the sex difference, since the bill wears more when feeding on harder substrates (Hulscher & Ens 1992, Durell *et al.* 1993, Lauro & Nol 1995). In our earlier paper on Pied Oystercatchers in Victoria we developed sexing criteria for these birds. These criteria, however, cannot be used to sex the Oystercatchers from NWA, as these oystercatchers are reported to have larger bills compared to the southern birds (Marchant & Higgins 1993). We therefore used the SHEBA computer programs of Rogers (1995) to estimate sex ratios, size parameters for each sex, and sexing criteria for NWA Pied Oystercatchers.

MATERIALS AND METHODS

Pied Oystercatchers were caught with cannon nets at high tide roosts and banded with standard metal bands. Catching

took place between 1991 and 2003 in all months except June. All were caught in Roebuck Bay (122°E 18°S) near Broome where a flock of 20-50 birds regularly roosts along the northern shoreline between Dampier Creek and Crab Creek. At Bush Point, at the south-west entrance to the bay, a flock of 100-300 birds normally roosts and a single catch was made in 1994 at this location.

After capture, birds were held in keeping cages made out of strong cloth, and processed within three hours. All birds were colour flagged with a yellow darvic flag. Weight, wing, bill, head-bill length, age, and moult of the primaries were recorded for most birds. Weights were measured using electronic balances. Wing, bill and head-bill lengths were measured using callipers. Age was determined on bill, eye, and leg colour (Prater *et al.* 1977) and the appropriate banding scheme age code (1, 2, 3, 2+, or 3+) recorded. To simplify data analysis, birds were grouped into three age classes: first year (1), second year (2), and adult birds (3, 2+ and 3+). Wing lengths for adult birds were divided into two categories, depending on whether the outer primary (p10) was old or new. Old primaries are worn, resulting in shorter wing lengths than new primaries. A similar distinction is appropriate for second year bird wing lengths. However, due to low sample sizes (n = 19), second year birds with old and new wing lengths were considered as a single group.

Moult of the 10 primary feathers were scored as follows: 0 = old feather, 1 = feather in pin or missing, 2 = feather up to 1/3 grown, 3 = feather between 1/3 and 2/3 grown, 4 = feather over 2/3 grown but still growing, 5 = fully grown new feather. The moult score was calculated by adding up the scores of the 10 feathers. To study the timing of moult and moult duration, median moult scores were calculated per week of all the years combined.

We used the computerised maximum likelihood approach of Rogers (1995) to estimate sex ratios and size parameters of bill length for each sex. These estimates were then used to estimate the size parameters by sex of other biometrics (head-bill length, wing length and mass) taken on the same birds and to develop sexing criteria or rules to allow the attribution of sex using bill length.

RESULTS

Age structure

In total 230 birds were caught, of which 25 were recaptures. Of these, 73.0% were adults (includes third year and older birds, which are not yet breeding), 11.3% second year, 14.8% first year, 0.9% of unknown age. Figure 1 shows the proportions of each known age group in each year. The proportion of adult birds within flocks did not differ between the breeding season (June to September, 76% adults) and the non-breeding season (October to May, 73%). Of the 22 retrapped birds (three birds were caught for a third time), two were caught at the two different locations, Roebuck Bay and Bush Point. The oldest retrapped bird was first caught in 1992 as a third year or older bird and caught again nine years later.

Biometrics

The histogram of the bill length of birds in all three age classes shows two humps, corresponding to females and males respectively (Figure 2). A similar picture applies to head-bill length but not for other biometrics, for which the size difference by sex is small relative to variability in the measurements. One of the SHEBA programs (Rogers 1995) separates the sexes, that is it estimates the distributional parameters of the measurement for each sex. These separation results are then used to estimate the distributional parameters for the other measurements. Table 1 gives the results. Female bill lengths are significantly longer than male

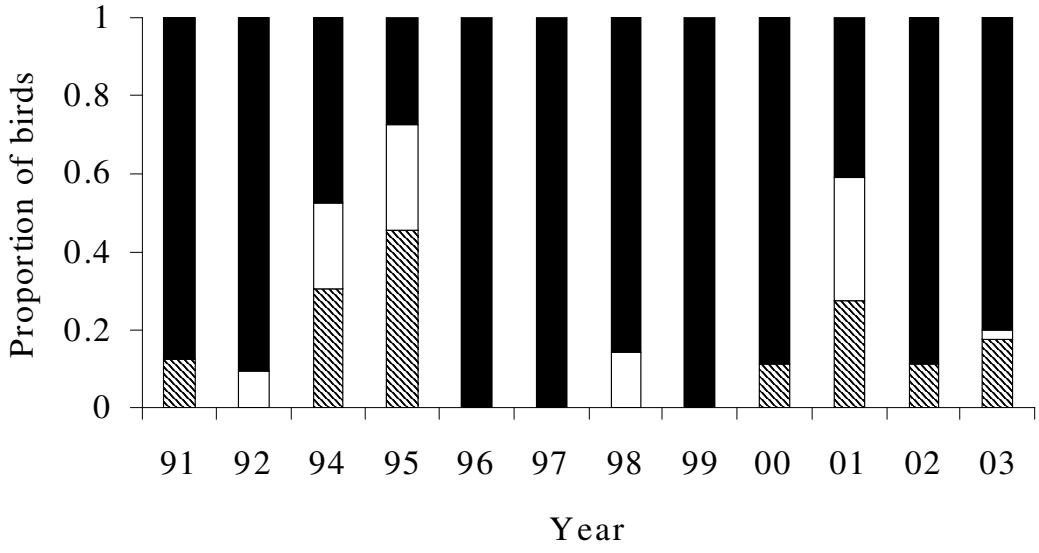


Figure 1. Proportion first year (hatched), second year (white) and adult (black) Pied Oystercatchers caught in north west Australia. Numbers at the top give total number of birds caught in each year. All birds were caught in Roebuck Bay, Broome.

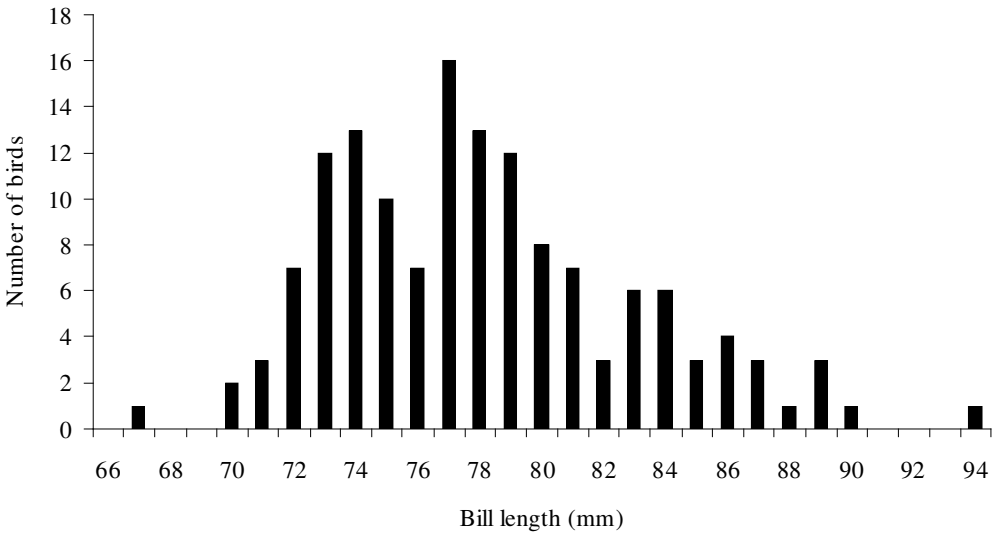


Figure 2. Histogram of the observed frequencies of bill length in adult Pied Oystercatchers caught in north west Australia (n = 142).

bill lengths. Similar patterns are observed for head-bill lengths, wing lengths and mass, although the difference in mass is not significant. In both adult males and females the wing length is shorter for old feathers compared to new feathers, but this difference is not significant. Wing lengths and mass in both first and second year birds are smaller than adult wing length and mass in both sexes. This trend is less obvious for bill and head-bill length for which adult females have smaller bills than juveniles.

Sexing criteria

A sexing criterion is a rule by which sex can be assigned to a bird of unknown sex on the basis of its measurements. In Table 2 sexing criteria for birds are presented at different confidence levels as calculated by the computer package SHEBA (Rogers 1995). Each criterion consists of a minimum probability of correct sexing specified by the user, and the upper limit of bill length for females, the lower limit of bill length for males and the percentages of birds that will be correctly sexed, wrongly sexed, or unsexed by application of the criterion. Sex cannot be assigned to birds in this last group above the minimum level of confidence specified. So, for example, adult birds with a bill length of 84.4 mm or above can be called female with at least 95% certainty. At this confidence level, adult birds with a bill length of 76.7 mm or less are males. With these minimum 95% confidence levels 53.7% of all adult birds caught are sexed correctly. However, since the distributions of male and female bill lengths overlap, 0.8% will be sexed wrongly and the sex of 45.5% is unknown. At lower confidence levels, more birds are sexed correctly, but the number of birds wrongly sexed also increases. The adult criterion at 80% might be considered a good compromise between sexing as many birds as possible correctly and getting as few birds as possible wrong. For the younger birds, the choice of confidence level makes very little difference.

Sex ratios

The sex ratios of the samples are skewed toward males in adult birds (Table 1). Around 71% of the adults caught appear to be males. In second year birds this percentage is approximately 51% whereas in first year birds the sex ratio is female biased with around 41% of the birds being male (Table 1).

Monthly variations in body mass and primary moult patterns

The general trend for both male and female weights is a decrease from July to December (covering both the breeding season which is from June until September, and the moulting period which is from October until March), after which weights increase again (Figure 3). However, sample sizes are low, especially in the months of February, March and September, and more data are needed to determine if these observations are representative of seasonal weight variation.

Adult birds begin their primary moult in October, just after the end of the breeding season, and most birds have completed their moult by March. They therefore have a moult duration of around 150 days (Figure 4). Although sample sizes for second year birds are small, moulting does not appear to occur in any particular period of the year (Figure 4). Moulting occurred in all months in which second year birds were caught, apart from November, when only one bird was caught which had a complete old plumage. Of the 34 first year birds, 11 were moulting their primary feathers. Moulting occurred in the months: April, May and July, at which time the birds are nine months or older (hatching occurs in July/August). The remaining juveniles, caught in January, February, April, May and July all still had their old primary feathers.

Table 1. Bill, head-bill, wing length (N = new, O = old) and body mass for male and female Pied Oystercatchers in north-west Australia. Mean, standard deviation (S.D.), number of birds used in the analysis (N) and the percentage of males, as determined by SHEBA, are given.

Measurement	Age	Male	Female	N	% Male	Z	P
		Mean (S.D.)	Mean (S.D.)				
Bill (mm)	1	73.3 (3.73)	84.5 (4.30)	34	41.2	8.11	< 0.01
	2	76.0 (2.91)	83.9 (3.21)	24	51.0	6.30	< 0.01
	2+	75.6 (3.56)	82.7 (3.89)	142	71.3	10.00	< 0.01
Head-Bill (mm)	1	115.7 (4.10)	127.1 (4.51)	34	41.2	7.66	< 0.01
	2	118.2 (3.18)	126.7 (3.40)	24	51.0	6.30	< 0.01
	2+	119.0 (4.06)	125.7 (4.29)	141	71.2	8.64	< 0.01
Wing New (mm)	1	261.2 (7.54)	267.4 (7.72)	33	42.3	2.32	< 0.05
	2 (N+O)	264.5 (7.57)	273.8 (7.84)	19	53.7	2.62	< 0.01
	2+ N	273.4 (7.38)	276.4 (7.46)	57	77.5	1.30	n.s.
	2+ O	271.7 (7.53)	275.8 (7.64)	72	68.3	2.15	< 0.01
N/O Wing Male	2+					1.10	n.s.
N/O Wing Female	2+					0.25	n.s.
Mass (g)	1	545.8 (48.53)	575.8 (51.20)	33	39.6	1.70	n.s.
	2	604.3 (73.32)	621.8 (75.44)	24	51.0	0.57	n.s.
	2+	628.7 (62.06)	641.5 (63.32)	142	71.3	1.10	n.s.

Table 2. Univariate sexing criteria based on bill length of Pied Oystercatchers in north west Australia. See result section for explanation.

Minimum confidence of correct sexing	**Upper limit for males**	**Lower limit for females**	**Sexed correctly (%)**	**Don't know sex (%)**	**Sexed wrong (%)**
Adult					
95%	76.7	84.4	53.7	45.5	0.8
80%	78.9	82.5	77.0	19.5	3.5
50%	80.7	80.8	89.7	0.5	9.8
Second Year					
95%	77.8	80.7	92.9	6.9	0.2
80%	78.5	80.0	96.4	3.0	0.6
50%	79.2	79.3	98.4	0.2	1.4
First Year					
95%	77.0	80.4	96.0	3.9	0.1
80%	77.9	79.5	98.2	1.5	0.3
50%	78.7	78.8	99.1	0.1	0.8

DISCUSSION

Age structure

The average percentage of adult birds in NWA of 73% is lower than the 81% observed in Victoria. This could suggest higher breeding success for birds in the north but there are other explanations which could lead to this difference. Figure 1 shows, despite some small samples, that breeding success can vary substantially between years. Samples were collected at different times of the year, and this may also affect the number of adult birds caught. Movements of both juveniles and adults are poorly understood but age specific differences in movements could influence age representation in catches.

Biometrics

All measurements of Victorian Pied Oystercatchers increase with age group (Kraaijeveld-Smit *et al.* 2001). This increase is not observed for bill nor for head-bill measurements in female NWA Pied Oystercatchers but this may simply be because the estimates for NWA birds are based on small samples. Alternatively, different feeding strategies (see below) may influence bill lengths differently in the north compared to the south. Both wing length and mass increase with age group in NWA birds as in the oystercatchers from Victoria (Kraaijeveld-Smit *et al.* 2001) and in European Oystercatchers *H. ostralegus* (Zwarts *et al.* 1996a, b). Wing lengths, for example, for sub-adults are ~ 4 mm and ~ 6 mm shorter than adult male and female wing lengths

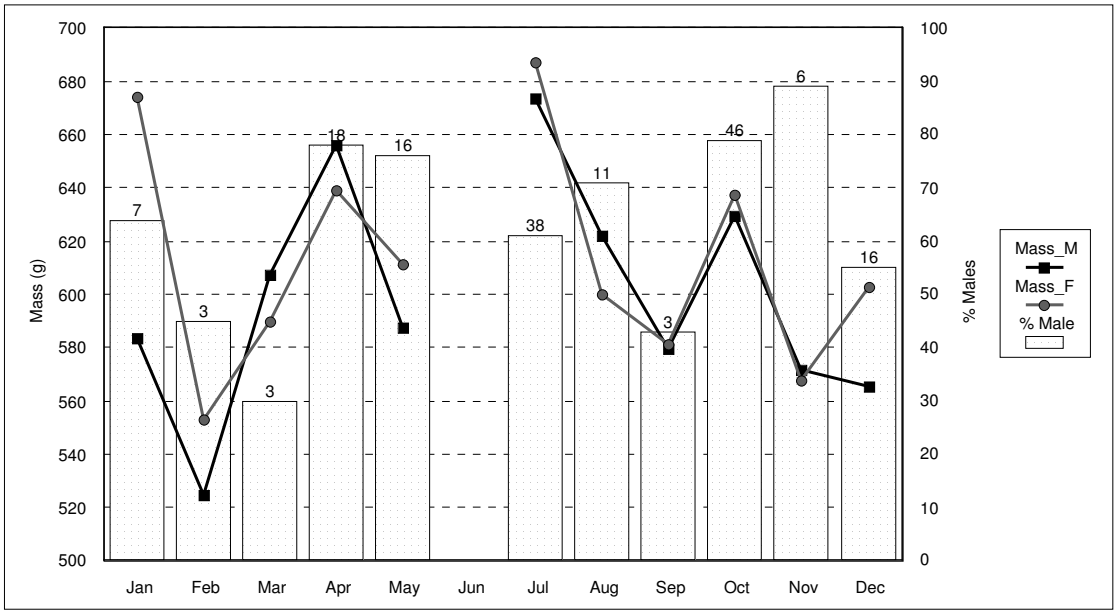


Figure 3. Mean monthly mass of adult male (closed triangle) and female (open circle) Pied Oystercatchers in north west Australia.

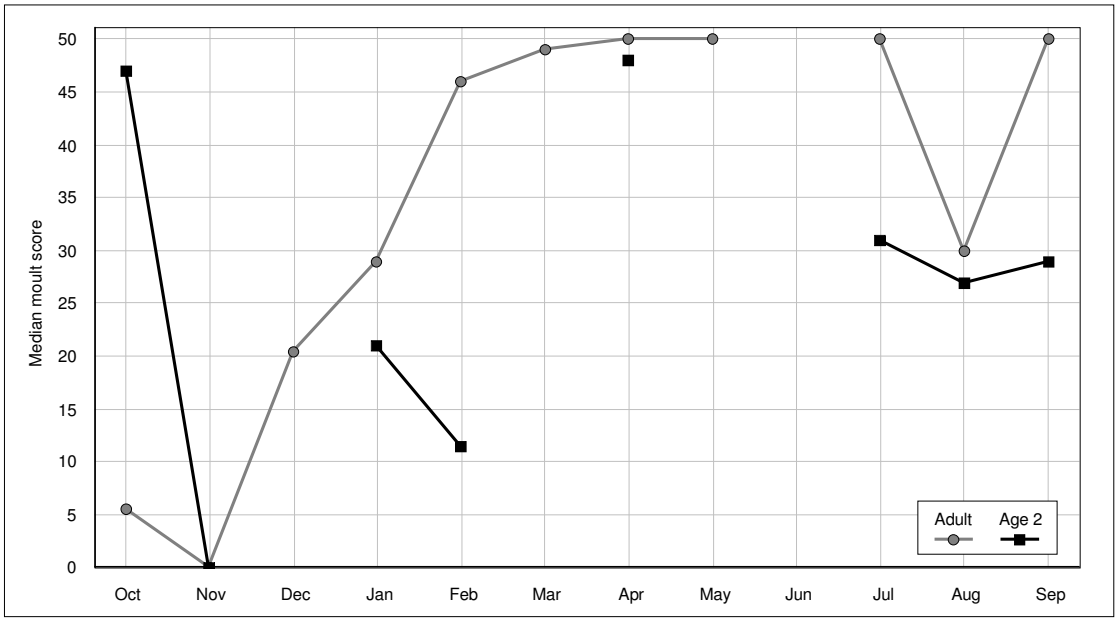


Figure 4. Median moult score versus date for adult (black diamonds) and second year (open squares) Pied Oystercatchers in north west Australia. Numbers at the top indicate the number of birds in each month for each age category.

respectively. The fact that young birds weigh less than adults is probably due to smaller body sizes (Zwarts *et al.* 1996b).

There are some striking differences between adult Pied Oystercatchers from Victoria and those from NWA; Victorian estimates in Table 3 are from Kraaijeveld-Smit *et al.* 2001. Bill lengths are larger in NWA, head-bill lengths are similar, but wing lengths and body mass are smaller. This implies that birds from NWA, the warmer region, have smaller body sizes with relatively much larger bills than birds from Victoria. The smaller body size in the warmer region compared to the colder region is comparable to observations on over-wintering Purple Sandpipers, *Calidris maritima* (Summers *et al.* 1998) and breeding Little Stints, *C. minuta* (Tulp *et al.* 2002). In the Little Stints the smaller birds breed in the warmer southern locations of the Eurasian Arctic whereas the larger birds, which are better able to cope with colder weather, breed further north (Tulp *et al.* 2002). Thus the smaller body sizes in NWA are consistent with Bergmann's rule that body sizes are larger in colder climates and the larger bill sizes in the warmer climate are consistent with Allen's rule that bare parts are larger in hotter climates to assist heat loss (Campbell and Lack 1985).

Table 3. Mean adult biometrics by sex for north-west Australia and south-east Australia

Biometric	Sex	NWA	SEA
Bill (mm)	Male	75.6	71.4
	Female	82.7	79.8
Head-Bill (mm)	Male	119.0	116.4
	Female	125.7	124.9
Wing, New (mm)	Male	273.4	287.1
	Female	276.4	290.7
Mass (g)	Male	628.7	641.5
	Female	732.8	763.5

Monthly variations in body mass and moult patterns

Weight differences between months in NWA Pied Oystercatchers are small compared to those European Oystercatcher populations which migrate longer distances from their breeding grounds to wintering grounds (Dare 1977). There appears to be a drop in body mass from July up until December. The breeding season for northern Pied Oystercatchers is from June to September (Marchant & Higgins 1993), after which adults starts a complete moult. This drop would therefore coincide with both the breeding season and the moulting period. This is in contrast to observations on European Oystercatchers (from the Dutch Wadden Sea) and Pied Oystercatchers from Victoria since, in those birds, body mass also decreases during the breeding season, but increases immediately after the breeding season when moulting begins (Zwarts *et al.* 1996b, Kraaijeveld-Smit *et al.* 2001). But as noted previously, samples sizes for the NWA Pied Oystercatchers are small and masses are highly variable and larger samples are needed to confirm the drop in body mass during the moult period.

Adult NWA birds, like European and Victorian Pied Oystercatchers, start moulting their primaries immediately after the breeding season (Dare & Mercer 1974, Hulscher 1977, Wilson & Morrison 1981, Kraaijeveld-Smit *et al.* 2001). Moulting costs energy, and therefore does not coincide with the costly period of breeding (Hemborg & Lundberg 1998, Lindström *et al.* 1993). The moult duration appears to be 150 days, which is slightly longer than the Pied Oystercatchers from Victoria, where moult duration is around 130 days (Kraaijeveld-Smit *et al.* 2001). Again, sample sizes were small, and the data were divided into monthly periods, rather than the two-weekly periods used in the Victorian Pied Oystercatcher study, reducing the precision of the estimated moult duration. Regardless, the moult duration of Australian Pied Oystercatchers is much longer than the 105 days of European Oystercatchers (Dare & Mercer 1974, Hulscher 1977, Wilson & Morrison 1981). This prolonged moult duration of Australian birds is possible as they do not have to migrate long distances during the non-breeding period (up to 500 km in Victoria, probably less in NWA, in contrast to 800-1600 km for European Oystercatchers) and many birds do not migrate at all. Furthermore, European Oystercatchers have to complete their primary moult on the non-breeding grounds quickly, before their winter food supplies deteriorate (Dare and Mercer 1974). In contrast to European Oystercatchers and Pied Oystercatchers from Victoria, where second year birds moult approximately two months earlier than adults (Kraaijeveld-Smit *et al.* 2001), immature birds in NWA do not seem to have a particular moulting period. This may also be explained by climatic conditions. Moulting is costly, and in the colder climates it cannot co-occur with the colder spells, when energy demands are high. However, in the warmer climate moulting may occur during any period except for the breeding season as cold spells are unlikely.

Sex ratios

The sample sex ratio for adults is estimated to be 71% males with an asymptotic standard error of 1.8 percentage points. It is likely that this is a biassed over-estimate of the population sex ratio. If males are over-represented in the population and equal numbers of males and females are absent from the roosting flocks (from which cannon net catches are made) either because they are breeding or remaining at their breeding territories after breeding, then the proportion of males in the sample caught must be higher than that in the population as a whole. This bias can be large. Figure 5 shows that, for a sample sex ratio of 71%, the population sex ratio could be as low as 53.4% if 90% of adult females were absent from the roosting flocks or as high as 63.3% if only 50% are absent. Without better information on Pied Oystercatcher demographics and movements in NWA, we can only conclude that the sex ratio is biased towards males but not by what amount.

A further concern is that the distribution of Pied Oystercatcher bill lengths may be inconsistent with the normality assumption of SHEBA (Rogers 1995). In European Oystercatchers three feeding strategies occur; worm feeding, mussel stabbing or mussel hammering. Worm feeders have pointed bill tips, mussel stabbers have chisel shaped bill tips, whereas mussel hammerers have blunt bill tips. From European Oystercatchers it is known that 90% of all birds with blunt bill tips are males, indicating that they are mainly mussel hammerers (Durell *et al.* 1993). Within the sexes, the average bill length of worm feeders (pointed bill tips) is larger than the bill length of mussel hammerers or stabbers (blunt and chisel shaped bill tips). It is possible that male NWA Pied Oystercatchers are also mainly mussel hammerers, resulting in a normal distribution regarding bill length. Females, however, may contain birds applying all three feeding strategies, resulting in a skewed distribution for bill length. In this event, females with blunt bill tips (shorter) may be considered by SHEBA to be males, biasing the sex ratio towards males. There is indirect support for this notion. The histogram of bill lengths (Figure 2) is not well behaved, apparently showing a peak in bill lengths between the means for the sexes. In future banding, bill shape should be recorded for all birds and specifically considered in future analyses.

A further possible explanation for the male bias in the sex ratio is that adult mortality rates may be slightly higher for females than males due to, for example, differential predation. As Australian Pied Oystercatchers can live up to 23 years (AWSG unpublished data; Newman 1992) this

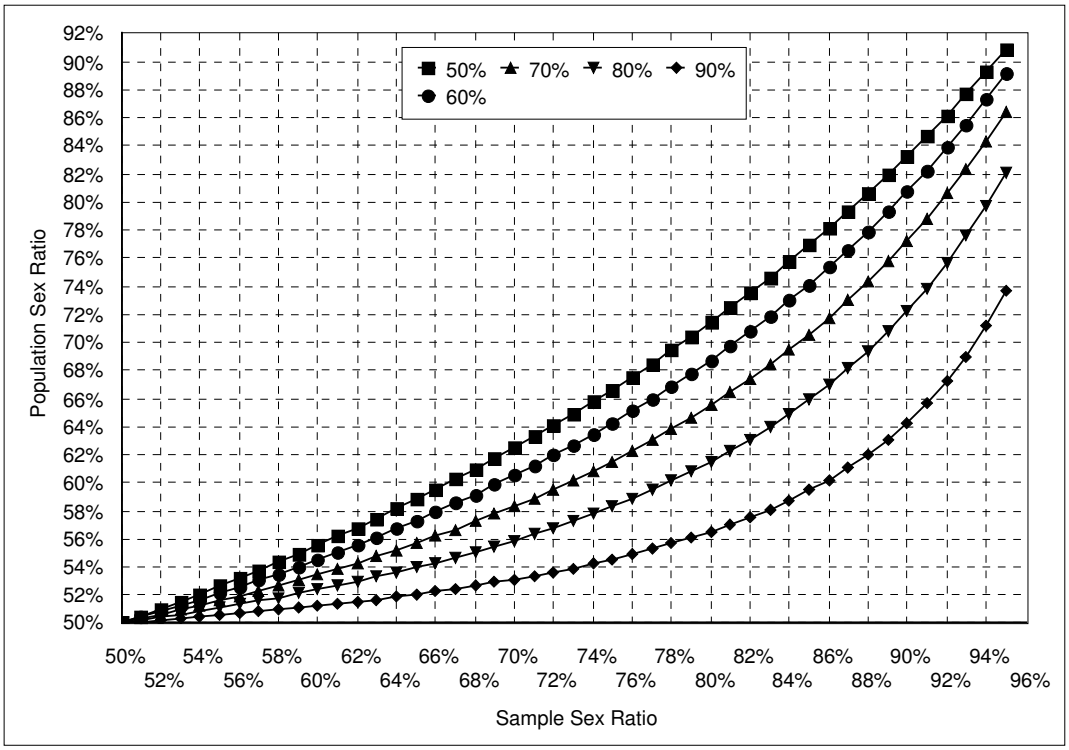


Figure 5. Overestimating sex ratio bias. Population sex ratio (r_{popn}) v. Sample sex ratio (r_{smpl}) for different percentages of females which are breeding (b_f) where
$r_{popn} = \{r_{smpl} + b_f(1 - 2.\ r_{smpl})\} / \{1 + b_f(1 - 2.\ r_{smpl})\}$

difference may result in notable sex ratio biases. Indeed, Durell & Goss-Custard (1996) used a simple model to investigate male-biased sex ratios (67%) in European Oystercatchers and found that slightly higher mortality rates for females can result in male-biased sex ratios. Their observed male-biased sex ratio of 67% closely matches our observed adult male-biased sex ratio of 71%.

Conservation implications and conclusions

This study has enhanced our knowledge of biometrics, moult and sex composition of NWA Pied Oystercatchers. Some clear differences from the Victorian Pied Oystercatchers were found. These differences, such as smaller body size and longer bill length in the north, are all likely to have occurred due to local adaptations to the environment. Future investigations of the suggested male biased sex ratio need to be undertaken. The paper has established that adult males outnumber adult females in cannon net catches. It is argued that this imbalance could be an artefact of the data, arising from the non-normality of observed bill length distributions making them unsuitable for analysis by numerical techniques which rely on the normality assumption. The imbalance could, however, be real if mortality in females is higher than that in males. Oystercatchers form monogamous pair bonds, so the number of breeding birds depends in this situation on the number of females (Newman 1992). In other words, the effective population size (number of breeding birds) would be less than the census population size of around 10,000 birds (Marchant & Higgins 1993), and it is important to consider this in relation to the conservation of the species (Frankham 1995). The census size of 10,000 birds is of course further reduced because birds do not join the breeding population until they are at least four years old and thus the actual number of breeding pairs may be much smaller. It is therefore a priority to identify how big the sexual imbalance actually is and which of the two explanations for it applies. Several different methods might be needed to gain this understanding; these might include molecular sexing techniques (Griffiths *et al.* 1998), the study of movements of individual birds within NWA, direct estimation of sex specific survival using demographic models such as Program MARK (Cooch and White 2001), and sexing of predated birds (e.g. Nebel *et al.* 2004).

ACKNOWLEDGEMENTS

We would like to thank all the volunteers in the Australasian Wader Study Group and at the Broome Bird Observatory who helped catch the birds, Ken Rogers for explaining the computer package SHEBA, and Ken Kraaijeveld, Ken Rogers and Silke Nebel for valuable comments on the manuscript. Andrew Dunn kindly provided data on museum specimens of NWA Pied Oystercatchers. The Australian Bird Banding Scheme of Environment of Australia and the Department of Conservation and Land Management, Western Australia are thanked for permits to band.

REFERENCES

Campbell, B. and E. Lack. (eds). 1985. A Dictionary of Birds. Calton (Poyser) and Vermillion (Buteo)

Cooch, E. & G.C. White. 2001. Program MARK Analysis of data from marked individuals; A gentle introduction, 2nd Ed. [www.phidot.org/software/mark/docs/book/]

Dare, P.J. 1977. Seasonal changes in body-weight of Oystercatchers *Haematopus ostralegus*. Ibis 119, 494-506.

Dare, P.J. & A.J. Mercer. 1974. The timing of wing-moult in the Oystercatcher *Haematopus ostralegus* in Wales. Ibis 116, 211-4.

Durell, S.E.A. Le V. Dit & J.D. Goss-Custard. 1996. Oystercatcher *Haematopus ostralegus* sex ratios on the wintering grounds: the case of the Exe estuary. Ardea 84a, 373-82.

Durell, S.E.A. Le V. Dit, J.D. Goss-Custard & R.W.G. Caldow. 1993. Sex-related differences in diet and feeding method in the oystercatcher *Haematopus ostralegus*. J. of Anim. Ecol. 62, 205-215.

Frankham, R. 1995. Effective population-size adult-population size ratios in wildlife: a review. Genet. Res. 66, 95-107.

Griffiths, R., M.C. Double, K. Orr & R.J.G. Dawson 1998. A DNA test to sex most birds. Mol. Ecol. 7, 1071-1075.

Hemborg, C. & A. Lundberg. 1998. Costs of overlapping reproduction and moult in passerine birds: an experiment with the pied flycatcher. Behav. Ecol. Sociobiol. 43, 19-23.

Heppleston, P.B. & D.F. Kerridge. 1970. Sexing Oystercatchers from the bill measurements. Bird Study 17, 48-9.

Hockey, P.A.R. 1981. Morphometrics and sexing of the African Oystercatcher. Ostrich 52, 244-7.

Hulscher, J.B. 1977. The progress of wing-moult of Oystercatchers *Haematopus ostralegus* at Drachten, Netherlands. Ibis 119, 507-12.

Hulscher, J.B. & B.J. Ens 1992. Is the bill of the male Oystercatcher a better tool for attacking Mussels than the bill of the female? Neth. J. Zool. 42, 85-100.

Kraaijeveld-Smit, F.J.L., C. Minton, R. Jessop & P. Collins 2001. Sexing criteria, age structure, biometrics, and moult of the Pied Oystercatcher, *Haematopus longirostris*, in Victoria. Stilt 40, 29-37.

Lauro, B. & E. Nol. 1993. The effect of prevailing wind directions and tidal flooding on the reproductive success of the Pied Oystercatcher *Haematopus longirostris*. Emu 93, 199-202.

Lauro, B. & E. Nol. 1995. Feeding behavior, prey selection, and bill size of Pied and Sooty Oystercatchers in Australia. Wilson Bull. 107, 629-40.

Lindström, A., G.H. Visser & S. Daan. 1993. The energetic cost of feather synthesis is proportional to basal metabolic rate. Physiol. Zool. 66, 490-510.

Marchant, S. & P.J. Higgins. 1993. Handbook of Australian, New Zealand and Antarctic birds, raptors to lapwings. II. Oxford Univ. Press, Melbourne.

Nebel, S., A. Cloutier & G.J. Thompson. 2004. Molecular sexing of prey remains permits a test of sex-biased predation in a wintering population of western sandpipers. Proc. R. Soc. Lond. B (Suppl.) 271, S321-S323.

Newman, M. 1992. Pied Oystercatcher breeding at Mortimer Bay, Tasmania. Emu 92, 87-92.

Prater, A.J., J.H. Marchant & J. Vuorinen 1977. Guide to the identification and ageing of Holarctic waders. BTO guide 17, Tring.

Rogers, K.G. 1995. SHEBA: computer programs for sexing birds on measurements using univariate data. Corella 19, 25-34.

Summers, R.W., T. Piersma, K.B. Strann & P. Wiersma. 1998. How do Purple Sandpipers *Calidris maritima* survive the winter north of the Arctic circle? Ardea 86, 51-58.

Tulp, I., H. Schekkerman, P. Chylarecki, P. Tomkovich *et al.* 2002. Body mass patterns of Little Stints at different latitudes during incubation and chick-rearing. Ibis 144, 122-134.

Watkins, D. 1993. A national plan for shorebird conservation in Australia. RAOU Report no. 90.

Wilson, J.R. & R.I.G. Morrison. 1981. Primary moult in Oystercatchers in Iceland. Ornis Scand. 12, 211-5.

Zwarts, L. 1996. Waders and their estuarine food supplies. PhD, Ministerie van Verkeer en Waterstaat, Lelystad, The Netherlands.

Zwarts, L., J.B. Hulscher, K. Koopman & P.M. Zegers. 1996a. Discriminating the sex of Oystercatchers *Haematopus ostralegus*. Ardea 84a, 1-12.

Zwarts, L., J.B. Hulscher, K. Koopman, T. Piersma & P.M. Zegers. 1996b. Seasonal and annual variation in body weight, nutrient stores and mortality of Oystercatchers *Haematopus ostralegus*. Ardea 84a, 327-56.

SURVEY OF SHOREBIRDS IN THE BELLINGER RIVER ESTUARY, NORTHERN NEW SOUTH WALES.

D. A. ROHWEDER

PO Box 401, Alstonville, NSW 2477, Australia. sandpiper_ecological@bigpond.com

The population of migratory and resident shorebirds in the lower Bellinger River Estuary was surveyed between September 2002 and March 2003. A total of seven high tide surveys at monthly intervals and one low tide survey were conducted. Population estimates were derived for each survey by sampling all known high tide roosts during a single period. The maximum population estimate was 189 individuals in February 2003. Fifteen species of shorebird were recorded during the survey, including four species listed on the New South Wales *Threatened Species Conservation Act 1995.* The migratory shorebird population was dominated by four species: Bar-tailed Godwit, Pacific Golden Plover, Eastern Curlew and Whimbrel. *Calidris* sandpipers were uncommon and occurred in small numbers only. The survey provides baseline data that can be used to manage shorebirds and their habitat in the estuary.

INTRODUCTION

The New South Wales coastline is experiencing high level of urban growth, with much of this growth occurring at towns situated adjacent to estuaries. Increasing coastal populations lead to a variety of direct and indirect impacts on the environment. One of the most obvious indirect impacts is an increase in the number of people using estuaries for recreation. Common recreational pursuits include swimming, fishing, walking and boating. All of these activities can disturb roosting and foraging shorebirds, and in extreme cases recreation can have a significant detrimental impact on habitat use (Burger 1986; Burger 1994). Disturbance may even have serious implications for bird migration and survival. An end result of uncontrolled recreation on and around estuaries may be declining shorebird populations.

