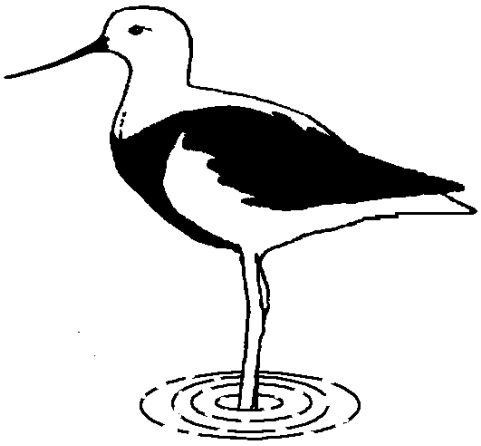
The Stilt

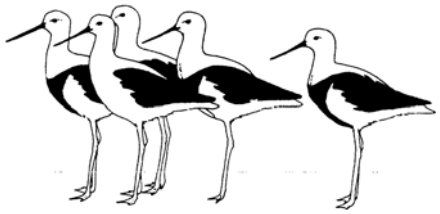


The Bulletin of the East Asian-Australasian Flyway

Australasian Wader Studies Group

A special interest group of Birds Australia

Number 45
April 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: Annie Rogers

EDITORIAL

Ever since the first edition of *The Stilt* appeared in April 1981, it has been, and still is, eagerly welcomed and competed for by the members of my family. One of my reasons for standing for editor was to ensure that I got to read it first. Over the years, *The Stilt* has built a wide readership throughout the East Asian-Australasian Flyway and nearby parts of the Pacific region and I hope very much that it will be welcomed by all, not just my family, as eagerly at the end of my tenure as it is at its start.

David Milton was editor of *The Stilt* for six years, a mammoth contribution from somebody with a full time job. He will be a hard act to follow and we all owe him a vote of thanks. I am particularly grateful to him for easing me into the job, a risky strategy on his part because I could have taken one look and run a mile leaving him *in situ*. The other unsung member of the editorial team is Andrew Dunn, the Production Editor. He takes the final versions of the texts from the editor and turns them into a journal. He has done this job, largely unnoticed, for eight years. How he does it is a mystery to me so I hope he goes on doing it.

I am sure readers would like to join in with me in thanking Stephen Davidson whose drawings of waders by have been a pleasing feature of *The Stilt* for many years. I bumped into him at Werribee at the time of the Hudsonian Godwit a few years ago and he was surprised then that they were still being used. He will doubtless be pleased that his art is to have company. We now have access to the vignettes that accompanied the species accounts in both atlases of Australian birds. Some of them appear in this issue.

The Stilt is the journal of record for all the waders (shorebirds) of the flyway, whether migrant or resident. It is interested in publishing any information about waders that will add to the scientific record and interest and inform its readership. Contributions can range from short notes to full-length papers. Feedback on content, even commentaries on published articles, would be welcome. Potential contributors in non-English speaking parts of the flyway may be hesitant about submitting material in a language with which they are not completely familiar. We cannot offer a translation service but we can undertake to help contributors prepare material for publication.

Wader counts for Summer 2003 have been received. They have been held over to the next issue for want of space.

I believe that *The Stilt*'s readership wants to read about the birds and that the editor should be a largely invisible presence. Editorials, when they occur, will be short.

Ken Rogers

CHAIR'S REPORT FOR 2003

This was a year of continued development for the AWSG.

1. AWSG Shorebird Conference - Canberra, December 2003

Coordinator - Phil Straw

The fourth AWSG Shorebird Conference was held in Canberra from 13th to 15th December 2003. The conference was a huge success with over 120 delegates coming from throughout the flyway. Papers from the conference will appear as a special publication of the International Wader Study Group and Wetlands International and will be widely distributed. Thanks to Phil Straw and the organising committee as well as the staff of Wetlands International for making it such a successful occasion. The next AWSG conference will be held immediately after the Southern Hemisphere Ornithological Conference in New Zealand in 2005.

2. NW Australia Expedition, 28th June to 19th July 2003

Co-ordinators - Clive Minton, Peter Collins, and Roz Jessop

This was the 22nd Australasian Wader Studies Group visit to Northwest Australia. It was aimed particularly at filling a gap in the data relating to the immature populations of migratory waders, and the local resident waders, present in Northwest Australia in late June/July (when the fully adult waders are away at their northern hemisphere breeding grounds).

The main objectives of the Expedition were achieved with ageing criteria, based primarily on moult, being satisfactorily confirmed/developed and with marked differences in the age structure of the different species of waders being determined.

A complete count of the waders on Roebuck Bay was undertaken (30,723 at Bush Point and 6,771 on the northern shores) together with the first ever "winter" count of the whole 220km length of 80 Mile Beach (41,498 waders, including 192 breeding pairs of Pied Oystercatchers).

A complete report of the expedition was published in *The Stilt* 44: 64-72. The expedition was self-financing. A further expedition will be held in January 2004.

3. Conservation report

Co-ordinator - Sandra Harding

Two conservation objectives of the AWSG are to:

1. promote the listing of sites on the Shorebird Site Network; and
2. raise awareness of the current management status of Ramsar sites.

To achieve these objectives requires the efforts of the State AWSG Conservation officers who are located in the different States. A meeting of state conservation officers was held at the AWSG conference in Canberra to collectively discuss the conservation of waders. The next Ramsar conference is in Uganda in 2005. The meeting in December encouraged a concerted effort to be given to the reporting needed for input to the Ramsar National Report.

Central issues for the conservation of waders are currently:

1. Applying the count data from a Ramsar site to the management of the site. Now that there is mapping for some important shorebird sites, this together with count data can assist in identifying areas for protection. Types of protection available include Nature Refuges or some form of protected area status, or protection under a local government planning scheme.
2. Involving community stakeholders in management decisions. Landholders may be involved when their agreement to allow access is required to monitor wader roosts or other stakeholders may become involved when providing assistance in managing and maintaining the integrity of a roost site. Grants encourage such partnerships.
3. Looking at the whole wetland system and catchment including other small sensitive sites when considering the management of a Ramsar site. A wetland is often dependent on the whole river/flood plain system. Protecting remnant wetlands can be more successful if they are part of a larger viable ecological system with wildlife corridors and adequate environmental flows.
4. Application of management tools developed in Australia to other countries in the flyway. Arrangements such as joint research and visits by counterparts in other areas of the flyway can enable sharing of knowledge and skills between Australia and the countries where the waders are moving through.
5. Identifying sites for the Site Network. By using the up-to-date count data, the State governments can be lobbied to list important sites on the Site Network.
6. Announcement by DEH to develop a Wildlife Conservation Plan for Migratory Shorebirds under the EPBC. Comments on the review were provided.
7. Four letters were sent to Korea concerning the reclamation of the largest wetland in Korea Saemangeum.

4. Sino - Australia Migratory Shorebird Capture and Colour Flagging Workshop

Co-ordinators - Peter Collins and David Melville

The second Sino - Australia Migratory Shorebird Capture and Colour Flagging Workshop was postponed until 2004 due to SARS.

5. Wader count of the Coorong, SA

Co-ordinators – Ken Gosbell, Peter Collins, and Maureen Christie

The fourth year of monitoring waders in the Coorong in South Australia was undertaken with the assistance of funds from the Department of Environment and Heritage, Mt Gambier Office. Wader numbers in 2003 were 84,039. Red-necked Stint showed a 3% increase and Curlew Sandpiper a 46% increase while Sharp-tailed Sandpiper and Banded Stilt showed a reduction on 2002 by 59% and 65% respectively.

A survey of the Watervalley Wetlands and the Southeast Coastal Lakes between the Coorong and Lake George found variable use by waders. All these wetlands have been substantially altered over time by drainage, which in turn has changed the land use in many cases. However several wetlands

and lakes were found to support at least one species of International or National importance.

Thanks to the staff of Coorong National Park (particularly Phil Hollow, Bill Koolmatrie, Steve Gilbert, Chris Thompson and Eric de Smit) for the provision of two boats and a 4WD vehicle. Permission to cross Aboriginal land was given by George and Tom Trevorrow. Thanks to the following fishermen who supplied and operated boats; Butch Ritchie, Greg Kessigan, Gary Hera-Singh, Rod Ayers and Glen Hill. Particular thanks to David and Margaret Dadd for assisting with their local knowledge and helping with local arrangements. Thanks also to local landholders who allowed access across their properties: Thanks to Brenton Greare of the DEHR Mt Gambia Office for arranging funding and other logistical support.

A further count is being organised for 2004 (Co-ordinator Ken Gosbell).

6. Maintenance of the AWSG leg-flag database.
Co-ordinator - Clive Minton

Funding was received from the Department of Environment and Heritage for the maintenance of the leg-flag database that is used throughout the flyway. Leg-flag sightings can be reported in electronic format through the AWSG web page.

Funding for continued maintenance of the database to July 2004 has been received from The Natural Heritage Trust.

7. Development of the AWSG wader count database
Co-ordinators - Ken Gosbell and Jenny Skewes

Further progress has been made on the making the AWSG wader count database more user friendly. Birds Australia received some funding from the Department of Environment and Heritage, which was supplemented by a grant of $5,000 from AWSG.

Project Officer: Andrew Silcocks (Birds Australia)
Project Assistant: Rob Clemens and Jessica Feder
Consultant: Heather Gibbs & Johannes Wahl.

Funding: The project was funded by DEH and AWSG.

General Aims: To make the database accessible and easy to use, by cleaning up the data and designing reporting tools.

The AWSG Shorebird database is probably the largest and most comprehensive shorebird database in Australia. Data collection dates back to 1980 and contains continuous summer and winter counts of shorebird for many sites. It is therefore of immense value to Researchers and Planners.

In 2003 a complete audit of the database was undertaken. Many of the sites were mapped incorrectly and had multiple entries for the same site. Using GIS software (developed by Wetlands International) these sites were moved into the correct position, duplicates removed and subsites created which were linked to a main site. Reporting facilities were created to allow the database to be integrated for sites with Ramsar and nationally significant numbers, as well as many other reporting tools. Additional work has been undertaken to develop a data entry and data editing facility for the database.

The original data sheets were taken to Environment Australia and scanned, so now there is an electronic copy of each sheet, including the useful mud-maps, which show where the counts were undertaken.

To assist with the correct mapping of the shorebird count sites, we have been working with Wetlands International to map the important shorebird areas in the different states. The State Count Coordinators and Counters were sent maps and asked to mark the boundary of the wetland area, the roost sites and feeding areas and if appropriate divide the site into sub-sites based on shorebird usage as well as count areas. This will assist future counters at these sites and provide valuable information to environmental planners.

8. Publications committee

Requests to use AWSG count and banding data by universities, government agencies and private contractors has greatly increased over recent years. During the year the publications committee chaired by Dr Clive Minton met three times. Other requests for data were dealt with by email.

9. Two copies of *The Stilt* published

Two copies of ***The Stilt*** were published. Thanks go to David Milton (Editor) and Andrew Dunn (production editor) for another successful year. Thanks also to Ken Gosbell for arranging packaging and postage. Ken Rogers will succeed David Milton as editor in January 2004.

10. The Tattler

The quarterly newsletter *The Tattler* edited by Phil Straw again provided up to date news of wader issues throughout the flyway.

11. Taiwan Bird Fair – 24-26 October 2003

AWSG was invited to provide a display and information booth at the Taiwan Bird Fair held on 24-26 October 2003. The AWSG/Birds Australia stall attracted lots of attention particularly the displays depicting colour leg flags from various countries in the migratory flyway between the Arctic and Australia/New Zealand. The educational publication "Feathers Flyways and Fast Food" was made available in both English and Chinese. Phil Straw who co-ordinated our display also gave a talk to managers and researchers on wetlands management. An invitation was extended to participate in 2004.

12. Asian Waterbird Census Meeting, Kuala Lumpur 9-10 October 2003.

The first Meeting of the Asian Waterbird Census (AWC) was held in Kuala Lumpur 9-10 October 2003. Ken Gosbell and Phil Straw represented the AWSG. The Meeting brought together 37 delegates from 23 countries. The theme of the Meeting was Promoting Waterbird and Wetland Conservation in Asia. This theme and the timing of the meeting was particularly relevant in the context of the alarming outcome of the International Wader Study Group Workshop held in Cadiz, Spain, earlier in 2003 which concluded that " The majority of populations of waders of known population trend are in decline all around the world - a matter of international conservation concern...." The conclusions also pointed out that the Central and Southern Asian Flyway is extremely poorly known and population estimates are very out of date.

In addition to the valuable networking and understandings that evolved between the delegates at the meeting, a Strategy Plan was developed for the implementation of the AWC for the period 2004 – 2006. Opportunities were identified for the AWSG to interact with this network in Asia to progress our common objectives.

Roz Jessop, Chair

AWSG COMMITTEE FOR 2004-2006

The new AWSG Committee to take office from 1 June 2004 is:

Chair	Roz Jessop
Vice-chair, editor Tattler	Phil Straw
Secretary/Treasurer	Ken Gosbell
Chair Research Committee	Danny Rogers
Chair Publications Committee	Clive Minton
Editor Stilt	Ken Rogers
Conservation Officer	Sandra Harding
Liaison Officer	Hugo Phillips
Committee Members	Mike Bamford
	David Close
	Peter Collins
	Chris Hassell
	David Milton
	Doug Watkins

As no more than one nomination was received for each position by 31st January 2004, the nominees are elected without the distribution of ballot papers (AWSG Rules: see *The Stilt* **42:** 3).

Ken Gosbell, Secretary/Treasurer.

TREASURER'S REPORT FOR 2003

The Consolidated Accounts provided below show that income exceeded payments by $5,315.01, however this includes commitments for expenditure on contracts yet to be paid of $21,000.

Australian Wader Studies Group. Consolidated Accounts. Statement of Receipts and Payments.
1 January 2003 - 31 December 2003

RECEIPTS			PAYMENTS		
Item	**2003**	**2002**	**Item**	**2003**	**2002**
	$	$			$
Balance B/f	54,435.53	51,728.15	Stationary/Printing	9,324.45	15,355.84
			Photocopying	27.27	121.14
Subscriptions	5,362.25	8,721.36	Insurance	220.00	110.00
			Postage/Courier	2,035.68	1932.86
Contracts - Federal Govt	23,000.00	34,033.36	Consultants	16,038.66	26,785.33
Contracts - State Govts	7,000.00	7,000.00	Field Expenses	1,000.01	7,428.17
Contracts - Other	2,727.27	5,454.55	Conferences/ Meetings	9,799.63	
Sales	317.58	988.64	Phone/Fax	193.59	119.04
Specific Donations (1)	4,509.09	1,144.00	Equipmt (consumable)	177.52	66.37
Courses & Fees	9,856.79	275.00	Travel & Accomm.	7475.16	1,752.78
			Admin Fee (BA)	1,000.00	1,000
			Depreciation	166.00	238.00
TOTAL INCOME	**52,772.98**	**57,616.91**	**TOTAL EXPENSES**	**47,457.97**	**54,909.53**

BALANCE AT 31/12/03 $59,750.54

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

Research Fund

The Research Fund comprises Specific Donations and is included in the statement of accounts. In accordance with our Rules the following is a Report for the Fund as at 31 December 2003.

Brought forward from 31/12/02	$7,542.00
Donations 2003	$4,509.09 (1)
Total Research Fund 31/12/03	$12,051.09

Note (1) Includes specific donation from Woodside Energy for $3,500 to VWSG for new trailer. Held in trust by AWSG.

Membership Statistics for 2003

The membership as at the end of 2003 was:

Australia/ New Zealand	198
Overseas (excl. NZ)	28
Institutions	17
Complimentary	50
TOTAL	293

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

Ken Gosbell, Secretary/ Treasurer

FINDINGS FROM THE 'SOUTHWARD SHOREBIRD MIGRATION' EXPEDITION TO ANIVA BAY (SAKHALIN ISLAND) AND ITURUP (KURILE ISLANDS), AUGUST 2003.

Falk Huettmann
Biology and Wildlife Department, Institute of Arctic Biology, University of Alaska, Fairbanks AK 99775-7000 USA.
Email: fffh@uaf.edu

ABSTRACT
The Sea of Okhotsk has a long coastline which is poorly surveyed for migratory shorebirds along the East Asian-Australasian Flyway (EAAF). Earlier surveys identified some migration hotspots but left other areas uncovered. Here a summary is given for the southward migration during August 2003 for southern Sakhalin Island and for Iturup Island on the Kurile Island Chain. No relevant migratory shorebirds were found at the Yushnow-Sakhalinsk Sewage Lagoon. Findings for Aniva Bay confirm its wider importance for general shorebird migration along the EAAF in the southern Sea of Okhotsk. It encompasses a high diversity of species, including important numbers of Grey-tailed Tattler, from Japan, the tropical Asian mainland and the entire flyway. All shorebird sightings in Aniva Bay suggest a high turn-over rate of migratory shorebirds. Iturup Island offered a variety of potential habitats such as estuaries, beaches with exposed sand, some small mudflats, rocky cliffs, swamps and grasslands for resting shorebirds on migration but these carried only small numbers of a low variety of shorebird species. Some flocks of migratory Red-necked Phalaropes were seen offshore. It is unlikely that the southern Kurile Islands plays a major role for a larger land-based shorebird migration in August. Reasons for the lack of shorebirds on southern Kuriles are unknown, but could be attributed to the relatively young geological history of this island chain, the volcanic habitats, and the lack of substantial mudflats and associated benthos.

INTRODUCTION

The Sea of Okhotsk (Fig. 1a) has a long coastline which is poorly surveyed for migratory shorebirds. Investigations in previous years, which focussed on Great Knot (*Calidris tenuirostris*), Red Knot (*C. canutus*) and Bar-tailed Godwit (*Limosa lapponica*) as representative study species for the East Asian-Australasian Flyway (EAAF), identified some migration hotspots in the region as well as much habitat that was unused during migration. It is possible, even likely, that the majority of the areas used by large migratory shorebird populations thought to be using the region remain to be found. Alternatively, it could be that these shorebirds do not make use of this large coastal zone and carry out a long-distance migration over-flying the whole area. The Kurile Islands offer a potential shorebird staging site which is mostly unsurveyed. Investigations here could clarify whether shorebirds use this part of the Sea of Okhotsk. A recent review of Russian literature on this topic found conflicting statements on the relevance of this huge volcanic island chain for shorebirds (Huettmann 2003b; see also Nechaev 1969, 1997 and Tomkovich 1997).

The largest of the Kurile Islands, Iturup, was visited from 13 to 27 August 2003 to record the shorebird migration and habitat situation during southward migration. While arranging for Kurile Island permits some time was available at Yushnow-Sakhalinsk. The opportunity was taken to visit the sewage lagoon in Yushnow-Sakhalinsk following earlier suggestions of its importance to migratory shorebirds (Huettmann 2001). Secondly, nearby Aniva Bay, a major but insufficiently surveyed mudflat was visited three times during 5 to 10 August 2003 (see also Huettmann 2001 for northern spring season and Nechaev 1991 for a general overview).

During this expedition most tattlers were scanned and identified in the field as Grey-tailed Tattler (*Heteroscelus brevipes*). Since, however, not all individuals in large flocks were so identified, some Wandering Tattlers (*H. incana*) could occur. This possibility is slim given that both the breeding and non-breeding ranges of Wandering Tattlers are far to the east of the study site, but Wandering Tattlers were suggested to be rare visitors by Nechaev (1991).

This report does not cover seabird sightings; details of these are given in a forthcoming report. Species seen include Temminck's Cormorant *Phalacrocorax capillatus,* Red-faced Cormorant *P. urile*, Black-headed Gull *Larus ridibundus,* Black-tailed Gull *L. crassirostris*, Slaty-backed Gull *L. schistisagus*, Glaucous Gull *L. hyperboreus*, *Sterna* Terns, Spectacled Guillemot *Cepphus carbo*, *Synthliboramphus* Murrelet, Tufted Puffin *Lunda cirrhata*, and Horned Puffin *Fratercula corniculata*. Findings from special research topics such as detectability surveys using DISTANCE Sampling, Beach Pollution surveys and Stable Isotope Analysis carried out at several locations in the study area are also reported elsewhere.