To assess adequately the impact of recreation on shorebirds it is essential that specific studies be undertaken that document the sources of disturbance and quantify the impact of disturbance on a bird's daily cycle. Furthermore, information on population size and important roost and feeding sites is essential to determine which areas should be protected from disturbance. Unfortunately, there is limited information available on the population size and location of important roost and feeding sites for many NSW estuaries.

Martindale (1984, 1987) undertook systematic surveys of shorebirds in the Clarence and Tweed River estuaries. These surveys provided important baseline data on population size and the location of important habitats and have been used frequently to assess the potential impact of developments adjacent to the subject estuaries. The aim of the survey reported here was to provide baseline data on the size and diversity of the shorebird population in the Bellinger River Estuary and to identify important roost and foraging sites.

STUDY AREA

The Bellinger River Estuary (Figure 1) is situated on the north-coast of New South Wales (NSW), approximately 500 km north of Sydney. The small town of Urunga is situated on the southern side of the estuary. As is the case for most coastal towns in northern NSW, Urunga is experiencing high levels of urban growth, with most urban expansion occurring to the south and west of the town centre. The estuary is dominated by two rivers (the Bellinger and Kalang), which meet about 800m from the estuary mouth. Due to logistic reasons this study was restricted to the lower estuary (Figure 1). Small areas of suitable foraging habitat occur outside the study area, and it is possible that additional roosts also occur outside the study area.

A variety of different intertidal and supra-tidal habitat types occur in the study area, including saltmarsh, open mangrove woodland, closed mangrove forest, sandflats, mudflats and seagrass beds. Mudflats occur in sheltered areas within Urunga Lagoon, and adjacent to mangroves in the main river channels. Seagrass beds are restricted to Urunga Lagoon. Sandflats are the most expansive habitat, occurring at the entrance to Urunga Lagoon, at the confluence of the Bellinger and Kalang Rivers and along the eastern side of the Bellinger River. A small area of saltmarsh, with encroaching mangroves, occurs near the confluence of the two rivers. Rock walls have been constructed along much of the riverbank in the lower estuary, which has most likely modified the extent of foraging and roosting habitat (Figure 1).

METHODS

Monthly high tide surveys were conducted over a period of seven months, from 7 September 2002 to 2 March 2003. A set route was followed during each survey and all birds encountered were recorded. The location of shorebird roosts was determined from a site inspection on 7 July 2002 and from a previous survey of shorebirds in the estuary (unpublished data). All but one of the surveys were undertaken during high tide and started one hour before high water and took 2.5 hours; the exception was a low tide survey conducted on 4 March 2003. A kayak was used to access all sites and surveys were undertaken during the day only. The dates of high tide surveys were: 7/9/02, 7/10/02, 3/11/02, 7/12/02, 3/1/03, 10/2/03 and 2/3/03.

The seven sites sampled were: Junction, Saltmarsh, West Bank, East Shore north, East Shore south, Ocean Beach and

Lagoon (Figure 1). These sites were sampled during each survey. During each survey particular care was taken to avoid disturbing roosting flocks. In the event that a flock was disturbed the number of birds flushed and the direction of flight was noted and the disturbed site was resurveyed. Disturbance by the observer was minimal, although on some occasions birds were disturbed by raptors and sailing boats.

A population estimate for shorebirds was derived from each survey by adding the number of individuals of each species recorded at each site. The data presented are maximum counts for each of the seven high tide surveys and the single low tide survey.

RESULTS

Species Diversity and Population Estimate

A total of 15 species of shorebird and 29 species of non-passerine were recorded during the survey (Tables 1 & 2). Most of the species listed in Table 2 were recorded roosting or foraging with shorebirds or in the immediate vicinity of shorebird roost or feeding sites. The shorebird community comprises nine migratory species and six resident species (Table 1). The highest number of migratory species recorded during a single survey was seven in November and December 2002, whilst the highest number of resident species recorded during a single survey was five in September 2002 (Table 1). The shorebird population was dominated by larger species with only small numbers of calidris sandpipers recorded.

The maximum population estimate of shorebirds was 189 individuals recorded in February 2003 (Table 1). The migratory shorebird population showed a steady increase from September through to December after which it declined (Table 1). The largest monthly increase in the migratory shorebird population was recorded from October to November when the population increased from 77 to 155 individuals. A number of migratory shorebirds (115) remained in the estuary during the March survey. The population of resident shorebirds fluctuated, reaching a low of nine individuals in March and a high of 50 individuals in February.

Species Accounts

Bar-tailed Godwit, Eastern Curlew and Pacific Golden Plover were the most abundant species of migratory shorebird, followed by Whimbrel and Grey-tailed Tattler. These species were also recorded during all high-tide surveys. Sharp-tailed Sandpiper, Red and Great Knots and Common Sandpipers were uncommon, recorded in at most two high-tide surveys (Table 1). The populations of Bar-tailed Godwit, Eastern Curlew, Whimbrel and Grey-tailed Tattler peaked in December or January. In contrast, the population of Pacific Golden Plovers peaked in February, with a similar number recorded in January (Table 1).

Masked Lapwings were the most abundant resident shorebird, with 33 individuals recorded on one occasion. Pied and Sooty Oystercatchers were the most frequently recorded species of resident shorebird. Sooty Oystercatchers were recorded during all surveys, whilst Pied Oystercatchers were recorded during six of the seven surveys. One Beach Stone-Curlew was recorded on two surveys.

The low tide survey (4/3/03) satisfied its objective by providing baseline information on the location of diurnal low-tide foraging habitat. The counts recorded at low tide differ slightly from high tide for several species. Greater numbers of Bar-tailed Godwits, Whimbrels and Pacific Golden Plovers were recorded at low tide than during the preceding high-tide survey, whilst fewer Eastern Curlew and Grey-tailed Tattlers were recorded at low tide.

Roost Sites

Saltmarsh, Junction and Ocean Beach were the most important spring tide roosts (Table 3), with birds moving between these sites if disturbed. Saltmarsh and Ocean Beach were the only sites available during the highest spring tides. During some surveys all Bar-tailed Godwits, Eastern Curlews, Whimbrels and Pacific Golden Plovers roosted at Ocean Beach and Junction.

West Bank, East Shore north, East Shore south and Lagoon were used regularly by small numbers of birds (Table 3). Grey-tailed Tattlers roosted either in mangroves at the entrance to Lagoon or at West Bank. Sandbars at East Shore north and East Shore south are likely to be important during neap high tides. A pair of Pied Oystercatchers successfully fledged a chick at West Bank.

DISCUSSION

Importance of the Bellinger Estuary

The Bellinger River estuary supports a small but diverse population of migratory and resident shorebirds. Using the 1% criterion (Watkins 1993) the estuary does not support populations of international, national or state importance. However, the estuary represents a link between larger estuaries in coastal New South Wales and is regarded as an important part of shorebird habitat in that state. It is anticipated that a small number of shorebirds would use the estuary during northward and southward migration. Further, more intensive, observations would be required to confirm the extent to which the estuary is used and to confirm the number of birds that use the site during migration.

The estuary also provides habitat for several species of shorebird listed on the NSW *Threatened Species Conservation Act 1995* (TSC), including Sooty Oystercatcher, Pied Oystercatcher, Beach Stone-Curlew and Great Knot. The occurrence of one Beach Stone-Curlew is interesting and raises the possibility that a pair of birds could become established in the estuary if habitat quality is maintained and disturbance minimised. The estuary is situated within an area of coastline where there are several breeding pairs of Beach Stone-Curlews (Rohweder 2003). The occurrence of 12 Sooty Oystercatchers during the January and February surveys is a substantial number for northern NSW estuaries.

The occurrence of a further 29 species of non-passerine further emphasises the conservation value of habitats within

Table 1. Population estimates of migratory and resident shorebirds derived during each of seven high-tide surveys and one low tide survey in the Bellinger River Estuary. Shading signifies low tide survey.

Species	**Survey Date**							
	07/09/02	**07/10/02**	**03/11/02**	**07/12/02**	**03/01/03**	**10/02/03**	**02/03/03**	**04/03/03**
Bar-tailed Godwit *Limosa lapponica*	4	28	59	65	44	38	30	35
Whimbrel *Numenius phaeopus*	9	6	14	21	17	21	5	10
Eastern Curlew *Numenius madagascariensis*	30	13	16	40	30	22	32	14
Common Sandpiper *Actitis hypoleucos*	-	-	-	-	1	-	-	1
Grey-tailed Tattler *Heteroscelus brevipes*	7	4	15	17	17	16	15	10
Great Knot *Calidris tenuirostris*	-	2	-	1	-	-	-	-
Red Knot *Calidris canutus*	-	-	1	-	-	-	-	-
Sharp-tailed Sandpiper *Calidris acuminata*	-	-	12	2	-	-	-	-
Pacific Golden Plover *Pluvialis fulva*	5	24	38	19	41	42	33	38
Total Migratory Shorebirds	55	77	155	165	150	139	115	108
Total Migratory Species	5	6	7	7	6	5	5	6
Beach Stone-curlew *Burhinus neglectus*	1	-	1	-	-	-	-	-
Pied Oystercatcher *Haematopus longirostris*	4	6	3	2	5	3	2	-
Sooty Oystercatcher *Haematopus fuliginosus*	4	3	2	-	12	12	5	3
Black-winged Stilt *Himantopus himantopus*	10	3	-	8	4	-	-	-
Red-capped Plover *Charadrius ruficapillus*	-	-	5	3	-	2	-	-
Masked Lapwing *Vanellus miles*	1	-	-	2	-	33	2	3
Total Resident Shorebirds	20	12	11	15	21	50	9	6
Total Resident Species	5	3	4	4	3	4	3	2
Total Population	**75**	**89**	**166**	**180**	**171**	**189**	**124**	**114**
Total Species	**10**	**9**	**11**	**11**	**9**	**9**	**8**	**8**

Table 2. Additional species of non-passerine recorded during the shorebird monitoring surveys in the Bellinger River Estuary.

Species	**Maximum Count**	**Species**	**Maximum Count**
Australian White Ibis *Threskiornis molucca*	70	Brahminy Kite *Haliastur indus*	1
Straw-necked Ibis *Threskiornis spinicollis*	1	Australian Pelican *Pelecanus conspicillatus*	5
Marsh Harrier *Podargus ocellatus*	1	White-bellied Sea-Eagle *Haliaeetus leucogaster*	2
Great Crested Grebe *Podiceps cristatus*	7	White-faced Heron *Egretta novaehollandiae*	3
Royal Spoonbill *Platalea regia*	1	Little Egret *Egretta garzetta*	4
Black-necked Stork *Ephippiorhyncus asiaticus*	2	Great Egret *Egretta alba*	3
Osprey *Pandion haliaetus*	3	Striated Heron *Butorides striatus*	1
Little-pied Cormorant *Artamus minor*	12	Nankeen Night Heron *Nycticorax caledonicus*	1
Black-shouldered Kite *Elanus axillaris*	1	Pacific Black Duck *Anas superciliosa*	1
Darter *Anhinga melanogaster*	2	Gull-billed Tern *Sterna nilotica*	2
Black Swan *Manorina melanophrys*	9	Crested Tern *Sterna bergii*	78
Pied Cormorant *Phalacrocorax varius*	34	Common Tern *Sterna hirundo*	172
Little Black Cormorant *Phalacrocorax sulcirostris*	108	Little Tern *Sterna albifrons*	122
Whistling Kite *Haliastur sphenurus*	1	Silver Gull *Hylacola cauta*	124
Great Cormorant *Phalacrocorax carbo*	5		

the estuary. This group includes a further three species, Osprey, Black-necked Stork and Little Tern that are listed under the TSC Act. The presence of these species on or in close proximity to shorebird roost and feeding sites provides further evidence of the need to conserve these habitats.

Variability in population estimates between surveys

Variability in the population estimates of some species occurred between surveys. Variability occurred between successive high tide surveys and between the high tide survey on 2 March and the low tide survey on 4 March. There are several reasons for the observed variability, including:

- The study area did not encompass all of the high-tide roosts or low tide foraging areas in the estuary or there are unknown roosts within the study area.
- The variability is due to the movement of birds to and from the estuary.

Table 3. Number of migratory and resident shorebirds recorded at each high tide roost during the seven surveys in the Bellinger River Estuary.

Date of Survey	Junction	Saltmarsh	West Bank	East Shore nth	East shore sth	Ocean Beach	Lagoon
2/03/03	0	55	1	0	0	73	15
10/02/03	68	0	0	18	85	4	23
3/01/03	2	43	5	0	1	99	4
7/12/02	4	93	17	0	0	116	0
3/11/02	111	0	0	22	4	5	24
7/10/02	70	0	0	3	8	0	8
7/09/02	50	0	0	18	6	0	1

o Birds may have moved between roosts during a survey period.

The low-tide survey did not cover all foraging habitat, which may explain the large reduction in the number of Eastern Curlews recorded in comparison to the previous high-tide survey, although movement of curlews from the estuary at this time of year is also plausible. Likewise, the fluctuation in the Eastern Curlew population from February to March could be due to migration as curlews often begin leaving north coast estuaries in mid-February (pers. obs.).

In contrast, the large reduction in the number of Pacific Golden Plovers counted in December may be due to movement during that survey, or the use of a roost outside the study area. Likewise, the small number of Whimbrels recorded in January and the high tide survey in March may be attributed to birds roosting outside of the study area. Lawler (1994) recorded 27 Whimbrels roosting on the rock wall at the junction of Back Creek and the Kalang River (Figure 1), just outside the study area. Whimbrels regularly roost in mangroves and on rock groynes and it is plausible that some individuals may roost outside the study area. During some surveys the number of Whimbrels counted exceeded 30 individuals, however, this number was reduced to the maximum seen at a single site to account for the possible movement of birds between sites.

Management

At present shorebird habitat in the estuary is not under direct threat, although there is an increasing level of indirect impact associated with increased human recreation. Impacts observed during this survey include disturbance of roosting flocks by 4WD vehicles, sailing boats and anglers. Furthermore, mangroves are encroaching and surrounding the saltmarsh on Urunga Island. At present these mangroves are occasionally grazed by cattle; this limits growth and ensures the retention of an open habitat. If cattle are removed it is likely that mangroves will grow and eventually reduce the quality of the high tide roost. The information gathered during this study provides some baseline data to manage shorebirds and their habitat in the Bellinger Estuary. A more temporally and spatially expansive survey, that includes both diurnal and nocturnal sampling, is required to determine more precisely the importance of the estuary to shorebirds, to identify trends in population size, and to identify all roost and foraging habitat.

ACKNOWLEDGEMENTS

The author wishes to thank Don Owner for providing assistance with the field surveys.

REFERENCES

Burger, J. 1994. The effect of human disturbance on foraging behaviour and habitat use in piping plover (*Charadrius melodus*). *Estuaries:* **17,** 695-701.

Burger, J. 1986. The effect of human activity on shorebirds in two coastal bays in northeastern United States. *Environmental Conservation:* **13,** 123-130.

Lawler, W. 1994. *Shorebird counts on NSW North Coast Estuaries*. Environmental Survey & Research Branch NSW National Parks & Wildlife Service.

Martindale, J. 1984. A Study of Estuarine Birds in the Lower Clarence River. NSW NPWS.

Martindale, J. 1987. *A Study of Estuarine Birds in The Lower Tweed River Estuary.* Unpublished report for the NSW National Parks & Wildlife Service.

Rohweder, D. A. 2003. A population census of Beach Stone-Curlews *Esacus neglectus* in New South Wales. *Australian Field Ornithology:* **20,** 8-16.

Watkins, D. 1993. *A National Plan for Shorebird Conservation in Australia*. Australasian Wader Studies Group, Royal Australian Ornithologists Union and World Wide Fund for Nature. RAOU Report No. 90.

JUVENILE PERCENTAGES OF MIGRATORY WADERS IN THE 2003/04 AUSTRALIAN SUMMER

CLIVE MINTON[1], ROSALIND JESSOP[2], PETER COLLINS[3], HUMPHREY SITTERS[4] AND CHRIS HASSELL[5]

[1]165 Dalgetty Road, Beaumaris, Vic 3193 Australia. mintons@ozemail.com.au*; [2]Phillip Island Nature Par, PO Box 97, Cowes, Vic 3922 Australia; [3]RMB 4009, Cowes, Vic 3922 Australia; [4]Limosa, Old Ebford Lane, Ebford Exeter. EX3 0QR. UK; [5]PO Box 3089, Broome, WA 6735 Australia.*

Data are presented on the age composition of primarily cannon net catches in summer 2003/04 in both south-east Australia (SEA) and north-west Australia (NWA). NWA juvenile percentages were low whilst those in SEA were more mixed with some species having high, and others with low, percentages. Annual monitoring of age proportions will continue in both NWA and SEA.

INTRODUCTION

Monitoring the annual breeding success of wader populations which spend the non-breeding season in Australia is a key element of the fieldwork programs of the Victorian Wader Study Group (VWSG) in south-east Australia (Victoria and south-east of South Australia) and the Australasian Wader Studies Group (AWSG) in north-west Australia. The percentage of juvenile birds in catches is used as an index of apparent breeding success. Although only an approximate estimate of breeding success, as the young birds of a year are the progeny of the breeding birds of the previous year, long term changes in breeding success will be reflected in the index.

Data from previous years have been published elsewhere (Minton *et al.* 2000, 2001, 2002, and 2003). This article gives data and comment on the results obtained in the 2003/04 austral summer relating to outcomes of the 2003 Arctic breeding season.

These data are published annually for three reasons:

- To put on record the percentage juvenile data collected on a variety of species in the non-breeding season in two different parts of Australia.
- To complement published reproductive success data obtained by other methods.
- To stimulate banders elsewhere to plan and undertake their wader banding activities with a view to generating similar data on other wader populations.

METHODS

The same data collection methods and ageing criteria were used as in previous years (Minton *et al.* 2000, 2001, 2002, and 2003). As far as possible conditions are standardised to minimise variations caused by catching factors. Birds caught by cannon netting provided the great majority of the data considered here, but some mist netting data are presented for the first time. Mist netting tends to catch a higher proportion of juveniles than adults (Pienkowski and Dick 1976, Goss-Custard *et al*. 1981) and so are considered separately. Only birds caught in the period when populations are considered to be most stable are counted i.e. after the majority of the juveniles have arrived and before adults depart on northward migration. In north-west Australia this covers the period 1 November to 20 March and in south-east Australia, 15 November to 20 March also (except for Sharp-tailed Sandpiper *Calidris acuminata* and Curlew Sandpiper *C. ferruginea* where the end date is 28 February).

There are potential biases in data collected in this way due especially to lack of homogeneity in the flocks of birds caught in the cannon nets. There are considerable data (e.g. Rogers *et al*. 2004) showing that some species show substantial regional and local variation in the distribution of the different age groups and that even in a single roosting flock there can be a patchy distribution of the age groups. The influence of such effects on juvenile ratios is minimised by combining data from as many different catches and locations as possible. Minton *et al.* (2000, 2001, 2002, 2003) give a more detailed discussion of potential biases. Minimal data for the last six years are given to allow a quick overview of how the most recent data compare with the immediate past. Consideration of the complete data set is in Minton *et al*. (2004).

RESULTS

The results for the 2003/04 season are given in Tables 1 and 2 for south-east Australia and north-west Australia. Table 3 gives some information on waders mist netted in north-west Australia. Tables 4 and 5 give the percentage juvenile data in south-east Australia and north-west Australia for the last 6 years.

South-east Australia

The outstanding feature of the 2003/04 data is the extremely high breeding success of Sharp-tailed Sandpipers *Calidris acuminata* with 39% juveniles in 989 birds caught in 10 catches. It was extremely noticeable from early October onwards to any wader watcher in the field that there were unusually large numbers of juvenile birds present.

In contrast Red-necked Stints *Calidris ruficollis* (23%) and Curlew Sandpipers *Calidris ferruginea* (15%) had average breeding years in 2003 but Ruddy Turnstone *Arenaria interpres* (6.7%) and Sanderling *Calidris alba* (2.7%) clearly had poor breeding years in 2003. Samples of Bar-tailed Godwit *Limosa lapponica* and Red Knot *Calidris canutus* were small but both probably also had poor breeding seasons in 2003. Note that the Red Knot figure of 19% may

Table 1. Percentage of juvenile/first year waders in cannon net catches in south-east Australia in 2003/04.

Species	No. of catches		Total	Juv/1st Yr		S.E.
	Large (>50)	Small (<50)	Caught	(#)	(%)	(% pts)
Bar-tailed Godwit	0	1	43	1	2.3	2.30
Ruddy Turnstone	0	9	122	8	6.6	2.24
Red Knot	0	1	22	19	86.4	7.32
Sanderling	0	4	74	2	2.7	1.89
Red-necked Stint	12	7	5470	1259	23.0	0.57
Sharp-tailed Sandpiper	3	7	989	388	39.2	1.55
Curlew Sandpiper	2	6	233	34	14.6	2.31

Note. Also Common Greenshank *Tringa nebularia* (2 caught, 1 juvenile), Great Knot (1, 1) and Pacific Golden Plover *Pluvialis fulva* (1, 0). All birds cannon netted in period 15 November to 28 February except for Red-necked Stint, Ruddy Turnstone and Sanderling where catches up to 23 March are included.

Table 2. Percentage of juvenile/first year waders in cannon net catches in north-west Australia in 2003/04.

Species	No. of catches		Total	Juv/1st Yr		S.E.
	Large (>50)	Small (<50)	Caught	(#)	(%)	(% pts)
Arctic Breeders						
Bar-tailed Godwit	2	7	312	28	9.0	1.62
Grey-tailed Tattler	0	7	158	22	13.9	2.75
Ruddy Turnstone	1	3	57	5	8.8	3.75
Great Knot	3	7	579	94	16.2	1.53
Red Knot	1	2	157	5	3.2	1.40
Red-necked Stint	2	9	303	30	9.9	1.72
Curlew Sandpiper	0	12	122	9	7.4	2.37
Broad-billed Sandpiper *Limicola falcinellus*	0	1	12	3	25.0	12.50
Non-Arctic Breeders						
Marsh Sandpiper *Tringa stagnatillis*	0	1	12	5	41.7	14.23
Common Greenshank	0	2	7	2	28.6	17.07
Lesser Sand Plover *Charadrius mongolus*	0	3	9	2	22.2	13.86
Greater Sand Plover	3	6	499	121	24.2	1.92
Terek Sandpiper	2	4	254	47	18.5	2.44
Oriental Plover *Charadrius veredus*	0	2	10	2	20.0	12.65
Oriental Pratincole	2	2	228	19	8.3	1.83

Note. Also Black-tailed Godwit *L. limosa* (5, 0), Grey Plover *P. squatarola* (2, 0) and Eastern Curlew *Numenius madagascariensis* (1, 0). All birds cannon netted in period 1 Nov 2003 to 29 Feb 2004 (actually all in period 25 Jan to 13 Feb 2004).

not be representative of the population. There is a high level of segregation of juveniles Red Knots into areas away from the normal locations of the main flocks of adult non-breeding birds. The absence of Red Knot from areas where they are caught when juvenile ratios are high suggests that true juvenile numbers may have been low.

North-west Australia

Overall wader populations spending the non-breeding season in north-west Australia seemed to have had a poor breeding season in 2003. Red-necked Stint (10%) and Curlew Sandpiper (7.4%) had much lower proportions of juveniles than populations of the same species in south-east Australia. Red Knot (3.4%) also fared badly in 2003. Ruddy Turnstone fared slightly better, but not significantly so, than in south-east Australia. Over the last five years, the juvenile percentages for Great Knot *Calidris tenuirostris* have been either low (not more than 5.2%) or high (17% or more), so this year's figure of 16% is indicative of a good breeding year.

Breeding outcome data are given for a number of species that breed in non-Arctic regions of Siberia. Greater Sand Plover *Charadrius leschenaultii* (24%) again produced a high proportion of juveniles, but this is middle of the range for this species. Terek Sandpipers *Xenus cinereus* (19%) seem to have had a good breeding season with the highest percentage in the last six years. The Grey-tailed Tattler

Table 3. Percentage of juvenile/first year waders in mist net catches in north-west Australia in 2003/04.

Species	No. of catches		Total	Juv/1st Yr		S.E.
	Large (>50)	Small (<50)	Caught	(#)	(%)	(% pts)
Pin-tailed Snipe *Gallinago stenura*	0	1	1	1	100.0	0.00
Swinhoe's Snipe *Gallinago megala*	0	1	2	2	100.0	0.00
Pacific Golden Plover	0	1	3	0	0.0	0.00
Marsh Sandpiper	0	3	11	1	9.1	8.67
Common Greenshank	0	2	6	4	66.7	19.25
Wood Sandpiper *Tringa glareola*	0	3	20	4	20.0	8.94
Common Sandpiper *Actitis hypoleucos*	0	2	7	3	42.9	18.70
Oriental Plover	0	2	9	2	22.2	13.86
Oriental Pratincole	0	2	22	2	9.1	6.13
Long-toed Stint	0	3	17	16	94.1	5.71
Sharp-tailed Sandpiper	1	2	87	49	56.3	5.32

All birds mist-netted, near Broome, in period 15 Nov 2003 to 4 Feb 2004.

Heteroscelus brevipes percentage (14%), although of the same scale as that for Terek Sandpiper, is the second lowest figure in the last six years for this species and represents a poor year. Oriental Pratincoles *Glareola maldivarum* were sampled for the first time and had only a modest 8.3% first year birds; if this is typical, the huge concentration (2.88 million) of this species at 80 Mile Beach (Sitters *et al*. 2004) could not have been due to an exceptionally good breeding season in 2003.

Some mist net catch results are included for the first time (Table 3). Mostly these are of small numbers of birds and of species that are normally not caught by cannon netting. Whilst there is a tendency for mist netting to produce a higher proportion of first year birds than cannon netting it would nevertheless appear from these data that Sharp-tailed Sandpipers and Long-toed Stints *Calidris subminuta* must have had a good breeding season in 2003, the former confirming the result already apparent from the south-eastern Australian data (Table 1).

DISCUSSION

Overall the 2003 breeding season produced more variable juvenile percentages in south-east Australia than are usual and overall lower percentages than are usual in north-west Australia.

The outstanding breeder of 2003 seems to have been the Sharp-tailed Sandpiper. Quite why this species should have done so well when other similar size species breeding in the same general areas of the Arctic should have fared much less well is unclear. Sanderling, Red Knot, and Ruddy Turnstone are species which share similar habitats in parts of the breeding range; Sanderling and Red Knot (probably) had a uniformly bad breeding outcome and that for Ruddy Turnstone was poor. The north-west non-breeding populations of Red-necked Stints and Curlew Sandpipers had juvenile percentages only a half those of the same species in south-east Australia. This suggests that these two local (in Australia) populations may breed in different areas of the Arctic. There is as yet, however, insufficient recovery or leg flag data to determine any difference in the breeding areas of the south-east and north-west Australian populations.

The Great Knot had a markedly different outcome in 2003 to most other species. It breeds on high mountains in north-east Siberia, a quite different habitat to most other wader species. The results here suggest that it was subject to more favourable weather and/or predation pressures in 2003 than most other wader populations breeding in northern Siberia. This is the second good breeding year in succession for Great Knots after three of the previous four years had poor breeding outcomes.

It is the intention to continue the annual monitoring of breeding success via the age composition of catches in Australia through continuation of the established VWSG programme in south-east Australia and through three week AWSG expeditions in the November to mid-March period in north-west Australia. These data can help explain population changes which may result from on-going reductions in the volume and quality of habitat at migratory staging areas in Asia and, in the longer term, from the effects of climatic change on wader habitats. Changes in populations are a consequence of either changes in survival rates or changes in juvenile production or both. There are few long-term schemes monitoring recruitment and this is one of them, indeed it is one of the longest running programs of its type in the world.

ACKNOWLEDGEMENTS

All those who have contributed to the collection of these data by participating in wader-banding activities in south-east Australia and north-west Australia are greatly thanked. The Australian Bird and Bat Banding Scheme provided permits and the wildlife authorities in Victoria, South Australia and Western Australia issued State licences. Various landowners kindly allowed access to their property. Financial support for equipment purchases was generously provided by the Victorian Department of Sustainability and Environment, CoastAction/Coastcare, Woodside Petroleum, and others.

Table 4. Percentage of first year birds in wader catches in south-east Australia 1998/99 to 2003/04

Species	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	Median
Bar-tailed Godwit	41	19	3.6	1.4	16	(2)	9.8
Ruddy Turnstone	6.2	29	10	9.3	17	6.7	9.7
Great Knot	-	7.5	(3.7)	8.2	-	-	d.k.
Red Knot	2.8	38	52	69	(92)	(86)	60.5
Sanderling	10	13	2.9	10	43	2.7	10
Red-necked Stint	32	23	13	35	13	23	23
Sharp-tailed Sandpiper	12	10	17	7.8	20	39	14.5
Curlew Sandpiper	4.1	20	6.8	27	15	15	15

Notes. (1) All birds cannon netted between late November and third week in March (except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only). Figures in brackets based on small samples.

(2) Some of the figures for earlier years in the above table have been revised from those published in Minton *et al.* 2002. This results from some small changes to the range of catch dates for which samples are included.

Table 5. Percentage of first year birds in wader catches in north-west Australia 1998/99 to 2003/04.

Species	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	Median
Arctic Breeders							
Bar-tailed Godwit	2.0	10	4.8	15	13	9.0	9.5
Little Curlew	57	33	-	36	30	-	34.5
Grey-tailed Tattler	26	(44)	17	17	9.0	14	17
Great Knot	2.4	4.8	18	5.2	17	16	10.6
Red Knot	3.3	14	9.6	5.4	32	3.2	7.5
Red-necked Stint	26	46	15	17	41	10	21.5
Curlew Sandpiper	9.3	22	11	19	15	7.4	13
Non-Arctic Breeders							
Terek Sandpiper	12	(0)	8.5	12	11	19	11.5
Greater Sand Plover	25	33	22	13	32	24	24.5

Note. All birds cannon-netted in the period 1 November to mid-March. Figures in brackets are from small samples.

Ken Rogers is thanked for improving the text and adding some statistical measures to Tables 1-3.

REFERENCES

Goss-Custard, J.D., S.E.A. le V. dit Durell, H. Sitters and R. Swinfen. 1981. Mist-nets catch more juvenile oystercatchers than adults. Wader Study group Bulletin 32:13;

Minton, C., R. Jessop, and C. Hassell. 2000. 1999 Arctic breeding success from Australian perspective. Arctic Birds 2: 19-20.

Minton, C., R. Jessop, P. Collins, and C. Hassell. 2001. Indications of year 2000 Arctic breeding success based on the percentage of first year birds in Australia in the 2000/01 austral summer. Arctic Birds 3: 31-32.

Minton, C., R. Jessop, P. Collins, and C. Hassell. 2002. Year 2001 Arctic breeding success, as measured by the percentage of first year birds in wader populations in Australia in the 2001/02 austral summer. Arctic Birds 4: 39-42.

Minton, C., R. Jessop, P. Collins, and C. Hassell. 2003. Arctic breeding success in 2002, based on the percentage of first year birds in wader populations in Australia in the 2002/03 austral summer. Arctic Birds 5: 45-47.

Minton, C., R. Jessop, P. Collins, and K. Gosbell. 2004. Monitoring wader breeding productivity by the percentage of first year birds in wader populations in S.E. Australian non-breeding areas. In: Straw, P., 2004 (Ed.). Status and Conservation of Shorebirds in the East Asian-Australasian Flyway. Proceedings of the 2003 Australasian Shorebird Conference 13-15 December 2003. Wetlands International Global Series (number not yet allocated), International Wader Studies 17, Sydney, Australia

Pienkowski, M.W. and W.J.A. Dick. 1976. Some biases in cannon- and mist-netted samples of wader populations. Ringing & Migration 1: 105-107.

Rogers, D., K. Rogers, and M. Barter. Measuring age ratios of shorebirds with a telescope: A pilot study. AWSG 2003 Conference Proceedings.

Sitters, H., C. Minton, P. Collins, B. Etheridge, C. Hassell, and F. O'Connor. 2004. Extraordinary numbers of Oriental Pratincoles in NW Australia. The Stilt 45: 43-49.

MORE ON ORIENTAL PRATINCOLE NUMBERS

CLIVE MINTON[1] & DANNY ROGERS[2]

[1]165 Dalgetty Road, Beaumaris, Vic 3193, Australia mintons@ozemail.com.au; [2](Charles Sturt University). 340 Nink's Road, St Andrews, Vic 3761, Australia.

Sitters *et al*. (2004) reported a count of 2.88 million Oriental Pratincoles *Glareola maldivarum* in north-west Australia in February 2004. This count was far in excess of the previous estimate of the East Asian-Australasian Flyway population of 75,000 (Wetlands International 2002). Our attention has been drawn to an old reference which tends to support two of the conclusions of the paper:

- that there have always been more Oriental Pratincoles in northern Australia than the previous official count estimates; and
- that the link between Oriental Pratincoles and rain was first recognised a very long time ago.

The information following was emailed by Robert Gosford on June 24th. He is currently preparing an annotated "Bibliography of Arnhem Land Ornithology 1802-1964". He quotes:

> "Mr. G. A. Keartland collected for the S. A. Museum while in charge of a camp at the Fitzroy and Margaret Rivers 45 miles from Derby…. Keartland was on the Horn Scientific Expedition in Central Australia. Note at North (1898) the description from Keartland's field notes at p. 160 refers "No. 56. Glareola orientalis (Eastern Pratincole)" in numbers rising "like a continuous column of smoke and circling overhead until they spread out so as to almost obscure the sky" and more, including them being prohibited birds because of their propensity to bring rain."

The Fitzroy and Margaret Rivers confluence is *c*. 450 km east-north-east of the northern end of 80 Mile Beach.

We have also recently been told by Peter Collins (pers. comm.) that the Oriental Pratincole is sometimes called "Rainbird" by local people in north-west Australia. In February 2001, the manager of Mardi Station (about 60 km south of Dampier) told Chris Hassell of once seeing "thousands and thousands and thousands of Rainbirds as far as the eye could see, flying towards the station homestead". Chris (pers. comm.) was unable to guess what the station manager meant by "Rainbirds", but in retrospect considers it is likely that he was referring to Oriental Pratincoles. The date of this sighting is unknown.

Another report of 'millions' of Pratincoles (not identified to species) on or near 80 Mile beach was made by two European tourists in the early 1980s (Peter Curry pers. comm.). Further reports of large numbers of Oriental Pratincoles are in Carruthers (1968) and Klapste (1977).

Unfortunately we do not know if any of the additional reports of huge Oriental Pratincole concentrations coincided with locust plagues. There were near-plague numbers of locusts in the Eighty Mile Beach region in February 2004 when 2.88 million Oriental Pratincoles were counted. It would be interesting to know more about the links between pratincole and locust numbers in Australia, especially as Peter Curry (pers. comm.) has noted that: "Over most of Africa, the Black-winged Pratincole [*Glareola nordmanni*] is known as the locust bird, famed for its massive appearances in locust years and spectacular absences at other times."

Whatever the relationship with locust numbers, it would certainly appear that the Oriental Pratincole's habit of moving ahead of heavy rain is quite well established and that this explanation for the extraordinary gathering of nearly three million birds in the vicinity of Eighty Mile Beach in early February 2004 is correct. It would also seem that vast concentrations have been seen in the past, the sighting by Keartland being more than 100 years ago.

REFERENCES

Carruthers, R.K. 1968. Notes on an influx of Oriental Pratincoles at Mt Isa. Emu 68(3): 217-7.

Klapste, J. 1977. A large concentration of Oriental and Australian Pratincoles in northern Queensland. Australian Birdwatcher 7(2): 65-6.

North, A. J. (1898) List of Birds Collected by the Calvert Exploring Expedition in Western Australia. Trans. Roy. Soc. South Austr. 22: 125-192.

Sitters, H., C. Minton, P. Collins, B. Etheridge, C. Hassell, & F. O'Connor. 2004. Extraordinary numbers of Oriental Pratincoles in NW Australia. Stilt 45: 43-49.

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

INDICES OF WADER BREEDING SUCCESS ON THE NON-BREEDING GROUNDS

KEN G. ROGERS[1], JIM R. WILSON[2], MARK A. BARTER[3] & DANNY I. ROGERS[1]

[1]340 Ninks Road, St Andrews, Vic 3761, Australia. kenrogers@hotkey.net.au; [2]Granveien 46, 1911 Flateby, Norway; [3]21 Chivalry Avenue, Glen Waverly, Vic 3150, Australia

The representation of young waders in the population on the non-breeding grounds is of interest for two reasons. First, it is widely used as an index of breeding success, it being assumed to rise and fall with the number of juveniles arriving in Australia each year. Secondly, there is a need to know recruitment rates so that an assessment can be made of whether mortality in the adult population is balanced by the number of young birds that attain breeding age. There are different ways of expressing the abundance of young birds in wader catches. One of these is the *first year proportion* – i.e. the number of young birds caught, divided by the total number of birds caught (Clark *et* al. 2004). This value, typically expressed as a percentage, has been the standard in Australian wader studies for many years (Minton 2000, 2001, 2002, 2003a, 2003b, 2004a, 2004b). In this note we consider the possibility that a better index of breeding success and recruitment may be the *first year ratio* – i.e. the number of young birds caught, divided by the number of birds caught that were aged as adult.