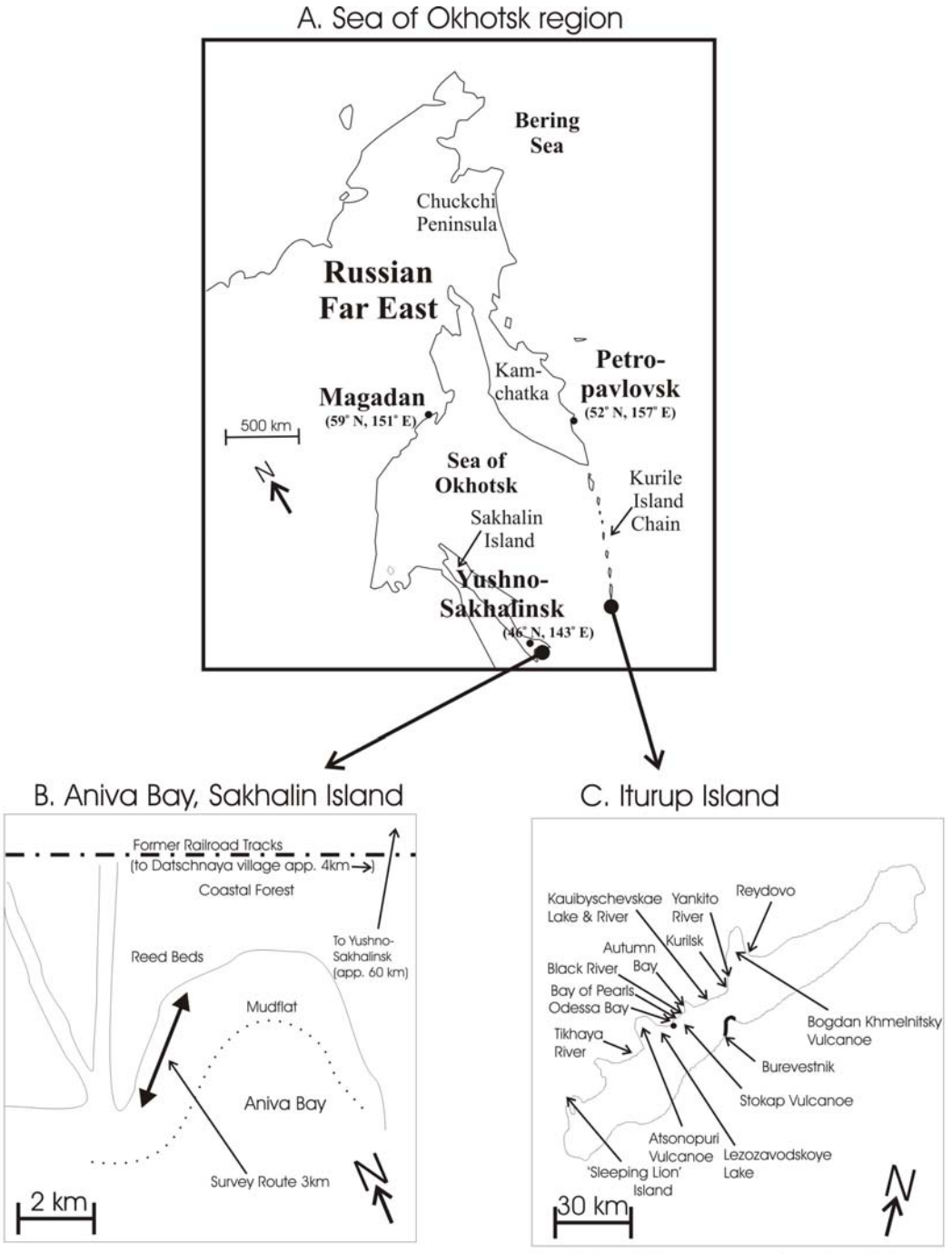


Figure 1: Map of Study Area, and sites mentioned in text

RESULTS

Yushnow Sewage Lagoon

7 August. This municipal sewage treatment facility was visited just before noon. With the exception of one Wood Sandpiper (*Tringa glareola*), no shorebirds nor any waterfowl species were found on the two large sewage lakes and some associated mud-habitats. High numbers of Carrion Crow (*Corvus corone*), Jungle Crow (*C. macrorhynchus*) and Eurasian Tree Sparrow (*Passer montanus;* flocks with 200 individuals) were found in the vicinity of the sewage lakes. Also some wagtails (likely *Motacilla lugens*), *Carpodacus* Rosefinches, Oriental Greenfinches (*Carduelis sinica*) and *Emberiza* Buntings (likely Black-faced Bunting *E. spodocephala*) were seen.

Aniva Bay

5 August. The mudflats at the base of Aniva Bay (Fig. 1b) were visited using the public bus from Yushnow-Sakhalinsk to Datschnaya village. Aniva Bay consists of an extensive tidal mudflat with exposed sand and mud, surrounded by a wetland with grass and reedbeds (for more details see Huettmann 2001 and Nechaev 1991). A survey during low tide following the 3 km survey route in both directions as described earlier by Huettmann (2001) was carried out. It resulted in 500 Grey-tailed Tattler, the highest concentration of this species found in my five years of survey work in the Sea of Okhotsk region (but see findings for 9 August below). In addition, 4 Lesser Sandplover (*Charadrius mongolus*; breeding plumage), 2 Great Knot (juveniles), 2 Red Knot (juveniles), 2,000 Red-necked Stint (*C. ruficollis*, transition plumage), and 15 Dunlin (*C. alpina*, transition plumage) were found. All shorebirds were scanned for leg flags but none was seen.

9 August. Surveys of the same area as 5 August resulted in 1,500 Grey-tailed Tattler, to my knowledge the highest number ever published for the Sea of Okhotsk in the western literature. The Grey-tailed Tattler sightings consisted of adults and of an unknown proportion of juveniles widely distributed and feeding in the mudflat. In addition, 120 Grey Plover (*Pluvialis squatarola*), 600 Red-necked Stint, 15 Dunlin, 1 juvenile Black-tailed Godwit (*Limosa limosa*), and 1 Ruddy Turnstone (*Arenaria interpres*) were seen. Also, 5 Grey Heron (*Ardea cinerea*) were observed. Of interest is one sighting of a Japanese blue leg-flag on one of the large flock of Red-necked Stints feeding on the mudflat.

10 August. This survey resulted in 1 Common Ringed Plover (*Charadrius hiaticula*),100 Grey Plover, 700 Red-necked Stint, 4 Lesser Sandplover, 1 Great Knot (juvenile), 4 Dunlin, 6 Black-tailed Godwit (flocks of 4 and 2 individuals), 6 Marsh Sandpiper (*T. stagnatilis*, feeding and resting), and 650 Grey-tailed Tattler. The Marsh Sandpipers were far to the east of their suggested breeding range (e.g. Hayman *et al*. 1986) and are a new record for Aniva Bay in August but they were reported for Aniva Bay in May by Nechaev (1991). Marsh Sandpipers were already recorded in the Sea of Okhotsk region in fall, August in 1999, but much further east in the Moroshechnaya estuary, Kamchatka, by Yu. Gerasimov and the author (Huettmann 1999).

Other aspects of Aniva Bay of interest

Numbers reported here were derived from consistent survey routes; the fluctuations in shorebird numbers indicate a high turnover rate of migratory birds for Aniva Bay. As in previous surveys (Huettmann 1999, 2001, 2003a), no sightings were made of Spoon-billed Sandpiper (*Eurynorhynchus pygmaeus*) and Spotted Greenshank (*T. guttifer*). Non-shorebird species seen (reported as daily averages) during the surveys in the mudflat and in the surrounding wetland (reed) and forests were 2 Harriers (*Circus cyaneus*), 37 Grey Heron, 1 swan, wagtails (likely *Motacilla lugens*), pipits, 1 Wryneck (*Jynx torquilla*), 2 White-throated Needletail (*Hirundapus caudacatus*), 1 snipe (*Gallinago* sp.), *Saxicola* Chats, 1 *Lanius* shrike, Oriental Greenfinches, and 1 *Locustella* warbler. Migratory flocks of 60 Titmice (*Paridae*) were commonly seen, and a rail was heard on several occasions. The absence of waterfowl species was noticeable in contrast to the reports for May by Huettmann 2001. Butterflies and dragonflies were also seen but no snakes, lizards or Brown Bears (*Ursus arctos*) (as had been suggested to occur in the region).

The weather during the surveys was usually hot and sunny and mainly windless; overcast sky occurred occasionally. Aniva Bay lies in a flight corridor of the international Yushnow-Sakhalinsk airport with about 3 planes per hour and some helicopter traffic; no effects on shorebirds were observed. The offshore oil development in waters of Sakhalin Island is increasing greatly and an oil-port is currently build in Korsakov harbour, some 15 km

south of the survey area. Shorebird numbers are not currently considered to be affected by oil exploration, potential oil spills or related issues. The risks for shorebirds are not yet fully assessed and more consideration needs to be paid to shorebirds and their habitat. This is increasingly important as international oil companies intensify their investment and exploration activities in the coastal waters of Sakhalin Island and as long as the shorebird diversity along the EAA Flyway and southern Sakhalin Island is still poorly known and documented.

Iturup Island

13 August. The ferry from Korsakov on the northern shore of Aniva Bay being unavailable, we flew to the airport at Burevestnik on Iturup Island (Fig 1c). A public bus connected the airport settlement with the village of Kurilsk (3,000 inhabitants), located 60 km northward on the western side of the island.

14 August. While arranging local island permits in Kurilsk, a survey of the central village bay at 11:00 a.m. resulted in several seabirds, 18 wagtails and 40 *Phoca* Seals. The local Kurilka River has a strong salmon run and supports intense fishery activities by locals. In the afternoon we went by bus and hitch-hiking to Reydovo, a village with a large fish plant and with a 6 km long sandy beach located 15 km north of Kurilsk. This resulted in sightings of large seabird flocks, 1 Nightjar (likely Jungle Nightjar *Caprimulgus indicus*), 80 wagtail and some bats. No shorebirds were seen. There were no major mudflats in either Reydovo or Kurilsk.

15 August. We found 80 wagtails in the river mouth of Kurilka (steep cliffs), seabirds, 3 Grey-tailed Tattlers, migratory Oriental Greenfinches and some seals. An afternoon walk through a coastal forest some 4 km south of Kurilsk and towards a coastal meadow plateau with a seabird colony on a steep cliff did not result in any shorebird sightings but in observations of seabirds,1 *Buteo* Hawk, Fork-tailed Swift (*Apus pacificus*), 1 Great Spotted Woodpecker (*Dendrocpus major*) and *Paridae*. Brown Bear tracks were found in the forest as well as in the coastal meadows. Afterwards, Rybachka River, 2 km south of Kurilsk, which has a strong salmon run, held seabirds, 18 wagtails, 15 Jungle Crows and 1 seal.

16 August. We went by caterpillar truck some 60 km south of Kurilsk to Autumn Bay, a sheltered bay on the west side of the island with a small harbour and fishing village but no major mudflats. Here, in the central freshwater estuary of Osennyaya River on the exposed sand and beach, were seabirds, 2 wagtails, 1 Grey-tailed Tattler and 8 Jungle Crows. We continued the trip southwards along the coast by inflatable boat for approximately 40 km. The trip was interrupted around noon stopping in a small bay bound by steep cliffs, a river (Black River) and a fishing village where we saw 4 wagtails, 1 Grey-tailed Tattler, many Pacific Swifts and 5 Jungle Crows, but no other shorebirds. Later, seabirds, wagtails and Pacific Swifts, some whales, and intensively feeding small cetaceans were observed at the entry of Odessa Bay. Of interest were also a flock of about 150 phalaropes (likely Red-necked Phalaropes *Phalaropus lobatus*) resting offshore. Once we arrived at the camp site at Sar (an abandoned fishing camp near a former Japanese settlement and dam behind the Stokap volcano), we saw 6 Red-throated Diver (*Gavia stellata*), 60 Harlequin Duck (*Histrionicus histrionicus*), 8 *Streptopelia* Doves, 3 woodpeckers, Pacific Swifts, 3 wagtails, and 10 Oriental Greenfinches. Fresh bear tracks were a common sight on the beach. We stayed at this campsite until August 21.

17 August. In the morning a 6 km long hike along the beach was made passing a fisherman's house and reaching the border guard point. No shorebirds were seen. From there we walked to the large freshwater lake Lesozavodskoye where some seabirds, 4 Long-toed Stint, and 2 larger unidentified sandpipers were seen along the volcanic lake shore. The large swamp surrounding the lake was entirely empty of shorebirds; two relatively big flocks of *Paridae* and a little falcon (likely Merlin *Falco columbianus*) were observed in the surrounding, mostly old growth, forest. Tracks and other traces of introduced Sable (*Martes zibellina*), Red Fox (*Vulpes vulpes*) and Brown Bears were common throughout the region.

18 August. In the coastal forest, we found 6 thrushes (likely Naumann's Thrush *Turdus naumanni*) and 5 large flocks of *Paridae*. The sandy beach near the border guard hosted a small flock of shorebirds, 2 flocks of 10 Lesser Sand Plover, 2 flocks of 20 Red-necked Stint 2, Grey-tailed Tattler and 5 unidentified small shorebirds. In the afternoon near the estuary of Tikhaya River, which has a very strong salmon run, we saw 1 feeding Osprey (*Pandion heliaetus*), 3 White-tailed Eagle (*Haliaeetus albicilla*), seabirds, wagtails, 10 Jungle Crow, and Pacific Swifts. High densities of small

mammal and bear tracks were sighted. The return trip in the evening across the coastal meadows resulted in the observation of 20 Long-toed Stint, some Stonechats (*S. torquata)* and *Emberiza* buntings resting on exposed sand along the caterpillar tracks.

19 August. We did an extensive 80 km round-trip with inflatable boats further south along the mostly steep and rocky coast passing by the Atsonopury volcano towards the seabird colony 'Sleeping Lion'. Most of this coast is directly shaped by volcanos and presents caldera type cliffs. Besides two divers and 60 flightless Harlequin Ducks in moult, many seabirds (some still indicating nesting) were seen. Of interest was an offshore sighting of a flock of between 80 and 120 Red-necked Phalaropes. The trip also resulted into 6 seal sightings.

20 August. This day was spent walking along the coast on top of the steep cliffs at the foot of the Atsonopury volcano. This survey resulted in 20 Grey-tailed Tattler resting on a small piece of exposed sandy beach. Besides seabird sightings, 38 Harlequin Duck (juveniles and females), 2 Whimbrel (*Numenius phaeopus*, together with one individual bird August 24th the only ones seen on the entire trip), and 2 seals were sighted on coastal cliff habitat at the foot of the volcano. Judging by the tracks, the coastal meadow plateau seems to be a favoured bear habitat.

21 August. The bird life in the bay of the camp changed little, hosting the species described for 16 August with an occasional White-tailed Eagle flying by. We broke camp in the morning and returned to Autumn Bay. Due to the increasingly strong wind we made an overnight stop in one of the numerous sheltered bays (Bay of Pearls). This has a small fresh water river and is occupied by a small fishing settlement which runs a fisheries business with gill nets. The bay hosted the typical configuration of seabirds, wagtails, Pacific Swifts nesting in the cliffs, and the occasional migratory flocks of Oriental Greenfinches. With the exception of a single Grey-tailed Tattler, no shorebirds were seen on the trip back.

22 August. Nearing Autumn Bay, we saw another flock of about 100 Red-necked Phalaropes (likely juveniles) resting on the water offshore.

23 August. The scheduled return flight from Iturup to Sakhalin was delayed due to weather and to an earlier helicopter accident in Kamchatka. This time was used for additional exploration of the area. In Kurilsk we saw some 5,000 gulls flying along the Kurilka River. Another trip was made again to Reydovo by hitchhiking, where an extremely strong but warm taifun wind precluded an extensive survey. Despite huge numbers of seabirds, no more shorebirds were seen.

24 August. This was used to investigate Kouibyshevskoe Lake, which we reached by military truck and hitchhiking. The large lake, the nearby estuary and adjacent long sandy ocean beaches were surveyed over late morning and afternoon and were found to be virtually empty. We only found seabirds, 1 wagtail, a few Fork-tailed Swifts, 10 Sanderling (*C. alba*), 2 Grey-tailed Tattler, 1 Carrion Crow, and 2 seals. A second river, Kouibyshevskoe (also near a former native, as well as a Japanese, settlement), located 3 km to the north, hosted only seabirds, 2 Ospreys, 3 juvenile Harlequin Duck, and 6 seals. After a longer search in the estuary and along the sandy beach, 8 Red-necked Stint and 1 Whimbrel were found. Also, 1 Black-tailed Kite (*Milvus migrans*) and 3 Carrion Crows were seen.

25 August. We went, walking most of the way, to the small Yankito River near the Bogdan Khmelnitsky volcano 9 km north of Kurilsk. Small surface-feeding cetaceans and 1 seal were found near the estuary but no shorebirds were seen. The evening trip back located two unidentified snipes. An inspection of Kitovyy, a former whaling village and the harbour of Kurilsk, resulted in high seabird numbers but no shorebird sightings.

27 August. We went by public bus along the 8 km of sandy beach from Kurilsk to the airport at Burevestnik and found three flocks of Red-necked Stints (8, 13, and 10 individuals), 5 seals, and some seabirds.

28 August. We flew from Iturup Island to Yushnow-Sakhalinsk.

Other aspects of Iturup of interest

Iturup has a fascinating landscape dominated by some active volcanoes ranging up to 1,589 m. The coastline is usually made up of steep cliffs and extensive rocky pebble beaches. Some areas have large exposed sandy beaches. Several hot springs are found, and extensive (old growth) forests cover the volcano foothills. The island has very few open freshwater sources but we were able to survey a major freshwater lake (Lesozavodskoye), a 'mare'

(lake caused by a volcano), which had no shorebirds. The coastal meadows on Iturup are very lush, and several bumblebee species are prominent in the windy landscape. Many sheltered bays are found along the coast; when freshwater was available fishing villages were frequently found. Such bays were usually dominated by solitary Grey-tailed Tattler, cliff-nesting Fork-tailed Swifts, wagtails, *Locustella* warblers and few migratory Oriental Greenfinches. The adjacent waters usually hosted some divers, seabirds, few moulting Harlequin Ducks and a White-tailed Eagle. Tidal ranges were as low as one metre.

Although no sea otters (*Enhydra lutris*), relatively few seals, and only 3 whales were seen, there is no indication of illegal hunting of sea mammals. Illegal salmon poaching is strongly controlled on the island, e.g. by the prominent fishing company Gydrostroy and governmental enforcement agencies. During this expedition, we surveyed over 120 km of shoreline and at least 10 estuaries, mostly on the west side of the island, without finding any large numbers of shorebirds nor did we find any rare or unusual shorebird species. Nevertheless, it may be possible that Iturup has more to offer since it is rarely surveyed.

No Spoon-billed Sandpiper were seen, nor any Rock Sandpiper (*C.ptilocnemis*), although it can be expected that at least the latter species occurs on the southern Kuriles. Shorebird sightings were very few; the most common sightings were of small flocks of Red-necked Stints and solitary Grey-tailed Tattlers. It is currently unknown where these individuals come from. Whimbrel are listed as local hunting species but seem not to occur in any numbers nor are such small birds considered by most hunters worth the cost of the ammunition. Bar-tailed Godwit are also on the local hunting list, but these birds are basically unknown to hunters on Iturup. Great Knot and Red Knot, too, are virtually absent on Iturup in August. The few villages of Iturup did not differ much in their bird species from other villages in the coastal Sea of Okhotsk region; Jungle Crows, Carrion Crows and Eurasian Tree Sparrows were the most common. Despite some suggestions by locals, Blakiston's Fish Owl (*Ketupa blakistoni*) was not seen or heard during this trip. A relatively small but constant flow of migratory songbirds was found, e.g. Paridae, Oriental Greenfinches, wagtails and pipits. This migration deserves more research since it is basically unstudied and presents a contrast to the lacking shorebird migration.

We contacted a local hunting organization on Iturup to ask if they are aware of shorebird bands and leg-flags. Despite strong hunting of migratory waterbirds over the southward migration period, no shorebirds with bands or leg flags are known. This further supports the case for no substantial shorebird migration through Iturup.

Large parts of Iturup's landscape are protected. Nevertheless, the island has an obvious, but not dominant human footprint. For instance, historical forestry activities can be found at some locations, introduced Norway Rats (*Rattus norvegicus*) are present and might have affected changes in the bird world (although migratory shorebirds are unlikely to be affected). The island has no paved roads and only a few gravel roads connect the major villages; off-road trucks are the major means of transportation. The beaches of Iturup were relatively clean but fishery impacts of unstudied magnitude exist on the entire remote coast and its ecosystem, usually arising from the use of gill nets and offshore trading of salmon. Other major environmental threats were not observed.

Earthquakes can occur on Iturup, but the last severe tsunami occurred decades ago. Weather conditions were mild and sometimes hot, but the sky was often overcast and strong winds were frequently encountered.

CONCLUSIONS

For the Yushnow-Sakhalinsk Sewage Lagoon no relevant migratory shorebirds were found. This indicates that this locality is not important for shorebird migration in early August. This finding is in contrast to relatively high numbers of Long-toed Stints and Wood Sandpipers in spring (Huettmann 2001), which could suggest a loop migration strategy for these birds.

Findings for Aniva Bay confirm its wider importance for general shorebird migration along the EAAF in the southern Sea of Okhotsk. It encompasses a high diversity of species from Japan, the tropical Asian mainland and the entire flyway. None of the three focus species were found during surveys in August, a suggested peak migration time for Great Knot for instance. It is likely that Aniva Bay is not among the major flyway routes for the focus species (compare also with Nechaev 1991).

All shorebird sightings suggest a high turn-over rate of migratory shorebirds. The total population passing through this site must be higher than the numbers reported for individual days. The number of Red-necked Stints is relatively small when compared to spring migration (Huettmann 2001) but Aniva Bay is still an important site for the overall migration of this species. More importantly, Aniva Bay had the highest concentrations of Grey-tailed Tattler observed in five years of survey work in Russian Far East. The estimated world population of Grey-tailed Tattlers is estimated at 40,000 (Delany and Scott 2002). It is likely that more than 1 percent of this population were present in Aniva Bay during the surveys and over the whole period of southward migration. If so, the tattler numbers for this site are of international importance.