Formally, recruitment is defined in demographic theory as the ratio of the number of birds present in one year, which were not present in the previous year, to the number of breeding adults present in the previous year (Cooch and White 2001). Measuring recruitment of waders directly is difficult, because it is usually impossible to tell whether a bird in adult plumage was a breeding adult in the previous year. Typically, the only data available to banders will be the number of young birds they have caught in a season, and the number of birds captured in the same season that were aged as adults. These "adults" will usually include some birds that have attained adult plumage, but have not yet carried out their first northward migration or breeding attempt.

The appendix shows how the first year percentage and ratio, and their associated standard errors, are calculated. It also shows the close relationship between them and how the percentage and ratio are related to recruitment. It is evident from the final two formulae of the Appendix that if the number of last year's breeding adults which die are replaced by the same number of new breeding adults, the term to the right of the multiplication sign in the two expressions for recruitment will equal 1 and we shall have:

$$\text{Recruitment} = \text{First Year Ratio}$$

and

$$\text{Recruitment} = \frac{\text{First Year Proportion}}{(1 - \text{First Year Proportion})}$$

In other words, the first year ratio is an unbiased estimate of recruitment, subject to there being no change in the number of breeding adults from year to year. Figure 1 plots the first year ratio, or recruitment if adult numbers are stable,

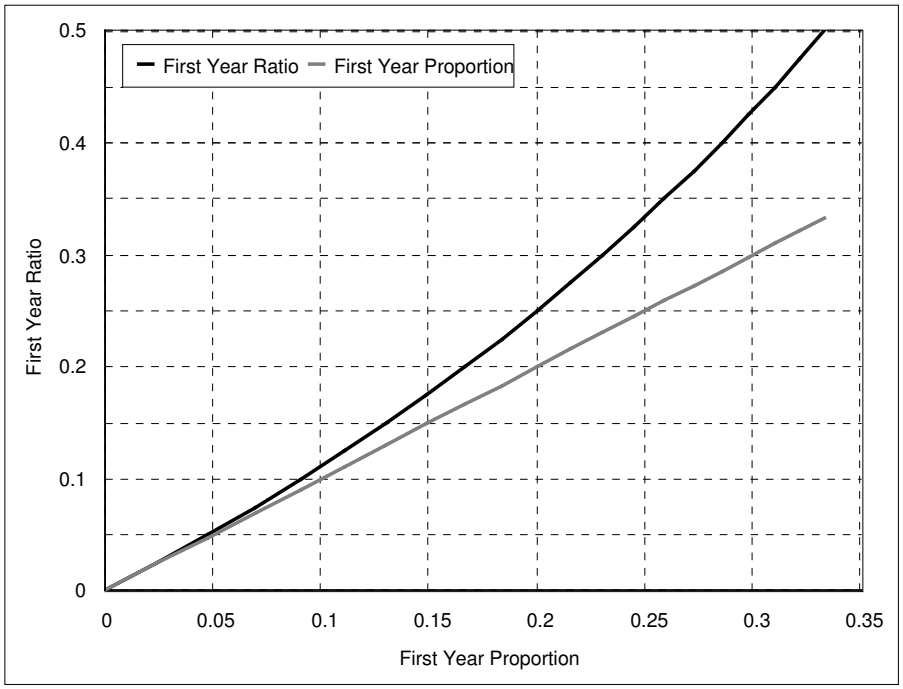


Figure 1. Recruitment v. First Year Proportion. If the number of breeding adults stays the same from year to year, the First Year Ratio is an unbiassed estimate of recruitment.

against first year proportion. This shows that the first year proportion, although increasing monotonically with recruitment, systematically underestimates it and that this bias increases as recruitment increases. In addition to being a better measure of recruitment, we argue that first year ratio is the more useful of the two measures for comparing breeding success in different years. In years when breeding success is low, first year proportions and first year ratios are very similar. However, in years when breeding success is high, first year proportion will be much lower than first year ratio, because the large number of first year birds caught has a substantial effect on total catch size. Figure 1 shows for example that if the first year proportion is 0.3, recruitment is 0.43 i.e. the proportion underestimates recruitment by 30%. In effect, use of first year proportion makes it more difficult to appreciate the scale of differences between good and bad years.

Delayed maturity is common in Australian waders. Red-necked Stints *Calidris ruficollis*, for example, do not leave for their first northward migration until toward the end of their second year. Some larger species, such as Red Knot *C. canutus*, Great Knot *C. tenuirostris*, and Bar-tailed Godwit *Limosa lapponica* may not begin migrating north until they are 3-4 years old. The argument above applies to all species irrespective of the age of first breeding. Table 1 gives some comparisons of actual first year proportions and ratios and shows how poor a proxy for recruitment the first year proportion can be.

To summarise, first year proportion is a systematically biased underestimate of recruitment. It should not be used as a synonym for recruitment or used as such in demographic analyses. Since both the proportion and the ratio are calculated using exactly the same data, there is a strong case for reworking all past results as ratios and only publishing ratios in the future.

ACKNOWLEDGEMENT

Clive Minton is thanked for his comments on an early draft of this note.

Table 1. Comparisons of first year proportions and ratios. Data from Minton *et al*. (2000).

Species	Total no. of birds caught (N)	No. of first year birds (J)	First Year Proportion (P)	S.E. of First Year Prop. SE{P}	First Year Ratio (R)	S.E. of First Year Ratio SE{R}
North-west Australia						
Bar-tailed Godwit *Limosa lapponica*	182	14	**0.077**	0.020	**0.083**	0.023
Ruddy Turnstone *Arenaria interpres*	20	4	**0.200**	0.089	**0.250**	0.142
Great Knot *C. tenuirostris*	770	34	**0.044**	0.007	**0.046**	0.008
Red Knot *C. canutus*	88	13	**0.148**	0.038	**0.173**	0.052
Red-necked Stint *C. ruficollis*	326	151	**0.463**	0.028	**0.863**	0.096
Curlew Sandpiper *C. ferruginea*	46	11	**0.239**	0.063	**0.314**	0.109
Broad-billed Sandpiper *Limicola falcinellus*	25	11	**0.440**	0.099	**0.786**	0.327
Greater Sand Plover *Charadrius leschenaultii*	182	60	**0.330**	0.035	**0.492**	0.078
South-east Australia						
Bar-tailed Godwit	36	7	**0.194**	0.066	**0.241**	0.102
Ruddy Turnstone	118	25	**0.212**	0.038	**0.269**	0.061
Great Knot	40	3	**0.075**	0.042	**0.081**	0.049
Red Knot	320	121	**0.378**	0.027	**0.608**	0.070
Sanderling *C. alba*	493	64	**0.130**	0.015	**0.149**	0.020
Red-necked Stint	4901	1108	**0.226**	0.006	**0.292**	0.010
Sharp-tailed Sandpiper *C. acuminata*	244	25	**0.102**	0.019	**0.114**	0.024
Curlew Sandpiper	1338	305	**0.228**	0.011	**0.295**	0.019

REFERENCES

Clark, J.A., R.A. Robinson, N.A. Clark & P.W. Atkinson. 2004. Using the proportion of juvenile waders in catches to measure recruitment. Wader Study Group Bull. 104: 51-55.

Cooch, E. & G.C. White. 2001. Program MARK Analysis of data from marked individuals; A gentle introduction, 2nd Ed. [www.phidot.org/software/mark/docs/book/]

Minton, C., R. Jessop, and C. Hassell. 2000. 1999 Arctic breeding success from Australian perspective. Arctic Birds 2: 19-20.

Minton, C., R. Jessop, P. Collins, and C. Hassell. 2001. Indications of year 2000 Arctic breeding success based on the percentage of first year birds in Australia in the 2000/01 austral summer. Arctic Birds 3: 31-32.

Minton, C., R. Jessop, P. Collins, and C. Hassell. 2002. Year 2001 Arctic breeding success, as measured by the percentage of first year birds in wader populations in Australia in the 2001/02 austral summer. Arctic Birds 4: 39-42.

Minton, C., R. Jessop, P. Collins, and C. Hassell. 2003. Arctic breeding success in 2002, based on the percentage of first year birds in wader populations in Australia in the 2002/03 austral summer. Arctic Birds 5: 45-47.

Minton, C., R. Jessop, P. Collins, and K. Gosbell. 2004. Monitoring wader breeding productivity by the percentage of first year birds in wader populations in S.E. Australian non-breeding areas. AWSG 2003 Conference Proceedings.

Minton, C. R. Jessop, P. Collins, H. Sitters and C. Hassell. 2004. Percentages of migratory waders in the 2003/04 Australian summer. Stilt 46: 31-34.

Minton, C. 2003. The importance of long-term monitoring of reproduction rates in waders. Wader Study group Bull. 100: 178-182.

APPENDIX. STATISTICAL DETAILS

A1. Estimation of First Year Percentage and Ratio

The first year proportion and the first year ratio are calculated from the same data. If we have a total of N birds, comprising A adults and J first year birds, the first year parameters and their standard errors are given by:

First Year Proportion $= P = J / N$ and its standard error $= SE\{P\} = [P.(1 - P) / N]^{1/2}$

First Year Ratio $= R = J / A$ and its standard error $= SE\{R\} = SE\{P\}.[(1 - P)^2 – SE\{P\}^2]^{-1}$

A2. Calculation of Recruitment

From the definition of recruitment, the number of first year birds this year is given by:

First Year Birds = Recruitment * Breeding Adults Last Year

and the first year proportion is given by:

$$\text{First Year Proportion} = \frac{\text{Recruitment} * \text{Breeding Adults Last Year}}{\text{Breeding Adults This Year} + \text{Recruitment} * \text{Breeding Adults Last Year}}.$$

and the first year ratio as:

$$\text{First Year Ratio} = \frac{\text{Recruitment} * \text{Breeding Adults Last Year}}{\text{Breeding Adults This Year}}$$

from which we can write Recruitment either as:

$$\text{Recruitment} = \frac{\text{First Year Proportion}}{(1 - \text{First Year Proportion})} * \frac{\text{Breeding Adults This Year}}{\text{Breeding Adults Last Year}}$$

or:

$$\text{Recruitment} = \text{First Year Ratio} * \frac{\text{Breeding Adults This Year}}{\text{Breeding Adults Last Year}}$$

BANDED STILT BREEDING ATTEMPT AT LAKE DISAPPOINTMENT

ALAN CLARKE[1], BILL MUIR[1], SUE ELSCOT[2] AND JIM LANE[2].

Department of Conservation and Land Management. [1] PO Box 51, Wanneroo, Western Australia, 6065. [2] 14 Queen Street, Busselton, Western Australia, 6280.

On 23 August 2004, two of the authors (A.C. and B.M.) visited Lake Disappointment in central Western Australia. At the northernmost access point to the main lake, between Wells No. 20 and No. 21 on the Canning Stock Route, a large (3 km x 5 km), banana-shaped embayment was found to be mostly dry with the exception of two small, shallow (1-2 cm deep) ponds of water at the base of a dune on the north-eastern edge of the lake. The remainder of the lake floor was covered with a thin salt crust which was broken through to reveal damp to wet sediment. A total of 220 juvenile Banded Stilt *Cladorhynchus leucocephalus* were found lying dead both around and within the two remaining areas of water. A few were scattered further away from the waters edge and two were found on the dune adjacent with evidence of predation. A third, similarly-sized pool with only a film of surface water was located approximately 1 km to the east-southeast of the access point and an additional 10 dead Banded Stilt were found there. The dead Banded Stilt found in the embayment appeared to be close to fledging. None had chest-band markings and they were noticeably smaller than adult Banded Stilt. The birds appeared to have been dead for around two weeks. A series of strand lines around the shore of the embayment had a light spread of white feathers. Small, dead, salt-preserved frogs were collected from the pools.

A second part of the main lake was accessed from a track off the Canning Stock Route located 5 km south of the turnoff to Well No. 20. Here approximately 40 dead juvenile Banded Stilt were found both within and around a small, very shallow pool on the lake surface, just below the samphire line. The dead stilts at this site appeared to be smaller than those found 10 km further north although all were fully feathered with no down visible. At this site, the lake edge had been eroded by runoff from a recent major rainfall event and some of the resultant erosion gullies still contained water.

The lake was also accessed where Savory Creek enters Lake Disappointment. The creek system leading into the lake was deep (about 1.5 m) and there was evidence that the creek had recently flooded and broken its banks. Where the creek entered the main lake basin, it opened out into a fan with a main body of water that became progressively shallower and was dry approximately 1 km from the creek mouth. Larger, very shallow pools of water were scattered further into the lake for some kilometres. At this site, more dead juvenile Banded Stilt were seen than at the previous two sites. Approximately 500 dead birds were scattered over an area of about 1 km^2 and there was evidence of predation of live young by cats. Dog/dingo tracks were also evident. Sixteen Banded Stilt without chest bands were observed feeding in shallow water in the lake, approximately 200 m from the entrance of Savory Creek. Both anostracan shrimps and ostracods were observed in the water where the birds were feeding. Other birds feeding in the vicinity were 10 Avocet *Recurvirostra novaehollandiae*, 60 Red-capped Plover *Charadrius ruficapillus*, two Red-necked Stint *Calidris ruficollis* and 11 Sharp-tailed Sandpiper *Calidris acuminata*. More dead stilts were seen upstream along Savory Creek for at least 3 km.

Although several large islands were visible further out into the lake, the exact location of the Banded Stilt breeding site could not be located, due to the distance and difficulty of access.

During 6-9 September 2004, two weeks after the dead Banded Stilts were recorded at Lake Disappointment, Clive Minton (pers. comm.) recorded 28 Banded Stilt, all juveniles, using a small, ephemeral saltmarsh lagoon located about a kilometre from Coral Bay, 1,000 km west of Lake Disappointment. This sighting suggests that some birds may have successfully fledged from Lake Disappointment.

Banded Stilt have previously been recorded breeding at or near Lake Disappointment. In August 1971, W.H. Butler recorded both adult and juvenile Banded Stilt using a claypan 30 km south of Durba Spring on the Canning Stock Route, and others using a claypan 4 km north of Well No. 11 (Kolichis, 1976). He collected an immature specimen that was thought to have come from a presumed nesting attempt at Lake Disappointment, which had filled in May of that year (ibid.). In 1975, the Western Australian Museum received fragments of Banded Stilt eggs which were found partly buried in clay in the Percival Lakes, to the north-east (ibid.). The eggs were still pigmented and were evidently of recent age.

REFERENCE

Kolichis, N. 1976. New breeding records of the Banded Stilt in Western Australia. *Western Australian Naturalist* 13:114-119.

REPORT ON THE FIRST SINO-AUSTRALIA FLAGGING WORKSHOP AT YALU JIANG NATIONAL NATURE RESERVE, CHINA, APRIL 2002

CHU GUOZHONG[1], PETER COLLINS[2], DAVID MELVILLE[3] AND QIAN FAWAN[4]

[1] *National Bird Banding Center of China* bird.vz@fee.forestry.ac.cn; [2]*RMB 4009, Cowes Vic 3922 Australia* moonbird@waterfront.net.au; [3]*Dovedale RD2, Wakefield, Nelson New Zealand;* [4]*National Bird Banding Center of China*

The first Sino–Australia Migratory Shorebird Capture and Colour Flagging Workshop, organised by the National Bird Banding Center of China, was held in Dong Gang, China, from 22 to 30 April 2002. Two Australasian Wader Studies Group members lectured on leg flag manufacture and application, wader identification, feeding and roosting habits, data analysis, and sexing by measurement and cross checking by internal examination. Counting waders and searching for leg flags as well as turnover rates and timing of migration and bird welfare were also discussed. In the field, 42 separate leg flag sightings were made, 12 from north-west Australia, seven from south-east Australia, 14 from New Zealand, two from Japan, and one from an area as yet unknown. A three-year old colour banded Great Knot from a study in north-west Australia was also seen. Although catching conditions were not ideal due to the full moon, mist net sessions were conducted on three nights and 94 waders caught; these included one bird that had been banded at Corner Inlet in Victoria, only the second overseas band recovery of a Bar-tailed Godwit banded in Victoria. Counts were made whenever possible and over 1,000 each of Whimbrel, Grey Plover, Great Knot, Dunlin and Bar-tailed Godwit were seen.

INTRODUCTION

Yalu Jiang National Nature Reserve is located in Liaoning Province north eastern China (124°E 40°N); see Figure 1. The reserve covers an area of 108,057 hectares with an estimated 30,000 hectares of mudflat (Barter 2002). Behind the sea wall there are many aquaculture ponds which vary in depth depending on whether the shrimps are ready for harvesting or are being seeded from the intake of sea-water. The Reserve is an East Asian-Australasian Shorebird Network Site. A fuller description of the area is provided by Barter *et al*. 2000.

Ten wader species have occurred in internationally important numbers during northward migration. These include more than 10% of the flyway populations of Great Knot and Bar-tailed Godwit; also 5% of the flyway populations of Grey Plover and Eastern Curlew occur in the area. Rare waders such as Nordmann's Greenshank and Spoon-billed Sandpiper *Eurynorhyncus pygmeus* have also been recorded in the area, albeit in very small numbers. In the northward migration period this area holds the highest numbers of Bar-tailed Godwit, Common Greenshank, Broad-billed Sandpiper, and Eurasian Oystercatcher in the Yellow Sea (Barter 2002).

PREPARATION

The Workshop was organised by the China National Bird Banding Centre of the State Forestry Administration. Local arrangements were made by the Liaoning Provincial Forestry Department and the Dandong City Forestry Bureau. The fieldwork was undertaken in the Yalu Jiang Nature Reserve which is administered by the Dandong Municipal Environmental Protection Office.

Tide tables are difficult to obtain in China (but can be obtained outside the country). The local nature reserve staff only had access to predicted times, but not heights of tides. The tidetable for Dalu Dao, some 30 km to the west of Yalu Jiang, which gives both time and height of tides, was obtained from the internet (www.pangolin.co.nz); see Table 1. Concerns had been raised in Tokyo and New Zealand about possible confusion between the recommended colour combination of blue over yellow leg flags for Yalu Jiang with the blue over white (which can discolour to a yellowish colour) currently used in central Japan. It was decided to use green over orange for the Dandong – Tangshen area. This combination had originally been allocated to the Yellow River Delta under the 'Colour Flagging Protocol for Migratory Shorebirds in the East Asian – Australasian Flyway'. This change was agreed to by Environment Australia, Wetlands International, and the China National Bird Banding Centre.

RESULTS

Latin names for all species are given in Table 2.

Catching and banding

Several of the Chinese participants were experienced banders having attended passerine banding courses in Hong Kong and other parts of China and three members of the course had attended Australasian Wader Studies Group expeditions to north-west Australia. The role of the two foreign experts was as guides and advisers rather than instructors. The one exception to this was extraction from mist nets at night; no member of the course had had any experience of this specialised technique.

22 to 23 April. The first day and a half of were spent surveying the mud flats and the aquaculture ponds near the mouth of Yalu Jiang for catching sites. A large area of open mud flat at low tide dominated the area. Behind the sea wall were the ponds, separated from the mud flats by a four metre high sea wall. We had been advised that on tides of 5.2 m

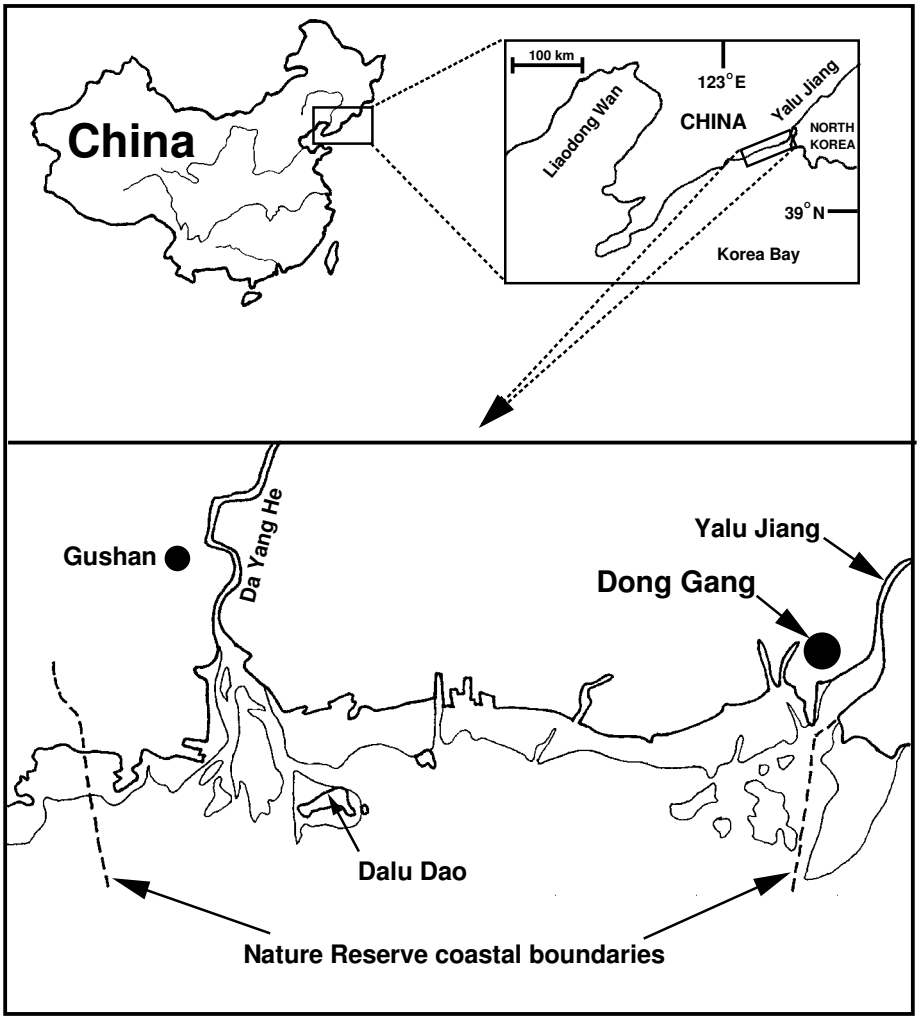


Figure 1. Location of the Yalu Jiang National Nature Reserve.

the entire mud flats would be covered and the birds forced into the ponds (M. Barter pers. comm.). The ponds were generally used for raising shellfish, shrimps and crabs for food. Empty ponds that had been drained for maintenance and/or harvesting were flooded on a series of high tides. Some ponds were covered in shallow water with areas of furrowed mud showing above the surface. These were used by waders at high tide when the mud flats were covered. One problem that occurred was finding potentially useful sites at low tide only to have them flood at high tide making them unsuitable for roosting waders. Discussions between workshop participants and the pond operators helped alleviate the problem.

These first two days of surveying had high tide heights ranging from 5.01 m to 5.15 m on the evening of 23 April when the high tide line was several hundred metres away from the sea wall, much further away than was expected. There is no clear explanation for this although the local fisherman were apparently not surprised. Prior information on tide conditions, obtained from tide tables and local knowledge should be considered when planning future courses.

24 April. The morning tide at 4.68 m was further out than the previous evening. The evening tide, 5.36 m at 1830, should have covered the mud but was still 500 m from the sea wall and did not fill the deep channel near it. Several teams were sent out to find access to the mud (a channel about 0.5 metre deep at mid-tide and several meters deep at high tide ran parallel to the seawall for most of its length) and high tide roosts on the ponds. No roosts were found on the ponds though several large roosts were seen on the mud. It was decided to set passerine nets on the mud flats the following evening when the high tide was predicted to be 18 cm higher. If the tide behaved as predicted, there should be ankle deep water over ankle deep mud. The presence of huge numbers of wader footprints over the mud up to the sea wall reinforced the conviction that birds could be caught on the mudflats with nets placed at right angles to the incoming tide.

25 April. A further morning survey revealed that large areas of mud were still uncovered on a 5.23 m tide. Knowing that the evening tides were higher the nets were set in the early afternoon about 100 m from the sea wall. Again extensive areas of wader footprints revealed that large numbers of

Table 1 . Tide Table for Dalu Dao (123° 45' E 39° 45' N) and Observations at Yalu Jiang, April 2002

Date	Time	Height	Observation at Yalu Jiang
23	0510	4.19	High tide 300 metres from sea wall, no waders in ponds
	1100	1.51	
	1730	5.15	High tide approximately 200 metres from sea wall
	2400	1.09	
24	0610	4.68	High tide circa 300 metres from sea wall
	1220	1.15	
	1830	5.36	High tide 250 metres from sea wall should have reached the sea wall easily.
25	0100	0.75	
	0710	5.23	Tide still several hundred metres from the sea wall.
	1320	0.75	
	1930	5.54	High tide 1 metre up the sea wall much higher than expected. Weather influence
.			
26	0140	0.45	
	0800	5.73	Much higher than yesterday birds came to fishpond 2 hours before high tide
	1410	0.42	
	2020	5.62	Appeared to be the same height as the morning birds in pond very early.
27	0230	0.24	
	0840	6.11	Very high tide 2 metres up the sea wall
	1500	0.22	
	2100	5.59	
28	0310	0.15	
	0930	6.33	
	1550	0.18	
	2150	5.44	Ideal time and height of tide for night catching in the ponds.

birds used areas of mud close to the sea wall. During the wait for the tide to bring the birds towards the nets, the New Zealand keeping cage was set up and the chicken cages supplied by the Chinese assembled. The members of the workshop assembled on the sea wall about two hours before the tide reached its peak and were met with the sight of the tide lapping against the sea wall to a depth that was estimated at a half a metre. This meant that the bottom shelves of the nets were dangerously near the water. Luckily it was still daylight and the nets were furled. It was decided to re-open the nets half an hour after high tide (5.54 m at 1930) and attempt to catch on the out-going tide. When we returned at 2000, the tide was already at least a kilometre away and no birds were near the nets.

The nets were retrieved and there followed a lengthy discussion between the senior members of the Workshop about the tide and its vagaries. It had been noticed that large numbers of birds were seen leaving the mud flats while the tide was coming in and heading both eastwards and westwards. These birds were presumably going to roost on the ponds. The fact that the evening tide came in apparently far more than was expected may have been due to the strong southerly wind pushing water inshore. The local fishermen were of little help, perhaps because they did not understand the questions being asked.

26 April. A 5.73 m high tide at 0800 gave the ideal conditions to survey high tide roosts on the ponds. We looked in the Power Station area at the mouth of the Yalu Jiang initially as several thousand waders had been observed there previously (Barter 2002). Among many unsuitable ponds there were three ponds that held waders, one of which looked suitable for catching. Once the birds had left the pond on the falling tide, the substrate was explored and, although the mud was ankle deep, the main problem was the relatively deep channel around the edge and the uneven surface below the water. This was a product of the method of construction of the ponds, the sediment to make the bund being dredged from the channel around the perimeter. Two lines of nets were erected in the afternoon, a line of passerine nets and a line of monofilament nets. The latter, being constructed of very fine material, have been shown to be very effective in relatively bright, moonlit conditions. The first birds arrived in the ponds at 1930, about an hour before high tide, and large numbers arrived in flocks of about 50 to 100 at regular intervals. The passerine nets were useless, as they were clearly visible; the sun had not set when the birds started to arrive at the ponds, and as the moon rose early, the sky remained quite bright. The other nets were however quite effective and the first bird was caught while the sun was still above the horizon. Sixteen birds (see Table 3) were fully processed and the first bird colour flagged in China was a Grey Plover in its second year. As the tide dropped the birds left almost together and no further birds were captured.

27 April. A morning survey of the western ponds found large numbers of Bar-tailed Godwit roosting on two ponds adjacent to a pumping station. A room at the pump house was made available for use as a processing station. The previous night's processing had been done in the bus and the

Table 2. Migratory shorebird species recorded during 2002 workshop.

English name	Scientific name
Bar-tailed Godwit	*Limosa lapponica*
Whimbrel	*Numenius phaeops*
Eurasian Curlew	*Numenius arquata*
Eastern Curlew	*Numenius madagascariensis*
Spotted Redshank	*Tringa erythropus*
Common Redshank	*Tringa totanus*
Marsh Sandpiper	*Tringa stagnatilis*
Common Greenshank	*Tringa nebularia*
Nordmann's Greenshank	*Tringa guttifer*
Wood Sandpiper	*Tringa glareola*
Terek Sandpiper	*Xenus cinereus*
Common Sandpiper	*Actitus hypoleucos*
Green Sandpiper	*Tringa ochropus*
Ruddy Turnstone	*Arenaria interpres*
Great Knot	*Calidris tenuirostris*
Red Knot	*Calidris canutus*
Dunlin	*Calidris alpina*
Eurasian Oystercatcher	*Haematopus ostralegus*
Pacific Golden Plover	*Pluvialis fulva*
Grey Plover	*Pluvialis squatarola*
Little Ringed Plover	*Charadrius dubius*
Kentish Plover	*Charadrius alexandrinus*
Lesser Sand Plover	*Charadrius mongolus*
Greater Sand Plover	*Charadrius leschenaultii*

small space meant that several people could not be involved in the whole process. Two lines of nets were set in the afternoon in adjacent ponds. The passerine nets were set along a central bund that was separated from the bank by a surprisingly deep channel. (The following day this pond was drained and the channel was revealed as an old stream bed and not a man made channel.) The passerine nets were used here because it was felt that the height of the bank might provide some background so the nets were less conspicuous. The monofilament nets were set along an area of exposed mud that had held 3,000 godwits on the morning high tide. Again the birds started to arrive an hour and a half before high tide and arrived in large numbers an hour before high tide. This was due to the tide having covered the mud and reached the sea wall well before the high tide. Again the passerine nets were ineffective as the full moon rose before sunset and illuminated the area like a floodlight. The monofilament nets were again successful; catch details are in Table 3.

Two local workers showed workshop members two recently deceased Bar-tailed Godwits. Apparently several birds of various species are often brought in with the tide in various stages of exhaustion. These invariably die and it may be that they could be a useful source of band recoveries in future.

28 April. Owing to the large numbers of birds at the pumping station site and the promised stability of the water level in the pond it was decided to set one line of monofilament nets in the same pond as the previous day. The birds returned to roost at the site on the morning tide, even though they were slightly disturbed on net rounds the previous night. The weather forecast was not good but the locals did not think that rain was going to be a problem. By evening, however, the cloud cover was quite heavy and the moon could not penetrate it. This led to a good catch (see Table 3) on the first fly-in as the tide rose. The later tide, coupled with the darker night, probably meant that the passerine nets would also have been effective had they been set. The catch included a Bar-tailed Godwit from Victoria that had been banded approximately two months previously (see Table 4). One of the workshop trainers (P.C.) was present at that catch.

29 April. The rain that started the previous evening became heavier during the night and continued all day. The mud road to the catching site became unsafe due to its extremely slippery surface and the narrowness of the causeways, thus preventing any catching.

Flag Observations

Every opportunity was taken during the workshop to check flocks for leg flags. Barter *et al*. 2000 reported seeing flagged waders in this area. In this workshop, 42 separate birds with leg flags and one with colour bands were seen; these have been reported to the various authorities concerned. One interesting observation was of the first Chinese leg-flagged Bar-tailed Godwit observed five kilometres from its banding place. The green over orange combination on the upper leg was clearly visible from a distance of 300 metres. Details of all flagged birds recorded are given in Table 4.

It was stressed to the participants of the course that as many details as possible of the birds that are observed should be noted to help minimise the double counting of flagged birds. Not only the position of the flag is important but the amount of breeding plumage, the possible sex, and any other detail, such as in one case here the shape of the flag, can help distinguish individual flagged birds. After discussing the salient points it was concluded that Table 4 is a minimum number of flag observations.

Table 3. Summary of birds caught and flagged

Species	26-Apr-02	27-Apr-02	28-Apr-02	Total
Bar-tailed Godwit	1	15	57	73
Terek Sandpiper	1	-	-	1
Great Knot	3	-	1	4
Dunlin	10	3	1	14
Grey Plover	1	-	1	2
Totals	16	18	60	94

Table 4. Flag sightings at Yalu Jiang National Nature Reserve

Date	**Flag colour**	**Flag position**	**Notes**
GREY PLOVER			**North Island, New Zealand**
24 April 2002	White	Right tarsus	Non-breeding plumage. Seen at a considerable distance – the White flag appeared to be below the 'knee' but was on the upper part of the tarsus. It was suspected that there was a dark coloured flag above the 'knee' but this could not be confirmed.
			North-west Australia
26 April	Yellow	Right tibia	Trace of breeding plumage
BAR-TAILED GODWIT			**North Island, New Zealand**
25 April 2002	White	Right tibia	Female
25 April 2002	White	Right tibia	Male, breeding plumage
25 April 2002	White	Right tibia	Female partial breeding plumage
26 April 2002	White	Right tibia	Male, full breeding plumage
26 April 2002	White	Right tibia	Female, 25% breeding plumage
26 April 2002	White	Right tibia	Female, 100% breeding plumage
27 April 2002	White	Right tibia	Male, 100% breeding plumage
28 April 2002	White	Right tibia	Female
28 April 2002	White	Right tibia	Male, 100% breeding plumage
28 April 2002	White	Right tibia	Female
			Victoria, Australia
25 April 2002	Orange	Right tibia	Female, partial breeding plumage
25 April 2002	Orange	Right tibia	Male, full breeding plumage
26 April 2002	Orange	Right tibia	Female, 75% breeding plumage, very narrow flag
26 April 2002	Orange	Right tibia	Male, 100% breeding plumage
26 April 2002	Orange	Right tibia	Male, 100% breeding plumage, faded flag
26 April 2002	Orange	Right tibia	Male, 100% breeding plumage, faded flag
27 April 2002	Orange	Right tibia	Female, breeding plumage
27 April 2002	Orange	Right tibia	Female, breeding plumage
28 April 2002	Orange	Right tibia	Male
28 April 2002	Orange	Right tibia	Male, 20% breeding plumage
28 April 2002	Orange	Left tibia	Female, breeding plumage
28 April 2002	Orange	Right tibia	Female
28 April 2002	Orange	Right tibia	Band number: 072-80929 – banded Corner Inlet, Victoria on 23 February 2002, age 2+
			North-west Australia
26 April 2002	Yellow	Left tibia	Male, full breeding plumage
26 April 2002	Yellow	Right tibia	Female, 75% breeding plumage, very wide flag
26 April 2002	Yellow	Right tibia	Male, 75% breeding plumage, faded flag
26 April 2002	Yellow	Right tibia	Male, 100% breeding plumage
27 April 2002	Yellow	Right tibia	Female, breeding plumage
27 April 2002	Yellow	Right tibia	Male
27 April 2002	Yellow	Right tibia	Male 75% breeding plumage
27 April 2002	Yellow	Right tibia	Male 100% breeding plumage
28 April 2002	Yellow	Right tibia	
28 April 2002	Yellow	Right tibia	Female
28 April 202	Yellow	Right tibia	Female
			Alaska, USA or Japan (Flag on tarsus not seen)
28 April 2002	Blue/?	Right tibia	Female, faded flag. Standing in water – not possible to see lower flag
28 April 2002	Blue/?	Right tibia	Male, 80% breeding plumage. Standing in water – not possible to see lower flag
			Don't Know. Combination belongs to Hong Kong, China but no Bar-tailed Godwits have been banded there
25 April 2002	Yellow/ White	Right tibia/ tarsus	Female, partial breeding plumage
GREAT KNOT			**Victoria, Australia**
26 April 2002	Orange	Right tibia	Faded flag looked pink
			North-west Australia
26 April 2002	Yellow	Right tibia	75% breeding plumage
26 April 2002	Yellow	Right tibia	100% breeding plumage
26 April 2002	Yellow	Left tibia	100% breeding plumage
28 April 2002	PaleYellow /Creamy White BAND	Tarsus	No flag. Banded at Broome, WA. Band is colour cohort band for birds fledged in 1999

Wader Counts

A series of wader counts was carried out as opportunity offered. The area counted was centred on the intertidal mudflats in the eastern part of the Reserve (sections D and E in Fig. 2, Barter *et al*. 2000). Most of the counts were undertaken at roosts on mudflats and as the birds were forced off them. Part of the reason for doing the counts was to gain an idea of species representation to determine the number and size of leg flags needed. Counts increased from 40,000 on 22 April to the maximum count on 26 April when *c*. 120,000 waders were counted. Details are in Table 5.

Visible Migration

The increase in birds from 22 to 26 April was very noticeable though no birds were actually seen to arrive. Birds were seen to leave the area in typical migratory flocks (calling, v formation) in a northerly direction and it appeared that with a change in wind direction from a northerly to a south-westerly there was an increase in birds calling. Birds were also seen to leave the mud flats in an easterly direction but as these were not seen to be ascending they were assumed to be going to roost on North Korean islands. The number and variety of passerines also increased over the period of the workshop.

Other Areas to be Explored.

Given that there were over 120,000 birds present on such a small area of mudflat, the numbers of birds found roosting on the ponds at high tide were very low. Three ponds with about 3,000 birds each were the maximum numbers counted and these consisted mainly of Bar-tailed Godwit. One other pond was found to have 1,000 waders, mostly godwits but included many Dunlin and Great Knot. Whimbrel appeared to make more use of the bunds dividing the ponds and curlew species roosted in deeper water. Some Grey Plover were mixed with other species roosting on bunds while others were found with godwits. When ponds were being flooded godwits were seen to swim to areas of mud above the water level rather than fly.

This leaves nearly 100,000 birds unaccounted for at high tide. Many flew towards North Korea and were therefore inaccessible. It was speculated that others flew into the Power Station grounds where it was thought that there were lagoons for ash disposal, which could provide suitable roosting conditions, but it was not possible to arrange access to this site. Given the unsuitability of many of the ponds because of the depth of water, a flexible approach to counting and catching birds in this area is needed unless the tide proves to be more predictable than it was during this workshop. Targeting species such as Eastern Curlew may prove difficult but other species appear to favour the same

Table 5. Count of waders observed at Yalu Jiang National Nature Reserve 22 – 30 April compared to 2 to 9 May counts (Barter *et al.* 2000)

Species	**April count this study**	**May count after Barter *et al*. 2000. Sectors D and E only**	**May count after Barter *et al.* 2000. Total reserve**	**Minimum numbers Watkins 1993.**	
				National	**Inter-national**
Bar-tailed Godwit	80,000	26,904	51,918	1,650	3,300
Whimbrel	1,000	50	286	100	400
Eastern Curlew	3,000	1,248	3,744	190	210
Eurasian Curlew	100	37	234		
Spotted Redshank	500	20	20		
Common Redshank*	100	6	162		
Marsh Sandpiper	few	0	0		
Common Greenshank	100	150	49	200	400
Nordmanns Greenshank	1	0	0		
Wood Sandpiper	few	0	490	60	600
Terek Sandpiper	few	52	153	180	360
Common Sandpiper	few	0	5	30	300
Green Sandpiper	2	0	0		
Ruddy Turnstone	10's	1	44	140	280
Great Knot	3,000	44,217	54,178	3,190	3,190
Red Knot	20	1,486	1,499	1,530	2,550
Dunlin	20,000	12,047	25,181		
Eurasian Oystercatcher	10's	3	70		
Pacific Golden Plover	17	0	147	90	900
Grey Plover	1,500	1,947	3,995	120	160
Little Ringed Plover	10's	0	0		
Kentish Plover	100	6	12		
Lesser Sand Plover	50	243	306	200	270
Greater Sand Plover	1	0	0	740	990

* A nest of this species was found containing four eggs.

pond for daytime and night-time high tide roosting so long as the water level remains the same. Given more time other areas of ponds could be explored. Also, the ash lagoons in the power station may prove to be a useful site if the lights of the area are not a problem.

DISCUSSION

Although the total number and species of waders seen in Yalu Jiang in late April were broadly similar to those seen in early May by Barter *et al.* 2000 (Table 5), the abundance of some species showed some considerable differences. The absence of small waders in the area has been noted before (Barter *et al.* 2002) and no Red-necked Stint, Curlew Sandpiper or Sharp-tailed Sandpiper were seen and very few Lesser Sand Plover. The number of Bar-tailed Godwit, 80,000, was greater than the total number observed by Barter *et al*. (2000) over the whole Yalu Jiang coastline (51,918), perhaps indicating that peak migration for this species is over by the first week in May. Thus Yalu Jiang holds at least eight times more Bar-tailed Godwit than any other site in the Yellow Sea that has been counted so far (*contra* Barter 2002). The number of Whimbrel, Spotted Redshank and Common Redshank counted was also greater than the count in May by Barter *et al*. (2000). Eastern Curlew and Dunlin numbers were higher in this study than those reported by Barter *et al.* (2000) for the same area but similar to the count of the total coastline reported by him. The number of Great Knot was well below that reported by Barter *et al*. (2000) for the same area, perhaps indicating that this species arrives at Yalu Jiang later than our count in late-April. The number of Grey Plover was similar in the two studies. The count for Whimbrel makes Yalu Jiang a new site of international importance for this species and one of the most important in the Yellow Sea area on northward migration (*contra* Barter 2002). Clearly it would be advantageous to count the area continuously from mid-April to mid-May.

Reclamation appears not to be a large problem in this area though it may have been in the past (Barter 2002).

It has been suggested that one of the main threats to shorebirds in this area is disturbance on ponds when the birds are roosting at high tide (Barter 2002). It appears that this is not a significant threat in this area as birds allowed a close approach by observers when looking for leg flags especially when they were roosting on or close to the middle of ponds. The main problem that shorebirds appear to have in this area is the changing situation within the ponds due to fluctuating water levels. The regime that governs the fluctuating water levels is complex and is not fully understood. It appears that at certain times of the year some ponds are drained and the invertebrate population is harvested, this includes shrimps as well as molluscs. When this has been achieved the ponds are allowed to remain fallow and are then flooded again at high spring tides presumably this brings in spat fall which is then grown on to another harvest. It is at the middle stage of the process that the ponds become suitable wader roost sites. Some species, notably Whimbrel and to a lesser extent Grey Plover, appear to prefer the bunds to roost on so would not be affected by variations in water levels.

Visible northward migration was noted in a few cases but this is less obvious than in other places such as Broome and Victoria in Australia (P.C. pers. obs). This is due to the lack of calling taking place in premigratory flocks and the variation in direction that flocks can, and apparently do, take when they leave the area. It would be interesting to monitor departing flocks and plot the direction and height that different species take to see if there is any correlation with species' breeding grounds.

The number of waders found on the ponds during this workshop was well below the number seen on the mudflats. As the tide rises large numbers of birds can be seen heading toward North Korea. Whether or not they arrive at roosts within North Korea is not known but there are many areas on the Chinese side that appear to be suitable. One of these is a large coal fired power plant. Ash lagoons are a well known roost site for waders throughout the world and it is hard to imagine that a relatively undisturbed site such as this would not be utilised.

One of the recurring problems when looking for flags on birds standing in water is the question as to whether a bird with one flag on the upper leg (tibia) has another on the lower leg (tarsus), or only one on the tibia. This matter was raised several times during the workshop, especially when two Bar-tailed Godwits were seen with blue flags on the tibia and the lower leg was underwater. It is part of the leg flagging protocol that, where a double leg flag combination is used, birds the size of Grey Plover and godwits and larger should be double flagged on the tibia. Any medium to large shorebird seen with a single leg flag on the upper leg should then be assumed to be carrying one flag. In the case of the two godwits referred to above, a single blue flag is not a recognised mark and it must be assumed that a second flag was on the tarsus and not visible. During the workshop Dunlin were double flagged on the upper leg and they appeared not to be inconvenienced. It is recommended that double leg flagging on the upper leg should be looked at for a wide range of species. Although it is doubtful whether very small species such as Red-necked Stint could be flagged in this way, Dunlin, Curlew Sandpiper and Sharp-tailed Sandpiper could be.

The need to change the previously agreed colour combination for the Yalu Jiang area resulted from a problem encountered in the use of white flags on the tarsus; the flags discoloured and became yellowish, thus potentially confusing observers. The cause of this discolouration is unknown.

During the closing ceremony it was announced that the area would become a no hunting area and that Yalu Jiang would become a banding station.

The most pleasing result from the workshop was the almost immediate sighting of Yalu Jiang flagged birds. A Bar-tailed Godwit was sighted in Alaska at the end of August 2002. At least one Bar-tailed Godwit was seen on southward migration in Queensland. Reports of several birds were reported in New Zealand. Even more surprising, perhaps, was the sighting of a Great Knot, one of only four flagged in New South Wales, on southward migration (AWSG unpublished data).

ACKNOWLEDGMENTS

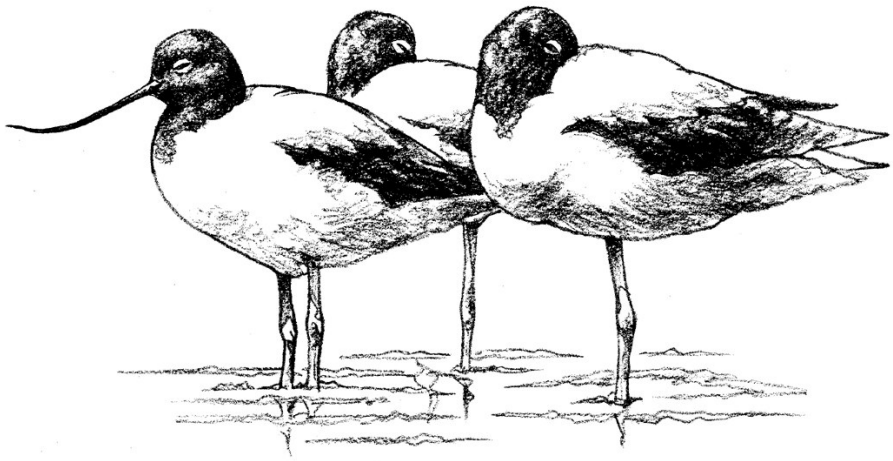
We thank the National Bird Banding Center of China for organising the workshop and covering the costs of Chinese and AWSG participants at Yalu Jiang. We also thank Environment Australia for the provision of funding to cover the cost of airfares to China and the purchase of leg-flag making equipment. We would like to thank Rosalind Jessop for the organisation of monies and flights at short notice and the organisation of various small but important constituents of the workshop and Doug Watkins and Chu Guozhong for the original idea. The supply of Darvic was undertaken by Rosalind Jessop, and several e-mails and phone calls were made to Queensland (Peter Driscoll) for green, Victoria (Malcolm Brown) for orange and yellow, and Tokyo (Kiyo Ozaki) for blue. Doris Graham organised the flag making equipment. Visual aids were supplied by Wetlands International Shorebird training modules. Mark Barter is thanked for information from his previous visits to the area. We would like to thank in particular the participants in the workshop for their enthusiasm especially in what to some of them was a completely alien environment - deep water and mud. It is not possible to thank everybody that made this workshop a success. This is due to the anonymity of the many local fishermen and businessmen who made us welcome and shared their local knowledge with us.

REFERENCES

Barter, M.A., Wilson, J.R., Li, Z.W., Dong, Z.G., Cao, Y.G. and Jiang, L.S. 2000. Yalu Jiang National Nature Reserve, north-eastern China – a newly discovered Internationally important Yellow Sea site for northward migrating shorebirds. The Stilt 37: 13 – 20.

Barter, M.A. 2002. Shorebirds of the Yellow Sea: Importance, threats and conservation status. Wetlands International Global Series 9, International Wader Studies 12, Canberra, Australia.

Watkins, D.W. 1993. A national plan for shorebird conservation in Australia. RAOU report No.90.



SIGHTINGS OF WADERS LEG FLAGGED IN SOUTH AUSTRALIA - REPORT NO. 2

LAUREN BEASLEY[1], CLIVE MINTON[1], ROSALIND JESSOP[2], PETER COLLINS, MAUREEN CHRISTIE, IAIN STEWART

[1]165 Dalgetty Road, Beaumaris, Vic 3193 Australia. mintons@ozemail.com.au; [2]Phillip Island Nature Park, PO Box 97, Cowes, Vic 3922, Australia

INTRODUCTION

This is the second list of sightings of leg-flagged birds from the south-east of South Australia, from Beachport to the Victorian border. It follows Minton *et al.* 2002. For Sanderling and Ruddy Turnstone only, an orange flag on the right tarsus was used until April 1999 to indicate a bird banded in South Australia. Since then, an orange over yellow flag on the right leg has been used for all species.

These flag sightings are published for the information and benefit of AWSG and VWSG members. It would be appreciated if records and data from this and similar compilations are not used without first obtaining permission from the AWSG or VWSG as appropriate. This is both to protect the interests of members, who have generated these flag sightings and will be using them in scientific papers, and to ensure that all data are checked for accuracy and completeness before being used.

RUDDY TURNSTONE, *Arenaria interpres*

TAIWAN

Date seen	No.	Location seen	Observer
13/05/01	1	Ta-chia river mouth, Taichung County	Mr. Tsai, Chung-Huang
22/08/02	1	HanBou (Hanpou), ChangHwa County	Chung-Yu Chiang, Yen-Fong Wu

NEW ZEALAND

31/12/00	1	Taramaire, Firth of Thames, South Auckland	Will Perry
11/02/01	1	Kaiaua, Firth of Thames, Auckland	Tony Habraken
18/05/01	1	Taramaire, Firth of Thames, South Auckland	David Williams
16/02/03	1	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham et al

Northern Territory **AUSTRALIA**

24/09/01	1	Darwin	Peter Hayman

Western Australia **AUSTRALIA**

18/09/01	1	Bush Point, south Roebuck Bay, near Broome	Peter Collins/Ken Gosbell et al
28/09/01	1	Broome Sewage Works	Adrian Boyle
2/09/02	1	Broome Sewage Works	Adrian Boyle
3/09/02	1	Broome Sewage Works	Adrian Boyle

Victoria **AUSTRALIA**

1/10/02	1	Port Fairy, Vic	Edward Woodward

The above sightings fit well with the previous established pattern for Ruddy Turnstones flagged in south-east South Australia (and Victoria). This includes migration through Taiwan, movements into New Zealand, migrants passing through northern Australia and an interchange with the populations in Victoria. These coastal movements within south-east Australia, however, are much less prevalent than in the Sanderling.

SANDERLING, *Calidris alba*

TAIWAN

22/08/02	1	HanPao, Changhua County	Chung-Yu Chiang and Yeng-Fong Wu

JAPAN

23/08/02	1	Takamatsu, Ishikawa Prefecture, Kahoku-Gun	Tadao Miura, Tomio Nakagawa
31/08/02	1	Takamatsu, Ishikawa Prefecture, Kahoku-Gun	Tadao Miura, Tomio Nakagawa

KOREA

29/08/01	1	Nak-dong Estuary	Nial Moores

Western Australia **AUSTRALIA**

9/09/98	1	80 Mile Beach	AWSG members
16/07/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle

New South Wales **AUSTRALIA**

Date seen	No.	Location seen	Observer
13/10/02	1	South Beach, Ballina	Bo Totterman

Northern Territory **AUSTRALIA**

22/09/02	1	Casuarina Beach, Darwin	Gavin O'Brien
13/07/03	1	Casuarina Beach, Darwin	Gavin and Meg O'Brien

Victoria **AUSTRALIA**

19/02/02	6	East of Killarney, near Port Fairy	Edward Woodward
20/02/02	7	West of Killarney, near Port Fairy	Edward Woodward
12/10/02	4	Livingstone Island Nature Walk, Nelson	Derek Carter
25/02/03	1	East end of Clonmel Island, Corner Inlet	Digger Jackson, Pete Collins and Peter Anton
28/02/03	1	East end of Clonmel Island, Corner Inlet	Digger Jackson, Pete Collins and Peter Anton
9/03/03	3	Between Killarney and Port Fairy	Laurie and Hazel Jones
25/03/03	5	Mills Reef or Reef Point, Port Fairy	Barbara Garrett
25/06/03	1	Between Waratah Bay and Shallow Inlet	M. Keenan, M. Hoskins, E. Thomas, J. Wilson

Sightings of leg-flagged birds in Japan, Taiwan and Korea are the norm for Sanderling flagged in south-east Australia. Migratory passage through north-west Australia, the Northern Territory and the east coast of Australia is also usual. The apparent "winter" movement of immature non-breeding Sanderling northwards to Broome and Darwin – mid July records – is less frequently documented.

The extensive list of sightings in Victoria is further confirmation of the quite significant mobility of this species along the coasts of south-east Australia.

RED-NECKED STINT, *Calidris ruficollis*

KOREA

26/05/02	1	Cheonsu Bay	Jin-Young Park

TAIWAN

20/05/03	1	Shin-Nan, ChuangWei, Ilan County	Mr. Hou, Yi-Luen

Victoria **AUSTRALIA**

19/08/02	1	Cheetham Saltworks Pt Cook Rd Laverton	Bernie McCarrick
1/10/02	1	Woodvale settling ponds NW of Bendigo	John and Pam Land
10/10/02	1	Werribee Sewage Farm	Maarten Hulzebusch
28/02/03	9	Port Fairy	Edward Woodward
22/05/03	1	Cheetham Saltworks Pt Cook Rd Laverton	Bernie McCarrick
26/06/03	1	South-east corner of Lake Corangamite	Barry Mousley

The above flag sightings all fit into the established pattern for Red-necked Stint movements overseas and within Australia.

CURLEW SANDPIPER, *Calidris ferruginea*

TAIWAN

14/04/03	1	Han-Pao, Changhua County	Chung-Yu Chiang

HONG KONG

24/04/03	1	Mai Po Marshes	Paul Leader, Geoff Carey, Mike Leven
25/04/03	1	Mai Po Marshes	Paul Leader
2/05/03	1	Mai Po Marshes	Paul Leader

Western Australia **AUSTRALIA**

15/06/02	1	Stilt Viewing, Roebuck Bay, Broome	Danny Rogers
28/07/02	1	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
3/09/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Dan Blunt
8/09/02	1	Serpentine River Reserve in Mandurah	Marcus Singor
9/09/02	1	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
11/11/02	1	Sandy Blowout, Roebuck Bay, Broome	Adrian Boyle, Chris Hassell
27/12/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
31/03/03	1	Roebuck Plains, 30km East of Broome	Jan van de Kam
30/06/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	AWSG Expedition members
22/07/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle

South Australia **AUSTRALIA**

Date seen	No.	Location seen	Observer
21/12/02	1	Port Prime, Adelaide	Colin Rogers
28/01/03	1	East side of Baird Bay (West Eyre Peninsula)	Colin Rogers, David Close

Victoria **AUSTRALIA**

12/06/02	1	Barry Beach, Corner Inlet	Peter Anton
18/10/02	1	Werribee Sewage Farm	Maarten Hulzebusch
26/01/03	1	Werribee Sewage Farm	Digger Jackson

The overseas sightings in Hong Kong and Taiwan are in the core migration area/time for northward movement through Asia.

Some of the sightings within Australia clearly relate to birds that have changed their non-breeding area from South Australia. The sightings in June/July each year at Roebuck Bay, Broome refer to immature first year birds that had crossed the continent to spend the Austral winter in warmer climes.

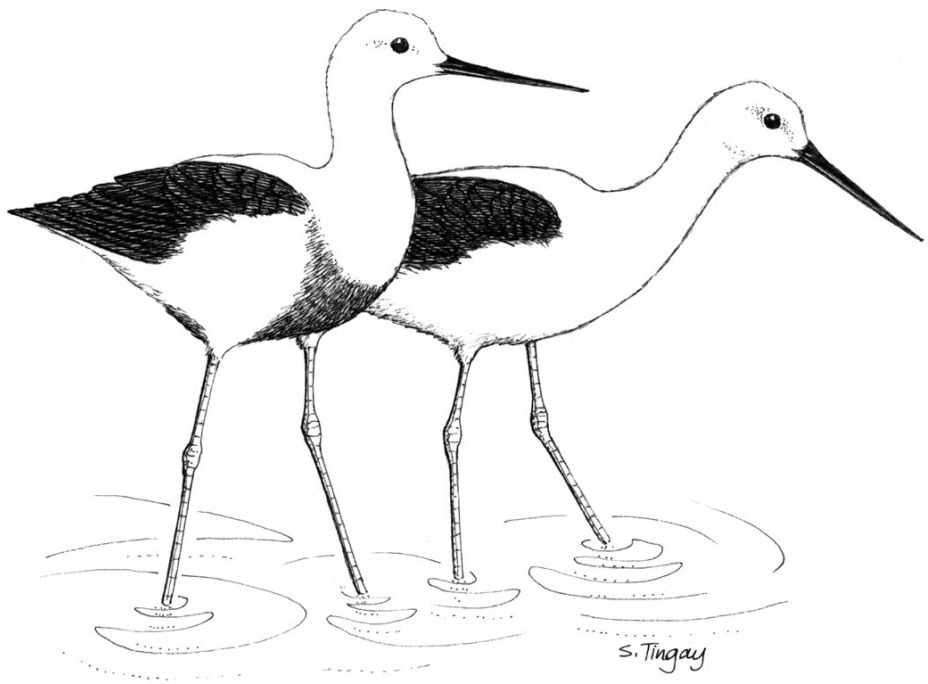
ACKNOWLEDGEMENTS

Victorian Wader Study Group (VWSG) members, Lauren Beasley and Julie Deleyev, have maintained the Leg Flag Database for the VWSG and the Australasian Wader Studies Group (AWSG) for the last year under a contract from Environment Australia (now the Department of Environment and Heritage) to the AWSG. Environment Australia are much thanked for this vital support which has enabled the database to be kept completely up to date, with reports to sighters and flaggers, and with rapid extraction of data whenever needed.

Thanks are due to all those people throughout the flyway who took the trouble to search for, record and submit leg flag sightings. Thanks are also due to the Australian Bird and Bat Banding Scheme for sightings reported through them.

REFERENCE

Minton, C., R. Jessop, P. Collins, J. Deleyev, and L. Beasley. 2002. Sightings of waders leg flagged in South Australia: Report No. 1. Stilt 42: 52-55.



SIGHTINGS IN 2003-04 OF WADERS LEG-FLAGGED IN SOUTH AUSTRALIA - REPORT NUMBER 3

CLIVE MINTON[1], ROZ JESSOP[2], PETER COLLINS, MAUREEN CHRISTIE, IAIN STEWART AND INKA VELTHEIM

[1]165 Dalgetty Road, Beaumaris, Vic 3193 Australia. mintons@ozemail.com.au; [2]Phillip Island Nature Park, PO Box 97, Cowes, Vic 3922 Australia

INTRODUCTION

This is the third list of flag sightings emanating from colour marking in the south-east of South Australia – between Beachport and the Victorian border. It follows Minton *et al.* 2002 and Beasley *et al*. 2004.

The use of an orange over yellow leg flag on the right leg for South Australia started in April 1999. Previously, an orange flag on the right tarsus was used - for Sanderling and Ruddy Turnstone only – to indicate a bird of South Australian origin.

These flag sightings are published for the information and benefit of AWSG and VWSG members. It would be appreciated if records and data from this and similar compilations are not used without first obtaining permission from the AWSG or VWSG as appropriate. This is both to protect the interests of members, who have generated these flag sightings and will be using them in scientific papers, and to ensure that all data are checked for accuracy and completeness before being used.

RUDDY TURNSTONE, *Arenaria interpres*

NEW ZEALAND

Date seen	No.	Location seen	Observer
1/11/2003	1	Kaitorete Spit, Lake Ellesmere, South Island	Colin Hill
11/12/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley

TAIWAN

6/05/2004	1	Han-Pao, Changhua County	Taiwan Wader Study Group

Western Australia **AUSTRALIA**

22/09/2003	1	Broome Sewage Works	Adrian Boyle
26/09/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Megan Underwood

Northern Territory **AUSTRALIA**

26/09/2003	1	Darwin	Bas Hensen
26/10/2003	1	Nightcliff Rocks, Darwin	Arthur and Sheryl Keates

It is interesting that there have been several previous sightings of flagged Ruddy Turnstones in New Zealand and this year has produced two more. However the one at Lake Ellesmere is thought to be the first to South Island. Taiwan is the most regular location in Asia where flagged Turnstones are seen on migration.

The sightings in Broome and Darwin are probably birds on southward migration back to South Australia.

SANDERLING, *Calidris alba*

RUSSIA

22/07/2003	1	Astokh Bay, NE Sakhalin	Andrej Blokhin

Northern Territory **AUSTRALIA**

1/09/2002	1	Darwin	Bas Hensen

South Australia **AUSTRALIA**

4/01/2004	1	Yanerbie beachfront, Sceale Bay, Eyre Peninsula	Julian Reid
13/01/2004	2	Murray River Mouth, Coorong	Margaret and David Dadd

Victoria **AUSTRALIA**

30/11/2002	3	Glenelg River	Ian Faithfull
26/07/2003	1	near the Cutting, bn Warrnambool and Port Fairy	Ray Schulz
17/01/2004	1	Queenscliff	VWSG Members
31/01/2004	7	Port Fairy	Adrian Boyle and Rob Berry
7/03/2004	1	Sandy Point, near Wilson's Promontory	Birgita Hansen
10/03/2004	1	Breamlea, between Torquay and Barwon Heads	Peter Fuller
20/03/2004	1	Sandy Point, near Wilson's Promontory	Inka Veltheim and Birgita Hansen

Western Australia **AUSTRALIA**

Date seen	No.	Location seen	Observer
16/09/2003	1	Coconut Wells near Broome	Adrian Boyle
22/09/2003	1	Broome Port	Megan Underwood and Inka Veltheim
2/10/2003	1	Eyre Bird Observatory	Bea Myers and Ian Tarbin Eyre Bird Observatory

It is nice to get another Sanderling report from eastern Siberia.

Sightings listed from various places in Australia relate either to birds on southward migration through Broome and Darwin or to birds that have changed their non-breeding area to other locations in South Australia or to Victoria. The Sanderling is much less faithful to a particular non-breeding location than most other migratory waders and birds move regularly between different parts of the coast of south-east Australia.

RED-NECKED STINT, C*alidris ruficollis*

HONG KONG

19/05/2004	1	Mai Po Marshes	Mike Leven
22/05/2004	1	Mai Po Marshes	John Holme
9/06/2004	1	Mai Po Marshes	Yu Yat-Tung

INDONESIA

2/05/2004	1	Wonorejo Wetlands, Surabaya	Iwan Londo and Y Peksa

South Australia **AUSTRALIA**

23/01/2004	1	Murray River Mouth, Coorong	Dean Cutten

Tasmania **AUSTRALIA**

27/09/2003	1	Cape Portland	Ralph Cooper

Victoria **AUSTRALIA**

4/09/2003	2	Cheetham Saltworks Pt Cook Rd Laverton	Bernie McCarrick
23/10/2003	1	Werribee Sewage Farm	Lauren Beasley
22/11/2003	1	Reef Island, Western Port	Peter Dann, Moraig Mackay, Pete Collins
25/11/2003	1	Sandy Point, near Wilson's Promontory	Pete Collins et al.
22/01/2004	1	Borrow Pit Lagoon, WTP, Werribee	Digger Jackson and Lauren Beasley
2/03/2004	2	Killarney Beach	Barbara Garrett
2/04/2004	1	West Head, Flinders	Pete Collins

Western Australia **AUSTRALIA**

21/03/2004	1	Lake Yangebup, Perth	Clive and Wendy Napier
12/04/2004	2	Eyre Bird Observatory	Frank O' Connor

Flag sightings in Indonesia are not common and therefore it was particularly pleasing to have one reported from there on northward migration in early May. The movement through Hong Kong, mainly in May and even early June, is consistent with sightings of Red-necked Stints flagged in Victoria.

Most of the sightings reported in Australia seem to relate to birds that have changed their non-breeding area. Most interchange takes place with Red-necked Stints to or from Victoria.

CURLEW SANDPIPER, *Calidris ferruginea*

HONG KONG

2/04/2003	1	Mai Po Marshes	Richard Lewthwaite
17/04/2003	1	Mai Po Marshes	Yu Yat-Tung
3/05/2003	1	Mai Po Marshes	John Allcock
8/05/2003	1	Mai Po Marshes	Yu Yat-Tung
22/04/2004	1	Mai Po Marshes	Yu Yat-Tung
23/04/2004	1	Mai Po Marshes	Tam Yiu-leung
24/04/2004	2	Mai Po Marshes	Tam Yiu-leung

Victoria **AUSTRALIA**

18/03/2004	1	Little River Mouth, Werribee Sewerage Farm	Digger Jackson

Western Australia **AUSTRALIA**

14/08/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Megan Underwood
6/03/2004	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle

Hong Kong is a favourite stopover area of Curlew Sandpipers from south-eastern Australia. Not many continue up the Chinese coast to the Yellow Sea area. All eight overseas sightings of South Australian flagged Curlew Sandpipers in the last two years were in Hong Kong.

The bird seen at Broome on the 14 August was in non-breeding plumage and was almost certainly an immature which had moved to north-west Australia for its first austral winter. The bird in Broome on the 6 March could have been an early northward migrant as some individuals leave southern Australia from the very beginning of March each year.

ACKNOWLEDGEMENTS

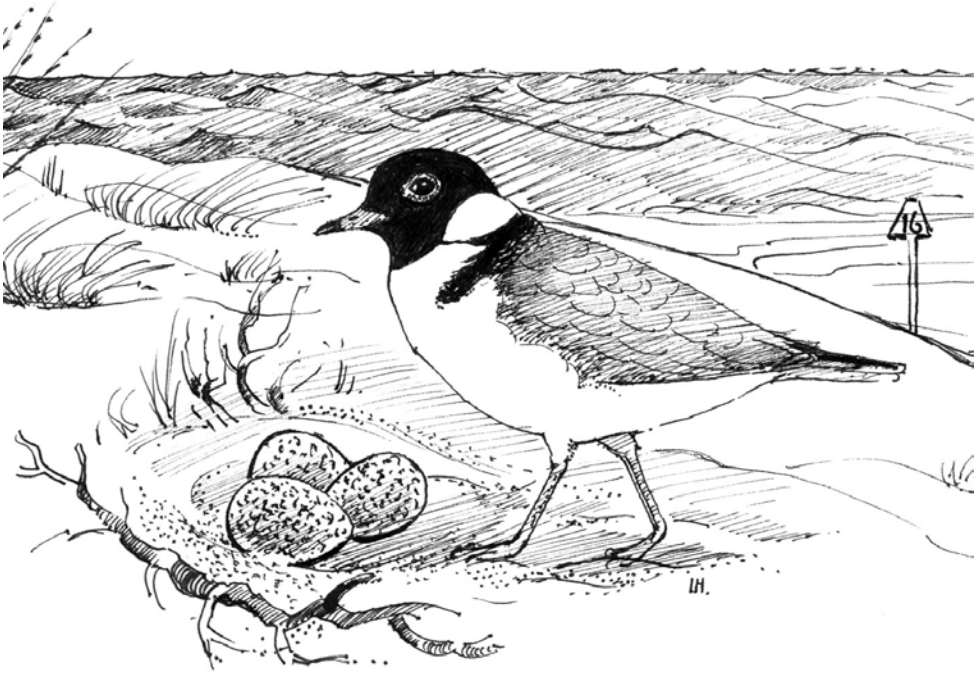
Victorian Wader Study Group (VWSG) members, Lauren Beasley and Inka Veltheim, have maintained the Leg Flag Database for the VWSG and the Australasian Wader Studies Group (AWSG) for the last year under a contract from Environment Australia (now Department of Environment and Heritage) to the AWSG. Environment Australia are much thanked for this vital support which has enabled the database to be kept completely up to date, with reports to sighters and flaggers, and with rapid extraction of data whenever needed.

Thanks are due to all those people throughout the flyway who took the trouble to search for, record and submit leg flag sightings. Thanks are also due to the Australian Bird and Bat Banding Scheme for sightings reported through them.

REFERENCES

Beasley, L., C. Minton, R. Jessop, P. Collins, M. Christie, and I. Stewart. 2004. Sightings of waders leg flagged in South Australia: Report No. 2. The Stilt 46: 47-49.

Minton, C., R. Jessop, P. Collins, J. Deleyev and L. Beasley, L. 2002. Sightings of waders leg flagged in South Australia: Report No. 1. The Stilt 42: 52-55.



SIGHTINGS OF WADERS LEG-FLAGGED IN VICTORIA: REPORT NUMBER 10

LAUREN BEASLEY[1], CLIVE MINTON[1], ROZ JESSOP[2], AND PETER COLLINS[3]

[1]165 Dalgetty Road, Beaumaris, Vic 3193 Australia. mintons@ozemail.com.au; [2]Phillip Island Nature Park, PO Box 97, Cowes, Vic 3922 Australia; [3]RMB 4009, Cowes. Vic 3922. Australia

INTRODUCTION

A large number of sightings of waders leg flagged in Victoria were received during 2002/03. Details of all sightings away from their original flagging area are given below. Comments on the significance of these sightings are given under each species.

The total number of waders leg flagged in Victoria had risen to 56,648 by the end of December 2002. The addition of the flagging process to normal marking with metal bands, commenced in Victoria in December 1990, has proved extremely beneficial with overseas flag sighting reporting rates being up to 20 times those of overseas recovery rates for most species.

This report follows Minton *et al.* (2002). It mainly covers flag sightings received in the second half of 2002 and up to the start of August 2003. However as some overseas countries collect flag sightings together and only send us them in batches periodically (e.g. Japan, Korea and the northward migration in 2003 in Hong Kong), there are some gaps in the data for the past year.

These flag sightings are published for the information and benefit of AWSG/VWSG members. It would be appreciated if records and data from this and similar compilations are not used without first obtaining permission from the AWSG/VWSG. This is both to protect the interests of AWSG/VWSG members, who have generated these flag sightings and will be using them in scientific papers, and to ensure that all data are checked for accuracy and completeness before being used.

BAR-TAILED GODWIT, *Limosa lapponica*

USA

Date seen	No.	Location seen	Observer
25/05/02	1	St. Paul, Pribilof Islands, Alaska	Rick Knight
17-25/08/02	13	Tutakoke River, central Yukon-Kuskokwim Delta, Alaska	Dan Ruthrauff, Marin Sardy
18/08/02 to 14/09/02	8	Tern Mountain, Village of Chefornak, Yukon Delta, Alaska	Chadd Fitzpatrick, Melanie Spies, Marin Sardy

KOREA

14/04/02	1	Song Do, Incheon	Nial Moores
9/05/03	1	Nak-dong Estuary	Wetlands and Birds Korea
11-12/05/03	1	Mokpo city in south-west Korea	Jeong-sik Lee
11/05/03	1	Geum River Estuary, Chungham Province	Bjorn Johansson

NEW ZEALAND

3/07/01	1	Miranda, Firth of Thames, South Auckland	N. Dillon
17/09/01	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
16/06/02	1	Clark's Bay, Manukau Harbour, South Auckland	Will Perry et al
7/09/02	1	Clark's Bay, Manukau Harbour, South Auckland	Tony Habraken
14/09/02	1	Miranda, Firth of Thames, South Auckland	Tony Habraken
23/09/02	1	Walker Island, Rangaunu Harbour, Far North	Gillian Vaughan, Tony Habraken
28/09/02	2	Karaka, Manukau Harbour, South Auckland	David Lawrie, Tony Habraken
29/09/02	1	Manawatu Estuary, Manawatu, North Island	Gillian Vaughan, Sue MacIntosh
6/10/02	2	Big Sand Island, Kaipara Harbour, North Island	Gwen Pulham
9/10/02	1	Opoutere on the Coromandel	Nigel Milius
11/10/02	1	Foxton Spit, near Wanganui, North Island	Brian Hardin, Enfys Graham, Rosemary Heather
12/10/02	1	Opoutere on the Coromandel	Ted Wnorowski
13/10/02	1	Miranda, Firth of Thames, South Auckland	Tony Habraken, David Lawrie et al
13/10/02	1	Colville, Coromandel	Ted Wnorowski
14/10/02	1	Miranda, Firth of Thames, South Auckland	Bruce Keeley
16/10/02	1	Washdyke Lagoon, Timaru, Canterbury, South Island	Alan Collins
23/10/02	1	Mangawai Wildlife Refuge, near Whangarei	Katrina Hansen
25/10/02	1	Miranda, Firth of Thames, South Auckland	Tony Habraken
28/10/02	1	Miranda, Firth of Thames, South Auckland	Tony Habraken
3/11/02	1	Bells Is, Waimea Inlet, near Nelson	Willie Cook
3/11/02	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
5/11/02	1	Nelson Haven, South Island	Peter Field
9/11/02	1	Motueka Sandspit, near Nelson	Steve Wood

Date seen	No.	Location seen	Observer
10/11/02	3	Thames, Firth of Thames	Tony Habraken
20/11/02	1	Mangere Sewerage Ponds, Manukau Harbour	R. Clough
24/11/02	1	Clark's Bay, Manukau Harbour, South Auckland	Gwen Pulham et al
5/12/02	1	Thames, Firth of Thames	Tony Habraken
7/12/02	1	Manawatu Estuary, Manawatu, North Island	Sav Saville
14/12/02	2	Thames, Firth of Thames	Tony Habraken
21/12/02	1	Manawatu Estuary, Manawatu, North Island	Sav Saville
2/01/03	1	Manawatu Estuary, Manawatu, North Island	Sav Saville
4/01/03	1	Miranda, Firth of Thames, South Auckland	Betty Seddon
6/01/03	1	Papakanui Spit, Kaipara Harbour, Auckland	Gwen Pulham, Bryce Lummis
12/01/03	1	Waihou River, Thames, Firth of Thames	David Lawrie, Tony Habraken
16/01/03	3	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
17/01/03	1	Manawatu Estuary, Manawatu, North Island	Sav Saville
19/01/03	1	Avon-Heathcote Estuary, Christchurch	Andrew Crossland
20/01/03	1	Big Sand Island, Kaipara Harbour, North Island	Gwen Pulham
7/02/03	1	Miranda, Firth of Thames, South Auckland	Nigel Milius
19/02/03	1	Manawatu Estuary, Manawatu, North Island	Brent Stephenson
22/02/03	1	Walker Island, Kaipara Harbour	Gwen Pulham, Gordon Gorbey, Darryl Jeffries
1/03/03	1	Clifton Bay, Auckland	Ted Wnorowski
19/03/03	2	Rangitoto Point, Raglan Harbour, Waikato	Nigel Milius
23/03/03	1	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
3/05/03	1	Karaka, Manukau Harbour, South Auckland	Gillian Vaughan et al.
4/05/03	1	Tapora Wildlife Refuge, South Kaipara Harbour	Gillian Vaughan et al.
18/05/03	1	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
15/06/03	1	Karaka, Manukau Harbour, South Auckland	David Lawrie

Western Australia **AUSTRALIA**

11/06/02	1	Stilt Viewing, Roebuck Bay, Broome	Kerry Davenport
21/05/03	1	Wader Spit, Roebuck Bay, Broome	Adrian Boyle
29/05/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Jonny Schoenjahn
7/07/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Megan Underwood
15/07/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Megan Underwood

Queensland **AUSTRALIA**

22/06/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates
1/09/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates, David Edwards
8/09/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates
10/09/02	1	Lytton High Tide Roost, Moreton Bay	Dawn Beck, Chris Bollar
13/09/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates, David Edwards
21/09/02	1	Lytton High Tide Roost, Moreton Bay	Arthur Keates
25/09/02	1	Toorbul, near Bribie Island	Gavin Goodyear
28/09/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates, David Edwards
4/10/02	1	Toorbul, near Bribie Island	E. Townsend
5/10/02	1	Toorbul, near Bribie Island	Jill Dening
6/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates, Dawn Beck
12/10/02	1	South Esplanade, Deception Bay	Phil Cross
13/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates, David Edwards
15/10/02	1	Toorbul, near Bribie Island	Dennis Stanbridge
19/10/02	1	Lytton High Tide Roost, Moreton Bay	Harry Briggs
20/10/02	1	Lytton High Tide Roost, Moreton Bay	Bobbie Bevan
20/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates, David Edwards
26/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates, David Connolly
2/11/02	1	Manly Boat Harbour, Moreton Bay	David Milton, Sandra Harding, Arthur Keates
19/11/02	1	Catalina Boat Ramp, Bowen, NQ	Phil and Linda Cross, Jon Wren
5/12/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates

New South Wales **AUSTRALIA**

21/09/02	1	Kooragang Nature Reserve, Hunter River	Hunter Bird Observers Club
27/09/02	2	Nambucca Heads	John Seale, Craig Cassady
11/10/02	2	Kooragang Island, Stockton Bridge	Chris Doughty

It has been a fantastic year for Bar-tailed Godwit flag sightings. Pride of place must go to 22 further reports from Alaska – the now strongly confirmed breeding location of Bar-tailed Godwits that visit eastern Australia and New Zealand. The sightings in Korea would have been of birds on their northward migration, where the route is through China and Korea

before an over-sea flight to Alaska. The return route is now known to be direct across the Pacific, from southwest Alaska to the coasts of Australia and New Zealand – an incredible 10,000 km non-stop flight which would take 7 or 8 days to complete.