Iturup Island offered a variety of potential habitats such as estuaries, beaches with exposed sand, some small mudflats, rocky cliffs, swamps and grasslands for resting shorebirds on migration. However, these habitats were not used by the focus species during a suggested peak migration season. Iturup carried only very few and a low variety of shorebird species, usually very small flocks of Red-Necked Stint, a few Sanderling, and some solitary Grey-tailed Tattler. Some flocks of migratory Red-necked Phalaropes were seen offshore. There could be internationally important numbers for this species in the area. These phalarope sightings need further investigation as it is believed that this species is drastically declining. Although the reported shorebird findings are specific to Iturup and the shorebird diversity might be slightly higher on other islands in the chain (G. Eichhorn pers.com.), I consider it unlikely that the southern Kurile Islands would play a major role for a larger land-based shorebird migration in August. This conclusion is backed up by other indications that the major shorebird migration routes are mostly in the western Sea of Okhotsk (for details see for instance Huettmann 1999, 2000, 2003b). Exact reasons for the lack of shorebirds on southern Kuriles are unknown, but could probably be attributed to the relatively young geological history of this island chain, and likely to the volcanic habitats and consequently to the lack of substantial mudflats and associated benthos. The exact flyway hotspots and migration strategies still remain unresolved for the majority of the shorebird populations of the flyway, and specifically for the three focus species Great Knot, Red Knot and Bar-tailed Godwit. These require further investigation to inform conservation decision making.

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REFERENCES

Delany, S. and Scott, D. 2002. Waterbird Population Estimates - Third Edition, Wetland International Global Series No. 12. Wageningen, The Netherlands.

Hayman, P., Marchant, J. and Prater, T. 1986. Shorebirds: An identification guide. Helm, London.

Huettmann, F. 1999. Pilot Study 1999: Fall migration of shorebirds in the Sea of Okhotsk region, Russian Far East. Report to Wetlands International - Oceania- Environment Australia, 57 pp. (see also for project summary in Stilt and Wader Study Bulletin 1999, 90: 21-22).

Huettmann, F. 2001. Summary of a trip to the Sea of Okhotsk studies to study migrating shorebirds: May 2000 on southern Sakhalin Island, and August 2000 on western Kamchatka and Magadan region. Stilt 39: 65-71.

Huettmann, F. 2003a. Summary: Shorebird migration in early fall 2002 on northern Sakhalin Island. Stilt 43:34-39.

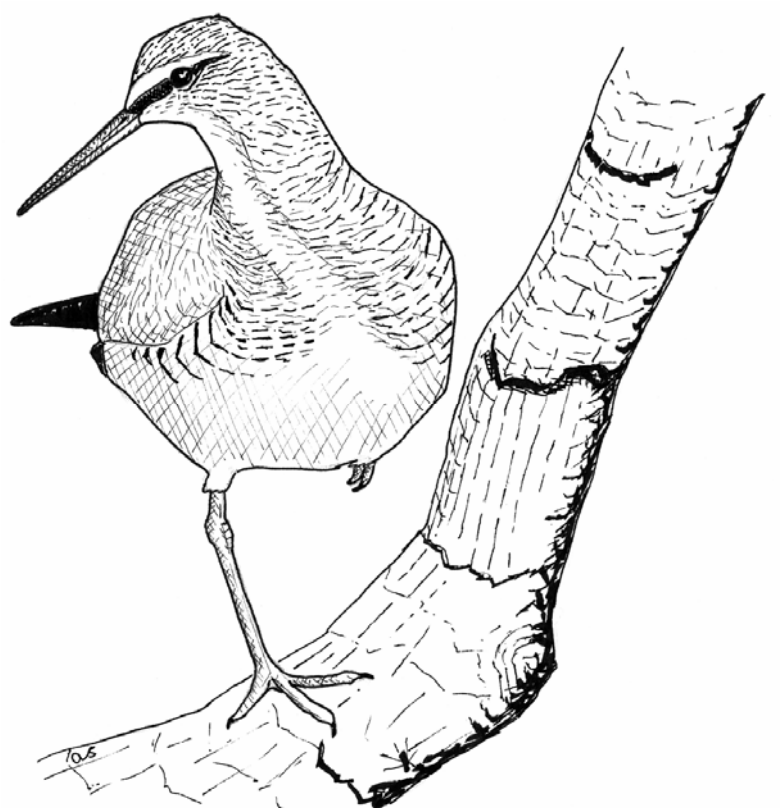
Huettmann, F. 2003b. Literature Review: Shorebird migration in the Sea of Okhotsk region, Russian Far East, along the East Asian Australasian flyway for selected species (Great Knot *Calidris tenuirostris*, Red Knot *Calidris canutus*, Bar-tailed Godwit *Limosa lapponica*). Doug Watkins (Environment Australia, Wetlands International).

Nechaev. V.A. 1969. Birds of Southern Kurile Islands. Nauka Publishers. Leningrad.

Nechaev, V.A. 1991. Birds of Sakhalin. Far-Eastern Branch, USSR, Academy of Sciences, Vladivostok (in Russian).

Nechaev, V.A. 1997. On the avifauna of Iturup Island (Kurile Islands). Russian Journal of Ornithology, Express Issue 27: 15-17 (in Russian)

Tomkovich, P. 1997. Breeding distribution, migrations and conservation status of the Great Knot *Calidris tenuirostris* in Russia. Emu 97: 265-282.



ON THE SOUTHWARD MIGRATION OF GREAT KNOT IN THE WESTERN SEA OF OKHOTSK: RESULTS AND CONCLUSIONS FROM COORDINATED SURVEYS OF NORTHERN SAKHALIN ISLAND AND SCHASTIA BAY, 2002

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ABSTRACT

The Sea of Okhotsk is little known to the western world. Great Knots (*Calidris tenuirostris*) are reported to occur in the area but their exact migration across this region is not well understood. We report here on two simultaneous migratory shorebird surveys made in 2002 during southward migration in the southern Sea of Okhotsk region. This is the first time that coordinated surveys have been carried out in the region, allowing spatial consistency and extent of migratory shorebirds to be addressed. Schastia Bay, near the Amur Estuary (Russian mainland), presents one survey area, the second survey area is located *c*. 350 km away on northern Sakhalin Island. It was found that the majority of migratory Great Knots were juveniles. Birds occurred in waves through August and September but seemed to peak in early August. When corrected for survey effort, Great Knots preferred mudflats which have a high organic content and which are located close to the saltwater edge. Sandy shores, as located on northeast Sakhalin, were not used. Our findings indicate the existence of a broad migration flyway located in the study area.

INTRODUCTION

The western world knows little about the Sea of Okhotsk. Great Knots are reported to occur in the area; however, it is not well known how they migrate across this large body of water with its extensive coastline. The autumn migration has already been described to occur in waves over a longer time period than spring migration (Tomkovich 1997). Indications from earlier studies and discussions with several ornithologists suggested that the northern sections of Sakhalin Island and the adjacent Russian mainland in the western Sea of Okhotsk (Fig.1) could serve as stop-over and resting sites for migratory shorebirds, particularly for Great Knot (*Calidris tenuirostris*) and Red Knot (*Calidris canutus*). The existing literature does not provide explicit evidence either for or against this hypothesis (Huettmann 2002). Simultaneous shorebird surveys were, therefore, made in 2002 during southward migration at two locations in the Sea of Okhotsk region. These surveys covered 80 km of the Schastia Bay coastline and seven big bays, sand spits, and tidal mudflats on northern Sakhalin Island. The data obtained on Great Knot are used here to investigate the specific habitat preferences and assess the contribution of these data to our knowledge of migration routes.

For Sakhalin Island, the following references for shorebirds of the study site were used and found accurate: Nechaev 1991, 1998, Zykov 1997, Zykov and Revyakina 1996; compare also Pronkevich 1998, and Tomkovich 1997 for Great Knot. The larger bays and spits of Nogliki (51° 50' N, 142 ° 00' W) are already well known for their shorebirds, and thus were not further investigated by us. However, reported sightings from this location fit very well with our findings.

METHODS AND RESULTS

Schastia Bay, Russian Far East Mainland

The shorebird surveys were made by AA and covered the whole of Schastia Bay (Fig. 1b) from August 6 to September 13, 2002 (Antonov 2003). Most of the coast of Schastia Bay was accessed by rubber boat. The bay is shallow with extensive sea-grass shoals. The nearby Chkalov and Baydukov Islands are low-lying with numerous muddy estuaries of swampy brackish streams, small bays and lagoons of brackish water. The widest mudflats (1-2 km at low tide) are located between the Iska River mouth and Petrovskaya Spit, which is sandy and little used by shorebirds.

Altogether, 1,374 Great Knots (*c*. 5% of the 26,326 shorebirds of the 27 species recorded) were counted at Schastia Bay. Migration dynamics of Great Knots during August until mid-September 2002 are summarized in Figure 2. The majority (> 90%) of Great Knots were juveniles. No Red Knot were seen. The time spent in the different habitats at Schastia Bay surveying shorebirds was 15% on

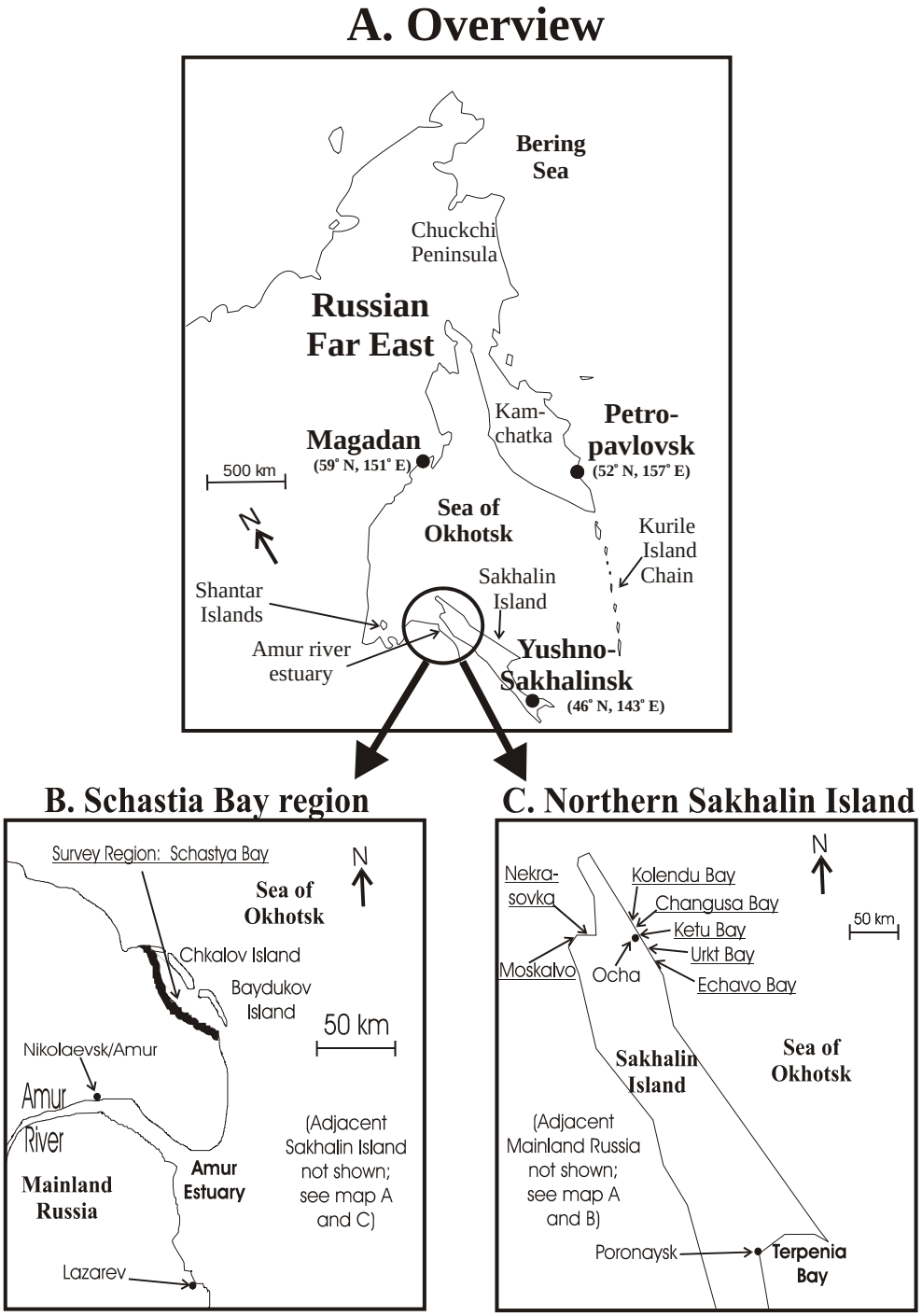

Fig 1. Map of study area and sites mentioned in text. Survey locations are underlined.

muddy tidal flats (in the following called 'muddy mudflats') and estuaries, 38% on sandy beaches, 20% on pebble shores, and 27% and brackish marshes and lagoons. More than half of the Great Knot were recorded at low tide on muddy mudflats (Fig. 3). The remaining birds were mainly found along sandy and pebble shores of the bay. The brackish marshes and inner lagoons are largely avoided by Great Knot with fewer than 5% being recorded there. Movements of flying knots were mainly to the south and south-east. Flocks consisted of several to several tens of individuals, usually less than fifty. The birds were observed feeding intensively on small gastropods on the shingles. Based on the intensive surveys, we conclude that birds generally do not roost at the bay, although some smaller islands out in the bay were not surveyed.

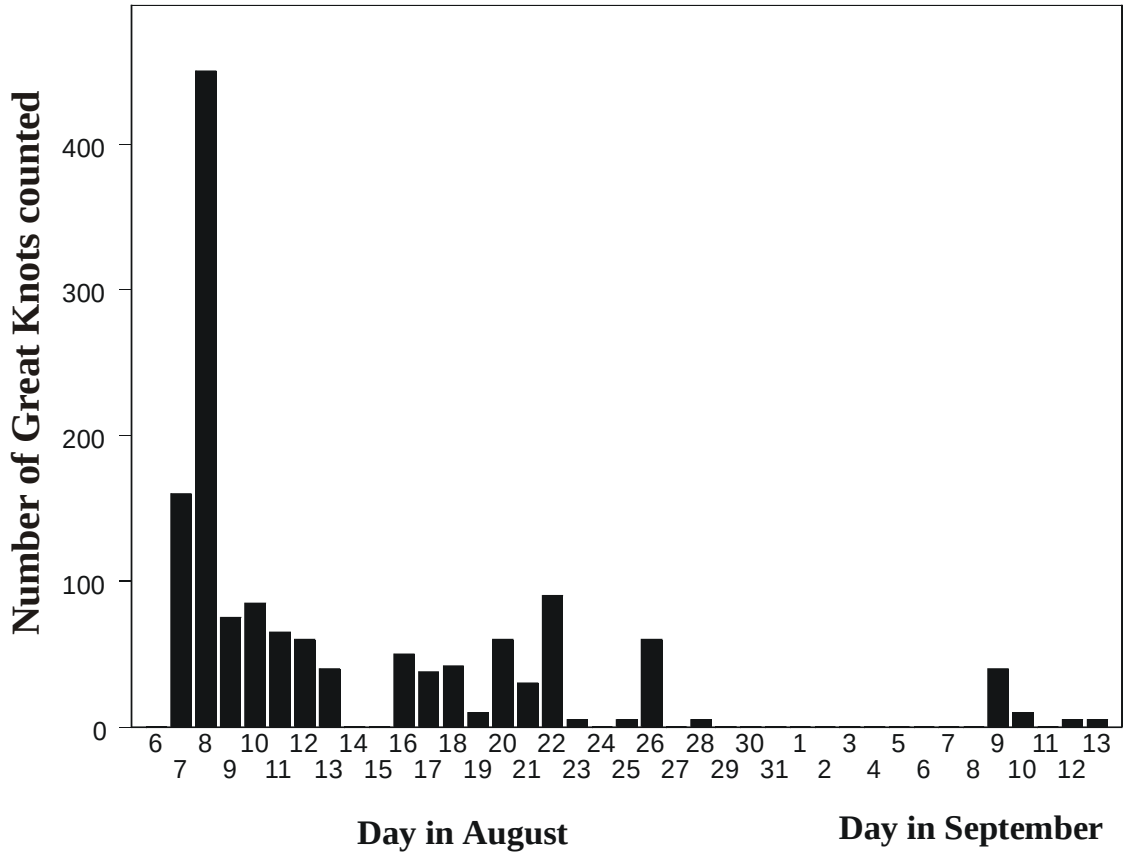

Figure 2: Numbers of Great Knots encountered during shorebird surveys in Schastia Bay 2002 (habitat types are not further specified; see Fig 3 for more details).

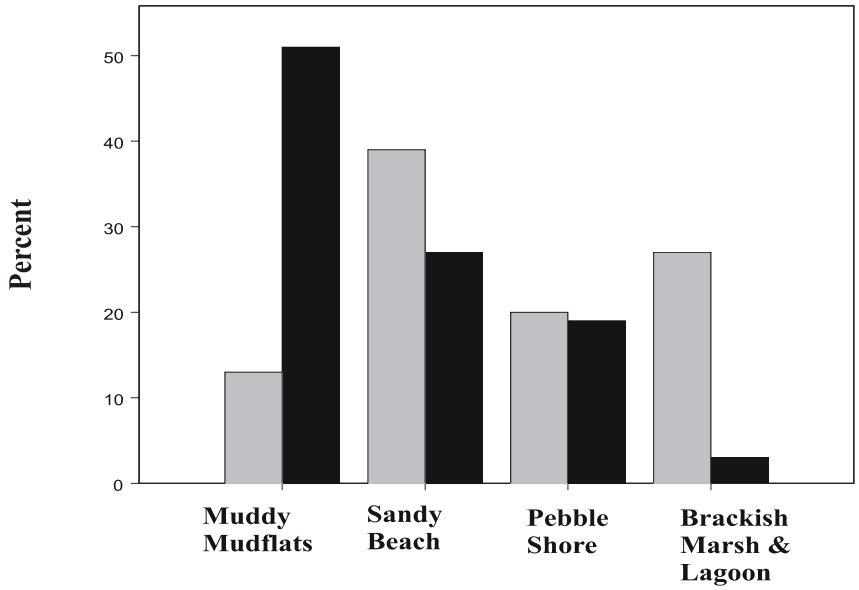

Figure 3: Great Knots encountered during surveys in Schastia Bay, and survey effort by major habitat types (both expressed as percent from overall; grey: survey effort; black: Great Knots).

Northern Sakhalin Island

Detailed shorebird survey results from this expedition are given in Huettmann (2003). The Great Knot results are summarised in Table 1. A single flock of Red Knot was sighted but provides too few data for analysis so the results following apply only to Great Knot. Of interest is a sighting

Table 1: A summary of Great Knot sightings for northern Sakhalin Island (for more details see Huettmann 2003). (MM Muddy Mudflats, SB Sandy Beach, BL Brackish Lagoon).
Only one flock of 50 Red Knot was seen at the coast of Urkt Bay 13 August.

Location	SI Coast	Survey Date 2002	Habitat Type	Length of Survey Transect (km)	Great Knot Numbers Counted
Poronaysk beach	East	9 Aug	SB	2	0
Urkt Bay south	East	10 Aug	BL	5	0
Ketu Bay	East	11 Aug	SB	1	1
Beach between Ketu Bay and Urkt Bay	East	11 Aug	SB	6	0
Urkt Bay coast	East	11 Aug	MM	1	200
		12 Aug	MM	1	8
		13 Aug	MM	1	19 (+43 in tundra)
		18 Aug	MM	1	300
Nekrasovska villages (old and new)	West	14 Aug	SB	6	0
Changusa Bay	East	15 Aug	SB	1	0
Kolendu Bay	East	15 Aug	SB	1	0
Moskalvo	West	16 Aug	SB	3	0
Echavo Bay	East	17 Aug	MM	3	20
Terpenia Bay	East	20 Aug	SB	40 (by car)	0
		21 Aug	SB		0
		22 Aug	SB	40 (by car)	0

of 43 Great Knot in the nearby coastal tundra further inland, in which the birds were probably feeding on gastropods (see also Huettmann 2001). In total, 771 Great Knot were seen from August 9 to 22, 2002. This species provided the majority of all shorebirds counted during the expedition (Huettmann 2003). Figure 4 summarizes Great Knot sightings and shows highest numbers of Great Knot on August 18. Birds were seen migrating south (not west), and appeared to have a high turnover rate of less than two days. Most (85%) of the survey effort on northern Sakhalin Island was spent on sandy beaches; muddy mudflats received 8% and brackish marsh and lagoons the remaining 7%. Figure 5 shows a very strong Great Knot preference for muddy mudflats; sandy beaches were almost unused and no birds at all were seen in brackish marshes and lagoons. We think that this habitat preference pattern is the main reason why no Great Knot were seen on the western side of northern Sakhalin Island where sandy beaches are prevalent (Huettmann 2003).

Other Results

All shorebirds were scanned for leg flags but none were seen. A yellow leg flag was obtained from a Great Knot by a local hunter in the beginning of July from Schastia Bay (metal band 061-90113, location 141°15' E, 53°20' N). The records show that this individual was banded as a second year bird on October 1, 1992 at Broome, north-west Australia.