The amazing number of flag sightings in New Zealand further confirms that, like the Red Knot, there is a considerable interchange between the populations in eastern Australia and New Zealand. This record number of New Zealand sightings is partly a consequence of the VWSG's success in catching Bar-tailed Godwits over the last few years but is also a reflection of the enthusiastic and skilled army of wader watchers in New Zealand.

The number of individual Bar-tailed Godwits flagged in Victoria and seen elsewhere in Australia is relatively few. Many of the sightings in the list above clearly refer to individual birds that remained in well-watched areas, such as Moreton Bay in Queensland and Broome in north-west Australia, for a significant period. At least one bird appears to have permanently changed its "home" to Moreton Bay. The Broome records probably relate to an immature individual that went north for its "winter holidays".

EASTERN CURLEW, ***Numenius madagascariensis***

JAPAN

Date seen	No.	Location seen	Observer
14, 19, 23/03/03	1	Sone Estuary and Tidal Flat, Kitakyushu, Fukuoke	Mr. Takeshita et al.

TAIWAN

9/03/03	1	Kao-Mei, Taichung County	Mr. Pan, Chih-Yuan

Queensland **AUSTRALIA**

11/08/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates
25/04/03	1	Mathieson Homestead, Hervey Bay	John Knight, Sally Sheldon

New South Wales **AUSTRALIA**

23/08/02	1	Fingal, Tweed River	Terry Dillon

Only five records, but two add valuable information, especially on the timing of northward migration back to the breeding grounds in south-eastern Siberia.

The bird seen in Taiwan on 9 March, of which some excellent photographs were provided, had two shiny new orange leg flags (we put one flag on each tibia on Eastern Curlew for maximum visibility). It was almost certainly one of 36 Eastern Curlews caught and leg flagged in Corner Inlet on 27 December – only 11 days earlier. Since the flying time for this 7,000 km non-stop journey would have been at least 5 days the bird must have left Corner Inlet less than a week after it was caught. March 9 is the earliest date on which any wader banded or flagged in Australia has been reported in Asia on the northward migration.

TEREK SANDPIPER, ***Xenus cinerius***

KOREA

23/08/02	1	Okku, Mangyeung	Nial Moores
9/09/02	1	Okku, Mangyeung	Nial Moores

These are only the fourth and fifth sightings of Victorian flagged Terek Sandpipers. There has been one sighting previously in Korea. Three of the five sightings refer to birds on southward migration, for which flag reports are scarce. This and count data indicate that Terek Sandpipers particularly favour the shores of South Korea as a stopover site during their southward migration.

RUDDY TURNSTONE, ***Arenaria interpres***

KOREA

27/08/02	2	Dongjin Estuary	Jin-Young Park

TAIWAN

1/05/03	1	Han-Pao, Changhua County	Chung-Yu Chiang, Yan-feng Wu
6/05/03	1	Han-Pao, Changhua County	Chung-Yu Chiang
14/05/03	1	Han-Pao, Changhua County	Chung-Yu Chiang

NEW ZEALAND

26/12/02	1	Kaikoura, South Island	Nick Allen

South Australia **AUSTRALIA**

22/06/02	1	Cape Banks Lighthouse, Carpenters Rocks	Maureen Christie
10/03/03	1	Danger Pt, Brown Bay, near Port Macdonnell	Matthew Dwyer

Western Australia **AUSTRALIA**

Date seen	No.	Location seen	Observer
16/07/03	1	Beaches, Crab Creek Rd, Roebuck Bay, Broome	Adrian Boyle

New South Wales **AUSTRALIA**

3/10/02	1	Lord Howe Island	Betty Seddon

The Korean sighting is the first Victorian flagged Ruddy Turnstone seen in that country. There have been quite a number of previous sightings indicating that Taiwan is an important stopover location for this species and that birds on their way to non-breeding areas in New Zealand may pass through Victoria en route.

The flag sighting in Lord Howe Island is a little puzzling. It could be a bird that was in the process of making a long transpacific migration from Alaskan breeding grounds. Some Alaskan Turnstones have long been thought to come to eastern Australia, but there has been no direct evidence of this during the last 25 years of banding.

Some interchange between the Ruddy Turnstones spending their non-breeding season on the coasts of Victoria and the south-east of South Australia does occur, and two further examples are listed above. The bird seen at Broome in mid July however is most likely another example of an immature bird taking its winter holidays in north-west Australia.

GREAT KNOT, *Calidris tenuirostris*

KOREA

23/08/02	1	Okku, Mangyeung	Nial Moores
9/09/02	1	Okku, Mangyeung	Nial Moores

TAIWAN

13/04/03	1	Han-Pao, Changhua County	Yan-feng Wu

Queensland **AUSTRALIA**

8/09/02	1	Toorbul, near Bribie Island	Phil and Linda Cross
12/09/02	1	Caloundra Sandbanks	Jill Dening
22/09/02	1	Toorbul, near Bribie Island	Linda Cross et al
4/10/02	1	Toorbul, near Bribie Island	E. Townsend
5/10/02	1	Toorbul, near Bribie Island	Jill Dening
15/10/02	1	Toorbul, near Bribie Island	Dennis Stanbridge
22/10/02	1	Toorbul, near Bribie Island	Dennis Stanbridge
25/10/02	1	Toorbul, near Bribie Island	Gavin Goodyear
27/10/02	1	Toorbul, near Bribie Island	Arthur Keates et al.
29/10/02	1	Toorbul, near Bribie Island	Dennis Stanbridge
4/11/02	1	Artificial roost on Bribie Island	Jill Dening
8/11/02	1	Toorbul, 1km north of high tide roost	Dennis Stanbridge
24/12/02	1	Toorbul, near Bribie Island	Dez Wells
5/01/03	1	Kakadu Beach, Bribie Island	Esther Townsend
8/01/03	2	Toorbul Sandfly Bay roost	Dennis Stanbridge
9/01/03	1	Toorbul, 1km north of high tide roost	Dennis Stanbridge
11/01/03	1	Toorbul, 1km north of high tide roost	Dennis Stanbridge
13/01/03	1	Toorbul, near Bribie Island	Dennis Stanbridge
21/01/03	1	Toorbul, near Bribie Island	Dennis Stanbridge
23/01/03	1	Toorbul, near Bribie Island	Dennis Stanbridge
25/01/03	1	Toorbul, near Bribie Island	Dennis Stanbridge
6/03/03	1	Kakadu Beach, Bribie Island	Ivan Fien
23/03/03	1	Toorbul, near Bribie Island	QWSG Committee and Members on Wader ID Day
5/04/03	1	Toorbul, near Bribie Island	Dez Wells

New South Wales **AUSTRALIA**

21/09/02	1	Kooragang Dykes, near Stockton, Newcastle	Hunter Bird Observers Club

Korea and Taiwan are both areas where leg flag sightings of Great Knot from Victoria have previously been reported. Note that the Korean sightings are both birds on southward migration. Many Great Knot are thought to use a take off point further north than Korea, on the southern shores of the Sea of Okhotsk in eastern Siberia for a direct 7,000 km non-stop flight to the northern coast of Australia.

At least one individual appears to have changed its non-breeding area from Victoria to near Bribie Island in south-east Queensland.

RED KNOT, *Calidris canutus*

TAIWAN

Date seen	No.	Location seen	Observer
15/04/03	1	Hsia-Pu, Ilan County	Mr. Lin, Fang-Tse
21/04/03	1	Han-Pao, Changhua County	Chung-Yu Chiang, Hsin-de Yaung

NEW ZEALAND

17/09/01	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
29/09/01	2	Miranda, Firth of Thames, South Auckland	T. Piersma, P. Battley and A. Riegen
30/09/01	3	Miranda, Firth of Thames, South Auckland	Will Perry
15/10/01	3	Miranda, Firth of Thames, South Auckland	Keith Woodley
24/10/01	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
3/11/01	1	Miranda, Firth of Thames, South Auckland	T. Wilson
19/11/01	1	Miranda, Firth of Thames, South Auckland	D. Price
26/11/01	1	Miranda, Firth of Thames, South Auckland	S. & J. Rowe
16/12/01	1	Miranda, Firth of Thames, South Auckland	Simon Fordham
28/01/02	7	Walker Island, Kaipara Harbour	Tony Habraken
4/02/02	1	Miranda, Firth of Thames, South Auckland	Bev Woolley
20/02/02	4	Miranda, Firth of Thames, South Auckland	T. Barnard
23/03/02	3	Miranda, Firth of Thames, South Auckland	Betty Seddon
24/03/02	1	Miranda, Firth of Thames, South Auckland	Betty Seddon
31/03/02	1	Bay Flat, Farewell Spit, South Island	Peter Field
2/04/02	1	Miranda, Firth of Thames, South Auckland	B. Keeley
13/04/02	1	Miranda, Firth of Thames, South Auckland	Will Perry
4/05/02	1	Miranda, Firth of Thames, South Auckland	N. Milius and M. Day
16/05/02	3	Miranda, Firth of Thames, South Auckland	J. King and C. Whiddett
27/07/02	6	Karaka, Manukau Harbour, South Auckland	Tony Habraken
10/08/02	10	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
15/08/02	1	Mangere Sewerage Ponds, Manukau Harbour	Tony Habraken
24/08/02	8	Taramaire, Firth of Thames, South Auckland	Tony Habraken
7/09/02	4	Karaka, Manukau Harbour, South Auckland	Adrian Riegen
14/09/02	3	Miranda, Firth of Thames, South Auckland	Tony Habraken
21/09/02	1	Parengarenga Harbour, Far North Cape	Gillian Vaughan and Tony Habraken
23/09/02	3	Walker Island, Rangaunu Harbour, Far North	Gillian Vaughan and Tony Habraken
28/09/02	1	Papakanui Spit, Kaipara Harbour, Auckland	Gwen Pulham
28/09/02	5	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
29/09/02	1	Manawatu Estuary, Manawatu, North Island	Gillian Vaughan and Sue MacIntosh
6/10/02	4	Farewell Spit, Gobi, near Nelson, South Island	Rob Schuckard and David Melville
12/10/02	1	Lake Ellesmere, Canturbury, South Island	Colin Hill
13/10/02	11	Miranda, Firth of Thames, South Auckland	Tony Habraken, David Lawrie et al
14/10/02	1	Miranda, Firth of Thames, South Auckland	Bruce Keeley
15/10/02	2	Lake Ellesmere, Canturbury, South Island	Colin Hill, Jan Walker and Professor Chu
25/10/02	11	Miranda, Firth of Thames, South Auckland	Tony Habraken
27/10/02	2	Lake Ellesmere, Canturbury, South Island	Steve Wrattens
28/10/02	12	Miranda, Firth of Thames, South Auckland	Tony Habraken
28/10/02	2	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
1/11/02	1	Avon-Heathcote Estuary, Christchurch	Jan Walker
2/11/02	3	Shellbanks, Miranda	Tony Wilson
3/11/02	1	Bells Is, Waimea Inlet, near Nelson	Willie Cook
3/11/02	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
3/11/02	1	Karaka, Manukau Harbour, South Auckland	Tony Habraken
9/11/02	1	Mangawhai Spit, North Auckland	Gwen Pulham, Tony Moore, Gordon Gorbey
9/11/02	2	Motueka Sandspit, near Nelson	Steve Wood
9/11/02	2	Manawatu Estuary, Manawatu, North Island	Ian Saville
10/11/02	15	Thames, Firth of Thames	Tony Habraken
10/11/02	3	Shellbanks, Miranda	David Lawrie
10/11/02	3	Kaiaua, Firth of Thames, Auckland	Gwen Pulham
17/11/02	3	Mangere Sewerage Ponds, Manukau Harbour	G. Pulham and T. Wnorowski
23/11/02	2	Tapora Wildlife Refuge, South Kaipara Harbour	Elliane Lagnez et al.
23/11/02	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
24/11/02	3	Karaka, Manukau Harbour, South Auckland	Tony Habraken et al.
24/11/02	2	Seagrove, Manukau Harbour, South Auckland	G. Vaughan and N. Dyson
1/12/02	1	Waipu Estuary, Northland	Gwen Pulham and Ted Wnorowski
5/12/02	3	Thames, Firth of Thames	Tony Habraken
7/12/02	1	Maketu Bay of Plenty, North Island	Tim Barnard
7/12/02	2	Manawatu Estuary, Manawatu, North Island	Sav Saville
7/12/02	7	Miranda, Firth of Thames, South Auckland	Keith Woodley

Date seen	No.	Location seen	Observer
14/12/02	9	Thames, Firth of Thames	Tony Habraken
15/12/02	1	Papakanui Spit, Kaipara Harbour, Auckland	Gwen Pulham and Ted Wnorowski
18/12/02	1	Lake Wainono, South Island	Alan Collins
21/12/02	2	Manawatu Estuary, Manawatu, North Island	Sav Saville
22/12/02	1	Walker Island, Kaipara Harbour	Gwen Pulham and Ted Wnorowski
24/12/02	3	Manawatu Estuary, Manawatu, North Island	Sav Saville
24/12/02	5	Motueka Sandspit, near Nelson	Colin Miskelly
26/12/02	6	Clark's Bay, Manukau Harbour, South Auckland	T. Habraken and D. Lawrie
28/12/02	6	Waihou River, Thames, Firth of Thames	T. Habraken and D. Lawrie
28/12/02	2	Miranda, Firth of Thames, South Auckland	Will Perry
2/01/03	3	Manawatu Estuary, Manawatu, North Island	Sav Saville
4/01/03	5	Miranda, Firth of Thames, South Auckland	Betty Seddon
12/01/03	3	Waihou River, Thames, Firth of Thames	David Lawrie, Tony Habraken
12/01/03	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
12/01/03	2	Rangaunu Harbour, Far North, North Island	Tony Wilson
16/01/03	6	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
17/01/03	3	Manawatu Estuary, Manawatu, North Island	Sav Saville
26/01/03	2	Miranda, Firth of Thames, South Auckland	David Lawrie
27/01/03	1	Maketu Bay of Plenty, North Island	Tim Barnard
27 & 29/01/03	1	Maketu Bay of Plenty, North Island	Tim Barnard
29/01/03	1	Waipu Estuary, Northland	Mike Hazel
30/01/03	1	Lake Ellesmere, Canturbury, South Island	Sheila Petch
3/02/03	4	Miranda, Firth of Thames, South Auckland	Tony Wilson
6/02/03	2	Maketu Bay of Plenty, North Island	Tim Barnard
7/02/03	1	Miranda, Firth of Thames, South Auckland	Nigel Milius
8/02/03	3	Miranda, Firth of Thames, South Auckland	Will Perry
16/02/03	7	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham et al
19/02/03	2	Manawatu Estuary, Manawatu, North Island	Brent Stephenson
20/02/03	1	Motueka Sandspit, near Nelson	Steve Wood
22/02/03	6	Walker Island, Kaipara Harbour	Gwen Pulham, Gordon Gorbey, Darryl Jeffries
23/02/03	5	Mataitai Bay, near Auckland	Tony Habraken
28/02/03	3	Maketu Bay of Plenty, North Island	Tim Barnard
1/03/03	9	Miranda, Firth of Thames, South Auckland	Ted Wnorowski
2/03/03	2	Karaka, Manukau Harbour, South Auckland	Adrian Riegen et al
8/03/03	1	Batley, Kaipara Harbour	Gwen Pulham, Darryl Jefferies, Ted Wnorowski
12/03/03	4	Clifton Bay, Auckland	Tony Habraken
20/03/03	20	Farewell Spit, Gobi, near Nelson, South Island	David Melville
21/03/03	4	Farewell Spit, Gobi, near Nelson, South Island	David Melville
22/03/03	4	Farewell Spit, Gobi, near Nelson, South Island	David Melville
23/03/03	2	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
23/03/03	2	Manawatu Estuary, Manawatu, North Island	Sav Saville
23/03/03	5	Farewell Spit, Gobi, near Nelson, South Island	David Melville
23/03/03	2	Clark's Bay, Manukau Harbour, South Auckland	Gillian Vaughan
23/03/03	4	Kirk's, Manukau Harbour, South Auckland	Gillian Vaughan
24/03/03	4	Farewell Spit, Gobi, near Nelson, South Island	David Melville
25/03/03	1	Foxton Estuary, Nth Island	Rosemary Heather
19/04/03	25	Big Sand Island, Kaipara Harbour, North Island	Gwen Pulham
20/04/03	8	Karaka, Manukau Harbour, South Auckland	David Lawrie, Gilian Vaughan et al.
27/04/03	15	Karaka, Manukau Harbour, South Auckland	Tony Habraken
3/05/03	3	Karaka, Manukau Harbour, South Auckland	Gillian Vaughan et al.
4/05/03	11	Tapora Wildlife Refuge, South Kaipara Harbour	Gillian Vaughan et al.
16/05/03	2	Tapora Wildlife Refuge, South Kaipara Harbour	G. Pulham, S. Chamberlin
18/05/03	4	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
18/05/03	2	Clark's Bay, Manukau Harbour, South Auckland	Gillian Vaughan, Ian Southey and Jan Butcher
1/06/03	12	Karaka, Manukau Harbour, South Auckland	Tony Habraken, Gillian Vaughan, Ian Southey
20/07/03	4	Karaka, Manukau Harbour, South Auckland	David Lawrie, Tony Habraken
2/08/03	22	Karaka, Manukau Harbour, South Auckland	Tony Habraken, Gillian Vaughan

Western Australia **AUSTRALIA**

12/06/02	1	Stilt Viewing, Roebuck Bay, Broome	Kerry Davenport
15/06/02	1	Stilt Viewing, Roebuck Bay, Broome	Danny Rogers
25/06/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Danny Rogers
31/08/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Dan Blunt and Chris Hassell
9/11/02	1	Nicks Beach, Roebuck Bay, Broome	Adrian Boyle, Chris Hassell

Date seen	No.	Location seen	Observer
26/01/03	1	Rushy Point, Albany	David Secomb
28/06/03	1	Pelican Point, mouth of Gascoyne River, Carnarvon	Les George
17/07/03	1	Boat Harbour, Gascoyne River, Carnarvon	Les George

Queensland **AUSTRALIA**

28/07/02	1	Toorbul, near Bribie Island	Arthur and Sheryl Keates, Phil and Linda Cross
17/08/02	1	Nudgee Beach, Moreton Bay	Arthur and Sheryl Keates
1/09/02	3	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates and David Edwards
8/09/02	1	Toorbul, near Bribie Island	Phil and Linda Cross
8/09/02	1	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates
13/09/02	3	Manly Boat Harbour, Moreton Bay	Arthur Keates and David Edwards
21/09/02	1	Lytton High Tide Roost	Arthur Keates
21/09/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates
22/09/02	1	Toorbul Sandfly Bay roost	Arthur Keates et al.
22/09/02	2	Toorbul, near Bribie Island	Arthur Keates et al.
26/09/02	1	Queens Esplanade, Thornside	Joyce Harding
30/09/02	1	Toorbul, near Bribie Island	Harry Briggs
4/10/02	1	Toorbul, near Bribie Island	E. Townsend
6/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates and Dawn Beck
12/10/02	2	South Esplanade, Deception Bay	Phil Cross
13/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates and David Edwards
20/10/02	2	Manly Boat Harbour, Moreton Bay	Arthur and Sheryl Keates and David Edwards
26/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates and David Connolly
29/10/02	1	Toorbul, near Bribie Island	Dennis Stanbridge
2/11/02	1	Inskip Point, near Gympie	John Cummings
2/11/02	1	Manly Boat Harbour, Moreton Bay	David Milton, Sandra Harding and Arthur Keates
4/11/02	1	Artificial roost on Bribie Island	Jill Dening
8/12/02	1	Toorbul, near Bribie Island	Esther Townsend
11/01/03	1	Toorbul Sandfly Bay roost	Dennis Stanbridge
23/01/03	1	Toorbul, 1km north of high tide roost	Dennis Stanbridge
25/01/03	1	Toorbul, near Bribie Island	Dennis Stanbridge
31/01/03	1	Kakadu Beach, Bribie Island	Trevor Ford
2/02/03	1	Kakadu Beach, Bribie Island	Trevor Ford
8/02/03	1	Toorbul, near Bribie Island	David Edwards et al
21/03/03	1	Toorbul North	Dennis Stanbridge
23/03/03	1	Toorbul, near Bribie Island	QWSG Committee and Members on Wader ID Day
28/03/03	1	Toorbul, near Bribie Island	Esther Townsend

New South Wales **AUSTRALIA**

21/09/02	1	Fullerton Cove Beach, Hunter River	Hunter Bird Observers Club
21/09/02	1	Kooragang Nature Reserve, Hunter River	Hunter Bird Observers Club
10/10/02	1	Broadwater Beach, Broadwater	Bo Totterman
11/10/02	2	Kooragang Island, Stockton Bridge	Chris Doughty
20/10/02	2	Broadwater Beach, Broadwater	Bo Totterman

Victoria **AUSTRALIA**

26/09/02	1	Mallacoota Inlet	Simon Starr

The flag sighting reports from Red Knots are amazing. In spite of our considerable success in catching this species in the last few years we still have never had a flag sighting (or a recovery) on or anywhere near the expected breeding grounds in north-east Siberia. Even sightings on migration though Asia are few and far between and proportionately far fewer than we receive for species such as Bar-tailed Godwit and Great Knot. The explanation is probably that they use a small number of discrete stopover locations during their migration and that these are at locations less frequented by bird observers (and hunters); other species using a much wider range of stopover sites.

The number of flag sightings in New Zealand is staggering, indicating the huge interchange of Red Knot between Victoria and there. Banding data shows that most of these movements refer to birds originally marked in their first year in Australia that, in subsequent years, change their preferred non-breeding area to New Zealand. The huge effort put in by some of the field observers in New Zealand is illustrated by several different birds being reported on each occasion – topped by Gwen Pulham finding 25 in one flock in Kaipara Harbour on 19 April, Tony Habraken and Gillian Vaughan finding 22 on 2 August in Manakau Harbour, and David Melville recording 20 at Farewell Spit on 20 March.

The sightings at Broome and Carnarvon in June/July probably refer to immature birds that had moved to the northern coast of Australia for the winter period. But the November record in Broome and the January record in Albany look more like birds that have changed their non-breeding location.

The records in Queensland seem to be a mixture of birds on southward migration in August/September and birds that had probably shifted their non-breeding area from Victoria (records in October to March). The records in New South Wales however were probably mostly birds still on their way south.

SANDERLING, *Calidris alba*

TAIWAN

Date seen	No.	Location seen	Observer
25/08/02	1	Tayuan, Taoyuan County	Li-Chun Chu

HONG KONG

20/04/02	1	Mai Po Marshes	Geoff Carey
21/04/02	1	Mai Po Marshes	Geoff Carey
24/04/03	1	Mai Po Marshes	Paul Leader/Geoff Carey/Mike Leven

Western Australia **AUSTRALIA**

2/10/02	1	Coconut Wells near Broome	Chris Hassell

New South Wales **AUSTRALIA**

7/09/02	1	South Beach, Ballina	Bo Totterman
27/09/02	1	Nambucca Heads	John Seale, Craig Cassady
13/10/02	1	South Beach, Ballina	Bo Totterman

South Australia **AUSTRALIA**

18/01/03	1	Entrance to Boundary Creek on Mundoo Island	Mark Ziembicki
11/03/03	1	Danger Pt, Brown Bay, near Port Macdonnell	Digger Jackson

Surprisingly, this year there were no reports of Victorian flagged Sanderling in Japan, the main location of overseas sightings in previous years. There have been several previous reports in both Taiwan and Hong Kong.

The sightings in northern and eastern Australia probably all refer to birds still on southward migration. However the sightings in South Australia relate to birds that had moved along the coast of Victoria and changed their non-breeding area. This behaviour is quite common in Sanderlings.

RED-NECKED STINT, *Calidris ruficollis*

RUSSIA

27/06/02	1	south east Taimyr Peninsula	Mikhail Soloviev
12-13/07/02	1	Lena River delta, Yakutia	Vitali Kontorschikov

MONGOLIA

5/08/01	1	Lake Khokh Nuur, North East Mongolia	Holger Lauruschkus and Harald Legge

KOREA

26/05/02	2	Cheonsu Bay	Jin-Young Park
9/09/02	1	Okku, Mangyeung	Nial Moores

TAIWAN

3/06/01	1	Fubou, Chang Hwa County	Ms. Lin, Gin-Yueh
19/05/03	1	Kang-Nan Coastal Area, Hsin-Chu City	Mr. Tsai, Yi-Chung
23/05/03	1	Han-Pao, Changhua County	Mr. Yeh, Chih-Wei
27/05/03	1	Han-Pao, Changhua County	Chung-Yu Chiang, Yan-feng Wu, Shih-han Hsu

HONG KONG

1/05/02	2	Mai Po Marshes	Geoff Carey
12/05/02	3	Mai Po Marshes	Yu-Yat Tung
16/05/02	2	Mai Po Marshes	Yu-Yat Tung
9/08/02	1	Mai Po Marshes	Rohan Clarke
2/05/03	2	Mai Po Marshes	Paul Leader
5/05/03	1	Mai Po Marshes	Paul Leader and Mike Leven

MALAYSIA

25-26/04/03	1	Teluk Mahkota Beach, Sedili (se Johor state)	Yang Chong

NEW ZEALAND

Date seen	No.	Location seen	Observer
from 18-9-01 to 20-9-01	1	Miranda, Firth of Thames, South Auckland	per Adrian Riegen

Western Australia **AUSTRALIA**

2/07/02	1	Wader Spit, Roebuck Bay, Broome	Adrian Boyle
10/07/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Judi and Neil Russill
28/07/02	1	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
1/09/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Dan Blunt
3/09/02	1	Observatory Beach, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
3/09/02	2	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
9/09/02	1	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
18/09/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Jenny Lewis
29/11/02	1	Alfred Cove, Swan River, Perth	Mike Bamford
12/01/03	2	Alfred Cove, Swan River, Perth	Toni Webster
23/01/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
2/04/03	1	Stokes Inlet, about 80km west of Esperance	Alex Morrison
5/04/03	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Inka Veltheim
26/04/03	2	Kanidal Beach, 12km west of Eyre BO	Bea Myers and Ian Tarbin
7/05/03	6	Kanidal Beach, 5-11km west of Eyre BO	B. Myers, I. Tarbin, B & L Murphy, S. Mueller
20/05/03	1	Kanidal Beach, 11km west of Eyre BO	Bea Myers and Ian Tarbin
20/05/03	1	Kanidal Beach, 12km west of Eyre BO	Bea Myers and Ian Tarbin
11/06/03	1	Kanidal Beach, 10km west of Eyre BO	Bea Myers and Ian Tarbin

Queensland **AUSTRALIA**

15/10/02	1	Cairns	Chris Doherty
2/02/03	1	Fisherman Island, Moreton Bay	Linda Cross

New South Wales **AUSTRALIA**

26/09/02	1	Long Reef, near Dee Why, Sydney	Keith Brandwood
3/11/02	1	Boat Harbour near Cronulla	David Hair
30/01/03	1	Boat Harbour, Botany Bay National Park	Keith Brandwood
2/02/03	1	Boat Harbour, Botany Bay National Park	Mark Husk

South Australia **AUSTRALIA**

11/07/02	1	Nene Valley	Maureen Christie
25/07/02	1	Lake Hawdon North	Maureen Christie
9/12/02	1	Murray River Mouth, Coorong	David Dadd
9/03/03	1	Dry Creek Saltfields, 5km NW of St. Kilda	David Edey, Vicki-Jo Russell
11/03/03	1	Danger Pt, Brown Bay, near Port Macdonnell	Digger Jackson
27/03/03	10	Penrice Saltfields St Kilda Adelaide	Tony Russell
10/05/03	1	Smokey Bay, between Streaky Bay and Ceduna	Bob and Lesley Murphy

Victoria **AUSTRALIA**

15/09/02	1	Marlo, east coast	David Hollands
28/02/03	1	Port Fairy	Edward Woodward
28/03/03	2	Lake Ranfurly, near Mildura	Alec Hawtin

Tasmania **AUSTRALIA**

18/08/02	1	Orielton Lagoon, Hobart	Stewart Blackhall
20/09/02	1	Cape Portland	Ralph Cooper
6/01/03	1	Georgetown Reserve, Tamar Estuary	Ralph Cooper
2/02/03	1	Pipe Clay Lagoon, Hobart	F. Wainwright and K. Cowell
16/03/03	1	Dora Point, Georges Bay	Hazel & Peter Britton and Mark Barter
17/03/03	1	Little Musselroe Bay, Northeast Tasmania	Hazel & Peter Britton and Mark Barter

Two sightings on the breeding grounds in northern Siberia are most valuable and a rare occurrence for any species, especially for our smallest wader. Another sighting on migration through Mongolia is also pleasing and this time it was of a bird on southward migration. Korea is right on the eastern edge of the Red-necked Stint migration path. Taiwan and Hong Kong are right in the core area of the northward migration route.

The sighting in Malaysia is only the second for this species. On the second day it was seen, it was in the company of a yellow-flagged Red-necked Stint from north-west Australia.

Very few Red-necked Stints reach New Zealand. Most previous flag sightings have been from Lake Ellesmere, near Christchurch, in South Island.

The sightings within Australia are a mixture of birds which have obviously changed their non-breeding area, birds which were on migration to/from Victoria or through Victoria to Tasmania, or wandering first year birds (some of which had gone to the northern coast of Australia for the austral winter).

SHARP-TAILED SANDPIPER, *Calidris acuminata*

KOREA

Date seen	No	Location seen	Observer
21/04/01	1	Geum River Estuary, Chungham Province	Nial Moores
22/04/01	1	Geum River Estuary, Chungham Province	(unknown)

TAIWAN

17/05/03	1	Ne-Hai, Tayuan County	Ms. Yu, Su-Lien Ms. Pan, Ming-Li Ms. Chang, Su-Chen

Northern Territory **AUSTRALIA**

12/05/02	1	Blue Lagoon 2, Newhaven Reserve	Bob and June Gleeson et al
13/05/02	2	Blue Lagoon 2, Newhaven Reserve	Bob and June Gleeson et al

Queensland **AUSTRALIA**

20/09/02	1	Lytton High Tide Roost, Moreton Bay	Brian Ryan

South Australia **AUSTRALIA**

22/04/02	1	Lake Goolangirie, Coongie Lakes Region,	Brydie Hill

The VWSG does not catch many Sharp-tailed Sandpipers so it is particularly pleasing to have flag sightings reported from Korea and Taiwan as well as birds on migration elsewhere in Australia. It was especially nice to have two Victorian flagged Sharp-tailed Sandpipers seen at the new Birds Australia reserve at Newhaven, in the Northern Territory, although the 12/13 May date seems rather a late date for birds still to be in Australia on northward migration.

CURLEW SANDPIPER, C*alidris ferruginea*

CHINA

30/04/03	1	Taipa-Coloane Wetland, Macao	Mr. Leung, Va

TAIWAN

15/07/02	1	Tseng-Wen Estuary, Tainan county	Mr. Fu, Yung-Tsang
21/07/02	1	FuPao, Changhua County	Mr. Lin, Shih-Hsien
1/05/03	1	Han-Pao, Changhua County	Chung-Yu Chiang, Yan-feng Wu
8/05/03	1	Szu-Tsao, Tainan city	Mr. Li, Shin-Hsueh
9/05/03	2	Ma-Gon, Peng-Hu County	Mr Cheng, Chien-Hsuin

HONG KONG

1/04/02	1	Mai Po Marshes	Geoff Carey
4/04/02	1	Mai Po Marshes	Peter Kennerley
5/04/02	4	Mai Po Marshes	Geoff Carey
10/04/02	3	Mai Po Marshes	Ying Hak King
14/04/02	1	Mai Po Marshes	Geoff Carey
15/04/02	2	Mai Po Marshes	Stephen Harris
15/04/02	2	Mai Po Marshes	Ying Hak King
17/04/02	1	Mai Po Marshes	Ying Hak King
20/04/02	1	Mai Po Marshes	Geoff Carey
21/04/02	8	Mai Po Marshes	Geoff Carey
27/04/02	2	Mai Po Marshes	Ying Hak King
28/04/02	5	Mai Po Marshes	Geoff Carey
24/04/03	2	Mai Po Marshes	Paul Leader, Geoff Carey, Mike Leven
25/04/03	1	Mai Po Marshes	Paul Leader
2/05/03	8	Mai Po Marshes	Paul Leader

Western Australia **AUSTRALIA**

30/07/02	2	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
3/09/02	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Dan Blunt
6/09/02	1	Tattler Rocks, Roebuck Bay, Broome	Jonny Schoenjahn
9/09/02	1	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
22/09/02	1	Quarry Beach, Broome	Jenny Lewis
11/11/02	2	Sandy Blowout, Roebuck Bay, Broome	Adrian Boyle, Chris Hassell
20/12/02	1	Lake McLarty, near Pinjarra, SE of Perth	Leon Dykstra
27/12/02	1	Lake McLarty, near Pinjarra, SE of Perth	Michael Craig
29/12/02	1	Lake McLarty, near Pinjarra, SE of Perth	John Darnell and Rolf Jensen

Date seen	No.	Location seen	Observer
9/01/03	3	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
31/03/03	1	Roebuck Plains, 30km East of Broome	Jan van de Kam
6/06/03	2	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Chris Hassell
16/07/03	3	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle

Queensland **AUSTRALIA**

6/10/02	1	Manly Boat Harbour, Moreton Bay	Arthur Keates, Dawn Beck

AUSTRALIA

New South Wales

21/09/02	1	Big Pond on Kooragang Island, Stockton Bridge	Hunter Bird Observers Club
21/09/02	1	Kooragang Nature Reserve, Hunter River	Hunter Bird Observers Club
11/10/02	1	Kooragang Island, Stockton Bridge	Chris Doherty

South Australia **AUSTRALIA**

21/06/02	2	Drain M, Lake George	Maureen Christie
10/03/03	1	Danger Pt, Brown Bay, near Port Macdonnell	VWSG Members

Sightings of Curlew Sandpipers on northward migration through Hong Kong and Taiwan are normal, but it was nice to get two sightings in Taiwan on southward migration, one on the very early date of 15 July. Sightings on the Chinese coast, other than Hong Kong, are few and far between so the report from Macao on 30 April was welcome.