DISCUSSION

These are the first large-scale simultaneous surveys in the Sea of Okhotsk region of two areas, about 150 km apart on the same latitude, which are used as migratory shorebird staging sites. Parallel surveying demonstrates convincingly that large-scale migration patterns exist in the area, and that the observed migration peaks are spatially consistent. We found three Great Knot migration peaks between early August and mid-September. The major occurrences for this species were: (i) during the first week of August in Schastia Bay; (ii)

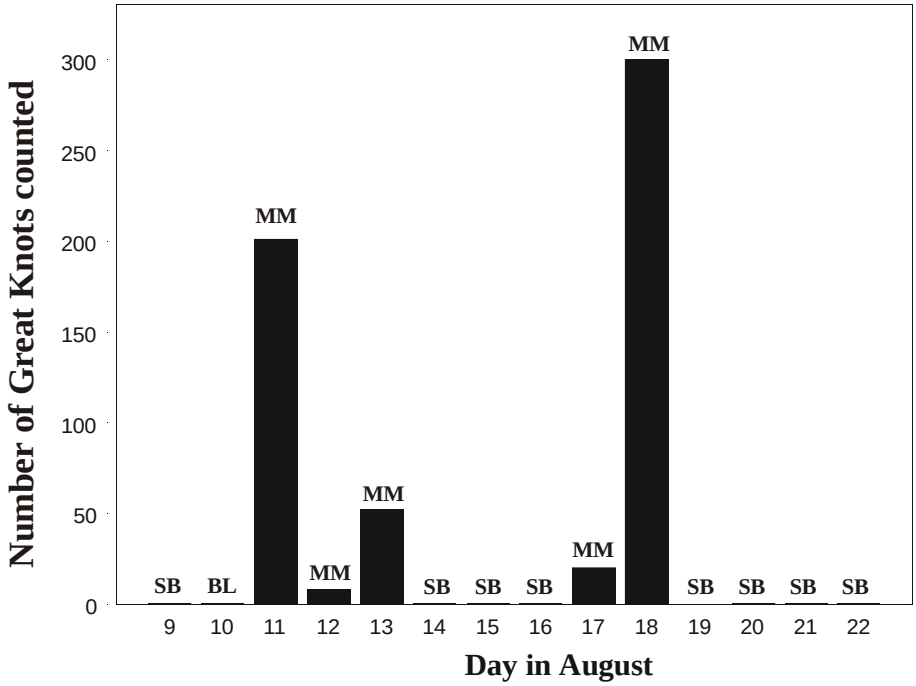

Figure 4: Numbers of Great Knots encountered during shorebird surveys on northern Sakhalin Island in 2002. Due to unequal survey effort by habitat, habitat types are shown in order to allow for a meaningful interpretation of the findings (MM Muddy Mudflats, SB Sandy Beach, BL Brackish Lagoon; for more details see Fig. 5).

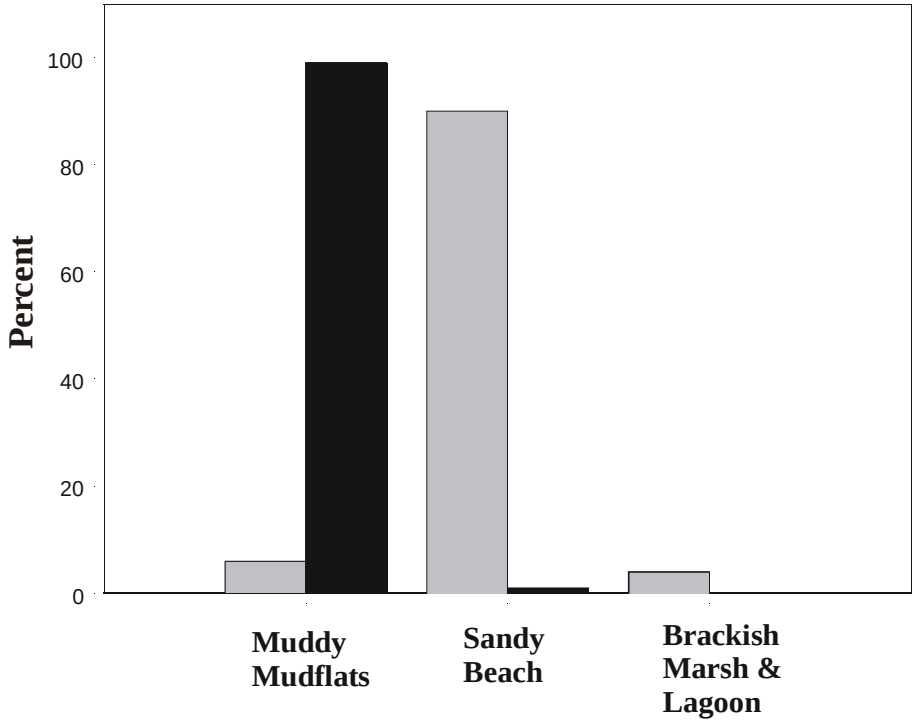

Figure 5: Great Knots encountered during surveys on northern Sakhalin Island, and survey effort by major habitat types (both expressed as percent from overall; grey: survey effort; black: Great Knots).

lower numbers were found during the second half of August (Schastia Bay and eastern coast of northern Sakhalin Island); and (iii) fewer than 40 birds were encountered at Schastia Bay for a period during the second week of September. Over 90% of Great Knot sightings were of juvenile birds (Huettmann

2003 for northern Sakhalin Island, AA for likely non-breeding individuals in Schastia Bay). One explanation of these waves of juvenile migration could be that they consist of birds from different breeding localities.

Great Knot are common at the Schastia Bay site through the entire boreal summer and early autumn but numbers differ from year to year. For example: 55 individuals were recorded at Schastia Bay from July 25 to August 2, 1985; 1,000 individuals from July 25 to 30, 1986; 95 individuals from July 20 to August 5, 2001; and 1,323 individuals from August 6 to 31, 2002 (Babenco 1990, data presented here). These data suggest that the magnitude and the timing of the migration for this species are variable and depend on conditions of the year. Tomkovich (1997) has already suggested that breeding success at the breeding grounds could be a factor. This pattern could also be driven in part by weather or lemming cycles. More large-scale research is needed, looking at links between nesting and migration as one aspect.

Weather conditions were colder and wetter in 2002 than in average years but this did not affect the daily surveys. Great Knot made up the majority of migratory shorebirds during our surveys. We identified only 50 Red Knot, which is consistent with current knowledge (e.g. Huettmann 2002) but informs little on if and how Red Knot migrate through the Sea of Okhotsk region. Despite intensive survey effort and scanning, only one leg-flagged bird was recorded at the two study sites. We think this could be due to the high proportion of juvenile birds on the flyway in August. Increased survey effort during the fast northward migration could lead to more sightings of leg flagged birds.

Over both sites, we counted only 2,145 Great Knots, mostly juveniles. No significant migratory concentrations have yet been found for adult birds (e.g. Huettmann 1999, 2002). This suggests either that adult Great Knot have an extended migration period over many weeks (as suggested by Tomkovich 1997) and thus occur in low numbers at suggested stop-over sites, or that the migration for the majority of these birds occurs elsewhere and is largely unknown. It is possible that the Sea of Okhotsk plays an important role for the migration of juvenile Great Knots during August and may well provide habitat for the migratory movement of the adults from the end of June to July (though a few records of banded adult birds in August are known from Tugursky Bay, Sea of Okhotsk, some 350 km to the west of the area surveyed, as reported by Babenco 2000). Great Knot sightings for the months of September, October and November are either sparse or do not indicate larger occurrences in the Sea of Okhotsk area.

For both study sites, the preferred habitat for Great Knot during migration is muddy mudflats; sandy beaches and lagoons are largely avoided. It is not clear if the availability of muddy mudflats determines the locations of migration flyways and the overall migration strategy for Great Knot. A large number of huge mudflats and sand spits exist in the Sea of Okhotsk region but many are not used by Great and Red Knot during the southward migration (Huettmann 2001). Knots, when found, are mostly found in muddy mudflats. Different types of mudflats exist in the Sea of Okhotsk. Consistent with earlier work, locations that have migratory Great Knot sightings are tidal mudflats near saltwater, with a high organic content that includes small white mussels.

Our findings raise some important questions about the exact location of important flyway locations and preferred migration habitat and its conservation. North-eastern Sakhalin is used by migratory Great Knots on southward migration and by a few Red Knots. Great Knot is also a common shorebird on the far eastern Russian mainland coasts of the southern Sea of Okhotsk. Red Knot sightings appear to be a few isolated cases (as already noted, Pronkevich 1998). Migration turnover rates on Russian mainland are believed to be less than a day, and on northern Sakhalin Island to be less than two days for Great Knot (Huettmann 2003). Currently, it is not known which route migratory knots take to our two study sites. Great Knots either follow the western coastline of the Sea of Okhotsk, or cross the Sea of Okhotsk from somewhere near northwestern Kamchatka. Since they occur in eastern Sakhalin Island as well as on the mainland coasts some 350 km to the west, this probably suggests an overall migration funnel 350 km in width. Alternatively, and since no Great Knots were observed on the west coast of Sakhalin Island, it could indicate a migration divide splitting Great Knot migration into two migration routes that have similar migration patterns along eastern Sakhalin and along the Amur river coastline of mainland far-eastern Russia.

Further work is required to determine and to predict the migration paths through the Sea of Okhotsk (Kusch and Huettmann unpubl.). Once established, they could inform on how or why any differences

might have arisen. Are they, for example, due to evolutionary causes or are they related to subpopulations from different breeding grounds with different migration timing as indicated in our data by three migration waves for juvenile Great Knot. This understanding, together with detailed knowledge of the characteristics of stop-over areas which make them acceptable to knots will enable the identification of potential stop-over sites throughout the Sea. Knowing the key habitats is essential to their conservation and, ultimately, that of the species they support.

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REFERENCES

Antonov, A. 2003. A shorebird census of Schastia Bay and the Amur Estuary, Sea of Okhotsk, Russia, from 6 August to 21 September 2002. Stilt.

Babenco, V. G. 1990. About the fall migration of some waders at the south-western coast of the Sea of Okhotsk . Ornithology 24: 139-140 (in Russian).

Babenco, V. G. 2000. Birds of Lower Amur. Moscow (in Russian).

Huettmann, F. 1999. Sea of Okhotsk Study: A first summary from a Pilot Project in the Sea of Okhotsk region to investigate wader migration in the fall. The Tattler. Australasian Wader Studies Group. No 21.

Huettmann, F. 2001. Summary of Sea of Okhotsk studies investigating migration of shorebirds May 2000 on southern Sakhalin Island, and August 2000 on western Kamchatka and Magadan region. Stilt 35: 21-26.

Huettmann, F. 2002. Literature Review: Shorebird migration in the Sea of Okhotsk region, Russian Far East, along the East Asian Australasian flyway for selected species (Great Knot *Calidris tenuirostris*, Red Knot *Calidris canutus*, Bar-tailed Godwit *Limosa lapponica*). Report to Wetlands International, Canberra, Australia.

Huettmann, F. 2003. Shorebird migration on northern Sakhalin Island, Russia, in early northern Autumn 2002. Stilt 43: 34-39.

Nechaev, V.A. 1991. Birds of Sakhalin. Far-Eastern Branch, USSR, Academy of Sciences, Vladivostok (in Russian).

Nechaev, V.A. 1998. Distribution of waders during migration at Sakhalin Island 1998. International Wader Studies 10: 225- 232.

Pronkevich, V.V. 1998. Migration of waders in the Khabarovsk region of the Far East. International Wader Studies 10: 425-430.

Tomkovich, P. 1997. Breeding distribution, migrations and conservation status of the Great Knot *Calidris tenuirostris* in Russia. Emu 97: 265-282

Zykov, V. B. and Z.V. Revyakina. 1996. Migration of shorebirds on the north-east of Sakhalin Island. In: N.M. Litvinenko (ed.) Birds of wetlands of the Southern Russian Far East amd their protection. Vladivostok: Dalnauka. Pp. 205-213 (in Russian).

Zykov, V. 1997. Wader Migration at north-eastern Sakhalin Island, based on Observations at Lunskiy Bay. in Straw, P. (ed.) Shorebird Conservation in the Asia-Pacific Region. Australasian Wader Studies Group, Melbourne. pp. 141-148.

PRIMARY MOULT OF THE RUDDY TURNSTONE *ARENARIA INTERPRES* IN AUSTRALIA

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ABSTRACT

Primary moult data for Ruddy Turnstones caught in the north-west and south-east of Australia were analysed to establish timing and pattern of moult in the three discernible age classes: first-year, second-year, and adult birds. Moult scores were converted to the Primary Moult Index (PMI) described by Underhill and Summers (1993). Three methods were used to estimate timing and duration of primary moult. Plots of the median and range of the PMI were drawn for all age classes. A small number of birds retrapped while still in the same moult cycle was used to calculate the rate of PMI increase and thus estimate duration. The maximum likelihood model of Underhill and Zucchini (1998) was applied to the data for adult birds, thus providing a rigorous estimate. These estimates are compared with others from the same species in different parts of its range. First-year birds either moulted no primaries (54%), moulted all primaries (11%), or did a partial moult of inner primaries (35%). The last is unusual as partial primary moults of waders are usually of outer primaries. Moult in the second year was later for birds that had moulted primaries in their first year. Plots of median PMI against time give a useful indication of the progression of primary moult in the population but give only subjective estimates of moult parameters (start date and duration). Same moult sequence encounters give parameter estimates but with large standard deviations because samples sizes are inevitably small. Underhill and Zucchini (1988) models are to be preferred. Adult moult parameters are compared with those for the species in other parts of its range. The spread of start dates of primary moult is significantly higher in southern Africa and significantly lower in Scotland than it is in Australia. Primary moult starts earlier and ends later in southern Africa than it does in north-west and south-east Australia. The mean duration of primary moult in Scotland at 74 days is shorter than it is in southern Africa (119 days), north-west Australia (93 days) and south-east Australia (119 days).

INTRODUCTION

The Ruddy Turnstone *Arenaria interpres* is a medium-sized shorebird which breeds in the Arctic and migrates to spend the non-breeding season on coastlines world-wide. The estimated 14,000 which spend the austral summer in Australia (Watkins 1993) are believed to breed in eastern Siberia and western Alaska. It has been suggested that the population occurring in south-eastern Australia arrives by a trans-Pacific route, while that in north-western Australia follows a route through east Asia (Lane 1987). No direct link with Alaska has been confirmed by recent banding recoveries and sightings of leg-flagged birds.

Moult is a key energy and time consuming activity that has to be fitted into the annual cycle usually, in migratory waders, after breeding and the southward migration to the non-breeding areas. The primary moult of the Ruddy Turnstone has been described in Europe (Branson *et al.* 1979) and southern Africa (Summers *et al.* 1989) but only briefly in Australia (Houston and Barter 1990). Since then the banding programmes of the Victorian and Australasian Wader Study Groups have generated a great deal more data. Banders have noted in the field that Ruddy Turnstones show unusual variability in primary moult but this has not yet been fully investigated. This paper discusses the timing, duration, extent and pattern of primary moult in first-year, second-year, and adult Ruddy Turnstones in the north-west and the south-east of Australia, the two areas in Australia where most birds have been caught.

METHODS

Ruddy Turnstones have been caught by cannon-netting in south-east Australia (SEA) since 1979 and in north-west Australia (NWA) since 1981. Principal sites in SEA are Flinders and Queenscliff in southern Victoria, and the coast between Beachport and the Victorian border in south-eastern South Australia. In NWA most have been caught on the northern shores of Roebuck Bay and on the 80-mile Beach. The numbers of records used for this

Table 1. Number of Ruddy Turnstones for which primary moult data are available

	Date range	First-year Birds	Second-year Birds	Adult
NWA	Aug 81– Dec 01	159	185	1051
SEA	Jan 80 – Mar 02	338	125	2107

analysis and the periods in which the data were collected are given in Table 1.

The primary moult was recorded for one wing of most birds using the method described by Rogers (1989). Following Rogers (1990), it is sometimes helpful to distinguish feather generations of fully grown feathers using the codes 'S' for slightly worn and 'V' for very worn in addition to the usual '0' for old and '5' for new. 'R' for 'Replaced' is now used in the field instead of 'S' to ensure that it is not mistakenly read as '5'. The computerised data base insists, however, on the use of 'S'. Ageing of birds was based on the state of the primary moult and plumage features. The Australian convention of starting the wader year on the August 1 was employed in ageing terminology.

Birds in their first year retain at least some of their diagnostic whitish-buff tipped wing coverts throughout the year. They initially have fresh unworn primaries but these show increasing signs of wear and become quite worn and faded, especially in the strong sunlight in NWA, by the end of the year. These birds do not migrate, although most assume some breeding plumage in the April/August period. Many carry out a partial moult starting at the innermost primary, but not until after December. These birds can all still be identified, at least in the August to October period, at the beginning of their second year. The principal identification feature is the presence of two age classes of primary, the new inner primaries resulting from the partial moult in the first year, and the very old remaining outer primaries. Individuals that have not carried out any primary moult in the first year have all primaries much more worn and also show less breeding plumage than returning adults. Second-year birds that have carried out a complete moult in the first year can be a little harder to identify but generally primaries are much less worn than those of adults. Some second-year birds can still be identified after October – especially if signs of the two earlier age classes of primaries remain – but, increasingly, they become inseparable from adults. Full (or complete) moults replace all primaries, working outwards from the inner primary.

Adults arriving back from the breeding grounds in August/September show substantial remains of breeding plumage. They have only moderately worn primaries and start a full primary moult soon after arrival; this is completed in January/February. Moult into breeding plumage begins in March and is almost completed before northward departure in April. This enables the separation of males and females; males have much whiter heads and considerably more chestnut-orange on the wing coverts and back.

Each primary moult formula was converted to the Primary Moult Index (PMI) of Underhill and Summers (1993), using their results for the relative masses of Ruddy Turnstone primaries. This index, equivalent to the proportion of feather mass grown, provides a better measure of the progress in time of the primary moult than the widely used but inappropriate Primary Moult Score (PMS). Table 2 gives some examples comparing the PMS and PMI for a sample of primary moults.

Catches from all years were pooled on the assumption that the timing of moult did not vary between years. The median and range of PMI were plotted at weekly intervals through the moulting period for all the age categories to give a broad overview of moult progression in the population. Three methods of estimating mean starting and end date and/or duration of primary moult were used:

- Subjective estimates based on the plots of median PMI against time. Inferring moult parameters from these plots is an exercise in

Table 2. Examples of primary moult records converted to the traditional Primary Moult Score and to the Primary Moult Index based on the proportion of feather mass grown

Primary moult	PMS	PMI
2210000000	5 (10%)	0.041 (4%)
5540000000	14 (28%)	0.141 (14%)
5554400000	23 (46%)	0.287 (29%)
5555552000	32 (64%)	0.456 (46%)
5555555550	45 (90%)	0.822 (82%)

Table 3. Number of primary feathers replaced in primary moults of first-year birds

Number replaced	0	1	2	3	4	5	6	7	8	9	10
NWA (n=123)	67	3	2	5	1	3	7	11	8	3	13
SEA (n=63)	35	2	3	2	2	1	3	5	1	2	7

Table 4. Percentages of first-year primary moult categories

	No moult	Interrupted moult	Full moult
NWA	54%	35%	11%
SEA	56%	33%	11%

guided guesswork and the estimates obtained can be subject to observer bias and have no measures of precision. The best use for such estimates may be the identification of outliers and the provision of starting values for the non-linear estimation methodology of the Underhill and Zucchini (1988) models.

- Cases of individual birds retrapped within a season were used to observe the progress of primary moult. Where two observations of the one moult sequence were made, the known rate of increase in PMI are used to estimate start date and duration by extrapolation. Estimates for groups of birds (e.g. SEA adults) are obtained by averaging. Sample sizes are small here, so standard deviations were estimated from ranges (Weatherburn 1962); this is more conservative for small samples than conventional calculation.
- Statistically rigorous maximum likelihood estimates of the three parameters that define the primary moult cycle were obtained using the Type 2 model of Underhill and Zucchini (1988). These parameters are the mean and standard deviation of starting date and the duration. Starting dates are assumed to be normally distributed. It is further assumed that the rate of feather mass gain is constant. The Type 2 model applies when all birds have arrived before moult starts, and none leaves before all birds have completed it. This was only done for adult moults for which consistent data over the whole primary moult were available.

RESULTS

Primary moult in first-year birds

There are real differences in the primary moult of individuals in their first year. Some undergo a full or partial moult starting at the inner primary, while others do not moult primaries at all. Once active moult has ceased, three categories can be observed: no moult (all old feathers - 0^{10}), interrupted moult (a number of new full-grown primaries followed by old ones – e.g. $5^{6}0^{4}$), and full moult (all primaries replaced - 5^{10}). Moults which have stopped mid-cycle are known as interrupted unless it is known from later data how moult restarted. Moults are called "arrested" when the next moult starts at the innermost primary; they are called "suspended" when moult restarts at the point of interruption (Jenni and Winkler 1994).

Wings of birds with all primaries fully grown in the period April to July were inspected to determine the proportions of these three categories of first-year moult. To these were added cases where a full moult was being completed by the growth of the tenth primary, and also cases of second-year birds in August (and September in SEA) in which the first-year moult history had not yet been obscured by the second-year moult. Table 3 shows the actual numbers of primaries replaced in the first year by the birds so identified. The percentages of the three moult categories are shown in Table 4. These tables show no suggestion of any difference in the numbers of feathers replaced between NWA and SEA..

North-west Australia

Figure 1 summarises the progression of moult for those first-year NWA birds that were actively moulting when caught. Actively moulting first-year birds were found in the first week of March, and the most advanced case (PMI = 0.625 on March 4) had probably commenced in late December or early January. March 4 was also the latest date on which the beginning of moult was seen. Cases of interrupted moult occurred from the fourth week of March onwards. The first completed full moult was observed in the fourth week of April and some birds

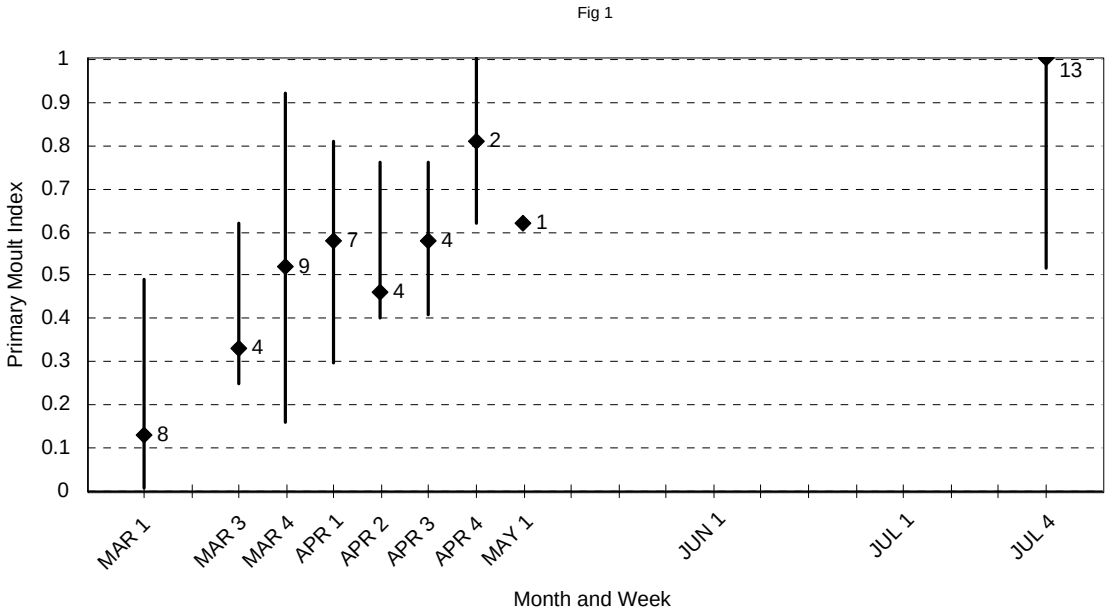

Figure 1. Median and range of primary moult index for first year Ruddy Turnstone in north-west Australia. Sample size by median.

were still completing a full moult in the fourth week of July.

Of the 123 birds caught between April and August, whose moult category could be determined, 67 did not moult, 43 had an interrupted moult and 13 underwent a full moult of all primaries. Table 5 gives all 28 cases where birds captured in their first year were recaptured in that year or their second. In the 22 cases where the nature of the first-year primary moult can be determined: 6 had no moult; 4 had a full moult; 15 had interrupted moult, which later recapture showed to have been arrested moults in 7 cases; no moults were unequivocally shown to have been suspended.

Start and duration of a complete moult of first-year NWA birds were estimated from retraps in the same primary moult. Three such cases were recorded in NWA (see Table 6). The average duration over these birds was estimated as 109 days (S.D. = 61.0, N = 3) with an average start date of February 9 (S.D. = 39.3 days, N = 3).

South-east Australia

Figure 2 summarises the progression of moult for those first-year SEA birds that were actively moulting when caught. Early moult was observed in mid-January, and a PMI of 0.171 on Jan 15 suggests that moult had commenced in late December. The latest early moult (PMI = 0.011) was on March 19. On that date the earliest completed moult and the first interrupted moult were also seen. The last active moult was recorded on April 5. Of the 63 first-year birds observed between April and September, whose moult category could be determined, 35 did not moult, 22 showed interrupted moult and 7 had a complete moult. Table 7 lists the 23 cases in which individual birds were captured and recaptured in their first and/or second year. The table shows: 10 cases of no moult; 3 of full moult; and 10 of arrested moult all of which were shown to have been arrested moults on recapture.

No estimates of start and duration are made for first-year birds in SEA. The median plots are incomplete due to the interrupted moult, there were no same moult retraps, and the data were considered insufficient to allow calibration of Underhill/Zucchini models models.

Primary moult in second-year birds

The second year of a wader's life, by Australasian Wader Study Group convention, starts on August 1. Any unmoulted primaries dating from when the bird fledged over a year previously will be faded and very worn; often the distal barbs wear away leaving the shaft longer than the webs (Rogers 1990). These feathers are recorded as 'V' i.e. Very old. Primaries that were grown during the first year, being a few months old, will be slightly worn and are recorded as 'R' i.e. Replaced.

Table 5. North-west Australia. Moult on 1st and 2nd year retraps.

Band	Date	Age	Moult Formula	PMS	PMI	Comments
05132711	24-Mar-88	1	5555554310	38	0.620	Full first-year moult. PMS increase of 6 in 11 days.
	04-Apr-88	1	5555555432	44	0.813	
05154716	01-Sep-92	2	5552VVVVVV	17	0.175	Full first-year moult. PMS increase of 16 in 43 days.
	14-Oct-92	2	5555553VVV	33	0.486	
05155022	01-Sep-92	2	55211VVVVV	14	0.131	Full first-year moult. PMS increase of 13 in 30 days.
	01-Oct-92	2	555552VVVV	27	0.346	
05155032	01-Sep-92	2	5551VVVVVV	16	0.157	Full first-year moult. PMS increase of 26 in 43 days.
	14-Oct-92	2	555555541V	40	0.669	
05155035	01-Sep-92	2	SSSSSSSSVV	0	0	Arrested moult in first year. Second-year moult starting within 6
	14-Oct-92	2	551SSSSSSV	11	0.096	weeks.
05155042	01-Sep-92	2	SSSSSSVVVV	0	0	Moult arrested. Restarted almost immediately. Moult suspended for a
	01-Oct-92	2	5555551VVV	31	0.426	month would also explain formulae
05181601	03-Mar-94	1	0000000000	0	0	No first-year moult. Second- year moult well advanced by late
	17-Apr-94	1	0000000000	0	0	September.
	26-Sep-94	2	5555321VVV	26	0.328	
05181634	04-Mar-94	1	1000000000	1	0.005	PMS increase of 14 in less than 17 days. Moult later interrupted.
	31-Mar-94	1	5550000000	15	0.148	
05182154	16-Mar-94	1	0000000000	0	0	No first-year moult.
	17-Apr-94	1	0000000000	0	0	
05182503	31-Mar-94	1	5555510000	26	0.320	PMS increase of 5 in 18 days.
	17-Apr-94	1	5555551000	31	0.426	
05182507	31-Mar-94	1	5555555410	40	0.669	Not possible. Unknown data error.
	17-Apr-94	1	5555552231	38	0.625	
05182518	31-Mar-94	1	5555000000	20	0.220	An interrupted moult, which was misread in April.
	17-Apr-94	1	0000000000	0	0	
05182535	31-Mar-94	1	5555521100	29	0.378	Full first-year moult. PMS increase of 13 in 18 days.
	17-Apr-94	1	5555555421	42	0.730	
05186140	15-Apr-96	1	0000000000	0	0	No first-year moult.
	19-Apr-96	1	0000000000	0	0	
05186323	03-May-98	1	5555555300	38	0.616	Moult interrupted, probably in May.
	14-Aug-98	2	SSSSSSSSVV	0	1.000	
05186328	26-Jul-98	1	5555555555	50	1.000	Full moult in first year. Second-year moult started
	12-Aug-98	2	111SSSSSSS	3	0.018	in Aug. PMS increase of 20 in 46 days.
	27-Sep-98	2	55553SSSSS	23	0.274	
05186329	26-Jul-98	1	5000000000	5	0.042	Moult arrested, possibly suspended at, P1 in first year. Later PMS
	12-Aug-98	2	542VVVVVVV	11	0.105	increase of 2 in 2 days.
	14-Aug-98	2	5521VVVVVV	13	0.131	
05186332	26-Jul-98	1	55555V5VVV	30	0.427	Moult interrupted in first year. Second-year moult not started by end
	29-Aug-98	2	SSSSSVSVVV	30	0.427	Aug.
05186333	26-Jul-98	1	55155555VV	11	0.075	Arrested first-year moult. Start of second year moult, starting in
	12-Aug-98	2	S154SSSSVV	10	0.128	July, is unconventional.
05186334	26-Jul-98	1	55555VVVVV	25	0.307	Arrested first-year moult. Second-year moult starting in Aug. Feather
	14-Aug-98	2	11VVVVVVV	2	0.011	ageing inconsistent.
05186339	26-Jul-98	1	5555555300	38	0.616	Moult interrupted after growth of Primary 8 in late July.
	12-Aug-98	2	SSSSSSSSVV	0	0	
05190564	26-Jul-98	1	0000000000	0	0	No first-year moult. Second -year moult starting early Aug (poss. late
	12-Aug-98	2	321VVVVVVV	6	0.051	July).
05190568	26-Jul-98	1	5500000000	10	0.089	Moult interrupted in first year. Second-year moult not started mid-
	12-Aug-98	2	SSVVVVVVV	0	0	Aug.
05190578	26-Jul-98	1	0000000000	0	0	No first-year moult. Second-year moult not started mid-Aug.
	12-Aug-98	2	VVVVVVVVV	0	0	
05190582	26-Jul-98	1	0000000000	0	0	No first-year moult. Second-year moult just started in mid-Aug.
	14-Aug-98	2	211VVVVVVV	4	0.029	
05190584	26-Jul-98	1	5555555555	50	1.000	Full moult in first-year. Second-year moult not started mid-Aug.
	12-Aug-98	2	SSSSSSSSS	0	0	
05190686	12-Aug-98	2	55421VVVVV	17	0.178	PMS increase 0f 18 in 44 days.
	25-Sep-98	2	55555541VV	35	0.533	
06216460	07-Aug-98	2	SSSSSSSVVV	0	0	Moult interrupted in first-year. Second-year moult not started mid-
	20-Aug-98	2	SSSSSSSVVV	0	0	Aug.

Table 6. Daily increase in Primary Moult Index of same moult sequence retraps

Band	Location	Age	Day 1st	PMI 1st	Day 2nd	PMI 2nd	Daily Increase	Start	Duration
05132711	NWA	1	14 Mar	0.621	04 Apr	0.814	0.0092	07 Jan	109
05182503	NWA	1	30 Mar	0.320	17 Apr	0.426	0.0059	07 Feb	170
05182535	NWA	1	31 Mar	0.378	17 Apr	0.731	0.0208	13 Mar	48
05154716	NWA	2	01 Sep	0.175	16 Oct	0.486	0.0072	08 Aug	138
05155022	NWA	2	01 Sep	0.131	03 Oct	0.346	0.0072	14 Aug	140
05155032	NWA	2	01 Sep	0.157	16 Oct	0.670	0.0119	19 Aug	84
05186328	NWA	2	12 Aug	0.019	27 Sep	0.274	0.0055	09 Aug	180
05186329	NWA	2	12 Aug	0.105	14 Aug	0.120	0.0075	30 Jul	133
05190686	NWA	2	12 Aug	0.179	25 Sep	0.533	0.0080	26 Jul	124
05140666	SEA	2+	31 Oct	0.088	04 Dec	0.372	0.0084	21 Oct	120
05141305	SEA	2+	12 Nov	0.150	01 Mar	0.979	0.0075	23 Oct	134

At the start of their second year, there will usually be no active moult but the wing will appear different depending on what moult was undertaken in the first year. The superposition of primary moult in the second year gives rise to some complex moult formulae. Table 8 gives some examples and explanations for them.

North-west Australia

The NWA moult data of birds in their second year are plotted in Figure 3. The start of the second-year moult was seen as early as 20 July (actually while the bird was still, by a few days, in its first 'Australian' year), and some birds didn't start moult until the end of September. No second-year birds were aged as such after November 1.

In August, 94 second-year birds were caught, of which 46 were in early to mid-moult. Thirty-six of these showed a few new and growing inner primaries followed by all V feathers, i.e. full moults following no moult in the first year. Three had new and growing inner primaries followed by all Rs, i.e. full moults following complete moult in first year. Six birds had a combination of new feathers and both R and V feathers. These birds, which had undergone an interrupted moult in their first year, showed complex moult formulae in their second year consistent with two sequences of moult in progress at the same time.

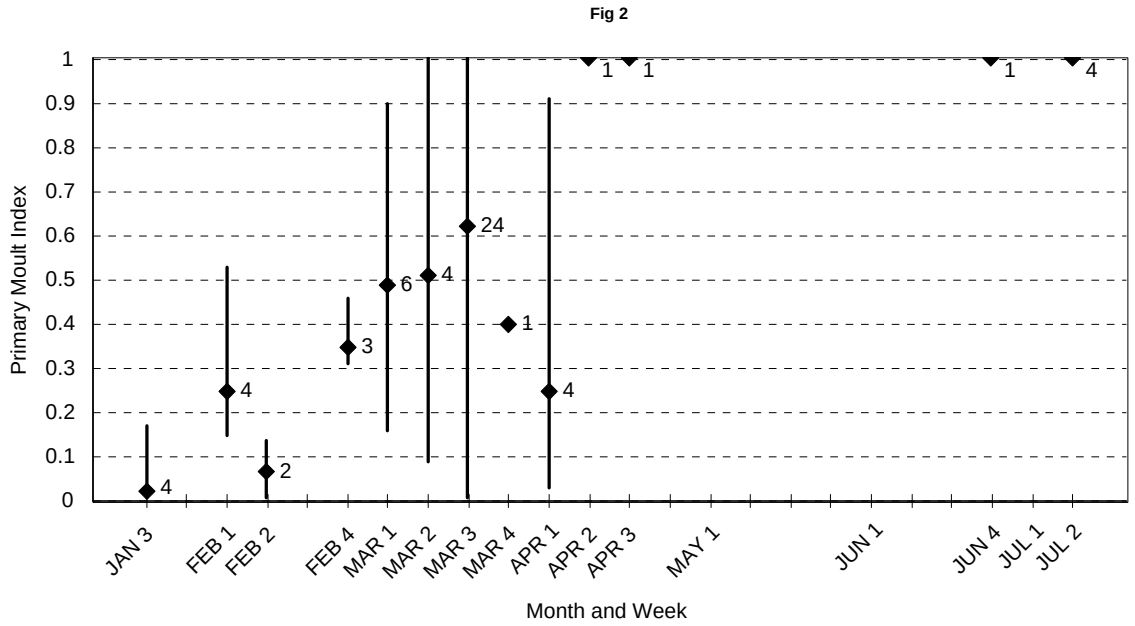

Figure 2. Median and range of primary moult index for first year Ruddy Turnstone in south-east Australia. Sample size by median.

Table 7. South-east Australia. Moult on 1st and 2nd year retraps.

Band	Date	Age	Moult Formula	PMS	PMI	Comments
05193759	19-Mar-98	1	0000000000	0	0	No moult in first year. Second-year moult well advanced in December.
	10-Jul-98	1	0000000000	0	0	
	06-Dec-98	2	55555551VV	36	0.548	
05193778	19-Mar-98	1	5555550000	30	0.411	First-year moult probably arrested by mid-March. Second-year moult
	10-Jul-98	1	5555550000	30	0.411	not yet started by 6 December. All new feathers at completion by mid-
	06-Dec-98	2	5555550000	30	0.411	April.
	18-Apr-99	2	5555555555	50	1.000	
05193781	19-Mar-98	1	5555500000	25	0.307	Moult arrested by mid-March. Next moult started October? Odd
	06-Dec-98	2	5555454000	33	0.505	formula results of accidental feather loss?
	18-Apr-99	2	5555555555	50	1.000	
05193782	19-Mar-98	1	5555555400	39	0.650	First-year moult arrested by late March/early April. Second-year moult
	10-Jul-98	1	5555555550	45	0.821	well under way by early December.
	06-Dec-98	2	5555454000	33	0.505	
	18-Apr-99	2	5555555555	50	1.000	
05193784	19-Mar-98	1	5555555420	41	0.708	Full first-year moult.
	10-Jul-98	1	5555555555	50	1.000	
05193787	19-Mar-98	1	0000000000	0	0	No moult in first year.
	10-Jul-98	1	0000000000	0	0	
05193791	19-Mar-98	1	0000000000	0	0	No moult in first year. Second-year moult well advanced by 6 Dec.
	10-Jul-98	1	0000000000	0	0	
	06-Dec-98	2	5555555200	37	0.582	
05193801	19-Mar-98	1	5555554000	34	0.515	First-year moult arrested at P9. Second-year moult started probably
	10-Jul-98	1	5555555550	45	0.821	around October.
	06-Dec-98	2	55553SSSSV	23	0.274	
	18-Apr-99	Ad	5555555555	50	1.000	
05193803	19-Mar-98	1	5555555100	36	0.548	First-year moult arrested at P8 about end of March. Second-year moult
	10-Jul-98	1	5555555500	40	0.667	started about November.
	06-Dec-98	Ad	5552000000	17	0.175	
	18-Apr-99	Ad	5555555555	50	1.000	
05193807	19-Mar-98	1	0000000000	0	0	No moult in first year. Second-year moult started well before
	10-Jul-98	1	0000000000	0	0	December.
	06-Dec-98	2	5555552000	32	0.456	
05193816	19-Mar-98	1	5555100000	21	0.231	First-year moult arrested at P5 end/March/early April. Second-year
	10-Jul-98	1	5555550000	30	0.411	moult started before Dec.
	06-Dec-98	2	5541000000	15	0.149	
05193819	19-Mar-98	1	5555555410	40	0.669	Full moult in first year, probably completed April. Second-year moult
	10-Jul-98	1	5555555555	50	1.000	started Oct/Nov.
	06-Dec-98	2	5554300000	22	0.265	
05193821	10-Jul-98	1	0000000000	0	0	No moult in first year. Second-year moult started well before Dec.
	06-Dec-98	2	5555553000	33	0.486	
05193822	19-Mar-98	1	5555510000	26	0.320	First-year moult arrested by end of March. Second-year moult started
	10-Jul-98	1	5555550000	30	0.411	well before December.
	06-Dec-98	2	555511VVVV	22	0.244	
05193824	19-Mar-98	1	0000000000	0	0	No moult in first year. Second-year moult started well before Dec.
	10-Jul-98	1	0000000000	0	0	
	06-Dec-98	2	5555555200	37	0.582	
	18-Apr-99	2	5555555555	50	1.000	
05193825	19-Mar-98	1	5555555420	41	0.708	Full moult completed early April. Second-year moult started well before
	10-Jul-98	1	5555555555	50	1.000	December.
	06-Dec-98	2	5555552SSS	32	0.456	
05193833	10-Jul-98	1	0000000000	0	0	No first-year moult. Second-year moult started before December.
	06-Dec-98	2	5552100000	18	0.186	
05193836	10-Jul-98	1	5555555000	35	0.530	Arrested first-year moult. Second-year moult started before Dec.,
	06-Dec-98	2	5550000000	15	0.148	possibly suspended, and completed probably before April.
	18-Apr-99	2	5555555555	50	1.000	
05193838	10-Jul-98	1	0000000000	0	0	No moult in first year. Second-year moult started well before Dec.
	06-Dec-98	2	5555554000	34	0.515	
05193851	10-Jul-98	1	0050000000	5	0.059	Unusual first-year moult, possibly replacement of feather accidentally
	06-Dec-98	2	5555553000	33	0.486	lost. Second-year moult started well before Dec.
05193852	10-Jul-98	1	5555000000	20	0.220	Arrested first-year moult. Second-year moult almost finished in early
	06-Dec-98	2	555555551V	41	0.687	Dec.
05193855	10-Jul-98	1	0000000000	0	0	No moult in first year. Second-year moult almost finished early Dec.
	06-Dec-98	2	55555552VV	37	0.582	
05193858	10-Jul-98	1	5555555000	35	0.530	Arrested first-year moult. Second-year moult started in Nov.
	06-Dec-98	2	3221000000	8	0.075	

Table 8. Primary moult formulae for second-year birds.

Moult formula	Explanation
At start of second year	
VVVVVVVVVV	No moult in first year
RRRRRRRRRR	Full moult in first year
RRRRRVVVVV	Interrupted moult in first year
Active moult in second year	
55555541VV	Conventional moult following interrupted or no moult in first year
555321RRRR	Conventional moult following full moult in first year
42RRRRRVVV }	Conventional moult following arrested moult in first year
551RRRRRRV }	
RRR41VVVVV }	Continuation of moult following suspended moult in first year
RRRRRR3VVV }	
Two centres of moult in second year	
51R31VVVVV }	Two active moult centres is unusual. Probably moult was somehow delayed and this response is an attempt to catch up. The speeding-up is effected by starting a new primary moult sequence before its predecessor has finished.
1555555541 }	
53RRRRRR2V }	
555554R541 }	
}	
}	
}	

The August data show that, of birds with only V primaries, 36 were moulting and 18 were not, while birds with some or all R primaries had 9 moulting and 28 not. Even taking into consideration the fact that some of the 36 moulting V birds may have already replaced some inner R feathers, these numbers suggest quite strongly that birds which have not moulted any primary feathers during the first year start the second-year moult earlier than those which have.

Start and duration of a complete moult of second-year NWA birds were estimated from retraps in the same primary moult. Six such cases were recorded in NWA (see Table 6). The average duration over these birds was estimated as 133 days (S.D. = 37.9, N = 6) with an average start date of August 6 (S.D. = 11.5 days, N = 6). The low S.D. of start date suggests that all these retraps are of birds which started their primary moult early because they had not moulted any feathers the previous year.