Most other records within Australia relate to birds obviously on migration to or from Victoria, but the one at Lake McLarty, south-east of Perth, had clearly changed its non-breeding area.

GREY PLOVER, *Pluvialis squatarola*

JAPAN

29/07/01	1	Tama River Mouth, Kawasaki, Kanagawa	Hiroshi Yukawa

There has been one previous sighting of a Victorian flagged Grey Plover in Korea. All other overseas sightings have been in Japan.

PECTORAL SANDPIPER, *Calidris melanotos*

New South Wales **AUSTRALIA**

23/10/02	1	Lagoon on Gronos Farm Rd, Wilberforce, near Sydney	Keith Brandwood

Only a handful of Pectoral Sandpipers have ever been banded/flagged in Victoria and this is the first sighting of a flagged bird away from the banding area. It was almost certainly flagged at Werribee Sewage Farm in January/February 2002 and was probably on its way back there when seen near Sydney.

ACKNOWLEDGEMENTS

Thanks are due to all those people throughout the flyway who took the trouble to search for, record, and submit leg flag sightings. Thanks are also due to the Australian Bird and Bat Banding Scheme for sightings reported through them.

The Leg Flag Database for the Victorian Wader Study Group (VWSG) and the Australasian Wader Studies Group (AWSG) for the last year has been maintained by Lauren Beasley under a contract from Environment Australia (now the Department of Environment and Heritage). They are much thanked for this vital support which has enabled the database to be kept completely up to date, enabling reports to both sighters and flaggers and rapid extraction of data whenever needed.

REFERENCE

Minton, C., Jessop, R., Collins, P., Deleyev, J. & Beasley, L. 2002. Sightings of waders leg-flagged in Victoria. Report Number 9. The Stilt 42: 56-72.

SIGHTINGS IN 2003-04 OF WADERS LEG-FLAGGED IN VICTORIA: REPORT NUMBER 11

CLIVE MINTON[1], ROZ JESSOP[2], PETER COLLINS[3] AND INKA VELTHEIM[1]

[1]165 Dalgetty Road, Beaumaris, Vic 3193 Australia. mintons@ozemail.com.au; [2]Phillip Island Nature Park, PO Box 97, Cowes, Vic 3922 Australia; [3]RMB 4009, Cowes, Vic 3922, Australia

INTRODUCTION

The year 2003/2004 has been a record period for reports of sightings of waders leg-flagged in Victoria. This is partly because of increased field observation activities throughout the Flyway, particularly in New Zealand, China and Taiwan.

The attached lists detail all sightings of birds that have moved a significant distance (generally regarded as overseas or interstate) from their marking location. Comments are given under each species giving explanations of some of these movements.

This list is published for the interest of AWSG members and as recognition of the huge contribution by the many people who have sighted and gone to the trouble of reporting flagged birds. It is not the intention that the data listed should be used by others for publication without first checking with the VWSG that the data are correct and complete.

BAR-TAILED GODWIT, *Limosa lapponica*

USA

Date seen	No.	Location seen	Observer
16/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
18/08/2003	2	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
20/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
21/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
22/08/2003	3	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
24/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
25/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
26/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
28/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
28/08/2003	5	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
29/08/2003	9	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
30/08/2003	3	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen and Sarah Connors
31/08/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
31/08/2003	2	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
1/09/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
2/09/2003	1	Egegik Bay, Alaska	Daniel Ruthrauff
2/09/2003	3	Egegik Bay, Alaska	Robert Gill, USGS - Alaska Biological Science Centre
2/09/2003	2	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
2/09/2003	2	Egegik Bay, Alaska	Robert Gill, USGS - Alaska Biological Science Centre
3/09/2003	2	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
3/09/2003	3	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
4/09/2003	1	Egegik Bay, Alaska	Daniel Ruthrauff
4/09/2003	1	Egegik Bay, Alaska	Robert Gill, USGS - Alaska Biological Science Centre
4/09/2003	3	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
4/09/2003	6	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
4/09/2003	1	Egegik Bay, Alaska	Robert Gill, USGS - Alaska Biological Science Centre
4/09/2003	1	Egegik Bay, Alaska	Robert Gill, USGS - Alaska Biological Science Centre
5/09/2003	1	Tern Mountain, Village of Chefornak, Yukon Delta	Heather Swensen
5/09/2003	10	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors
5/09/2003	2	Egegik Bay, Alaska	Robert Gill, USGS - Alaska Biological Science Centre
7/09/2003	2	Tern Mountain, Village of Chefornak, Yukon Delta	Sarah Connors

KOREA

8/05/2003	1	Mokpo city in south-west Korea	Kwak Ho-kyong
2/04/2004	1	Hongsung	Ji In-sook and Kwan Kyong-sook
17/04/2004	6	Hongsung	Kim Hyun-tae
19/04/2004	2	Hongsung	Ji In-sook and Ham In-ja
22/04/2004	2	Hongsung	Ji In-sook and Ham In-ja
25/04/2004	2	Hongsung	Kim Hyun-tae
21/05/2004	2	Yeongjong	Nial Moores

CHINA

Date seen	No.	Location seen	Observer
14/04/2004	7	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
15/04/2004	8	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
17/04/2004	1	Tianjin	Liu Yang and Mark Barter
17/04/2004	2	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
18/04/2004	1	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
19/04/2004	8	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
20/04/2004	1	Yalu Jiang National Nature Reserve	Tony Habraken, David Lawrie, and Gillian Vaughan
20/04/2004	2	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
21/04/2004	1	Yalu Jiang National Nature Reserve	Wang Tao, Gillian Vaughan, Mark Barter and Keith Woodley
21/04/2004	1	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
22/04/2004	2	Yalu Jiang National Nature Reserve	Tony Habraken, David Lawrie and Adrian Riegen
23/04/2004	1	Yalu Jiang National Nature Reserve	Wang Tao
25/04/2004	3	Yalu Jiang National Nature Reserve	David Lawrie and Gillian Vaughan
22/05/2004	1	Zuidong, near Tanshang, Heibei Province	Hongyan Yong

NEW ZEALAND

16/11/2002	3	Miranda, Firth of Thames, South Auckland	J. Berry
28/11/2002	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
5/01/2003	1	Nelson Haven, South Island	Peter Field
20/01/2003	1	Nelson Haven, South Island	Peter Field
1/02/2003	1	Pakawau, Golden Bay, South Island	Peter Field
2/02/2003	3	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
3/02/2003	1	Pakawau, Golden Bay, South Island	Peter Field
3/02/2003	1	Totara Ave, Golden Bay, South Island	Peter Field
15/02/2003	2	Nelson Haven, South Island	Peter Field
22/02/2003	2	Farewell Spit, Gobi, near Nelson, South Island	David Melville and Gillian Pollock
22/02/2003	1	Farewell Spit, Gobi, near Nelson, South Island	Willie Cook
23/02/2003	3	Farewell Spit, Gobi, near Nelson, South Island	Rob Schuckard
18/03/2003	1	Miranda, Firth of Thames, South Auckland	L. Scott
24/03/2003	1	Farewell Spit, Gobi, near Nelson, South Island	Phil Battley and Rob Schuckard
24/06/2003	1	Miranda, Firth of Thames, South Auckland	N. Milius and W. Hare
12/08/2003	1	Waimea Inlet, Mapua Estuary, Nelson	Willie Cook
28/08/2003	1	Waimea Inlet, Mapua Estuary, Nelson	Willie Cook
30/08/2003	1	Waimea Inlet, Mapua Estuary, Nelson	Willie Cook
31/08/2003	2	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
9/09/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley
12/09/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley
13/09/2003	3	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
13/09/2003	1	Tasman Bay, Nelson Haven	Peter Field
14/09/2003	2	Miranda, Firth of Thames, South Auckland	Phil Battley
18/09/2003	1	Mairetahi, Kaipara Harbour	John Simmons and Gwen Pulham
25/09/2003	1	Pakawau, Golden Bay, South Island	Peter Field
26/09/2003	2	Pakawau, Golden Bay, South Island	Peter Field
27/09/2003	3	Tapora Wildlife Refuge, South Kaipara Harbour	G. Pulham and S. Chamberlin
8/10/2003	3	Tasman Bay, Nelson Haven	Peter Field
11/10/2003	1	Pakawau, Golden Bay, South Island	Peter Field
11/10/2003	2	Totara Ave, Golden Bay, South Island	Peter Field
12/10/2003	2	Totara Ave, Golden Bay, South Island	Peter Field
13/10/2003	2	Tasman Bay, Nelson Haven	Peter Field
17/10/2003	2	Miranda, Firth of Thames, South Auckland	Phil Battley
24/10/2003	2	Tasman Bay, Nelson Haven	Peter Field
24/10/2003	1	Taramaire, Firth of Thames, South Auckland	Phil Battley
25/10/2003	2	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
26/10/2003	4	Farewell Spit, Stockyard, South Island	Peter Field
27/10/2003	4	Karaka, Manukau Harbour, South Auckland	G. Pulham and G. Goreby
27/10/2003	2	Totara Ave, Golden Bay, South Island	Peter Field
29/10/2003	1	Tasman Bay, Nelson Haven	Peter Field
2/11/2003	2	Papanui Inlet	Peter Schweigman
5/11/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley

Date seen	No.	Location seen	Observer
5/11/2003	1	Miranda, Firth of Thames, South Auckland	Sav Saville
12/11/2003	2	Tasman Bay, Nelson Haven	Peter Field
12/11/2003	2	Nelson Haven, South Island	Peter Field
15/11/2003	1	Tapora Wildlife Refuge, South Kaipara Harbour	Tony Habraken and Gillian Vaughan
15/11/2003	1	Whangerai Harbour	G. Grant and M. Twyman
16/11/2003	2	Waihou River, Thames, Firth of Thames	Tony Habraken
16/11/2003	2	Miranda, Firth of Thames, South Auckland	David Lawrie et al.
21/11/2003	2	Golden Bay, Taupota Point, South Island	Peter Field
24/11/2003	1	Tasman Bay, Nelson Haven	Peter Field
26/11/2003	1	Motueka Sandspit, near Nelson	Peter Field
10/12/2003	1	Tasman Bay, Nelson Haven	Peter Field
11/12/2003	2	Miranda, Firth of Thames, South Auckland	Phil Battley
11/12/2003	1	Tasman Bay, Nelson Haven	Peter Field
24/12/2003	1	Totara Ave, Golden Bay, South Island	Peter Field
2/01/2004	2	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
4/01/2004	1	Farewell Spit, Stockyard, South Island	Peter Field
7/01/2004	3	Totara Ave, Golden Bay, South Island	Peter Field
8/01/2004	1	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham
20/01/2004	1	Tasman Bay, Nelson Haven	David Melville
21/01/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
22/01/2004	1	Nelson Haven, South Island	David Melville
23/01/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
24/01/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
25/01/2004	2	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham et al
7/02/2004	1	Miranda, Firth of Thames, South Auckland	Tony Habraken
25/02/2004	1	Whangapoua Beach, Great Barrier Island	Keith Woodley
1/03/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
5/03/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
7/03/2004	1	Farewell Spit, Bushend Point, South Island	Rob Schuckard
8/03/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
9/03/2004	2	Waihou River, Thames, Firth of Thames	Phil Battley
11/03/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
13/03/2004	1	Kaiaua, Firth of Thames, Auckland	Simon Fordham
17/04/2004	2	Walker Island, Kaipara Harbour	G. Pulham and G. Goreby
27/04/2004	1	Thames, Firth of Thames	Phil Battley
19/06/2004	1	Tapora Wildlife Refuge, South Kaipara Harbour	E Lagnez et al
19/06/2004	1	Walker Island, Kaipara Harbour	T. Wnorowski

Western Australia **AUSTRALIA**

4/08/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Inka Veltheim
15/12/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle and Chris Hassell
6/03/2004	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle

Queensland **AUSTRALIA**

18/05/2003	1	Manly Boat Harbour, Moreton Bay	S. Harding, D. Milton, B & J Morgan
27/09/2003	1	Manly Boat Harbour, Moreton Bay	Sandra Harding, David Milton, Barry& Joanna Morgan
4/10/2003	1	Mathieson Homestead, near Hervey Bay	John Knight
5/10/2003	1	Maroom, Great Sandy Strait	John Bell and Inge Brandt
13/10/2003	1	Mathieson Homestead, near Hervey Bay	John Knight and Elaine Lyons
14/10/2003	1	Mathieson Homestead, near Hervey Bay	John Knight and Elaine Lyons
16/10/2003	1	Mathieson Homestead, near Hervey Bay	John Knight
17/10/2003	1	Wright's Ck, Banksia Beach, Bribie Island	Ted and Kerry Davenport
19/10/2003	1	Wright's Ck, Banksia Beach, Bribie Island	Phil and Linda Cross et al.
20/10/2003	1	Kakadu Beach, Bribie Island	Linda Cross and Ivell White
29/10/2003	1	Mathieson Homestead, near Hervey Bay	Bob & June Gleeson, Les Strong, Sean Norman
1/11/2003	1	Lytton High Tide Roost	David Edwards
1/11/2003	1	Mathieson Homestead, near Hervey Bay	John Knight

New South Wales **AUSTRALIA**

Date seen	No.	Location seen	Observer
30/09/2003	1	Stockton Bridge, Hunter River, near Newcastle	Ivan Chapman
3/10/2003	1	Pelican Island, Hastings River mouth	Hastings Birdwatchers
15/10/2003	1	Kooragang Island, Stockton Bridge	Keith Brandwood

The above list contains a record 252 overseas sightings of Bar-tailed Godwit flagged in Victoria. An amazing total of 74 of these sightings were in south-west Alaska where post breeding flocks gather in late August/early September prior to their trans-Pacific 10,000 km non-stop flight back to Australia and New Zealand. Two dedicated teams from the US Fish and Wildlife Service were in the field studying these pre-migratory departure flocks for three weeks.

There was also a record number of 123 flag sightings in New Zealand. This huge increase over previous years is particularly the result of intensive observational fieldwork in the Auckland area, particularly by Phil Battley, and intensive fieldwork in the north-west corner of South Island, New Zealand, by Peter Field. These data further confirm the extremely strong link between the Bar-tailed Godwit populations in eastern Australia and New Zealand.

There was an unprecedented 39 sightings of flagged birds in China on northward migration in April and May 2004. Most of these were at Yalu Jiang, at the northern end of the Yellow Sea, where two separate teams from Australia and New Zealand were working with Chinese ornithologists counting and banding waders.

It is pleasing to see Korea again featuring significantly in the lists of flag sighting locations. This is the result of an excellent web site operated by Kim Hyun-tae and the communication efforts of Nial Moores.

It is noticeable that all the Asian flag sightings were during northward migration. On southward migration Bar-tailed Godwit from the Alaskan breeding grounds return by direct flight over the Pacific to non-breeding areas in Eastern Australia and New Zealand.

The sightings in Western Australia, Queensland and New South Wales are a mixture of birds passing through those areas on southward migration, birds which have clearly changed their non-breeding area away from Victoria, and one or two birds (immature) which have gone for "winter holidays" in northern Australia.

EASTERN CURLEW, ***Numenius madagascariensis***

CHINA

14/04/2004	1	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team
15/04/2004	1	Yalu Jiang National Nature Reserve	Yalu Jiang 2004 team

TAIWAN

21/03/2004	1	Lun-Wei, Changhua County, Taiwan	Chung-Yu Chiang

Queensland **AUSTRALIA**

5/05/2003	1	Mathieson Homestead, near Hervey Bay	John Knight, Don & Rhonda Jennings
6/05/2003	1	Mathieson Homestead, near Hervey Bay	John Knight and Laurie Baldwin
7/08/2003	1	Mathieson Homestead, near Hervey Bay	John Knight et al.
22/08/2003	1	Mathieson Homestead, near Hervey Bay	John Knight et al.

The sightings in China are the first for this species. However, this is mainly the result of the previous lack of observers. Count data shows the northern Yellow Sea to be a very important migratory stopover area for Eastern Curlew.

Sightings in Taiwan are more regular. This one, on the 21 March, follows one reported last year on the very early date of the 9 March.

The first two sightings in Queensland probably refer to an immature bird that had moved north within Australia for the winter. The last two records more likely refer to birds on southward migration back to Victoria.

RUDDY TURNSTONE, ***Arenaria interpres***

CHINA

17/04/2004	1	Tianjin	Liu Yang and Mark Barter

TAIWAN

20/04/2004	1	Changhua County	Chung-Yu Chiang
3/05/2004	2	Han-Pao, Changhua County	Taiwan Wader Study Group

South Australia **AUSTRALIA**

21/08/2002	1	Cape Banks Lighthouse, Carpenters Rocks	Maureen Christie
22/08/2002	1	Pelican Point, near Mt Gambier	Maureen Christie
23/08/2002	1	Cape Banks Lighthouse, Carpenters Rocks	Maureen Christie
6/11/2003	1	Gerloff Bay, Carpenter Rocks	Maureen Christie
7/11/2003	1	Stony Point, Port Macdonnell	Maureen Christie and Lorraine Moore
28/11/2003	1	Stony Point, Port Macdonnell	Maureen Christie and Lorraine Moore
10/02/2004	1	Riddock Bay, near Port MacDonnell	Maureen Christie and Lorraine Moore
24/04/2004	1	Cape Banks Lighthouse, Carpenters Rocks	Maureen Christie

New South Wales **AUSTRALIA**

Date seen	No.	Location seen	Observer
8/04/2004	1	Lord Howe Island	Penny Drake-Brockman

Western Australia **AUSTRALIA**

16/09/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Inka Veltheim

Northern Territory **AUSTRALIA**

26/09/2003	1	Darwin	Bas Hensen

The sighting in China is the first for that country. Sightings of birds on migration through Taiwan are more regular.

The sighting on Lord Howe Island is the second at that location, the first being in October 2002. The records in WA and NT are probably birds on southward migration back to Victoria. The records in South Australia reflect the small interchange of Turnstones that seems to take place between different locations along the coasts of south-east Australia.

GREAT KNOT, *Calidris tenuirostris*

CHINA

17/04/2004	1	Tianjin	Liu Yang and Mark Barter

HONG KONG

6/04/2004	1	Mai Po Marshes	Jemi Wong

Queensland **AUSTRALIA**

30/06/2003	1	Mathieson Homestead, near Hervey Bay	John Knight and Peter Royall
14/08/2003	1	Mathieson Homestead, near Hervey Bay	John Knight
14/09/2003	1	Toorbul North	Dez Wells, Phil and Linda Cross
27/09/2003	1	Mathieson Homestead, near Hervey Bay	John Knight
4/10/2003	1	Mathieson Homestead, near Hervey Bay	John Knight
10/10/2003	1	Toorbul, near Bribie Island	Dennis Stanbridge
14/10/2003	1	Mathieson Homestead, near Hervey Bay	John Knight and Elaine Lyons
25/10/2003	1	Toorbul, near Bribie Island	Dez Wells
29/10/2003	1	Mathieson Homestead, near Hervey Bay	Bob & June Gleeson, Les Strong, Sean Norman
29/11/2003	1	Toorbul North	Dennis Stanbridge
30/11/2003	1	Toorbul, near Bribie Island	Phil and Linda Cross
10/12/2003	1	Toorbul North	Dennis Stanbridge
13/12/2003	1	Deception Bay mangroves	Phil and Linda Cross
30/12/2003	1	Toorbul Sandfly Bay roost	Dez Wells

Northern Territory **AUSTRALIA**

15/09/2003	1	Darwin	Bas Hensen
23/09/2003	1	Darwin	Bas Hensen
11/10/2003	1	Buffalo Creek Beach, Darwin	Arthur and Sheryl Keates
26/10/2003	1	Buffalo Creek Beach, Darwin	Arthur and Sheryl Keates
23/11/2003	1	Between Lee Point and Buffalo Creek	Arthur and Sheryl Keates
22/02/2004	1	Buffalo Creek Beach, Darwin	Arthur and Sheryl Keates

Only a very small part of the Great Knot population comes as far south as Victoria for the non-breeding season. The overseas sightings suggest that these birds migrate through the same part of Asia and at the same time as Great Knot from non-breeding grounds in northern Australia.

The sightings within Australia may contain some birds which are on southward migration back to Victoria but mostly indicate birds which have changed their non-breeding area to the more conventional non-breeding areas along the northern coast of Australia.

RED KNOT, *Calidris canutus*

CHINA

17/04/2004	1	Tianjin	Liu Yang and Mark Barter
20/04/2004	1	Yalu Jiang National Nature Reserve	Gillian Vaughan and Tony Habraken
22/05/2004	1	Zuidong, near Tanshang, Heibei Province	Hongyan Yong
9/06/2004	1	Zuidong, near Tanshang, Heibei Province	Yang Hong Yan

TAIWAN

Date seen	No.	Location seen	Observer
25/04/2003	1	Ta-chuang, Hsin-chu City	Wen-Hsiung Li
22/07/2003	1	Chi-ku, Tainan County	Mr. Li, Chung-hsien
25/04/2004	1	Auku, Chiayi County	Chwan-Jyh Lin

HONG KONG

29/04/2003	1	Mai Po Marshes	Yu Yat-Tung
19/05/2004	1	Mai Po Marshes	Mike Leven

NEW ZEALAND

31/03/2002	1	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
22/09/2002	1	Miranda, Firth of Thames, South Auckland	Will Perry
6/10/2002	1	Farewell Spit, Gobi, near Nelson, South Island	Rob Schuckard
12/10/2002	1	Miranda, Firth of Thames, South Auckland	Bruce Keeley
9/11/2002	1	Waikiri Creek, Kaipara	Gwen Pulham
10/11/2002	1	Farewell Spit, Farmpark, South Island	Peter Field
2/12/2002	1	Miranda, Firth of Thames, South Auckland	Nigel Milius
10/12/2002	4	Miranda, Firth of Thames, South Auckland	Nigel Milius
17/12/2002	2	Miranda, Firth of Thames, South Auckland	T. Wilson
20/01/2003	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
2/02/2003	8	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
22/02/2003	1	Farewell Spit, Gobi, near Nelson, South Island	Willie Cook
22/02/2003	1	Farewell Spit, Gobi, near Nelson, South Island	Rob Schuckard
23/02/2003	3	Farewell Spit, Gobi, near Nelson, South Island	Rob Schuckard
23/02/2003	1	Farewell Spit, Bay Flat, near Nelson	Rob Schuckard
23/02/2003	5	Farewell Spit, Gobi, near Nelson, South Island	David Melville and Rob Schuckard
31/08/2003	8	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
1/09/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley
1/09/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley
13/09/2003	12	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
18/09/2003	2	Mairetahi, Kaipara Harbour	John Simmons and Gwen Pulham
27/09/2003	1	Tapora Wildlife Refuge, South Kaipara Harbour	G. Pulham and S. Chamberlin
27/09/2003	2	Farewell Spit, Stockyard, South Island	Peter Field
29/09/2003	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
2/10/2003	1	Mangawhai Estuary, Auckland	Gwen Pulham and Gordon Gorbey
4/10/2003	1	Farewell Spit, Farmpark, South Island	Peter Field
5/10/2003	2	Farewell Spit, Farmpark, South Island	Peter Field
6/10/2003	6	Miranda, Firth of Thames, South Auckland	Phil Battley
7/10/2003	5	Taramaire, Firth of Thames, South Auckland	Phil Battley
8/10/2003	5	Miranda, Firth of Thames, South Auckland	Phil Battley
11/10/2003	2	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
12/10/2003	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
15/10/2003	6	Miranda, Firth of Thames, South Auckland	Phil Battley
17/10/2003	6	Miranda, Firth of Thames, South Auckland	Phil Battley
18/10/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley
19/10/2003	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
24/10/2003	1	Taramaire, Firth of Thames, South Auckland	Phil Battley
24/10/2003	3	Taramaire, Firth of Thames, South Auckland	Phil Battley
24/10/2003	3	Taramaire, Firth of Thames, South Auckland	Phil Battley
24/10/2003	8	Taramaire, Firth of Thames, South Auckland	Phil Battley
25/10/2003	2	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
26/10/2003	3	Tapora Wildlife Refuge, South Kaipara Harbour	G. Grant and M. Twyman
26/10/2003	7	Farewell Spit, Stockyard, South Island	Peter Field
27/10/2003	1	Manawatu Estuary, Manawatu, North Island	Ian Saville and Brent Stephenson
1/11/2003	2	Manawatu Estuary, Manawatu, North Island	Ian Saville
2/11/2003	3	Taramaire, Firth of Thames, South Auckland	Phil Battley
5/11/2003	6	Miranda, Firth of Thames, South Auckland	Sav Saville
5/11/2003	5	Miranda, Firth of Thames, South Auckland	Phil Battley
9/11/2003	1	Waikiri Creek, Kaipara	G. Pulham and G. Goreby
12/11/2003	2	Manawatu Estuary, Manawatu, North Island	Ian Saville

Date seen	No.	Location seen	Observer
15/11/2003	7	Tapora Wildlife Refuge, South Kaipara Harbour	Gillian Vaughan and Tony Habraken
15/11/2003	1	Tapora Wildlife Refuge, South Kaipara Harbour	Gillian Vaughan and Tony Habraken
15/11/2003	1	Takahiwai, Whangarei Harbour	G. Grant and M. Twyman
16/11/2003	15	Waihou River, Thames, Firth of Thames	Tony Habraken et al.
16/11/2003	8	Miranda, Firth of Thames, South Auckland	David Lawrie et al.
16/11/2003	3	Maketu Bay of Plenty, North Island	Tim Barnard
21/11/2003	1	Golden Bay, Taupota Point, South Island	Peter Field
22/11/2003	3	Tasman Bay, Best Island	Willie Cook, Rose Blois and Don Cooper
22/11/2003	2	Walker Island, Kaipara Harbour	L. Alston & T. Kitching
22/11/2003	1	Jordan's Farm, SE Kaipara Harbour, Auckland	G. Eller & M. Taylor
22/11/2003	3	Tapora Wildlife Refuge, South Kaipara Harbour	Ted Wnorowski
23/11/2003	1	Motueka Sandspit, near Nelson	Steve Wood
23/11/2003	4	Karaka, Manukau Harbour, South Auckland	D. Lawrie and T. Crocker
29/11/2003	1	Maketu Bay of Plenty, North Island	Tim Barnard
11/12/2003	1	Miranda, Firth of Thames, South Auckland	Phil Battley
13/12/2003	2	Mangere Sewage Ponds, Manukau Harbour	T. Wilson
14/12/2003	2	Manawatu Estuary, Manawatu, North Island	Sav Saville
14/12/2003	1	Manawatu Estuary, Manawatu, North Island	Ian Saville
21/12/2003	2	Shellbanks, Miranda	Adrian Riegen
26/12/2003	12	Waihou River, Thames, Firth of Thames	David Lawrie and Tony Habraken
27/12/2003	9	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
30/12/2003	3	Taramaire, Firth of Thames, South Auckland	Phil Battley
1/01/2004	6	Mangere Sewage Ponds, Manukau Harbour	G. Pulham and R. Clough
2/01/2004	6	Farewell Spit, Gobi, near Nelson, South Island	Peter Field
4/01/2004	1	Farewell Spit, Stockyard, South Island	Peter Field
8/01/2004	7	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham
20/01/2004	1	Maketu Bay of Plenty, North Island	Tim Barnard
22/01/2004	1	Waipu Estuary, Northland	Gwen Pulham and Gordon Gorbey
25/01/2004	2	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham et al
6/02/2004	3	Kaiaua, Firth of Thames, Auckland	Phil Battley
8/02/2004	3	Walker Island, Kaipara Harbour	Gwen Pulham and Kimberley McMullen
9/02/2004	2	Rangipo, Firth of Thames	Phil Battley
14/02/2004	7	Mangere Sewage Ponds, Manukau Harbour	Ted Wnorowski
16/02/2004	1	Farewell Spit, Base, South Island	Chris Petyt
19/02/2004	2	Jordan's Farm, SE Kaipara Harbour, Auckland	Stephen Davies
29/02/2004	1	Waiongana Beach, near New Plymouth	Peter and Julie Flyer
1/03/2004	8	Taramaire, Firth of Thames, South Auckland	Phil Battley
1/03/2004	3	Kaiaua, Firth of Thames, Auckland	Phil Battley
2/03/2004	2	Wairoa River, Mataitai Firth of Thames	Graham Don
4/03/2004	4	Kaiaua, Firth of Thames, Auckland	Phil Battley
7/03/2004	2	Farewell Spit, Bushend Point, South Island	Rob Schuckard
9/03/2004	5	Waihou River, Thames, Firth of Thames	Phil Battley
11/03/2004	2	Kaiaua, Firth of Thames, Auckland	Phil Battley
13/03/2004	2	Miranda, Firth of Thames, South Auckland	Adrian Riegen and Warren Lee Long
15/03/2004	2	Waihou River, Thames, Firth of Thames	Phil Battley
18/03/2004	3	Kaiaua, Firth of Thames, Auckland	Phil Battley
19/03/2004	1	Mangere Sewage Ponds, Manukau Harbour	R. Clough
19/03/2004	1	Waihou River, Thames, Firth of Thames	Phil Battley
21/03/2004	2	Tapora Wildlife Refuge, South Kaipara Harbour	Simon Chamberlin
31/03/2004	1	Kaiaua, Firth of Thames, Auckland	Phil Battley
22/05/2004	1	Karaka, Manukau Harbour, South Auckland	David Lawrie
12/06/2004	1	Miranda, Firth of Thames, South Auckland	Tony Habraken
13/06/2004	1	Miranda, Firth of Thames, South Auckland	Phil Battley

New South Wales **AUSTRALIA**

22/09/2003	1	South Beach, Ballina	Bo Totterman
30/09/2003	1	Stockton Bridge, Hunter River, near Newcastle	Ivan Chapman
11/10/2003	1	Kooragang Dykes, near Newcastle	Liz Crawford and Chris Herbert Hunter Bird Observers Club
15/10/2003	2	Kooragang Island, Stockton Bridge	Keith Brandwood

Date seen	No.	Location seen	Observer
18/10/2003	1	Brou Lake, north of Narooma	Mike Crowley
20/10/2003	1	Shell Point, Botany Bay	Ken Gilmore
31/10/2003	1	Tuross Estuary	George Rayner
8/11/2003	2	Kooragang Dykes, near Newcastle	Ann Lindsey
8/12/2003	1	Pelican Island, Hastings River mouth	Hans Lutter

Northern Territory **AUSTRALIA**

19/02/2004	1	Buffalo Creek Beach, Darwin	Arthur and Sheryl Keates
22/02/2004	1	Buffalo Creek Beach, Darwin	Arthur and Sheryl Keates
6/03/2004	2	Buffalo Creek Beach, Darwin	Arthur and Sheryl Keates

Queensland **AUSTRALIA**

30/08/2003	2	Deception Bay mangroves	Phil Cross

South Australia **AUSTRALIA**

26/12/2003	2	Thompson Beach, near Dublin	John Seymour

Tasmania **AUSTRALIA**

24/01/2004	1	Robbins Island (Knot Pt)	Peter and Hazel Britton

Western Australia **AUSTRALIA**

27/08/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Jonny Schoenjahn
4/09/2003	2	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
9/09/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
28/09/2003	1	Quarry Beach, Broome	Chris Hassell, Rob Berry and Gail
15/12/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle and Chris Hassell

The list contains a fantastic 321 overseas leg flag sightings including 312 in New Zealand. The latter are a product of the intensive and extremely skilled team of wader watchers in New Zealand, with Phil Battley joining the effort this year with his intensive studies in the Auckland area. Banding recoveries have shown that many of the Red Knot caught in Australia in their first year subsequently move to New Zealand and adopt that country as their principal non-breeding area in subsequent years. Judging by the volume of sightings, there is an even stronger link between the Red Knot populations of eastern Australia and New Zealand than there is for Bar-tailed Godwits.

Flag sightings of Red Knot on migration through Asia are quite scarce and therefore nine sightings in China/Taiwan/Hong Kong are pleasing. The main migratory stopover locations for Red Knot in Asia are still poorly known – hence the dearth of flag sightings and recoveries. The breeding grounds are also unknown, with no recoveries or flag sightings of Red Knot from eastern Australia or New Zealand. This population is presumed to breed in the Chukotsk region of north-east Siberia.

Most of the sightings within Australia are birds that appear to have changed their non-breeding area, particularly to the northern parts of the continent. However, some may have been on passage when seen.

SANDERLING, *Calidris alba*

CHINA

3/08/2003	1	Zuidong, near Tanshang, Heibei Province	Yang Hong Yan
9/08/2003	1	Zuidong, near Tanshang, Heibei Province	Yang Hong Yan

HONG KONG

23/04/2003	1	Mai Po Marshes	Geoff Carey
29/04/2003	1	Mai Po Marshes	Yu Yat-Tung

Northern Territory **AUSTRALIA**

30/08/2002	1	Darwin	Bas Hensen
21/09/2002	1	Darwin	Bas Hensen

South Australia **AUSTRALIA**

20/08/2002	1	Oil Rig Square, Millicent	Maureen Christie
28/11/2003	1	Stony Point, Port Macdonnell	Maureen Christie and Lorraine Moore

Western Australia **AUSTRALIA**

22/09/2003	1	Broome Port	Megan Underwood and Inka Veltheim

The sightings in China were the first for this species. It was also notable that these were on southward migration. Sanderling is the only species for which more reports of flagged or banded birds tend to be made on southward, as opposed to northward, migration.

The sightings within Australia appear to be mostly of birds on southward migration back to Victoria. However, those in South Australia could very well reflect the considerable movement of Sanderling between different non-breeding areas in south-east Australia.