South-east Australia

The moult data of second-year birds in SEA are plotted in Figure 4. In contrast to NWA, very few Ruddy Turnstones have been caught in SEA in the August/early October period. This makes it difficult to determine the moult behaviour and timing for second-year birds. The earliest record of second-year moult was of two birds in very early moult on September 13. All second-year birds identified in mid-November were moulting. A completed moult was seen on November 29, but 20 known second-year birds caught on December 6 were all still moulting. Of the 15 second-year birds caught in the period August to October, 5 had some or all R primaries and none were moulting. Six of the remaining 10 were moulting. In the second and third weeks of November, 4 birds with R primaries were moulting, all at an earlier stage than most of the other 58 which were by then moulting the outer Vs. As in NWA this again suggests that birds that had not moulted any primaries in their first year started their second-year primary moult rather earlier.

Twenty-one of the birds in Table 7, which were retrapped on Dec 6, 1998, were known second-year birds as they had been aged as first-year birds the previous March or July. The median PMI of these

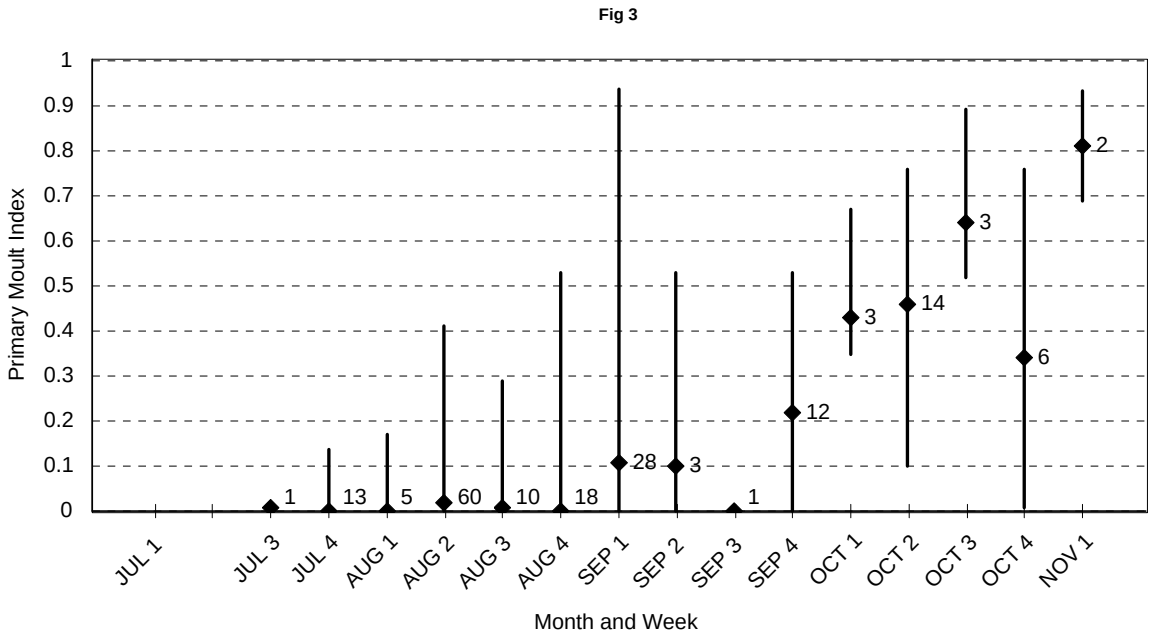

Figure 3. Median and range of primary moult index for second year Ruddy Turnstone in north-west Australia. Sample size by median.

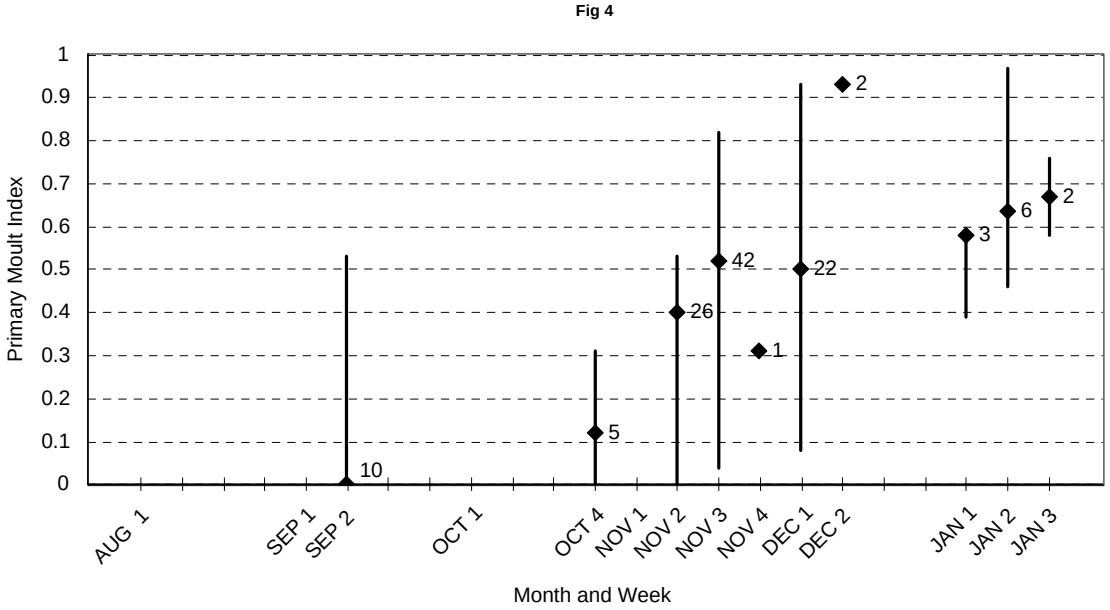

Figure 4. Median and range of primary moult index for second year Ruddy Turnstone in south-east Australia. Sample size by median.

second-year birds was 0.5, whereas the median PMI for the 90 remaining birds aged as adult on that date (which may still have included unidentified second-year birds) was 0.22. This provides confirmation of the observation that second-year birds are further ahead in their moult than adults at the same time. If the 12 December 1998 second-year birds are grouped by whether or not they replaced more or fewer than 5 primary feathers in their first year (8 and 10 individuals respectively), the two groups have PMI scores showing the following:

- > 5 replaced:
  median PMI = 0.25 mean PMI = 0.33;
- < 5 replaced:
  median PMI = 0.53 mean PMI = 0.51.

This further supports the idea that birds that moult fewer primaries in their first year start moult earlier in their second year, presumably because their wings are more worn. The bird with band 05193778 in Table 7 showed interrupted moult on 19th March and was still not moulting on the December 6. By April 18 it had a full set of new primaries, but it is worth noting that its weight then (125 g) was well below average (150g) and it showed only a trace of breeding plumage. The late moult appears to have prejudiced this bird's preparations for northward migration.

No estimates of start and duration are made for these birds. There are no same moult sequence retraps, the mixed distribution of starting dates, and the sparse data preclude a modelling approach.

Primary Moult In Adults

North-west Australia

Of 35 adult birds caught in August, none were moulting. Birds in the initial stages of moult were seen on September 1, with one bird already having a PMI of 0.197. The latest date for a bird in the early stages of moult was October 22. All birds caught in November were in primary moult. The earliest completed moult was seen on December 17, but this could have been an early-moulting second-year bird rather than a full adult. Of seven birds caught in January, three had completed moult and four were close to finishing. Of 386 birds caught in March, only three were still moulting, one as late as March 25.

From the median PMI plot (Fig 5), it appears than adult primary moult starts in the first week of October on average and finishes by the middle of January, giving an average duration of a little over 3 months or approximately 100 days. There were no same primary moult recaptures of adults in NWA but calibration of the Underhill-Zucchini model was possible. This gave mean starting date as October 5 (S.E. = 1.7 days), the standard deviation of start date as 17.6 days (S.E. = 1.1 days), and the duration as 92.9 days (S.E. = 4.8 days).

South-east Australia

Few birds were caught in the early part of the moulting period. Of 18 adult birds recorded in the period 18 to 20 October, 10 were in active moult. The most advanced of these was a bird with PMI = 0.413 on 18 October, but this may have been a second-year bird which was not distinguishable as such. The latest starting moult was observed on the December 6. A finished moult was seen on January 8. Of 125 birds in the first week of March, 26 were near the end of moult and the rest had finished. In the second week of March, only 4 out of 37 were still finishing the primary moult. In the rest of March and April only a very few instances of active moult were seen, all near the end, with the latest being one bird finishing in the third week of April.

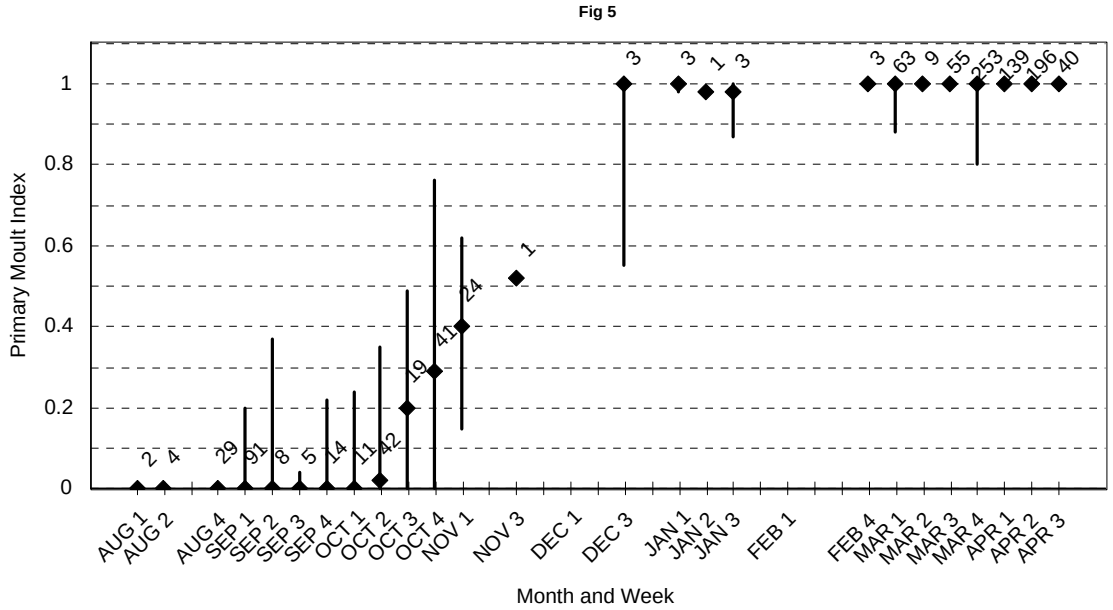

Figure 5. Median and range of primary moult index for adult Ruddy Turnstone in north-west Australia. Sample size by median.

From the plot of median PMI (Fig. 6), it appears that on average, adult primary moult starts at the end of October and finishes in early February, giving an average duration of three and a half months or approximately 108 days.

Two adults were caught more than once in the same moult cycle in SEA (Table 6). These give an average duration as 127 days (S.D. = 12.5, N = 2) with an average start dates of October 22 (S.D. = 2.2 days, N=2).

The Type 2 model of Underhill and Zucchini (1988) is calibrated for adult birds. The model estimates the mean starting date as October 27 (S.E. = 1.2 days), its standard deviation as 18.4 days (S.E. = 0.4 days), and the duration as 109.3 days (S.E. = 1.6).

DISCUSSION

Nearly half the Ruddy Turnstones in both NWA and SEA moult all or some of their primaries in their first year. This moult starts at the innermost primary, usually in December/January, but in three-quarters of these birds the moult is arrested in March/April. In both southern Africa (Summers *et al.* 1989) and Australia the arrested moults showed the unusual pattern of replacing the inner primaries while the outermost worn ones were retained. This is unlike most other wader species in Australia, where partial primary moults of first-year birds, if they occur, tend to be of outer primaries. Complete moults are not reported for southern African birds and no first-year moult replaced more than six primaries. First-year primary moult has not been reported in Turnstones that spend the boreal winter in Europe (Cramp 1983, Summers *et al.* 1989).

The Australian primary moult formulae showed great variety. Where there had been no moult or a full primary moult in the first year, a full primary moult occurred in the second year, starting somewhat later for birds that had done a full moult the previous year. No late-moulting second-year birds were trapped twice in the same primary moult so the parameter estimates made for these birds in NWA are based wholly on birds that did no moult in their first year. In a small number of cases, active moult was recorded at two places in the same primary tract. It would seem here that a new sequence of moult has started followed by a second sequence before its predecessor was complete. This strategy possibly enables birds whose moult has for some reason been delayed to catch up with the schedule of undelayed birds.

Calibration of primary moult of second-year birds is difficult because the birds become indistinguishable from adults during the course of the moult. Use of the rather simpler method of Rothery and Newton (2002), which calibrates the moult when only data at the start or at the end of moult are available,

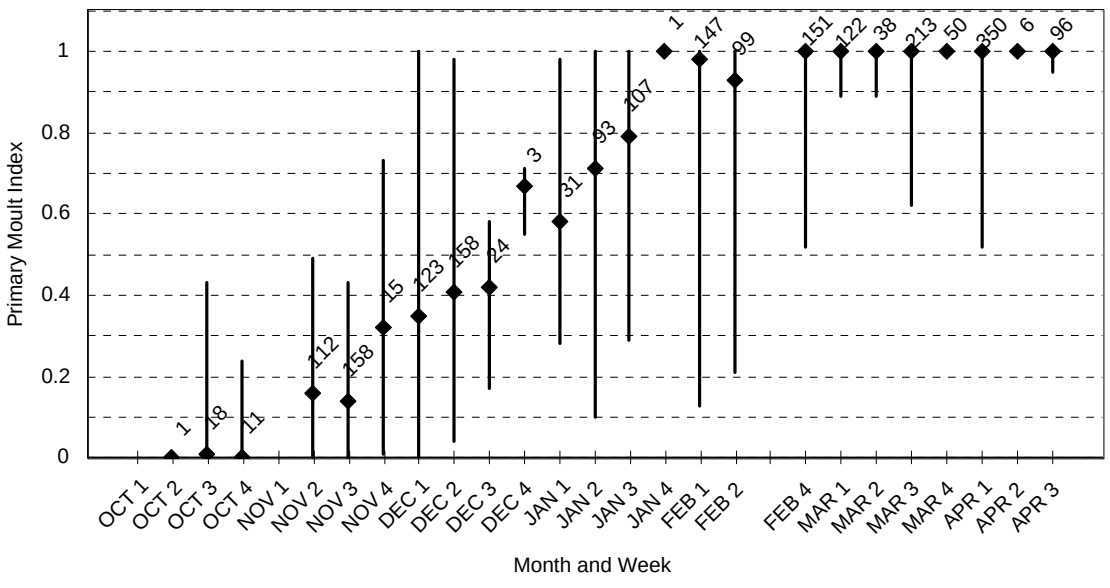

Figure 6. Median and range of primary moult index for adult Ruddy Turnstone in south-east Australia. Sample size by median.

could be considered but it is not clear if or how the method would deal with the mixture of early and late starting times.

Adult Ruddy Turnstones which spend the non-breeding season in Australia follow the typical world-wide pattern of commencing a standard "inner to outer" primary moult soon after they have completed their southward migration. Birds in NW Australia start their moult three weeks earlier than birds in SE Australia and take, on average, 93 days to complete moult as opposed to 109 days in SEA.

Summers *et al.* (1989) used the Type 2 model of Underhill and Zucchini to compare primary moult parameters of adult birds in Southern Africa and Scotland. Their results are given here in Table 9 together with the NWA and SEA estimates of this study derived by the same method. For comparison, estimates from the Wash (UK) (Branson *et al.* 1979) are also shown. Compared with Scottish birds, Australian birds have a slower moult spread out over a greater range of starting dates. The faster moult of the Scottish birds is probably achieved by those birds replacing more feathers at the same time than do Australian ones. The primary moult of southern African birds is broadly comparable to that of south-east Australian birds.

The moult strategies described here ensure that all adult and second year Ruddy Turnstones have primary feathers in the best possible condition prior to the critical time-constrained northward migration in March/May just before the breeding season. The timing and duration of the moulting periods is determined by the period available between completing the southward migration and the need to start accumulating fat reserves and moulting into breeding plumage before the next northward migration.

The key finding of this study is that nearly half the first-year birds moult some (34%) or all (11%) of their primaries, starting at the innermost, in their first year, with the remainder (55%) undertaking no moult. All second-year birds undergo a complete primary moult. Why do they have such a mixed moult strategy? The question is intriguing since, as far as we know, no Ruddy Turnstones carry out any significant northward migration in their first year.

Birds always have to balance the advantages of having a good set of flight feathers (for migration or for avoiding predators) against the costs of moulting feathers (energy demand, temporarily reduced flying efficiency). First-year birds which moult all their primaries incur the costs of undertaking a moult which the non-moulters do not then incur. By so doing, they never fly with primaries more than about 10 months old and avoid the costs associated with flying with old, increasingly weakened flight feathers up to 15 months old or more before they are replaced in their second-year moult. The second-year primary moult of these birds is earlier than that of the first-year moulters because of the need to replace the very worn flight feathers.

There are two reasons for supposing that moulting in the first year is the preferred strategy. First, unless some first-year birds adopt this strategy because finishing their second-year moult later affords some advantage, and there is no evidence on this point either way, then the advantage of never flying with very worn flight feathers outweighs the costs of the extra moult. Secondly, the partial primary moult suggests that birds will, if they can, undertake this moult. Why else would they start the

Table 9. Estimates of primary moult parameters for adult Ruddy Turnstones.

Location	N	Starting Date			Duration	Completion Date	
		Mean	S.D. (days)	95% Range	Mean (days)	Mean	95% Range
NWA	458	5 Oct (1.68)	17.6 (1.11)	31 Aug – 9 Nov	92.9 (4.84)	6 Jan (4.1)	4 Dec – 12 Feb
SEA	1616	27 Oct (1.16)	18.4 (0.43)	23 Sep – 3 Dec	109.3 (1.61)	13 Feb (2.08)	10 Jan – 21 Mar
Southern Africa	577	9 Oct (4.6)	31.5 (1.6)	8 Aug – 9 Dec	119.4 (5.8)	5 Feb (5.5)	5 Dec – 8 Apr
Scotland	457	5 Aug (2.6)	12.9 (0.6)	11 Jul – 30 Aug	73.8 (4.1)	19 Oct (1.9)	24 Sep – 13 Nov
The Wash	600	7 Aug (median)	_	_	[~80]	26 Oct (median)	_

Note. Standard errors (in days) of estimates are given in parentheses. N = sample size.

moult at the innermost primary? This gives the opportunity for the moult to continue as long as conditions are suitable. Partial moults of outer primaries, on the other hand, are determined wholly by where they start in the middle of the wing and are almost invariably carried out until all outer primaries are replaced.

It is only the fittest members of the first year population (e.g. those with little parasite infection, those with the greatest feeding efficiency) that can afford to do a complete moult in the first year. Less fit birds carrying out only a partial moult in their first year obtain some advantage, but not as much as those which carry out a full moult. Clearly the least fit birds, which carry out no moult in their first year, are subject to the greatest risk from avian predators, especially by the time their feathers are a year old at the end of their first year and the beginning of their second year. It is a mystery why other species do not adopt this apparently advantageous strategy.

The moult of adult birds does not seem to need any great explanation. On average they start after they have had a short period to get over their migration and they complete moult in sufficient time for the weight gains and plumage changes necessary before the start of northward migration.

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REFERENCES

Branson, N.J.B.A., E.D. Ponting and C.D.T. Minton 1979. Turnstone populations on The Wash. *Bird Study* 26:47-54.

Cramp, S. (ed). 1983. Handbook of the Birds of Europe the Middle East and North Africa: the Birds of the Western Palearctic. Vol. 3. Oxford University Press, Oxford

Houston, P. and M. Barter. 1990. Morphometrics of Ruddy Turnstone *Arenaria interpres* in Australia. *Stilt* 17:17-23.

Jenni, L. and R. Winkler. 1994. Moult and Ageing of European Passerines. Academic Press, San Diego.

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

Rogers, K.G. 1989. Collecting Bird Banding Data, in The Australian Bird Bander's Manual. K.W.Lowe (ed). Australian National Parks and Wildlife Service. Canberra.

Rogers, D.I. 1990. The use of feather abrasion in moult studies. *Corella* 14 (5): 141-147.

Rothery, P. and I Newton. 2002. A simple method for estimating timing and duration of primary moult using field data. *Ibis* 144: 526-528.

Summers, R.W., L.G. Underhill, C.F. Clinning and M. Nicoll. 1989. Populations, Migrations, Biometrics and Moult of the Turnstone *Arenaria i. interpres* on the East Atlantic coastline, with special reference to the Siberian population. *Ardea* 77:145-67.

Underhill, L.G. and R.W. Summers. 1993. Relative masses of primary feathers in waders.Wader Study Group Bull. 71:29-31.

Underhill, L.G. and W. Zucchini. 1988. A model for avian primary moult. *Ibis* 130, 358-372.

Watkins, D. 1993. A National Plan for Shorebird Conservation in Australia. RAOU Report No. 90.

Weatherburn, C.E. 1962. A First Course in Mathematical Statistics. Cambridge University Press, London.

SOUTHWARD MIGRATION IN 2003 OF SHOREBIRDS AT THE PENZHINA RIVER MOUTH, KAMCHATKA, RUSSIA

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ABSTRACT

Daily observations of the southward migration of shorebirds at the mouth of Penzhina River were conducted over 31 days from August 11 to September 10, 2003. Two methods of shorebird counting were used each day: a 5-6 hour count on mudflats along a fixed 10 km shoreline length and a count of shorebirds flying over the study area. The survey complements the 2002 survey made over the 30 days preceding August 11 and confirms the great importance of the Penzhina River mouth for shorebirds during southward migration. A total of 307,811 individuals of 24 species were counted. Most numerous were Dunlin (302,820), Red-necked Phalarope (1,858), and Red-necked Stint (1,810). We could not obtain reliable counts of night-migrating species (especially Common Snipe and Long-toed Stint). It was expected that most of four late-migrating species would pass through the Penzhina River mouth during this later survey period; this was confirmed for Dunlin but not for Long-billed Dowitcher, Pacific Golden Plover, and Grey Plover.

INTRODUCTION

The Penzhina River mouth has the second highest tidal range in the world and vast mudflats are exposed at low tide. The first survey undertaken here (Gerasimov 2003), from July 12 to August 10 in 2002, counted 139,627 shorebirds of 29 species and confirmed the great importance of the Penzhina River mouth on southward migration. Migration was still in progress at the end of the 2002 survey and the 2003 survey was undertaken to provide information on the use of the area by shorebirds later in the migration period.

METHODS

The southward migration surveys in 2003 took place at the Penzhina River estuary (62°28'N; 165°15'E) from August 11 to September 10. The study area is shown in Figures 1 and 2. The Penzhina River is 713 km long and has a catchment area of 73,500 sq. km.; the Talovka River has a length 458 km and a catchment area of 24,100 sq. km. The rivers are covered in ice for about 200 days of the year (Anon 1973). The estuaries of the Penzhina and Talovka Rivers, as well as all the northern part of the Penzhina Gulf, have a very high tidal range, the second highest in the world; the maximum range is 14 m, with an average of 9 m. The high tidal range uncovers vast mudflats at low tide.

The study was a continuation of last year's work (Gerasimov 2003) and employed the same methodology. Three counting methods were used:

– On a daily basis, a five to six hour count of shorebirds on mudflats along a fixed ten km shoreline length (Figure 2).

– A count of shorebirds flying past the study area. At night, estimates of migrating shorebird numbers were made based on the calls of birds flying past.

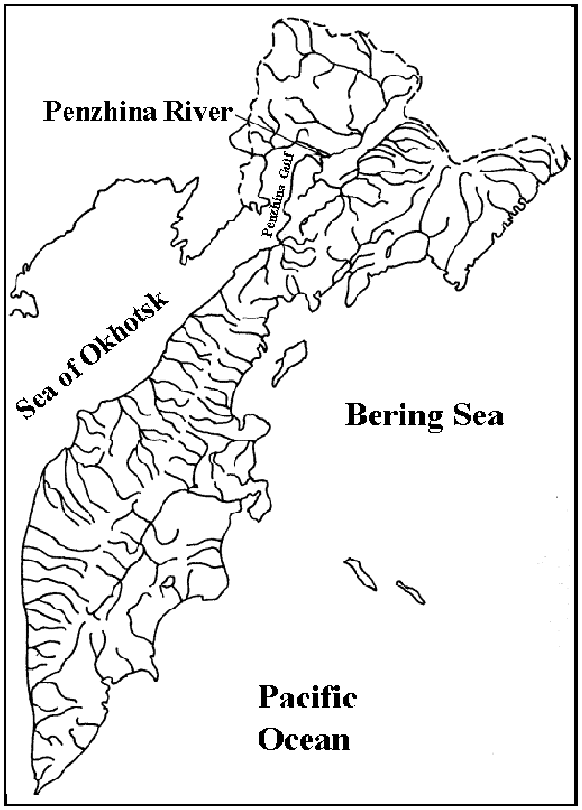

Figure 1. Location of study area.

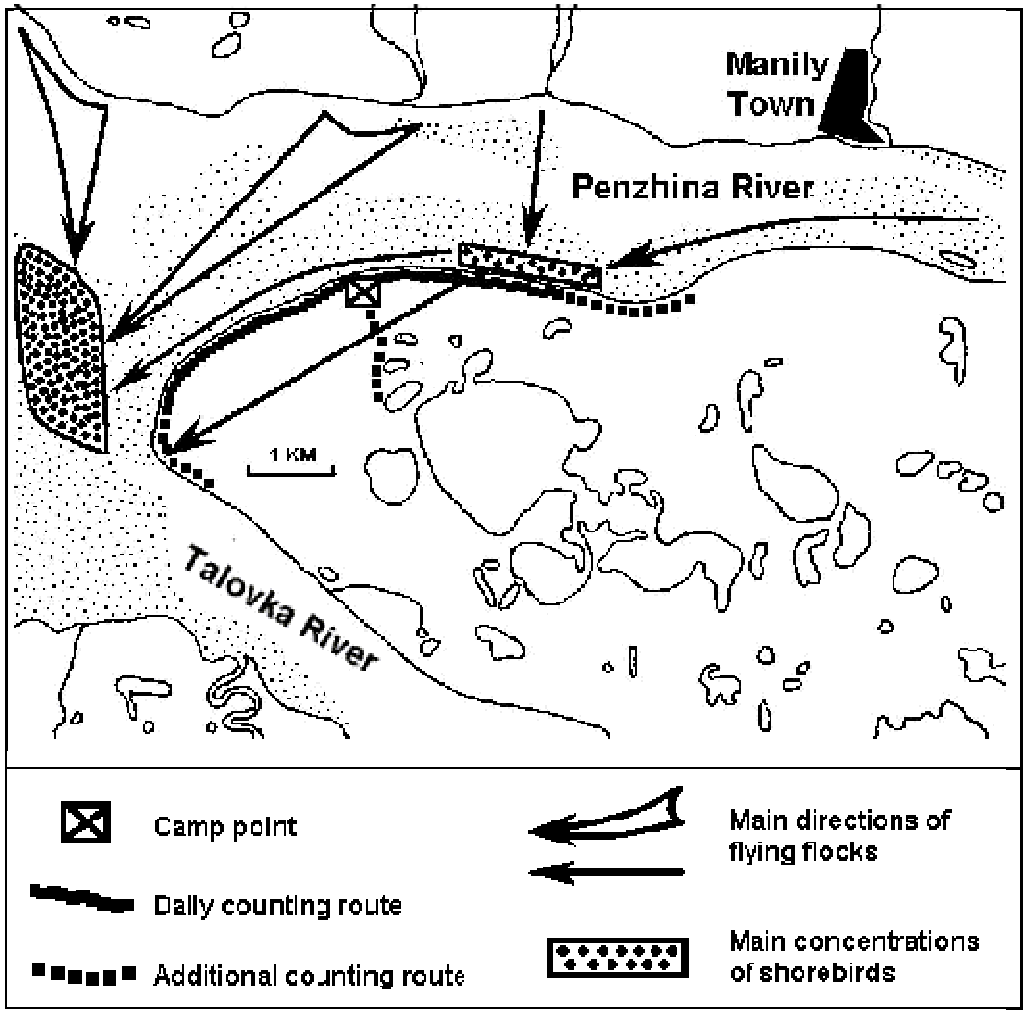

Figure 2. Study area.

– Inland counts over 3km were made on August 23, 27 and 31, and September 5 and 8.

The total daily estimate of migrating shorebirds includes the counts of birds on mudflats and those counted flying past. it is unlikely that gross errors will occur due to summing the daily counts as observations showed that shorebirds generally remain at the Penzhina River estuary no more than one day. This is because there are no suitable roosting places for species such as Dunlin and Red-necked Stint at high tide. There are no beaches and only areas of grassland remain uncovered by water during high tide. Furthermore, during migration large numbers of shorebirds fly over the mudflats without stopping and are not included in the mudflat count.

Table 1 and Figure 3 summarize the main weather variables during the study period. The weather was generally tolerable with rain on 16 days (including 10 days of light rain) out of the 31 and very strong

Table 1. Wind and rainfall at the Penzhina River estuary from August 11 to September 10 2003

	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10
I	E	NE	NE	W	W	0	E	SE	S	SE	E	E	E	NE	NE	NW	NW	NW	0	NW	0	SE	0	NW	NE	E	NW	NW	NW	NW	NW
II	2	4	3	2	3	0	2	1	1	1	2	2	3	5	5	1	2	2	0	2	0	1	0	3	2	3	2	3	3	4	3
III			L		L			L	R		R	R	L	L	L			R	R		L	L			R					L	L

I – Wind direction; II – Wind strength from light (1) to very strong (5); III – Rainfall (R – rain, L – light

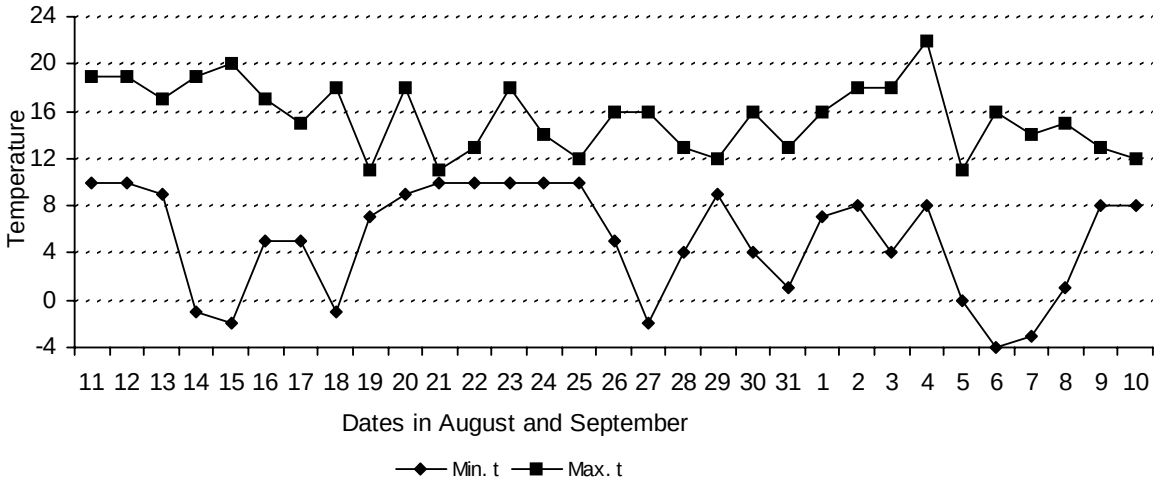

Figure 3. Maximum and minimum temperatures (t) at the Penzhina Mouth during the study period.

winds on only two days. Smoke from a large fire on Chukotka affected visibility until August 20.

RESULTS AND DISCUSSION

A total of 307,811 shorebirds of 24 species were observed during the 2003 survey. Compared with 2002, one new species, Sharp-tailed Sandpiper, was seen and six were not: Great Knot *Calidris tenuirostris*, Red Knot *Calidris canutus*, Grey Phalarope *Phalaropus fulicaria*, Wandering Tattler *Heteroscelus incanus*, Eurasian Oystercatcher *Haematopus ostralegus*, and Spoon-billed Sandpiper *Eurynorhynchus pygmeus*. Only one species, Dunlin, was numerous; it accounted for more than 98% of all shorebirds counted. Two species, Red-necked Stint and Red-necked Phalarope, were common but their numbers were much lower than in the previous year. We believe that the actual number of these two species is probably much higher than we counted. The numbers counted of the different species in 2003 are given in Table 2. Daily counts of the more common species are given in Table 3. Notes on individual species are given below.

Common Snipe *Gallinago gallinago*. Only 50 birds were counted but certainly many more migrated through the area. Common Snipe were recorded at night (mainly 8 to 10 p.m.). The periods of most active migration were: August 20 to 23, 26 to 28, and September 2 to 6. Common Snipe were not recorded after September 6.

Bar-tailed Godwit *Limosa lapponica*. Five birds were seen on August 23; they were feeding on the lake with Spotted Redshanks and Eastern Curlew.

Whimbrel *Numenius phaeopus* was uncommon, with 67 individuals counted. Despite advice from the local people that migration finished by the end of July, in 2003 Whimbrel were recorded from August 17 to September 2, with a peak of 33 individuals on August 23 (Table 3). Whimbrel

Table 2. Summary of numbers counted in 2003 at the Penzhina River estuary.

Species	Number
Common Snipe	50
Bar-tailed Godwit	5
Whimbrel	67
Eastern Curlew	11
Spotted Redshank	320
Common Greenshank	14
Wood Sandpiper	129
Terek Sandpiper	1
Common Sandpiper	32
Grey-tailed Tattler	170
Ruddy Turnstone	1
Long-billed Dowitcher	44
Sanderling	3
Red-necked Stint	1,810
Temminck's Stint	17
Long-toed Stint	3
Sharp-tailed Sandpiper	5
Dunlin	302,820
Ruff	12
Red-necked Phalarope	1,858
Pacific Golden Plover	352
Grey Plover	72
Common Ringed Plover	10
Lesser Sand Plover	5
TOTAL	307,811

Table 3. Daily numbers of common species counted at Penzhina River mouth

Date	Whimbrel	Spotted Redshank	Wood Sandpiper	Common Sandpiper	Grey-tailed Tattler	Long-billed Dowitcher	Red-necked Stint	Dunlin	Red-necked Phalarope	Pacific Golden Plover	Grey Plover
August											
11	-	-	60	3	-	5	533	984	37	6	-
12	-	-	1	3	-	-	131	486	7	7	-
13	-	-	11	2	2	3	66	632	2	2	-
14	-	-	2	1	-	8	345	4004	4	3	-
15	-	-	4	2	2	23	150	15482	17	1	-
16	-	-	12	-	-	-	110	8950	30	-	1
17	1	-	6	-	-	-	-	2897	4	23	-
18	2	-	4	1	5	-	25	11621	6	17	-
19	2	-	6	-	2	-	13	1853	3	14	-
20	1	-	3	-	11	-	18	2366	78	27	-
21	5	6	5	1	3	-	-	39	10	7	-
22	7	2	3	12	4	-	12	191	12	12	-
23	33	253	11	7	31	-	3	473	378	20	-
24	3	-	-	-	8	-	-	1	3	-	-
25	-	-	-	-	-	-	-	-	-	-	-
26	-	35	-	-	8	-	-	12022	40	7	-
27	-	8	-	-	19	-	-	5217	5	20	-
28	-	-	-	-	20	-	-	1544	112	20	1
29	4	10	-	-	23	-	-	1096	334	12	-
30	2	-	-	-	6	-	302	38395	70	6	-
31	3	3	-	-	-	-	102	7166	187	19	-
September											
1	-	-	1	-	1	-	-	40043	11	16	-
2	4	-	-	-	6	-	-	30082	237	16	-
3	-	3	-	-	9	-	-	6222	7	30	-
4	-	-	-	-	10	-	-	14	5	36	4
5	-	-	-	-	-	-	-	20000	4	8	-
6	-	-	-	-	-	5	-	30020	200	5	7
7	-	-	-	-	-	-	-	40172	52	13	7
8	-	-	-	-	-	-	-	20033	3	-	21
9	-	-	-	-	-	-	-	802	-	3	24
10	-	-	-	-	-	-	-	13	-	2	7

migrated as single birds and in small flocks of up to five individuals.

Eastern Curlew *Numenius madagascariensis*. In total, 11 birds were counted from August 16 to August 23, with a maximum of seven birds on August 23. Even this small number was higher than expected as it is an early migrant. The breeding area of these birds is unknown. On August 23, four Eastern Curlew were feeding with Spotted Redshanks on a lake.

Spotted Redshank *Tringa erythropus.* A total of 320 birds was counted. The first birds were seen on August 21. Active migration started on August 23 (Table 3). Some passing flocks (5, 3, 26, 84, 5 individuals) were seen in the morning. About 130 Spotted Redshanks were seen on a 2 km long lake located about 2.5 km inland from the river. Some of these birds were feeding actively on mudflats amongst the *Phragmites australis (P.communis)*, but most were resting - obviously after migrating a long distance. Thirty-five birds were counted on the same lake on August 26 after two days of very windy weather. After this very few birds were seen. The final sighting was on September 3.

Greenshank *Tringa nebularia.* A total of 14 birds was counted, mainly single flying birds. All passed without stopping.

Wood Sandpiper *Tringa glareola*. In total 129 birds were counted. The count of 60 birds on the first day of this survey was the end of intensive migration of this species. Migration finished on August 23, apart from a single bird seen on September 1 (Table 3).

Terek Sandpiper *Xenus cinereus* was rare in 2003. Migration had finished before the start of observations and only one bird, which passed during the night of August 20, was recorded.

Common Sandpiper *Actitis hypoleucos.* A total of 32 birds was counted. Migration took place from the first day of observation up to August 23; peak numbers were counted on the last two days (Table 3). Most birds were counted along the river shore between the camp and the river mouth. Common Sandpipers preferred to feed and rest at the border between wetlands and mudflats.

Grey-tailed Tattler *Tringa brevipes*. A total of 170 birds was counted. Migration took place from August 13 to September 4, mostly from August 18 to 30 (Table 3). Some birds passed the study area at night, probably without stopping. Other birds stopped to feed on the shore edge. The birds occurred as singles or in small flocks of up to five individuals.

Ruddy Turnstone *Arenaria interpres* was rare; one bird was seen on August 20.

Long-billed Dowitcher *Limnodromus scolopaceus* was uncommon. All birds of this species were observed in flocks – but only one flock per day. Forty-four birds in flocks of 5, 3, 8, 23 and 5 individuals were counted. Most migration had finished by August 15, but the final flock of five birds was seen on September 6, 21 days after the previous sighting of this species (Table 3).

Sanderling *Calidris alba* was rare. This species was heard twice at night on August 15 and September 2.

Red-necked Stint *Calidris ruficollis* was numerous, 1,810 birds being counted. The largest number (533 birds) was seen on the first day (Table 3). On this day a few Red-necked Stint were observed from a short distance and only one of them had bright breeding plumage. Following this no birds were seen in breeding plumage. On August 11, flocks of some hundreds of Red-necked Stints were feeding actively on salt marsh. This is the only record of feeding in this kind of habitat and was probably due the appearance of a large quantity of suitable food. Hundreds of Dunlin and many hundreds of Yellow Wagtails were feeding with the Red-necked Stints at the time. It is highly probable many Red-necked Stints, feeding in the distance on the mudflats between the estuaries of the Penzhina and Talovka Rivers, were missed. The number of Red-necked Stints was much lower than in late July-early August 2002 and no Stints were seen after August 31.

Temminck's Stint *Calidris temminckii.* A total of 17 birds was counted. All birds were recorded between August 15 and August 31, mainly passing birds.

Long-toed Stint *Calidris subminuta* was rare. Only a few passing birds were heard on the nights of August 20 and 23.

Sharp-tailed Sandpiper *Calidris acuminata* was a rare late migrating species, with five birds counted between September 4 and 6.

Dunlin *Calidris alpina* was the most numerous species; 302,820 birds were counted in total. During the first three days the number of Dunlin was low (Table 3). Some hundreds of birds were seen feeding with Red-necked Stints in salt marsh on August 11. The first migration wave was from August 14 to 20. During the following five days (a period of bad weather) few Dunlin were seen. Active migration commenced again on August 20 and continued until September 8, with peak numbers on some days of up to 40,000 individuals. Few birds passed the camp, by day or night. Most birds probably arrived from north and northeast directly over the mountains. Between 8 and 9 a.m. on August 16 to 20, Dunlin flocks arrived from a great height from the northeast and landed on the large mudflat at the confluence of the Penzhina and Talovka Rivers.

From August 11 to15, closely observed Dunlin (hundreds) were mostly adults in different stages of moult. On August 18 about half were moulting adults; on August 30 about 80% were either juveniles or adults that had completed moult, with the remainder being birds with residual black belly plumage.

Dunlin migration certainly continued after the end of observations, as L. Borovskoy (pers. comm.) sometimes observed flying flocks of small shorebirds at the beginning of October, once in high numbers.

Ruff *Philomachus pugnax* was uncommon, 12 birds being counted. Most occurred as single birds, in some cases with Spotted Redshank. On the first day, a juvenile bird and an adult were recorded together.

Red-necked Phalarope *Phalaropus lobatus* was numerous. A total of 1,858 birds was counted. Migration took place over the whole study period (Table 3). The number of Red-necked Phalaropes passing through the area was probably significantly higher than that counted, as we could not identify many small shorebirds on the 3 km distant mudflats located between the Penzhina and Talovka estuaries. Sometimes it was possible to identify swimming phalaropes.

Pacific Golden Plover *Pluvialis fulva. In total,* 352 individuals were counted. Rather intensive migration took place from August 17 to September 7, except for two days with a very strong wind (August 24 and 25) when migration of all bird species ceased (Table 3). Pacific Golden Plovers migrated as single birds or in small flocks of up to eight individuals. All closely observed birds were juveniles or adults which had completed body moult. The Pacific Golden Plover is a late migrant, similar to Grey Plover. The latest sightings were on Karaginsky Island (370 km to the south) on October 22 (1970) (flock of 10 individuals), and at Petropavlovsk-Kamchatsky on November 13 (1965) and November 18 (1993) (unpub. data).