RED-NECKED STINT, *Calidris ruficollis*

RUSSIA

Date seen	No.	Location seen	Observer
6/08/2003	1	Lake Baikal, Island of Kosa, Irkutskaya Oblast	Hans-Heiner Bergmann

CHINA

15/04/2002	1	Taipa-Coloane Wetland, Macao	Dr. Leung Chee Va
7/05/2003	1	Taipa-Coloane Wetland, Macao	Dr. Leung Chee Va
29/04/2004	1	Taipa-Coloane Wetland, Macao	Va Leung
8/05/2004	1	Beidaihe, Qinhuangodao City, Hebei Province	Hans Meltofte
10/05/2004	1	Ba Li Qiao, 50 km south of Beidaihe	Allan Hale
13/05/2004	1	Ba Li Qiao, 50 km south of Beidaihe	Allan Hale
13/05/2004	1	Happy Island, Hebei Province	Shaun Robson and David Taylor
18/05/2004	1	Beidaihe, Qinhuangodao City, Hebei Province	Robert Stormes
19/05/2004	1	Beidaihe, Qinhuangodao City, Hebei Province	Hans Meltofte
20/05/2004	1	Beidaihe, Qinhuangodao City, Hebei Province	Allan Hale
22/05/2004	1	Zuidong, near Tanshang, Heibei Province	Hongyan Yong

TAIWAN

27/07/2003	1	Yung-An, KaoHsiung County	Kun-Hai Lin
28/07/2003	1	Fu-Pao wetland, Changhua County	Chung-Yu Chiang and Wen-yin Hu Taiwan Wader Study Group
29/07/2003	1	Szu-Tsao, Tainan city	Miss Wang, HsinHua
17/08/2003	1	Chi-ku, Tainan County	Su-Lien Yu
22/08/2003	1	Changhua County	Wei-Chieh Liao
23/08/2003	1	Chi-ku, Tainan County	Chi-Yuan Pan
15/05/2004	1	Chinshan, Taipei County	Shueng-Chang Chen
22/05/2004	1	Li-Chai Estuary, Taitung Country	Wei-Hsuan Tsai
25/05/2004	1	Han-Pao, Changhua County	Taiwan Wader Study Group
25/05/2004	2	Chi-An, Hualien County	Ching-Wen Liu
25/05/2004	2	Han-Pao, Changhua County	Taiwan Bird banding Centre
27/05/2004	1	Cheng-Hsi-Li, Tainan City	Hsing-Jen Chou
10/06/2004	1	Hsiang-Shan, Hsinchu County	Cheer

HONG KONG

25/04/2003	1	Mai Po Marshes	Richard Lewthwaite
2/05/2003	2	Mai Po Marshes	Yu Yat-Tung
3/05/2003	1	Mai Po Marshes	John Allcock
5/05/2003	2	Mai Po Marshes	Yu Yat-Tung
8/05/2003	1	Mai Po Marshes	H. F. Cheung
17/05/2003	1	Mai Po Marshes	Yu Yat-Tung
18/05/2003	2	Mai Po Marshes	Yu Yat-Tung
28/05/2003	1	Mai Po Marshes	Yu Yat-Tung
5/06/2003	1	Mai Po Marshes	Yu Yat-Tung
26/08/2003	1	Mai Po Marshes	Yu Yat-Tung
23/04/2004	1	Mai Po Marshes	Tam Yiu-leung
24/04/2004	1	Mai Po Marshes	Tam Yiu-leung
4/05/2004	2	Mai Po Marshes	Yu Yat-Tung
7/05/2004	1	Mai Po Marshes	Yu Yat-Tung
8/05/2004	1	Mai Po Marshes	Mike Chalmers
10/05/2004	14	Mai Po Marshes	Yu Yat-Tung
16/05/2004	3	Mai Po Marshes	Yu Yat-Tung
19/05/2004	7	Mai Po Marshes	Mike Leven
22/05/2004	2	Mai Po Marshes	John Holme
23/05/2004	5	Mai Po Marshes	John Holme
8/06/2004	1	Mai Po Marshes	Yu Yat-Tung

INDONESIA

Date seen	No.	Location seen	Observer
1/04/2004	1	East Java	Iwan Londo
2/05/2004	1	East Java	Iwan Londo and Y Peksa
2/05/2004	1	Wonorejo Wetlands, Surabaya	Iwan Londo and Y Peksa

NEW ZEALAND

6/10/2003	1	Lake Grassmere, near Blenheim, South Island	Steve Wood
19/10/2003	1	Lake Wainono, South Island	Alan Collins

New South Wales **AUSTRALIA**

22/09/2003	1	Wallagoot Lake, Bournda National Park	Derek and Glenys Lambert
10/10/2003	1	Rainbow Beach, near SW Rocks	Laurie McEnally
12/12/2003	1	Lake Cathie	Dave Whitfield
22/12/2003	1	Stockton Bridge, Hunter River, near Newcastle	Phil Straw
28/12/2003	1	Ash Island, Hunter Estuary, near Newcastle	Ann Lindsey
4/01/2004	1	Shoalhaven Heads	Ken Gilmore
15/01/2004	1	Shoalhaven Rivermouth, Shoalhaven Heads	Phil Craven

Northern Territory			**AUSTRALIA**
1/09/2002	1	Darwin	Bas Hensen
21/09/2003	1	Alice Springs Sewage Ponds	Phil Gregory

Queensland **AUSTRALIA**

31/08/2003	1	Fishermans Island, Moreton Bay	Linda Cross
28/09/2003	1	Fishermans Island, Moreton Bay	Linda Cross and Andrew Geering
28/09/2003	1	Fishermans Island, Moreton Bay	David Edwards and Joyce Harding
22/11/2003	2	Caboolture River	Ivan Fien
23/11/2003	1	Fishermans Island, Moreton Bay	Linda Cross and Ralf Regeer
10/01/2004	1	Fishermans Island, Moreton Bay	David Edwards et al
11/01/2004	1	Deception Bay Bermuda Avenue	Phil and Linda Cross
6/03/2004	1	Deception Bay Bermuda Avenue	Linda Cross
7/03/2004	1	Fishermans Island, Moreton Bay	David Edwards
15/05/2004	1	Fishermans Island, Moreton Bay	Linda Cross, Dawn Beck, Arthur & Sheryl Keates
16/05/2004	1	Manly Harbour	Sandra Harding, David Milton, Barry & Joanna Morgan, Arthur and Sheryl Keates
6/06/2004	1	Fishermans Island, Moreton Bay	Linda and Phil Cross et al

South Australia **AUSTRALIA**

20/02/2003	1	Nene Valley	Maureen Christie
30/06/2003	2	Lake Eliza, south-east of Robe	Maureen Christie
2/11/2003	1	Gantheume Bay, south coast of Kangaroo Island	Bev Abbott
2/11/2003	1	Douglas Point Conservation Park	Mt. Gambier Area Friends of the Parks
16/12/2003	1	Coorong National Park	Margaret and David Dadd
17/02/2004	1	Between Goolwa Barrage and Murray Mouth, Coorong	Dean Cutten
31/03/2004	3	Lake Alexandrina	Ken Gosbell
18/04/2004	2	Tolderol Game Reserve	Dean Cutten
24/04/2004	3	Blackfellows Caves 6kmse Carpenters Rock	Maureen Christie
24/04/2004	1	Cape Banks Lighthouse, Carpenters Rocks	Maureen Christie
26/04/2004	1	Cape Banks Lighthouse, Carpenters Rocks	Maureen Christie and Lorraine Moore
29/04/2004	1	Bucks Bay, Carpenter Rocks	Maureen Christie

Tasmania **AUSTRALIA**

7/11/2003	1	Cape Portland	Ralph Cooper
25/11/2003	3	Sorell, near Hobart	Chris Loyd
27/12/2003	1	Perkins Island	Peter and Hazel Britton
14/01/2004	1	Marion Bay	Tenille Plummer
24/01/2004	1	Kangaroo Island	Richard and Erica Ashby
26/01/2004	1	South Arm Peninsula	Denis Charlesworth
8/02/2004	1	Pipe Clay Lagoon, Hobart	Priscilla Park
8/02/2004	1	Orielton Lagoon	Elizabeth Jones
16/04/2004	1	Marion Bay	Andrew Meyles

Victoria **AUSTRALIA**

Date seen	No.	Location seen	Observer
21/11/2003	1	Tern Island, Gippsland Lakes	Faye Bedford
16/03/2004	1	Glenelg River	Maureen Christie
17/05/2004	1	Tatura Sewage Lagoons, near Shepparton	Don Roberts

Western Australia **AUSTRALIA**

11/04/2002	1	Thomas River mouth, 105 km east of Esperance	Michael and Ada Nield
29/12/2002	1	Alfred Cove, Swan River, Perth	Tony Webster
28/08/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Inka Veltheim
28/09/2003	1	Eyre Bird Observatory	Bea Myers and Ian Tarbin Eyre Bird Observatory
7/10/2003	1	Barrow Island (east side)	Dr. Mike Craig
11/01/2004	1	Lake McLarty, near Pinjarra, SE of Perth	John Dartnell
8/03/2004	1	Alfred Cove, Swan River, Perth	Colin Davis
21/04/2004	2	Eyre Bird Observatory	Frank O' Connor
21/04/2004	1	Eyre Bird Observatory	Frank O' Connor
15/05/2004	1	Eyre Bird Observatory	Karina & Ken Harris
28/05/2004	1	Lake Preston, Myal National Park	Tony France

Another excellent list of sightings, from a wide variety of locations both overseas and within Australia.

It is noticeable that most of the sightings in Asia are in May whereas, in most other species, the majority on northward migration occur in April. The Red-necked Stint is the last species to set off on northward migration from Australia with some individuals not departing from Victoria until the very end of April.

There were more sightings in China than in any previous year. The ones in Hebei province, north-west Yellow Sea, mainly derive from bird watchers around the world who now visit that area each year because of its reputation as an excellent place to see a wide variety of wading birds on northward migration. It's also interesting to speculate whether the single bird seen at Macao in three successive years was the same individual.

The extensive northward passage of flagged birds in Taiwan and Hong Kong continued into early June this year at both locations.

The sightings in Indonesia are most welcome. There are very few previous records of flagged or banded birds there, especially on northward migration.

Each year seems to produce some flag sightings in New Zealand even though only a few hundred Red-necked Stints spend the non-breeding season there.

Extensive lists of sightings in different parts of Australia mainly relate to birds on migration to and from Victoria via a variety of stopover locations elsewhere in Australia. However, sightings in the November to mid March periods almost certainly indicate Red-necked Stints that have moved their non-breeding area away from Victoria. A few also reflect the wanderings of immature birds during their first austral winter (May to mid August records).

SHARP-TAILED SANDPIPER, *Calidris acuminata*

TAIWAN

15/04/2004	1	Chi-Feng, Pingtung County	Chung-Ying Chen
7/05/2004	1	Fubou, Chang Hwa County	Wen-Yin Hu
9/05/2004	1	Wu-Ku, Taipei County	Hsiu-li Lin

New South Wales **AUSTRALIA**

21/09/2003	1	Ash Island, Hunter Estuary, near Newcastle	Edwin Vella
22/09/2003	1	Bushells Lagoon	Keith Brandwood

Queensland **AUSTRALIA**

6/04/2003	1	Fishermans Island, Moreton Bay	Linda Cross et al
3/04/2004	1	Kedron Brook Wetlands	Dez Wells

Victoria **AUSTRALIA**

28/01/2004	1	Hird Swamp, near Terrik Terrick	A. Boyle, M.Tarburton, C. Colebourne

Western Australia **AUSTRALIA**

8/02/2004	1	Lake McLarty, near Pinjarra, SE of Perth	John Hansen and Allan Collins

The increased number of sightings in 2004, from a normally low level, is probably a result of several hundred Sharp-tailed Sandpipers being caught at Werribee Sewage Farm in late December 2003.

The sightings in Queensland in early April probably reflect the tendency of this species to move from Victoria in very early March to carry out their main pre-migratory fattening in the wetter regions of northern Australia.

CURLEW SANDPIPER, *Calidris ferruginea*

CHINA

Date seen	No.	Location seen	Observer
1/05/2004	1	Xuwei Saltworks near Lian Yun Gang	Mark Barter

TAIWAN

1/08/2003	1	Szu-Tsao, Tainan city	Cheng-feng Lee
3/09/2003	2	Chi-ku lagoon, Tainan County	Mr. Fu, Yung-Tsang
20/04/2004	1	Changhua County	Chung-Yu Chiang, the Team of Video Broadcast Co. Ltd. and the Taiwan Wader Study Group
20/04/2004	1	Changhua County	Chung-Yu Chiang, the Team of Video Broadcast Co. Ltd. and the Taiwan Wader Study Group
3/05/2004	1	Han-Pao, Changhua County	Taiwan Wader Study Group
4/05/2004	1	Szu-Tsao, Tainan city	Cheer
29/04/2004	1	Szu-Tsao, Tainan city	Pete Collins and Taiwan Wader Study Group

HONG KONG

1/04/2003	2	Mai Po Marshes	Richard Lewthwaite
2/04/2003	1	Mai Po Marshes	Richard Lewthwaite
11/04/2003	2	Mai Po Marshes	Richard Lewthwaite
17/04/2003	1	Mai Po Marshes	Geoff Carey
20/04/2003	2	Mai Po Marshes	Ying Hak King
20/04/2003	1	Mai Po Marshes	Apachae Lau
23/04/2003	1	Mai Po Marshes	Geoff Carey
23/04/2003	3	Mai Po Marshes	Yu Yat-Tung
29/04/2003	1	Mai Po Marshes	Richard Lewthwaite
3/05/2003	3	Mai Po Marshes	John Allcock
4/05/2003	1	Mai Po Marshes	Apachae Lau
27/07/2003	1	Mai Po Marshes	Yu Yat-Tung
22/04/2004	2	Mai Po Marshes	Yu Yat-Tung
23/04/2004	4	Mai Po Marshes	Tam Yiu-leung
24/04/2004	3	Mai Po Marshes	Tam Yiu-leung

New South Wales **AUSTRALIA**

21/09/2003	1	Ash Island, Hunter Estuary, near Newcastle	Edwin Vella
24/09/2003	1	Ash Island, Hunter Estuary, near Newcastle	Ann Lindsey

Queensland **AUSTRALIA**

27/09/2003	1	Manly Boat Harbour, Moreton Bay	Sandra Harding, David Milton, Barry& Joanna Morgan
25/10/2003	1	Deception Bay mangroves	Phil and Linda Cross
23/11/2003	1	Fishermans Island, Moreton Bay	Sandra Harding and Phil Cross
13/12/2003	1	Pine River, North Side	David Edwards
10/01/2004	1	Fishermans Island, Moreton Bay	David Edwards et al

South Australia **AUSTRALIA**

7/11/2003	1	Stony Point, Port Macdonnell	Maureen Christie and Lorraine Moore
2/02/2004	2	Murray River Mouth	Terry Dennis

Tasmania **AUSTRALIA**

24/01/2004	3	Robbins Island (Bird Point)	Peter Atkinson and Jim Hunter

Western Australia **AUSTRALIA**

4/08/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Inka Veltheim
6/08/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
4/09/2003	2	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
9/09/2003	2	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
15/09/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle
24/09/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Megan Underwood and Inka Veltheim
6/11/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle, Inka Veltheim, Megan Underwood
9/12/2003	2	Wader Beach, Roebuck Bay, Broome	Adrian Boyle
15/12/2003	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle and Chris Hassell
30/12/2003	1	Pelican Point, mouth of Gascoyne River, Carnarvon	Les George
5/02/2004	1	80 Mile Beach approx 10km S of Anna Plains access	Andrea Spencer, Shih Han, Chris Hassell
6/03/2004	1	Beaches, Crab Ck Rd, Roebuck Bay, Broome	Adrian Boyle

A nice series of flag sightings, but nothing like so extensive as for the Red-necked Stint. This reflects the current relatively low population of Curlew Sandpipers in Australia and therefore the reduced number caught and flagged in recent years.

As usual the main locations for overseas sightings were Hong Kong and Taiwan.

Most of the sightings in other places around Australia appear to be of birds that have changed their non-breeding areas from Victoria. The two August sightings at Broome, however, were birds in non-breeding plumage, clearly immatures that had moved north within Australia for their first winter.

GREY PLOVER, *Pluvialis squatarola*

CHINA

24/04/2004	1	Yalu Jiang National Nature Reserve	Gillian Vaughan, David Lawrie and Tony Habraken

This is the first flag sighting in China of a Grey Plover from Australia. Previous flag sightings have been in Japan and Korea.

DOUBLE-BANDED PLOVER, *Charadrius bicinctus*

NEW ZEALAND

1/01/2004	1	Lake Ellesmere, Canturbury, South Island	Tony Crocker

Another example of the well established movement of Double-banded Plovers between wintering grounds in south-east Australia and the breeding grounds of South Island, New Zealand.

GREATER SAND-PLOVER, *Charadrius leschenaultii*

New South Wales **AUSTRALIA**

15/02/2004	1	North Creek, Richmond Estuary, Ballina	Bo Totterman

This species is comparatively uncommon in Victoria and only 16 have been flagged. This bird appears to have changed its non-breeding area.

LESSER SAND-PLOVER, *Charadrius mongolus*

Queensland **AUSTRALIA**

28/09/2003	1	Fishermans Island, Moreton Bay	Linda Cross and Andrew Geering

Fewer than one hundred of this species normally spend the non-breeding season in Victoria and comparatively few have been flagged (55). This bird was probably on its way back to Victoria.

ACKNOWLEDGEMENTS

Thanks are due to all those people throughout the flyway who took the trouble to search for, record and submit leg flag sightings. Thanks are also due to the Australian Bird and Bat Banding Scheme for sightings reported through them.

During the year the leg flag database was maintained initially by Lauren Beasley and later by Inka Veltheim and April Reside. This work is carried out through funding provided by the Department of Environment and Heritage Australia through the AWSG. Their financial support is greatly appreciated.

IDENTIFYING AND MANAGING THREATS TO WADERS ON THE CENTRAL QUEENSLAND COAST THROUGH COOPERATION BETWEEN THE COMMUNITY AND LOCAL AND STATE GOVERNMENTS

SANDRA HARDING

336 Prout Road, Burbank Qld 4156 Australia pitta@gil.com.au

INTRODUCTION

Waders in the East Asian-Australasian Flyway face threats from humans throughout their migration paths. In Australia, there has been increasing competition between humans and waders for the use of coastal land, especially areas used by waders for high tide roosts. Driscoll (1997) identified the important regions for waders in Queensland. He identified the central coast around Mackay as the fourth most important region, with about 19,000 waders.

Local birdwatchers in Mackay recognised that a lack of conservation and management of wader sites along the Mackay coastline was becoming a major concern. These concerned residents contacted Queensland Wader Study Group (QWSG) and together we saw the potential for undertaking comprehensive counts of waders in the region to identify specific threats at key sites. At the time, the Federal government's Natural Heritage Trust provided funding to World Wild Fund for Nature, (WWF) Australia for the Shorebird Conservation Project. With devolved funding from the Shorebird Conservation Project, a shorebird project was set up to identify the wader values and to create greater awareness about waders in the Mackay region.

Specific objectives of the project set out to meet this end were:

- Surveying the wader roost sites
- Training local residents in wader identification
- Public education and awareness
- Providing management advice on wader roost sites

The components of this approach are also activities undertaken within the Action Plan for the Conservation of Migratory Shorebirds in the Asia-Pacific (Watkins and Mundkur 1997). All these activities are necessary to achieve visible on-ground conservation. All the activities within this Action Plan were developed to be applied within the entire Flyway. However, in this project I have tried to apply them at the local or regional level.

This paper deals with two aspects - the survey information collected and management recommendations. A summary is given of the species seen at the high tide roost sites in the three surveys undertaken in 2003 as part of the WWF project and in a subsequent survey undertaken in February 2004 with QWSG funding. Overall, management recommendations were made for roost sites at five locations, those for three locations are summarised here.

A significant requirement for the project was to identify important sites for waders (roost sites) and to bring them to the attention of local governments responsible for development planning in the vicinity of the wader roost. The local governments in the survey area are Mackay City Council, Sarina Shire Council and Whitsunday Shire Council.

SURVEYING THE ROOST SITES

The QWSG in conjunction with the Queensland Parks and Wildlife Service (QPWS) and local birdwatchers conducted a series of surveys of the waders along the Queensland coast from Ince Bay and Cape Palmerston (south of Sarina) north to Repulse Bay near Proserpine (approx 250 km south of Townsville). An initial reconnaissance survey was made in November 2002 by two teams each of two people on the ground. The pilot of an ultralight aircraft found the high tide roosts and guided the teams to them using VHF radio. The surveys, which involved about 35 bird watchers, were conducted in January, April and October of 2003 and in February 2004.

Altogether 54 sites were identified and counted. These were mostly roost sites. While all the sites are important, to provide an understanding of their relative importance, the sites with a maximum count of more than 300 but less than 1,000 and those with greater than 1,000 have been specifically mapped and the highest count presented.

The main survey costs were for air tickets for participants to fly from Brisbane to Mackay. However most of the work was self-funded being carried out by volunteers on the weekend. The QPWS provided most of the transport to the wader roost sites and this involved 4WD vehicles, boats and a helicopter.

RESULTS

Wader Counts

Figures 1, 2 and 3 show the location of the major sites and an indication of their importance for each of the three local government areas. Table 1 gives a list of all sites where birds were counted in the Mackay region and the maximum number of waders on any one visit for the major sites. Table 2 details counts of waders during each survey and identifies nine species that occur in internationally significant numbers in the region. Not all sites were counted on each survey due to weather conditions limiting access to some remote roost sites in Sand Bay and Ince Bay (Cape Palmerston area) in October 2003 and all roost sites in Ince Bay in February 2004.

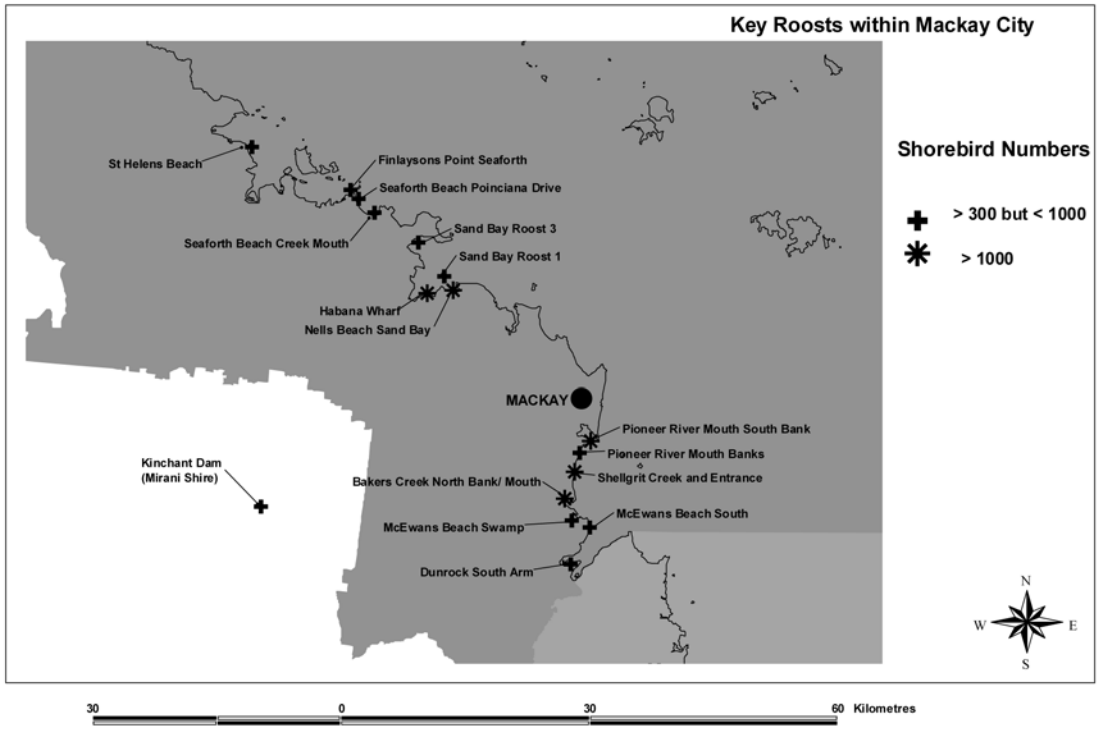


Figure 1. A map of the key wader roost sites in Mackay City Council jurisdiction and their significance for waders.

Management of Roost Sites

The foreshores for many of the wader roosts are subject to pressure from recreation activities and construction of new development. Each roost is subject to these threats to varying degrees. To determine the appropriate steps to maintain the viability of these sites as wader roosts it is necessary to consider land tenure, future land uses proposed in planning schemes, and the controls applicable to recreational activities.

For use by local governments, it is important to present the sites for management on maps that are on a scale that is consistent with their planning schemes. This is very detailed planning, often at a minimum scale of 1:10,000. The most efficient method of mapping was to use aerial photographs on which major roosts were individually mapped. Tenure, usually a form of reserve, was included on the roost maps for clarity. While the intertidal area of the foreshore is not within the reserve tenure, the land above the high water mark is often in a reserve. These reserves are often esplanade reserves and either under the control of the Queensland Department of Natural Resources and Mines and Energy (DNRME) or managed by the local government as trustee. Within urban areas and townships, these reserves are typically under control of the local government and are for community purposes (picnic areas, boat ramp facilities, playground areas) and some are dedicated for environmental purposes. It is important to ensure appropriate management of the reserves to protect the wader roosts from disturbance. Management of foreshores for waders needs both the local government and the DNRME to be informed of the habitat values and for them to work in cooperation with QPWS.

Specific Recommendations

Recommendations have been provided for specific roosts to illustrate the management approaches applicable to all roosts with similar issues. Three indicative case studies are considered here.

Blacks Beach Spit, Mackay City

This roost has had up to 584 waders (not during these surveys). It is an important roost for the waders feeding along the northern beaches of Mackay. While the roost benefits from being at the end of an undeveloped beach (see Fig. 4), the proximity to the township of Blacks Beach still means that the roost is subject to considerable disturbance.

The *Mackay City Council Local Law No. 68 (Parks and Reserves)* provides for restrictions on driving motor vehicles in a park or reserve. At the entrance to a vehicle track that runs behind the frontal dunes along the beach, a warning sign indicates that Council does not allow unauthorized vehicles to use the track. Penalties (fines) have been established in the local law. However, there is no awareness by the local residents that people could be fined or warned for driving vehicles along the track. As most people access the roost by driving down the track, it is suggested that by controlling this access, much of the disturbance could be reduced. Installing appropriate obstructions to vehicles

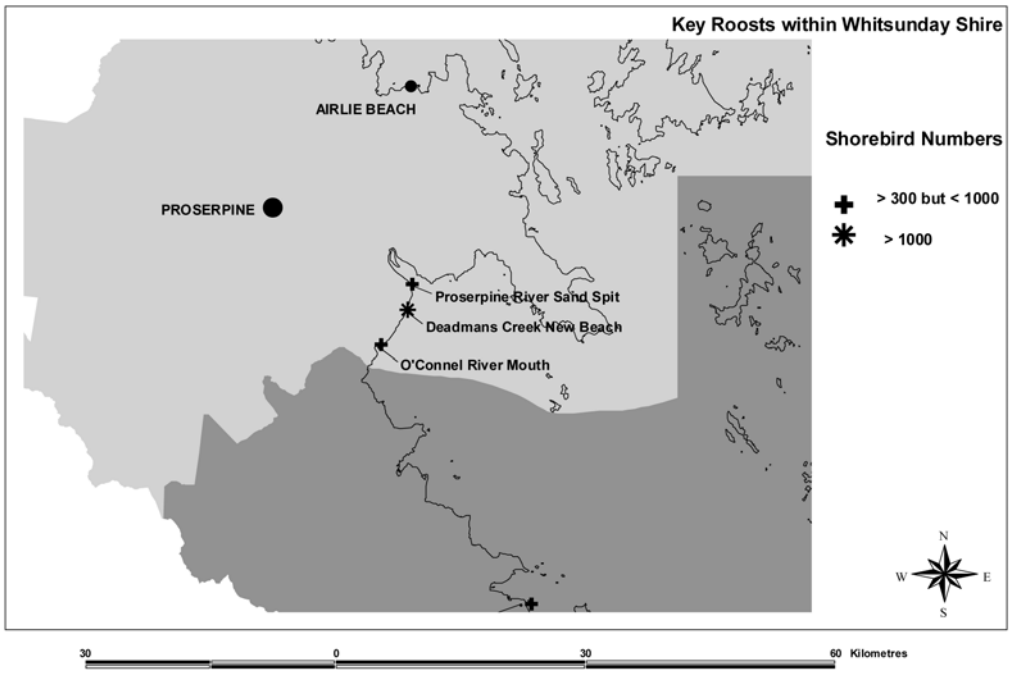


Figure 2. A map of the key wader roost sites in Whitsunday Shire Council jurisdiction and their significance for waders.

would assist. Most people are dissuaded from walking down the beach at high tide as the sand is soft and fallen trees lie across the beach.

The planning scheme needs to identify the roost and a buffer area of 200 m around the roost. Land use in the buffer area would be such as to not allow public access. This is required given the freehold tenure of the land and that development applications are already being considered for land uses which have the potential to increase disturbance to waders on the roost.

Protection of the roost would also benefit from interpretative signage placed at sites where people access the beach about not disturbing waders. Additional disturbance arises from the use of jet skis and power-boats, travelling at speed within the mouth of McReadies Creek, directly adjacent to the roost. Additional signs at the Slade Point side of the creek, where water-craft are launched may assist in reducing disturbance. It may also be possible to liaise with Boating and Fisheries Officers in an effort to increase enforcement of relevant regulations in this area (i.e. speed limits). A regular count of the waders would assist in monitoring disturbance and would support improved awareness resulting from Council actions to reduce disturbance. Additionally, keeping dogs on leashes will prevent them from chasing birds along the beach and at the spit.

St Helens Beach, Mackay City

The management of the foreshores lies with the DNRME as the tenure is unallocated State land. There are two roosts, St Helens Beach with a maximum count of 864 and St Helens Beach Claypan with 110 waders (Fig. 5). The areas used for roosting are highly susceptible to disturbance as they are close to the township. However, these roosting waders are also potential tourist attractions. The waders are easily viewed at high tide from the esplanade. In particular, there are large numbers of Pied Oystercatchers that are quite distinctive.

Providing appropriate access to the foreshores is crucial to ensure that the main wader roosting areas are not disturbed. Controlled beach access could be provided by appropriate signposting of access ways and provision of constructed pedestrian access. Vehicle access and boat ramps should not be provided where the birds are roosting. The Pied Oystercatchers are most likely to be nesting along the nearby foreshores and any vehicle access would be detrimental to their breeding success.

Interpretative signage about waders would work well in this location given the ease of viewing waders for people in the park along the foreshore.

Armstrongs Beach, Sarina Shire

The whole beach is a very important site for waders, having a maximum count of 2,089 for the Armstrongs Beach roost. Further counts to monitor the use of the beach would be useful. They would provide information on how beach use is influenced by wind, by tide levels, and by disturbance.

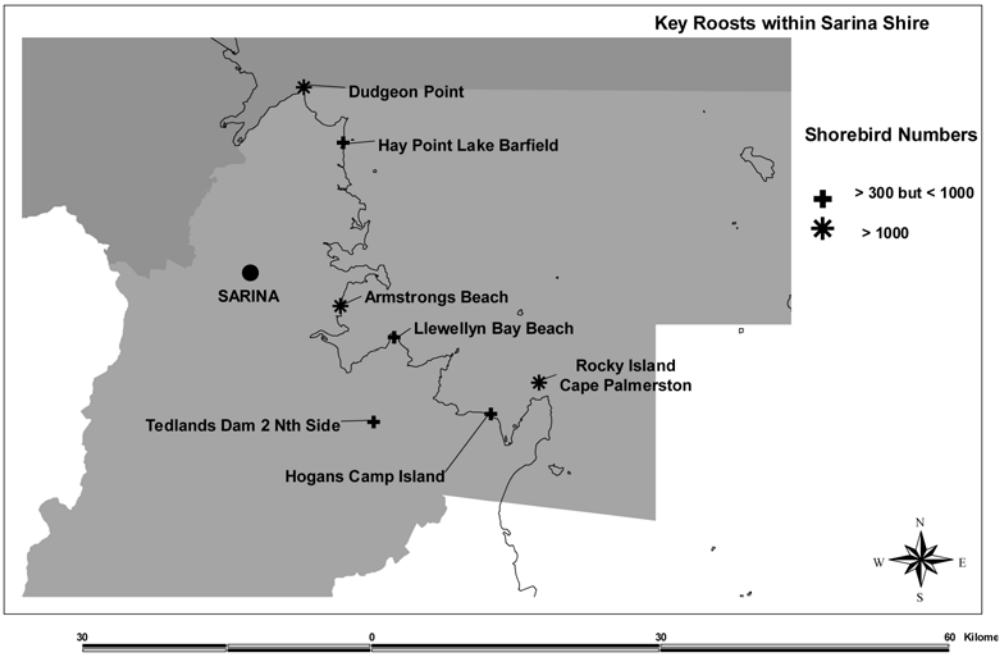


Figure 3. A map of the key wader roost sites in Sarina Shire Council jurisdiction and their significance for waders.

Birds roost along the length of Armstrongs Beach as far north as Freshwater Creek and as far south as Figtree Creek (Fig 6). The roosting site varies depending on how high the high tide is and where there is disturbance. There is also a roost site south of Figtree Creek (Armstrong south point roost). Although it does not have as many birds, the uncommon Sooty Oystercatcher is more likely to be seen there. Land tenure is a combination of Marine Park, road reserve and esplanade under Sarina Shire Council control.

The key management issue is minimizing human disturbance. At high tide, access to the roosts needs to be controlled. The waders congregate together at the mouths of creeks where they can safely rest and preen. Where possible, activities such as beach fishing, launching of boats, driving of vehicles and riding horses should be kept about 200 m from the creek mouths at high tide. Unleashed dogs are also an issue, as they tend to chase birds. Enforcing keeping dogs on leashes is recommended. This approach should be adopted in relevant planning documents and local laws. Information illustrating appropriate behaviour should be provided to residents through Council publications and in the general information to ratepayers. The Sarina Integrated Catchment Management Group could be approached for assistance in distribution of educational material. If necessary, a local law could include penalties to apply to the deliberate disturbance of waders at roosts. Also locally conducted regular counts would assist in providing information needed to develop appropriate management actions.

DISCUSSION

The surveys provided new data about the relative importance of the region for waders in Queensland. Nine species were found to occur in internationally significant numbers. Twelve roosts or freshwater wetlands were identified as having over 1,000 waders and a further 18 having between 300 and 1,000 waders. The final report (Harding and Milton 2003) to WWF Australia was also provided to local governments, catchment groups and local conservation groups.

The most important threats to the wader roosts studied were the possibility of urban expansion and human disturbance from both the landward and seaward sides. Local government or DNRME managed foreshore reserves can allow for the recreation needs of people while ensuring that appropriate buffer distances are established around wader roosts. Identified wader roosts and buffer areas (which may include adjacent freehold land) need to be mapped in the planning schemes. If this occurs, these roost sites can be protected from urban expansion. However, in order to maximise the protection of the birds, as well as their habitats, human encroachment of wader roosts also needs to be minimised. All appropriate powers (e.g. local laws and watercraft speed control) need to be applied to reduce the encroachment of wader roosts by people undertaking recreation activities along foreshores.

ACKNOWLEDGEMENTS

Projects such as this are only possible through the participation by large numbers of people. I thank all the local

Table 1. List of all the high tide roosts and freshwater wetlands counted during surveys in the Mackay region, broken down by local government area. Counts with over 300 waders are shown and those with more than 1,000 birds are highlighted in bold. Counts with fewer than 300 birds are listed, but no numbers are shown.

Site	Count	Site	Count
MACKAY		**MACKAY (continued)**	
Pioneer River mouth sth bank	**2,183**	St Helens Beach Claypans	-
Pioneer R mouth banks	799	Freshwater wetlands	-
Shellgrit Ck entrance	796	Kinchant Dam	585
Shellgrit Ck Mackay	**1,254**	Kinchant Dam Burrow Pits	-
Bakers Ck mouth	614	Mackay Port Wetland	-
North bank Bakers Ck	385	**SARINA**	
Blacks Beach	-	Armstrongs Beach	**2,089**
Blacks Beach Spit	375	Armstrongs south point	417
Bucasia Ck mouth	-	Llewellyn Bay Beach	543
Dunrock south bank Sandy Ck	-	Cape Creek Beach mouth	-
Dunrock town	-	Coconut Ck, Ince Bay	-
Dunrock South Arm	506	Hogan's Camp Is	326
Shoal Point	-	Ince Bay Roost 6	-
Finlayson Point Seaforth	-	Rocky Island, Cape Palmerston	**1,414**
Hodges Lagoon Shoal Pt	-	Dudgeon Pt	**1,430**
Sand Bank NE McEwans Beach	-	Dudgeon Pt Beach	-
McEwans Beach south	776	Dudgeon Pt Ck mouth	-
McEwans Beach Swamp	445	Dudgeon Pt Claypan	-
Habana wharf	**1,387**	Dudgeon Pt wetland	-
Habana wharf Claypan	-	Freshwater wetlands	
Nells Beach Sand Bay	**1,654**	Hay Pt Lake Barfield	798
Sand Bay Roost 1	870	Tedlands wetland	367
Sand Bay Roost 2	-	Tedlands Dam 2 N side	**1,055**
Sand Bay Roost 3	**2,366**	**WHITSUNDAY**	
Sand Bay Roost 4	-	Deadmans Ck New Beach	**2,283**
Seaforth Beach Ck mouth	475	O'Connell River mouth	**3,925**
Seaforth Beach Poinsiana Drive	400	Proserpine River Sand Spit	715
St Helens Beach	864	Repulse Bay	-

residents and QWSG members who helped with the project and joined in the wader surveys. However, I especially thank Derek Ball from Queensland Parks and Wildlife Service (QPWS) in Mackay for help in facilitating the surveys and coordinating QPWS support, Maureen Cooper for accommodating and catering for large numbers of QWSG members during each survey and Linda Cross for tireless help with all the details of the logistics of each survey. The project was partly funded by the Natural Heritage Trust, QPWS and QWSG.

REFERENCES

Driscoll, P.D. 1997. The distribution of waders along the Queensland coastline. In: Straw, P. (ed.) Shorebird Conservation in the Asia-Pacific Region pp 80-122. AWSG, Melbourne.

Harding, S.B. & D.A. Milton. 2003. Mackay shorebird plan final report. Queensland Wader Study Group report to WWF Australia.

Watkins, D. & T. Mundkur. 1997. Developing an action plan for the conservation of migratory shorebirds in the Asia-Pacific. In: Straw, P. (ed.) Shorebird Conservation in the Asia-Pacific Region pp 76-79. AWSG, Melbourne.

Table 2. The number of each species of wader seen during the four surveys in the Mackay region from the reconnaissance in November 2002 to February 2004. Species that occur in internationally significant numbers are shaded with the highest count in bold.

English name	**Scientific Name**	**Survey period**				
		Nov 2002	**Jan 2003**	**Apr 2003**	**Oct 2003**	**Feb 2004**
Black-tailed Godwit	*Limosa limosa*	-	331	-	116	71
Bar-tailed Godwit	*Limosa lapponica*	1,242	**4,360**	236	1,530	2,350
Little Curlew	*Numenius minutus*	-	16	-	1	-
Whimbrel	*Numenius phaeopus*	332	813	1,586	**1,647**	1,009
Eastern Curlew	*Numenius madagascariensis*	546	**1,324**	448	1,235	294
Marsh Sandpiper	*Tringa stagnatilis*	5	50	5	2	11
Common Greenshank	*Tringa nebularia*	88	153	80	148	119
Terek Sandpiper	*Xenus cinereus*	21	152	179	172	329
Common Sandpiper	*Actitis hypoleucos*	-	2	-	-	-
Grey-tailed Tattler	*Heteroscelus brevipes*	46	417	**1,311**	929	893
Ruddy Turnstone	*Arenaria interpres*	-	61	98	10	38
Great Knot	*Calidris tenuirostris*	447	5,679	229	1,935	**6,093**
Red Knot	*Calidris canutus*	-	31	29	251	7
Red-necked Stint	*Calidris ruficollis*	162	1,995	844	1,676	763
Sharp-tailed Sandpiper	*Calidris acuminata*	25	1,030	4	1,006	68
Curlew Sandpiper	*Calidris ferruginea*	40	90	13	191	6
Comb-crested Jacana	*Irediparra gallinacea*	-	18	2	1	1
Bush Stone-curlew	*Burhinus magnirostris*	-	12	5	3	4
Beach Stone-curlew	*Burhinus neglectus*	2	4	10	2	7
Pied Oystercatcher	*Haematopus longirostris*	134	**662**	477	223	536
Sooty Oystercatcher	*Haematopus fuliginosus*	10	**40**	33	20	35
Black-winged Stilt	*Himantopus himantopus*	15	268	39	8	62
Pacific Golden Plover	*Pluvialis fulva*	59	457	208	775	41
Grey Plover	*Pluvialis squatarola*	91	113	89	39	176
Red-capped Plover	*Charadrius ruficapillus*	57	356	231	419	155
Double-banded Plover	*Charadrius bicinctus*	-	-	1	-	-
Lesser Sand Plover	*Charadrius mongolus*	33	1,817	895	499	**1,887**
Greater Sand Plover	*Charadrius leschenaultii*	14	493	170	**1,462**	1,077
Black-fronted Dotterel	*Charadrius melanops*	4	20	2	19	1
Red-kneed Dotterel	*Erythrogonys cinctus*	-	4	-	3	-
Masked Lapwing	*Vanellus miles*	14	81	118	76	54
Australian Pratincole	*Stiltia isabella*	-	4	-	-	-
Snipe sp.		-	-	-	1	-
Unid. Tattler		-	9	-	-	-
Unid. large waders		-	-	21	-	1
Unid. medium waders		60	53	108	202	-
Unid. Sand Plovers		-	714	140	-	-
Unid. small waders		21	-	179	-	35
Unid. waders		-	-	200	150	-
TOTAL		3,868	21,629	7,990	14,751	16,276

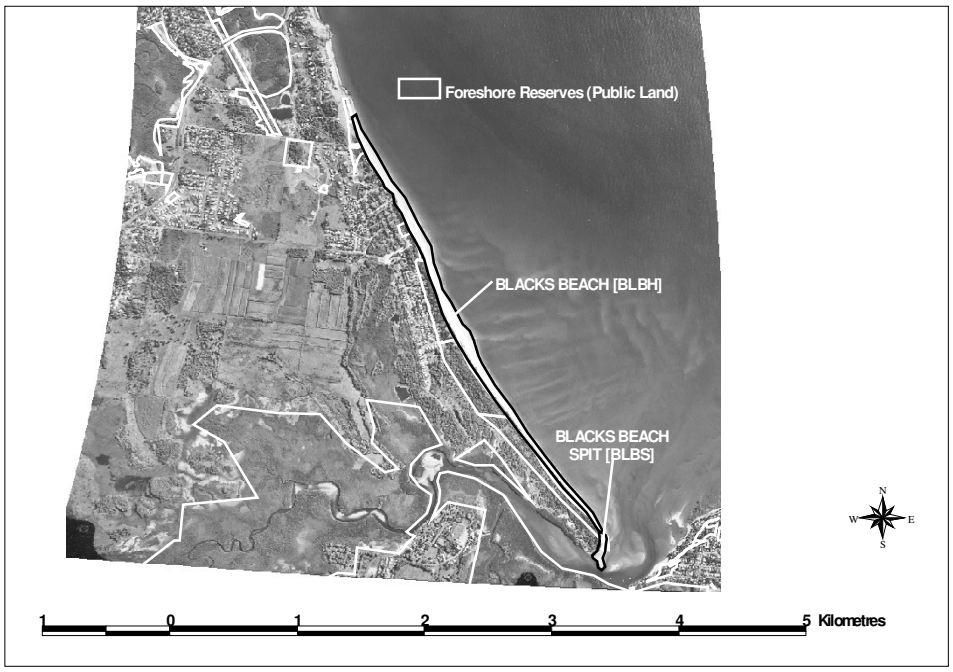


Figure 4. Aerial photograph of the Blacks Beach spit high tide roost site, the existing road reserves and the main access roads to the site. The shorebird roost is defined by the line that encloses the eastern extent of the beach. A colour version of this figure is available from the author.

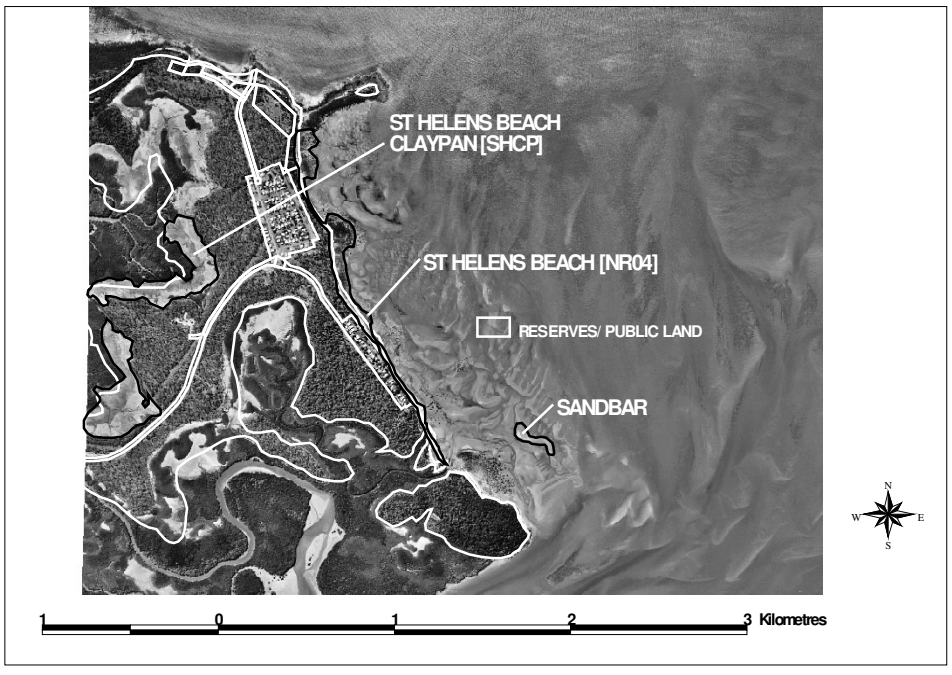


Figure 5. Aerial photograph of St Helens showing the main shorebird high tide roost sites, existing foreshore reserves and the main road access to the site**.** The shorebird roosts enclose the main beach area, the sandbar and the two large claypans to the west and southwest of the township. A colour version of this figure is available from the author.

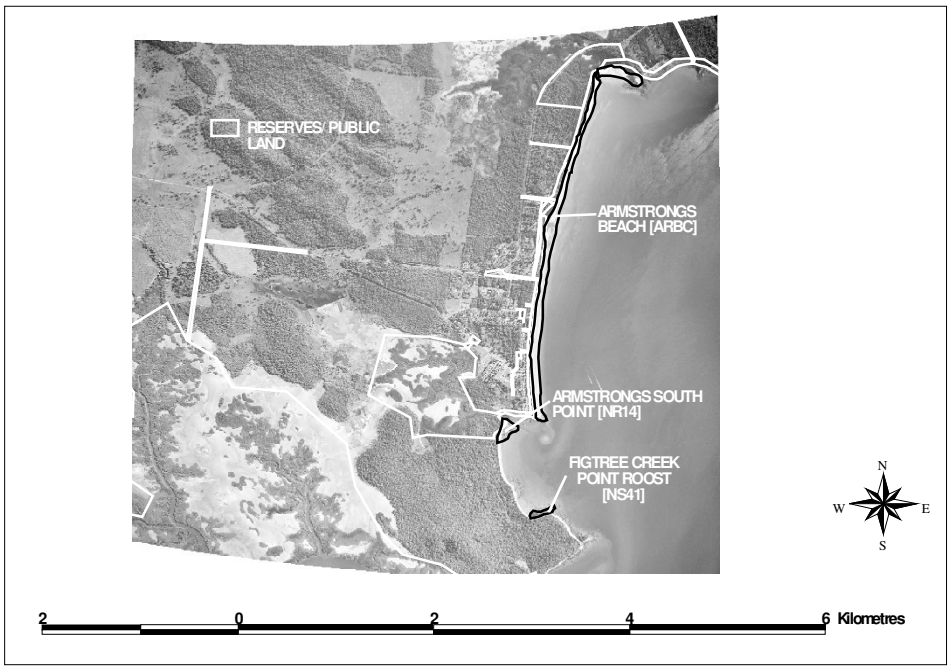


Figure 6. Aerial photograph of Armstrongs Beach, Sarina Shire showing the main shorebird high tide roost sites, existing foreshore reserves and the main road access to the site. The shorebird roosting area encloses the main beach, the south bank of Figtree Ck mouth and the northern end of Figtree Pt. A colour version of this figure is available from the author.

REPORT ON POPULATION MONITORING COUNTS, 2003

JENNY SKEWES

13 Waterloo Street, Heathmont, Vic 3135, Australia

The Population Monitoring Project (PMP) counts for summer and winter of 2003 are published below. The report covers 31 wader sites around Australia as explained in Skewes 2003. There was very good coverage of these sites in 2003, especially in the summer period, for which we have counts for all but two sites. Winter was not so well covered.

It was particularly pleasing that an extensive count was carried out of the Western Eyre Peninsula. Jane Cooper assembled a dedicated team which spent several weeks travelling long distances to cover a large area of coastline. During the same period a small team led by David Close carried out counts within the same area, particularly on off-shore islands which the other group did not count. The results from both groups have been judiciously combined. Though it is not possible to rule out some double counting for this site, over 30,000 waders of 28 species were counted. It was a terrific effort by all concerned.

Another count which restarted after some years was for the Darwin area. Niven McCrie organised a team to count four popular wader sites in November 02. In Broome and Darwin the summer counts are done at the end of the preceding year, when numbers seem most stable. In Darwin it is not possible to count a closed system of wader roosts, as it is for example in Westernport, Victoria, because there are always roosts available which are inaccessible to counters. However, it is better to have partial information than none, and we are very pleased to receive the Darwin data. In 2004, regular PMP counts are being carried out, under the co-ordination of Arthur and Sheryl Keates.

Once again our thanks go to all the dedicated observers, co-ordinators and organisers of transport without whom this important information could not be gathered. Please keep up the good work, and keep sending in your data!

Andrew Silcocks and some volunteers at the Birds Australia office have continued to develop the Australasian Wader Studies Group Wader Count database. Access to the database, both for entering data to it and preparing reports from it, has been made easier and the register of sites, and associated sub-sites, is being? brought up to date. Population monitoring counts and other count data continue to be added. I would encourage anyone who has counts of any Australian wetlands to submit them for inclusion in the database. This applies to historical or current data, and to regular or occasional counts. Please send any counts to Jenny Skewes at the address above.

REFERENCE

Skewes, J. 2003. Report on population monitoring counts, 2002. Stilt 44: 56-63.

SUMMER 2003	**QUEENSLAND**					**NEW SOUTH WALES**						
	Cairns	Townsville	Mackay	Moreton Bay	Bowen	Tweed	Richmond	Clarence	Hunter	Parramatta R	Botany Bay	Shoalhaven
Date							~24/2	~24/2	~24/2	~24/2	~24/2	~24/2
Latham's Snipe	-	-		-	-	61	-	-	-	-	-	-
Black-tailed Godwit	-	100		367	55	-	-	166	131	-	-	-
Bar-tailed Godwit	2	1806	N	5179	526	-	146	293	858	216	351	390
Little Curlew	-	2	O	-	-	-	-	-	-	-	-	-
Whimbrel	1	979	T	345	615	-	18	29	16	-	60	28
Eastern Curlew	-	867		1647	224	13	37	173	520	-	207	129
Marsh Sandpiper	9	6	C	56	452	1	-	27	168	-	-	
Common Greenshank	11	89	O	157	300	2	11	34	66	-	7	2
Wood Sandpiper	-	-	U	-	-	-	-	-	-	-	-	-
Terek Sandpiper	-	68	N	1	-	2	31	18	-	-	-	-
Common Sandpiper	-	13	T	-	65	-	-	-	3	-	1	-
Grey-tailed Tattler	-	607	E	52	-	-	23	32	15	-	86	1
Wandering Tattler	-	-	D	-	-	-	-	-	-	-	-	-
Tattler Spp	-	-		-	-	-	-	-	-	-	-	-
Ruddy Turnstone	-	-		28	49	-	36	22	-	-	13	-
Great Knot	-	18702		732	162	-	25	300	3	-	-	1
Red Knot	-	200		40	8	-	2	-	9	-	-	-
Sanderling	-	-		-	-	-	56	-	-	-	-	-
Red-necked Stint	84	5429		924	2394	-	83	63	52	-	160	57
Pectoral Sandpiper	-	-		-	-	-	-	-	-	-	-	-
Sharp-tailed Sandpiper	161	1062		133	2997	-	4	95	1201	-	-	-
Curlew Sandpiper	12	49		308	3333	-	7	-	241	4	4	-
Bush Stone-curlew	6	-		-	-	-	-	-	-	-	-	-
Beach Stone-curlew	-	16		-	-	-	-	-	-	-	-	-
Pied Oystercatcher	-	42		199	118	-	12	10	29	-	50	16
Sooty Oystercatcher	-	-		-	1	-	8	16	-	-	12	-
Black-winged Stilt	-	38		440	1418	1654	68	323	910	241	3	-
Banded Stilt	-	-		-	-	-	-	-	-	-	-	-
Red-necked Avocet	-	-		41	228	-	-	119	3869	24	-	-
Pacific Golden Plover	18	75		189	78	-	114	118	149	5	10	105
Grey Plover	-	4		-	-	-	-	-	-	-	-	-
Red-capped Plover	-	683		178	2069	-	7	25	16	-	11	46
Double-banded Plover	-	-		-	-	-	-	-	-	-	-	39
Lesser Sand Plover	60	511		601	606	-	1	9	-	-	2	-
Greater Sand Plover	4	291		8	795	1	41	13	-	-	-	-
Oriental Plover	-	-		-	-	-	-	-	-	-	-	-
Black-fronted Dotterel	-	4		-	128	97	-	6	10	4	-	-
Hooded Plover	-	-		-	-	-	-	-	-	-	-	-
Red-kneed Dotterel	-	-		26	-	9	-	2	-	-	-	-
Banded Lapwing	-	1		-	-	-	-	-	-	-	-	-
Masked Lapwing	7	59		22	401	472	12	68	35	52	9	2
Long-toed Stint	-	-		-	-	-	-	-	-	-	-	-
Redshank	-	-		-	-	-	-	-	-	-	-	-
Broad-billed Sandpiper	-	7		-	-	-	-	-	-	-	-	-
Ruff	-	-		-	-	-	-	-	-	-	-	-
Swinhoe's Snipe	-	-		-	-	-	-	-	-	-	-	-
Asian Dowitcher	-	-		-	-	-	-	-	-	-	-	-
Oriental Pratincole	-	-		-	-	-	-	-	-	-	-	-
Australian Pratincole	-	-		-	-	-	-	-	-	-	-	-
Unidentified waders	-	993		-	332	1	-	-	-	-	-	-
TOTAL	375	32703		11673	17354	2313	742	1961	8301	546	986	816
No. SPECIES	12	28		23	24	11	21	23	20	7	16	12

SUMMER 2003	**VICTORIA**							**TASMANIA**			
	Corner Inlet East	Corner Inlet West	Westernport	East Port Phillip	Altona (Point Cook)	Wrrbee/Avalon	BellarinePen/ Mud Is	E Derwent/ Pittwater	Marion & Blackman Bays	North West	Cape Portland/ NNE
Date	14/2	30/1	1/2	23/2	22/1	7/2	~8/2				
Latham's Snipe	-	-	-	1	-	-	94	-	-	2	-
Black-tailed Godwit	-	-	-	-	-	11	4	-	-	-	-
Bar-tailed Godwit	7400	333	354	-	-	-	160	53	-	-	19
Little Curlew	-	-	-	-	-	-	-	-	-	-	-
Whimbrel	-	10	35	-	-	-	-	4	-	-	-
Eastern Curlew	940	150	557	-	-	2	103	64	-	191	44
Marsh Sandpiper	-	-	-	-	51	86	87	-	-	-	-
Common Greenshank	14	22	79	-	15	75	317	31	-	36	1
Wood Sandpiper	-	-	-	-	-	-	-	-	-	-	-
Terek Sandpiper	-	-	2	-	-	-	-	-	-	1	-
Common Sandpiper	-	-	-	-	-	-	-	-	-	-	-
Grey-tailed Tattler	-	-	4	-	-	1	1	-	-	5	4
Wandering Tattler	-	-	-	-	-	-	-	-	-	-	-
Tattler Spp	-	-	-	-	-	-	-	-	-	-	-
Ruddy Turnstone	70	-	106	-	-	-	-	-	-	2217	90
Great Knot	400	10	-	-	-	-	-	-	-	1	-
Red Knot	2100	370	60	-	-	-	-	-	-	12	-
Sanderling	50	-	-	-	-	-	-	-	-	-	1
Red-necked Stint	13500	2020	4246	11	8343	13642	14777	1145	407	7938	910
Pectoral Sandpiper	-	-	-	-	-	-	-	-	-	-	-
Sharp-tailed Sandpiper	5	-	281	-	671	2456	3990	-	-	154	3
Curlew Sandpiper	550	430	863	-	1723	1453	1399	99	2	68	37
Bush Stone-curlew	-	-	-	-	-	-	-	-	-	-	-
Beach Stone-curlew	-	-	-	-	-	-	-	-	-	-	-
Pied Oystercatcher	786	128	256	-	-	33	70	640	150	1192	68
Sooty Oystercatcher	154	174	1	-	-	-	-	13	1	790	38
Black-winged Stilt	-	-	-	21	109	385	457	-	-	-	-
Banded Stilt	-	-	-	-	85	68	820	-	-	-	-
Red-necked Avocet	-	-	2	-	470	1166	166	-	-	-	-
Pacific Golden Plover	-	-	17	-	-	19	31	44	-	521	44
Grey Plover	300	-	-	-	-	-	-	-	-	4	-
Red-capped Plover	-	-	79	-	53	48	215	69	8	133	81
Double-banded Plover	1	-	-	-	-	1	3	-	-	12	2
Lesser Sand Plover	2	-	-	-	-	-	-	-	-	2	-
Greater Sand Plover	1	-	-	-	-	-	-	-	-	-	-
Oriental Plover	-	-	-	-	-	-	-	-	-	-	-
Black-fronted Dotterel	-	-	-	25	-	4	14	-	-	-	-
Hooded Plover	-	-	-	-	-	-	3	-	7	49	-
Red-kneed Dotterel	-	-	-	-	-	6	35	-	-	-	-
Banded Lapwing	-	-	-	-	-	-	-	-	-	-	13
Masked Lapwing	-	25	181	152	75	296	459	420	31	76	24
Long-toed Stint	-	-	-	-	-	-	-	-	-	-	-
Redshank	-	-	-	-	-	-	-	-	-	-	-
Broad-billed Sandpiper	-	-	-	-	-	-	-	-	-	-	-
Ruff	-	-	-	-	-	-	-	-	-	-	-
Swinhoe's Snipe	-	-	-	-	-	-	-	-	-	-	-
Asian Dowitcher	-	-	-	-	-	-	-	-	-	-	-
Oriental Pratincole	-	-	-	-	-	-	-	-	-	-	-
Australian Pratincole	-	-	-	-	-	-	-	-	-	-	-
Unidentified waders	-	-	-	-	-	-	-	-	-	-	-
TOTAL	26273	3672	7123	210	11595	19752	23205	2582	606	13404	1379
No. SPECIES	16	11	17	5	10	18	21	11	7	20	16

SUMMER 2003	**SA**			**WA**				**NT**	**Total**
	SE coast SA	Gulf St Vincent	West Eyre pen	Albany	Swan Est/ Rottnest	80 Mile (10-30 km)	Broome	Darwin	All Sites
Date	20/2		J/F/M	Feb	Feb	11/12	19/12	18/11	
Latham's Snipe	-		-	-	-	-	-	-	158
Black-tailed Godwit	-		-	-	-	1	1785	-	2620
Bar-tailed Godwit	-		832	29	10	13897	7275	12	40141
Little Curlew	-		-	-	-	10	115	2	129
Whimbrel	-	N	8	5	1	7	245	9	2415
Eastern Curlew	2	O	26	-	-	119	332	2	6349
Marsh Sandpiper	-	T	-	-	-	178	-	34	1155
Common Greenshank	12		473	34	6	772	140	5	2711
Wood Sandpiper	-	C	-	-	-	-	-	-	0
Terek Sandpiper	-	O	-	-	-	4555	805	6	5489
Common Sandpiper	-	U	1	2	-	-	3	5	93
Grey-tailed Tattler	-	N	8	11	4	3002	1180	40	5076
Wandering Tattler	-	T	-	-	-	-	-	-	0
Tattler Spp	-	E	-	-	-	-	-	-	0
Ruddy Turnstone	433	D	743	10	299	55	115	38	4324
Great Knot	-		622	260	8	26985	15935	201	64347
Red Knot	-		556	63	-	591	855	-	4866
Sanderling	-		787	-	80	109	-	35	1118
Red-necked Stint	1317		13858	235	1035	4531	4875	38	102074
Pectoral Sandpiper	-		-	-	-	-	-	-	0
Sharp-tailed Sandpiper	55		2924	8	8	3	-	13	16224
Curlew Sandpiper	115		2140	76	115	693	930	-	14651
Bush Stone-curlew	-		-	-	-	-	-	3	9
Beach Stone-curlew	-		-	-	-	-	-	1	17
Pied Oystercatcher	4		1078	6	93	10	54	2	5046
Sooty Oystercatcher	2		530	-	-	-	20	-	1760
Black-winged Stilt	-		7	445	60	-	-	123	6702
Banded Stilt	-		1567	1	7649	-	-	-	10190
Red-necked Avocet	-		71	18	8	3	-	-	6185
Pacific Golden Plover	130		88	38	-	10	3	30	1836
Grey Plover	-		1074	14	43	133	207	12	1791
Red-capped Plover	33		4719	-	243	1035	600	16	10367
Double-banded Plover	4		2	-	-	-	-	-	64
Lesser Sand Plover	-		30	15	-	-	7	9	1855
Greater Sand Plover	-		17	-	4	7435	1956	406	10972
Oriental Plover	-		-	-	-	16340	406	-	16746
Black-fronted Dotterel	-		-	-	-	-	-	-	292
Hooded Plover	3		9	-	-	-	-	-	71
Red-kneed Dotterel	-		6	-	-	-	-	17	101
Banded Lapwing	-		129	-	41	-	-	-	184
Masked Lapwing	59		322	-	-	-	-	15	3274
Long-toed Stint	-		-	-	-	-	-	-	0
Redshank	-		-	-	-	1	-	-	1
Broad-billed Sandpiper	-		-	-	-	-	26	-	33
Ruff	-		-	-	-	-	-	-	0
Swinhoe's Snipe	-		-	-	-	-	-	-	0
Asian Dowitcher	-		-	-	-	-	-	-	0
Oriental Pratincole	-		-	-	-	27	11	-	38
Australian Pratincole	-		-	-	-	-	-	12	12
Unidentified waders	-		-	-	4	-	12000	-	13330
TOTAL	2169		32627	1270	9711	80502	49880	1086	364816
No. SPECIES	13		28	18	19	25	25	26	50

WINTER 2003	**QUEENSLAND**					**NEW SOUTH WALES**						
	Cairns	Townsville	Mackay	Moreton Bay	Bowen	Tweed	Richmond	Clarence	Hunter	Parramatta R	Botany Bay	Shoalhaven
Date							14/6		14/6	20/6	14/6	1/8
Latham's Snipe				-	-	-	-		-	-	-	-
Black-tailed Godwit				57	-	-	-		1	-	-	-
Bar-tailed Godwit				234	-	-	5-8		129	15	119	107
Little Curlew				-	-	-			-	-	-	-
Whimbrel	N	N	N	144	3	-	-	N	11	-	-	-
Eastern Curlew	O	O	O	322	1	-	-	O	63	-	20	9
Marsh Sandpiper	T	T	T	-	-	-	-	T	4	-	-	-
Common Greenshank				2	1	-	-		-	-	-	-
Wood Sandpiper	C	C	C	-	-	-	-	C	-	-	-	-
Terek Sandpiper	O	O	O	-	-	-	1	O	-	-	1	-
Common Sandpiper	U	U	U	-	-	-	-	U	-	-	-	-
Grey-tailed Tattler	N	N	N	77	-	-	9	N	-	-	5	-
Wandering Tattler	T	T	T	-	-	-	-	T	-	-	-	-
Tattler Spp	E	E	E	-	-	-	-	E	-	-	-	-
Ruddy Turnstone	D	D	D	-	-	-	-	D	-	-	2	-
Great Knot				70	-	-	-		-	-	-	-
Red Knot				-	-	-	-		-	-	-	-
Sanderling				-	-	-	-		-	-	-	-
Red-necked Stint				3	18	-	21		-	-	25	3
Pectoral Sandpiper				-	-	-	-		-	-	-	-
Sharp-tailed Sandpiper				-	-	-	-		-	-	-	-
Curlew Sandpiper				1	-	-	-		-	-	-	-
Bush Stone-curlew				-	-	-	-		-	-	-	-
Beach Stone-curlew				1	-	-	-		-	-	-	-
Pied Oystercatcher				71	1	-	5		5	-	61	-
Sooty Oystercatcher				1	-	-	6		-	-	9	-
Black-winged Stilt				1368	31	11	35		655	55	11	-
Banded Stilt				-	-	-	-		-	-	-	-
Red-necked Avocet				-	-	-	-		4115	51	-	-
Pacific Golden Plover				10	-	-	16		-	-	-	3
Grey Plover				-	-	-	-		-	-	-	-
Red-capped Plover				57	42	-	10		59	10	17	108
Double-banded Plover				35	-	-	38		-	-	58	72
Lesser Sand Plover				-	-	-	-		-	-	-	-
Greater Sand Plover				-	-	-	-		-	-	-	-
Oriental Plover				-	-	-	-		-	-	-	-
Black-fronted Dotterel				2	2	-	-		23	26	-	-
Hooded Plover				-	-	-	-		-	-	-	-
Red-kneed Dotterel				-	-	-	-		2	5	-	-
Banded Lapwing				-	-	-	-		-	-	-	-
Masked Lapwing				37	26	4	7		83	8	2	-
Long-toed Stint				-	-	-	-		-	-	-	-
Redshank				-	-	-	-		-	-	-	-
Broad-billed Sandpiper				-	-	-	-		-	-	-	-
Ruff				-	-	-	-		-	-	-	-
Swinhoe's Snipe				-	-	-	-		-	-	-	-
Asian Dowitcher				-	-	-	-		-	-	-	-
Unidentified small				-	-	-	-		-	-	-	-
Unidentified medium				-	-	-	-		-	-	-	-
Unidentified large				-	-	-	-		-	-	-	-
TOTAL				2492	125	15	206		5150	170	330	302
No. SPECIES				18	9	2	11		12	7	12	6

WINTER 2003	**VICTORIA**							**TASMANIA**			
	Corner Inlet East	Corner Inlet West	Westernport	East Port Phillip	Altona (Pt Cook)	Wrrbee/Avalon	BellarinePen/ Mud Is	E Derwent/ Pittwater	Marion & Blackman Bays	North West	Cape Portland/ NNE
Date	3/6	11/8	14/6		11/7	11/7	13/7	27/6	23/6	12/7	
Latham's Snipe	-	-	-	-	-	-	-	-	-	-	
Black-tailed Godwit	-	-	-	-	-	3	-	-	-	-	
Bar-tailed Godwit	370	380	72	-	-	30	1	15	2	7	
Little Curlew	-	-	-	-	-	-	-	-	-	-	
Whimbrel	-	-	32	-	-	-	-	-	-	-	N
Eastern Curlew	22	140	68	-	-	-	24	2	-	7	O
Marsh Sandpiper	-	-	-	-	-	-	13	-	-	-	T
Common Greenshank	-	1	-	-	-	3	26	7	-	-	
Wood Sandpiper	-	-	-	-	-	-	-	-	-	-	C
Terek Sandpiper	-	-	1	-	-	-	-	-	-	-	O
Common Sandpiper	-	-	-	-	-	-	-	-	-	-	U
Grey-tailed Tattler	-	-	-	-	-	-	-	-	-	-	N
Wandering Tattler	-	-	-	-	-	-	-	-	-	-	T
Tattler Spp	-	-	-	-	-	-	-	-	-	-	E
Ruddy Turnstone	-	-	6	-	-	-	-	-	-	333	D
Great Knot	-	-	-	-	-	-	-	-	-	-	
Red Knot	400	65	63	-	-	-	14	-	-	-	
Sanderling	4	-	-	-	-	-	-	-	-	1	
Red-necked Stint	1600	540	543	-	78	306	517	108	170	719	
Pectoral Sandpiper	-	-	-	-	-	-	-	-	-	-	
Sharp-tailed Sandpiper	-	-	-	-	-	-	-	-	-	-	
Curlew Sandpiper	6	120	4	2	-	-	34	-	-	26	
Bush Stone-curlew	-	-	-	-	-	-	-	-	-	-	
Beach Stone-curlew	-	-	-	-	-	-	-	-	-	-	
Pied Oystercatcher	670	97	277	-	-	26	45	729	122	130	
Sooty Oystercatcher	140	110	1	-	-	-	-	51	-	278	
Black-winged Stilt	-	-	-	165	48	351	427	-	-	-	
Banded Stilt	-	-	-	-	-	1	-	-	-	-	
Red-necked Avocet	-	-	181	6	290	109	158	-	-	-	
Pacific Golden Plover	-	-	-	-	-	-	-	-	-	-	
Grey Plover	12	-	-	-	-	-	-	-	-	8	
Red-capped Plover	24	-	88	6	118	128	253	237	42	156	
Double-banded Plover	85	163	218		190	27	157	170		1161	
Lesser Sand Plover	-	-	-	-	-	-	-	-	-	-	
Greater Sand Plover	-	-	-	-	-	-	-	-	-	-	
Oriental Plover	-	-	-	-	-	-	-	-	-	-	
Black-fronted Dotterel	-	-	-	96	-	32	35	9	3	-	
Hooded Plover	5	-	-	-	-	-	12	17	3	64	
Red-kneed Dotterel	-	-	-	62	-	12	-	-	-	-	
Banded Lapwing	-	-	-	-	-	-	-	-	-	-	
Masked Lapwing	-	3	145	80	55	148	430	201	25	15	
Long-toed Stint	-	-	-	-	-	-	-	-	-	-	
Redshank	-	-	-	-	-	-	-	-	-	-	
Broad-billed Sandpiper	-	-	-	-	-	-	-	-	-	-	
Ruff	-	-	-	-	-	-	-	-	-	-	
Swinhoe's Snipe	-	-	-	-	-	-	-	-	-	-	
Asian Dowitcher	-	-	-	-	-	-	-	-	-	-	
Unidentified small	-	-	-	-	-	-	1	-	-	-	
Unidentified medium	-	-	-	-	-	-	-	-	-	-	
Unidentified large	-	-	-	-	-	-	-	-	-	-	
TOTAL	3342	1619	1699	417	779	1176	2147	1546	367	2905	
No. SPECIES	13	10	14	7	6	13	16	11	7	13	

WINTER 2003	SA				WA			NT	Total
	SE coast SA	Gulf St Vincent	Eyre peninsula	Albany	Swan Est/ Rottnest	80 Mile (km 10-30)	Broome	Darwin	All Sites
Date	17/7				28/6	3/7	6/6		
Latham's Snipe	-				-	-	-		0
Black-tailed Godwit	-				-	-	350		411
Bar-tailed Godwit	-				-	1487	1940		4966
Little Curlew	-				-	-	-		0
Whimbrel	-	N	N	N	-	-	-	N	190
Eastern Curlew	-	O	O	O	-	35	206	O	919
Marsh Sandpiper	-	T	T	T	-	2	-	T	19
Common Greenshank	-				-	40	17		97
Wood Sandpiper	-	C	C	C	-	-	-	C	0
Terek Sandpiper	-	O	O	O	-	9	40	O	52
Common Sandpiper	-	U	U	U	-	-	-	U	0
Grey-tailed Tattler	-	N	N	N	-	1	395	N	487
Wandering Tattler	-	T	T	T	-	-	-	T	0
Tattler Spp	-	E	E	E	-	-	-	E	0
Ruddy Turnstone	120	D	D	D	21	-	63	D	545
Great Knot	-				-	277	1050		1397
Red Knot	-				-	-	390		932
Sanderling	50				4	12	-		71
Red-necked Stint	320				54	791	200		6016
Pectoral Sandpiper	-				-	-	-		0
Sharp-tailed Sandpiper	-				-	-	-		0
Curlew Sandpiper	2				-	126	520		841
Bush Stone-curlew	-				-	-	-		0
Beach Stone-curlew	-				-	-	-		1
Pied Oystercatcher	4				17	-	44		2304
Sooty Oystercatcher	4				-	-	5		605
Black-winged Stilt	-				18	-	650		3825
Banded Stilt	-				220	-	-		221
Red-necked Avocet	-				2	-	44		4956
Pacific Golden Plover	-				-	-	-		29
Grey Plover	-				1	49	1		71
Red-capped Plover	52				31	1115	260		2813
Double-banded Plover	-				-	-	-		2374
Lesser Sand Plover	-				-	-	-		0
Greater Sand Plover	-				-	255	10		265
Oriental Plover	-				-	-	-		0
Black-fronted Dotterel	-				-	-	-		228
Hooded Plover	7				-	-	-		108
Red-kneed Dotterel	-				-	-	-		81
Banded Lapwing	-				15	-	-		15
Masked Lapwing	8				-	-	-		1281
Long-toed Stint	-				-	-	-		0
Redshank	-				-	-	1		1
Broad-billed Sandpiper	-				-	-	-		0
Ruff	-				-	-	-		0
Swinhoe's Snipe	-				-	-	-		0
Asian Dowitcher	-				-	-	8		8
Unidentified small	-				-	-	-		1
Unidentified medium	-				-	-	-		0
Unidentified large	-				-	-	-		0
TOTAL	567				383	4199	6194		36130
No. SPECIES	9				10	13	20		50

Please note:

- Views and opinions expressed in *The Stilt* are those of the author(s) and not necessarily those of the AWSG or RAOU.
- Publication of data in *The Stilt* does not constitute permission for the commercial use of those data. All such inquiries should be directed to the Editor.
- The AWSG holds copyright to *The Stilt*.
- The Editorial Team does its best to ensure the accuracy of information published in the *Stilt*, but it is recommended that anyone wishing to cite material within the *Stilt* contact the relevant authors.

Vignettes:

Ian Venables, p. 1
Rob Mancini, p. 47
Susan Tingay, p. 50
Ian Hance, p. 53

Back Issues:

All volumes of *The Stilt* are available as back issues. Costs including postage, are as follows. Payment should be forwarded as a bank draft or money order in Australian currency or by *Visa/Bankcard* etc (*not American Express*). All enquiries should be directed to the Secretary- Treasurer.

	Australia and New Zealand	**Other countries**
Single copies	$Aus 6.00	$Aus 7.00
Complete set		
Vols 1–28	$Aus 90.00	$Aus 125.00
Vols 29 and later	$Aus 12.50	$Aus 15.00

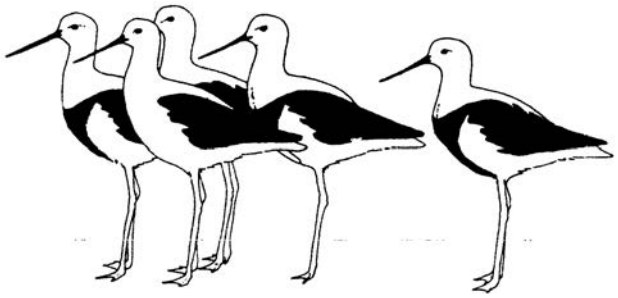
Indexes:

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

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

Deadlines:

The closing dates for submission of material are **1 March** and **1 September** for the April and October editions respectively. **Extensions to these dates must be discussed with the Editor.** Contributors of research papers and notes are encouraged to submit well in advance of these dates to allow time for refereeing. Other contributors are reminded that they will probably have some comments to consider, and possibly incorporate, at some time after submission. It would be appreciated if this could be done promptly.



Stilt 46 - October 2004
Table of Contents