Grey Plover *Pluvialis squatarola.* This is latest migrating shorebird species. During August only two single birds were seen. Main migration began on September 6 and continued to the end of the study period (Table 3). Grey Plovers occurred as singles or in small flocks up to five individuals. All closely observed individuals were either juveniles or adults which had completed body moult, in comparison to birds migrating at the end of July 2002 which still had breeding plumage. Migration of Grey Plovers almost certainly continued after the end of this survey (September 10), as in southern Kamchatka this species occurs until November.

Common Ringed Plover *Charadrius hiaticula* was rare. Ten birds were counted from August 15 to 26, no more than two birds at a time.

Lesser Sand Plover *Charadrius mongolus* was rare. Five birds were counted, all singles, from August 14 to 22.

Additional information

From August 29-September 1, during a survey on one incoming tide on the opposite side of the Penzhina Gulf, between the the Tylkhoy and Kuyul estuaries (62°23'N; 163°20'E – 100 km west of the Penzhina River estuary), about 60,000 small shorebirds (presumably Dunlin) were counted. Many flocks of other species were also seen.

CONCLUSION

Given the large numbers of birds passing through the Penzhina River mouth and the absence of suitable roosting sites, it is highly desirable to carry out more shorebird studies in north Kamchatka as it is likely to be an important staging area during southward migration, as well as being potentially important for breeding shorebirds.

ACKNOWLEDGEMENTS

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REFERENCES

Anon. 1973. Surface Water Resources of the USSR. Leningrad.

Gerasimov, Yu. N. 2003. Shorebird studies in north Kamchatka from July 5 – August 12 2002. Stilt 44, 19-28.

BREEDING BY AUSTRALIAN PAINTED SNIPE ON THE TORILLA PLAIN, BRIGALOW BELT COAST, QUEENSLAND

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ABSTRACT

We document the discovery in April 2003 of six birds and a nest with eggs of the Australian Painted Snipe *Rostratula benghalensis australis* at Torilla Plain on the Brigalow Belt coast of Queensland, Australia. The nest was on a muddy islet in a shallow freshwater wetland with marshy margins, at the landward edge of a tropical marine plain. There have been relatively few reports of this species in central Queensland.

INTRODUCTION

The Australian Painted Snipe *Rostratula benghalensis australis* has been infrequently recorded, apparently not breeding, in the Rockhampton district of central Queensland (eg. January 1867, February 1950, October 1994: database of Queensland Parks & Wildlife Service, J.M. pers. obs.). It was not recorded there by Longmore (1978). There were records in the first Atlas (Blakers *et al.* 1984) from near Rockhampton and Broad Sound but none from those localities in the second Atlas (Barrett *et al.* 2002). Breeding has been recorded in coastal areas some distance to the south (eg. South-East Queensland) and north (eg. Ayr) (Marchant & Higgins 1993, database of the Queensland Parks & Wildlife Service, R.J. pers. obs.).

The species has been listed, under the name *R. australis*, as nationally Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (DEH 2003) and is listed as Vulnerable in Queensland under the *Nature Conservation Act 1992*.

OBSERVATIONS

During 2003, Wetlands International conducted waterbird surveys on a Queensland coastal plain (ca. 25,000 ha) that is known locally as the 'Torilla Plain'. The Plain is in the north-western part of the Torilla Peninsula, immediately east of Broad Sound and 125 km NNW of Rockhampton (Fig. 1), and is in the Brigalow Belt North biogeographic region (DEH 2004). It supports a diverse assemblage of wetlands influenced by the macro-tidal regime of Broad Sound and by fresh-water from a suite of short creeks flowing from the east and north. Most of the plain's interior is naturally treeless and the clay substrate supports extensive dryland and wetland grass/sedge communities and aquatic vegetation, with bare saline flats backed by mangroves on the seaward side. In many respects the saline grassland and associated habitat resembles that of the Roebuck Plains in north-western Australia (R.J. pers. obs.). Torilla Plain is mostly under freehold tenure.

On 30 April 2003 at 8 a.m.we saw two Australian Painted Snipe *Rostratula benghalensis australis* in a suite of drying freshwater ponds (22^0 24' S, 150^0 07' E) at the south-eastern edge of the Torilla Plain. The suite extended for about 2 km and covered about 30 ha, component ponds being up to 250 m wide. Most of the pond where the birds were found was less than 0.3 m deep; the innermost part was about 0.5 m deep. Small, permanent block banks on outflow channels connected distantly to Broad Sound had probably delayed draw-down of the pond following the principal rains (about 500 mm) in February 2003. These banks possibly have also

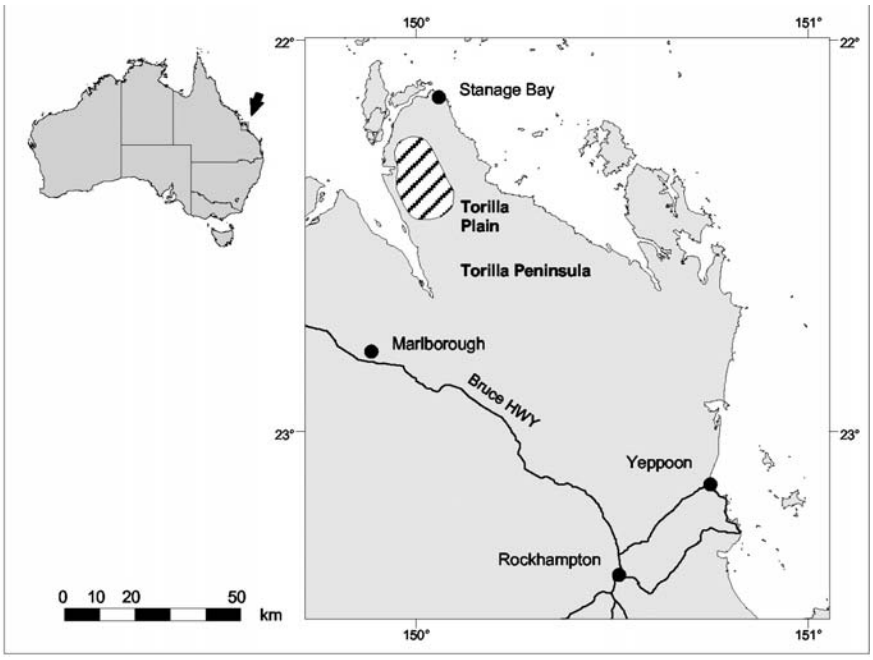

Figure 1. Location of the Torilla Plain, central Queensland coast.

prevented or limited the occasional incursions of seawater.

The wet and muddy margins (5-20 m wide) of this pond supported a moderately dense, lush plant community (0.5-1.0 m tall) dominated by the sedges *Cyperus difformis* and *C. scariosus*, a narrow-stemmed spike-rush *Eleocharis* sp., beetle grass *Leptochloa fusca*, and the erect forbs *Ludwigia perennis* and *Ammannia multiflora*. This vegetation also occurred sparsely or in small patches on emerging muddy islets on one side of the pond. Many individual tussocks were on small mud mounds and some mounds were bare; this habitat provided shelter for shorebirds. Common aquatic plants in the shallows were water primrose *Ludwigia peploides*, nardoo *Marsilea* sp. and bladderwort *Utricularia* sp.; marginal damp areas of the pond also supported dense grass mats of freshwater couch *?Paspalum distichum.* Dry areas surrounding the ponds were either covered by low grass or bare.

The Australian Painted Snipe were detected during a routine count of waterbirds at the wetland, using a tripod-mounted spotting scope. They were moving a short distance through a set of small mounds, in water a few cm deep, 20 m lakeward of the far side of the pond. One of the birds was a fully-coloured adult female. Search effort leading to the sighting was relatively brief (20 minutes) and was not the result of walking through cover. No Australian Painted Snipe had been seen during a 45 minute search (R.J.) of the same area at dusk on 28 March 2003.

As the primary task of our work was to survey the wetlands of the Torilla Plain we finished our count and returned to the site later in the morning. At 10.25 a.m. we flushed a male Australian Painted Snipe from an islet about 80 m from the site of the first observation. The islet was in a corner of the pond, only 7-10 m from shore, separated by water up to 0.4 m deep. It was roughly 35 m long and at most 8 m wide. The ground was muddy, being at most only 0.15 m above water. Driest parts were covered in freshwater couch and similar cover occurred on nearby shores of the pond.

A nest of the Australian Painted Snipe was found at the wide end of the islet, within a metre of where the male bird had been flushed. It was 0.7 m from the water edge and substantially concealed within the freshwater couch grass, which was 0.1-0.2 m high around and over the nest. (There was no evidence that the birds had created the nest 'canopy'.) Other plants in the vicinity included some water primrose, nardoo and *Cyperus scariosus*. The nest was a shallow bowl 0.1 m wide and contained sparse lining of dry grass stems.

The nest contained four eggs, which were white with black/dark blotches and other irregular marks and were similar to others we had seen elsewhere

(R.J. pers. obs.). Three of the eggs had a thin partial coat of dry mud but one egg was clean. The mud forming the nest bowl was still damp, apparently due to recent emergence of the islet rather than rainfall because the weather had been dry. This finding suggested that the clutch had probably been completed within the last 1-2 weeks because the islet would have become dry enough for a nest site only within that time period.

Over the ensuing hour we observed a total of six Australian Painted Snipe, three males and three females, around the breeding pond. Females were identified by lack of bold yellow/buff spots on the upper-wings of birds at rest. First, a dull coloured female was flushed from green low grass similar to cover on the islet, at shore about 30 m from the nest. It was considered to be sub-adult because it had a grey chest streaked with white and only a narrow black band on the pectoral border. It seemed anxious and trotted quickly toward the nest area after alighting on the pond shore. Next, the (presumed) incubating male was re-disturbed from its refuge among high-water mark debris on the dry shore, 40 m from the nest. Then, an adult female was flushed from sparse grass tussocks in a mostly bare dry area 20 m from the pond and 80 m from the nest. This bird had a dark hood and chest, bright white eye-patch, pink-tipped yellow bill and prominent chestnut colour on the nape. Finally, three birds were flushed from the tussock-mounds in shallow water at the site of the first observation. These comprised two males (with faint chest bands) that were relatively conspicuous as they groomed beside cover, and a female that remained hidden until flushed as the observer traversed that site.

Despite careful and extensive searching, no other nests of Australian Painted Snipe were found although potential nest sites similar to that of the active nest were found. Recent nests of Black-winged Stilt *Himantopus himantopus* were situated atop some of the bare tussock-mounds; ten nests with eggs were recorded here on 28 March 2003 (R.J.) but only juveniles were seen on 30 April.

CONCLUSIONS

The fate of the Australian Painted Snipe nest on the Torilla Plain was not determined because a return visit was not possible within the period of incubation and nurture of the young to independence. Separate surveys by two of us (R.J., W.H.) on 1-3 July 2003 failed to locate any Australian Painted Snipe in the breeding pond, which had by that stage dried back substantially and lost much of its fringing vegetation. Cattle were wading in the wetland, especially during the July visit, but any effect on nesting success was unknown. There were no cattle footprints around the nest site in April. Conditions tend to limit cattle use of inundated swamps and biting insects drive them onto higher dry country, particularly at night.

Given an incubation period for this species of only 16-17 days (Marchant & Higgins 1993), laying of the Torilla Plain clutch was apparently completed in early April. This laying date is later than that recorded recently in the sub-tropical Channel Country (January: Jaensch 2003) and South-East Queensland (spring-summer: R.J. pers. obs.). However, it is consistent with the conclusion that breeding season is later in northern Australia (Marchant & Higgins 1993), and corresponds to approximately one and a half months after assumed maximum depth of water at the site. There is some evidence, mainly from non-tropical regions, that Australian Painted Snipe breed at a later stage in the drying out of wetlands than many other Australian waterbirds (D. Rogers pers. comm.). No relevant studies of the biological advantages and disadvantages of such a strategy are known to the authors.

The wetland habitat and nest site for the Australian Painted Snipe on the Torilla Plain on 30 April had several aspects in common with those recorded elsewhere, notably by Hassell and Rogers (2002) in north-western Australia and Jaensch (2003) in the Channel Country. Low islets or small mounds with short grass/sedge seem to be a common nest site for the species.

Breeding by Australian Painted Snipe at the Torilla Plain in 2003 could have been a one-off event given the apparent movement of inland waterbirds (eg. Black-tailed Native-hens *Gallinula ventralis*, as well as Australian Painted Snipe: J. Reid pers. comm., D. Rogers pers. comm., R.J. pers. obs.) to coastal regions during the severe 2002-3 drought across Australia. Two intense rain events on the Central Queensland coast in February 2003 undoubtedly increased the attractiveness of the Torilla Plain to waterbirds. However, we have no baseline data that would show the frequency of occurrence of this species at this site. The relatively small wetland used for breeding in 2003 is at the edge of the Plain and would capture creek inflow from isolated local storms as well as major rain events. It would probably provide islet nest sites

during both deep and shallow inundation although wetter years may produce the best fringing cover. According to local residents, January 2003 was especially dry and, despite the heavy February rains, wetland conditions on the Torilla Plain in the 2002-3 wet season were drier than average. In conclusion, occurrence and breeding by Australian Painted Snipe at this wetland may be possible frequently, in both drier and wetter years. It should be noted, however, that prolonged dry periods, probably less suitable for waterbird breeding, have occurred in the region (major wet years have been scarce since the 1991 flood: J.M. pers. obs.).

The extent to which placement of block banks on outflow channels from the ponds has affected the Torilla Plain site as a breeding habitat for Australian Painted Snipe cannot be fully determined in the absence of baseline survey data. Modification of wetland hydrology by construction of banks has been a major impact on the ecology of marine plains of Central Queensland. So far, relatively little modification has taken place on the Torilla Plain. Among other possible impacts, the effects of woody weeds and introduced pasture grasses on the Torilla Plain seem relatively minor (but not well understood) at present though the latter occupy large areas in the apparently less saline centre of the Plain. Where these grasses have established, grazing by cattle has been noted as the main agent preventing dense monocultures of running, introduced pasture grasses from covering open water areas and native sedge communities (Houston and McCabe 1996).

Survey emphasis or method can influence the incidence of records of cryptic species. J.M. and W.H. focussed their waterbird survey efforts around Rockhampton on dry season refuges (Houston & McCabe 1996). Most bird observers tend to skirt but not probe into broad shallow wetlands. Therefore, the Australian Painted Snipe is possibly overlooked at some localities.

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REFERENCES

Barrett, G., A. Silcocks, R. Poulter, S., Barry & R. Cunningham. 2002. Australian Bird Atlas 1998-2001. Main report to Environment Australia. Birds Australia, Hawthorn East.

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

Department of the Environment and Heritage. 2003. Threatened species and ecological communities. Environment Protection and Biodiversity Conservation Act 1999. [Online], http://www.ea.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna, 3 September 2003.

Department of the Environment and Heritage. 2004. Interim Biogeographic Regionalisation for Australia Version 5.1. [Online], http://www.deh.gov.au/parks/nrs/ibra/version5-1/qld.html, 6 February 2004.

Hassell, C.J. and D.I. Rogers. 2002. Painted Snipe nesting at Taylor's Lagoon near Broome, north-western Australia. Stilt 41, 14-21.

Houston, W. and J. McCabe. 1996. Waterbirds and Waterbird Habitats of the Freshwater Wetlands of the Lower Fitzroy River. Report to Queensland Department of Environment and Australian Heritage Commission. Capricorn Conservation Council, Rockhampton.

Jaensch, R.P. 2003. Breeding by Australian Painted Snipe in the Diamantina Channel Country, south-western Queensland. Stilt 43, 20-22.

Longmore, N.W. 1978. Avifauna of the Rockhampton area, Queensland. *The Sunbird* 9, 25-53.

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

DISCOVERY OF A NEST OF THE GREAT THICK-KNEE IN BANGLADESH

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A nest of the Great Thick Knee *Esacus recurvirostris* (Burhinidae) has recently been discovered for the first time in Bangladesh. The nest, containing two eggs, was found along the shoreline of Pakhir Char (island) in the eastern Sundarban, near the Kachikhali Widlife Centre (89^0 51.086'E, 21^0 51.476'N). The area, located under the Sharankhola Range, is well-known and important for biodiversity.

The nest was found on 5th April 2003 by an IUCN ornithological team comprising M. Anisuzzaman Khan, M. Sazedul Islam, and wildlife researcher Sharmin Sultana that surveyed that area under the Sundarban Biodiversity Conservation Project (SBCP). The nesting pair was also observed. Proof that the bird is resident to Sundarban is a significant scientific finding. No previous information was available on whether or not the Great Thick-Knee bred in Bangladesh. Hayman *et al*. (1986) give breeding seasons as mainly February to April in India and April to July in Sri Lanka. del Hoyo *et al*. (1996) give breeding in India as February to July.

During our observation period at 8 a.m. one individual was on the nest and the other nearby. The nest scrape (see photograph), which contained no nesting materials, was in sand dunes a safe distance from the intertidal zone. Kalmi (the local name for a creeper) and grass covered the nearby (1 m) higher ground. Remains of a marine turtle nest were observed nearby. The eggs measured 58.1 mm in length and 41.9 mm in diameter. One egg was off-white with a blackish olive mosaic, the other pale tan, with a deep brown mosaic.

Another two pairs of Great Thick-knee were observed on the south-east beach of this island in course of the survey. Previously, three individuals of the species were observed in April 2002, two in June 2002, and two in September 2002; all of these were recorded on the eastern beach of the same Island. Analysis of the previous observations suggests that two or three nesting pairs may be located there. A nearby island, Demayr Char, has potential as a breeding ground for Great Thick-knee but none has yet been recorded there. Regular monitoring is essential.

The Sundarban, the single largest area of productive mangrove forest in the world, is located in the estuary of the river Ganges spanning an area of about one million hectares in south-west Bangladesh and the south-eastern portion of the State of West Bengal in India. About 62% of the forest lies between the longitudes 89^0 00'E and 89^0 55'E and latitudes 21^0 30'N and 22^0 30'N in the districts of Bagerhat, Khulna, and Satkhira in Bangladesh. This forest is declared as the Sundarban Reserve Forest (SRF) and has an area of about 6000 sq. km. In the southern part of the SRF, there are three Protected Areas that form the core area of a World Heritage Site that was inscribed in 1997. The SRF is recognized internationally as an ecosystem of high biodiversity value. It is the most important remaining habitat in the world of the critically endangered Bengal Tiger *Panthera tigris tigris*. A comprehensive threat analysis is yet to be carried out, but a 1994 IUCN publication, Hussain and Acharya (1994), lists the following recorded threats to this mangrove ecosystem: changes in fresh water flow and resulting salinity changes, which in turn affect the vegetation pattern; sedimentation increase due to polder construction and other activities in the Northern Impact Zone; pollution from agricultural and industrial production; oil spills from boats; over-exploitation of wood and non-timber forest products; sea level rise; and damage due to cyclones and storm surges. There are similar threats to the aquatic ecosystem, where shrimp production and the resulting pressure on shrimp fry collection from the SRF waters seems to be the main cause for concern. This

issue is becoming complicated as the Government is now producing cheap shrimp fries, thereby making the traditional shrimp fry collection uneconomic.

However, the directly observed threats to Great Thick-knees were destruction of eggs by predators and loss of eggs to fishermen and other collectors of forest resources. This significant sighting predicates an urgent need to initiate a conservation plan to protect this rare species from the several threats to which it, and its nesting grounds, are subject.

REFERENCES

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

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

Hussain, Z. and G. Acharya, 1994. Mangroves of the Sundarbans. Volume two: Bangladesh . IUCN Bangkok.

AN ENCOUNTER WITH WOOD SANDPIPERS IN THE TANAMI DESERT

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The Wood Sandpiper *Tringa glareola* is a small wader with an upright stance; it has long yellowish legs and a medium length dark straight bill. Colouring is grey-brown with profuse light spots above, light below, with streaking on the breast and flanks, a pale eyebrow, and white rump. Breeding occurs across northern parts of Europe and Asia. The non-breeding areas are mainly in tropical and sub-tropical Africa, southern Asia to southern China, Philippines, Indonesia, and Australia. The Australian non-breeding population is thought to breed in eastern Siberia, and move south mainly in August to October through near-coastal parts of eastern Asia, with only a small proportion of this population reaching Australia.

In Australia, arrival in the north is from August in the north and interior, but little is known about the subsequent dispersal. The largest numbers are recorded in the north-west, with small numbers arriving in the south in November and December. Return begins in the south in March, with the last sightings in the north in late April, then travelling through south-east Asia and eastern China to arrive in breeding grounds in May.

Observations in Australia are mostly confined to well-vegetated shallow freshwater wetlands, frequently inundated grasslands, floodplains with temporary or receding water, or more rarely brackish wetland or dry stunted saltmarsh. Also often recorded at artificial wetlands, dams, open sewage ponds, and irrigation schemes. It would appear that very few observations have been made where water has not been present or recently present.

On September 12, 2003, my wife Nancy and I were returning to our home in Adelaide from an extended holiday in the Kimberley region, including a lengthy stay at the RAOU Broome Bird Observatory marvelling at the waders beginning to return from their breeding grounds in the northern hemisphere. We were approaching the Tanami Mine on the Tanami Road when a small grey bird like a Pratincole flew up from the side of the road. We quickly turned around and found it, settled again at the side of the road, and were able to stop only about 20 m from the bird and observe it clearly without even getting out of the car. It was a Wood Sandpiper. The bird moved only very slowly away from us and did not fly again. We watched for only about 5 minutes, but did not get out of the car, which we later regretted. The road here was typical reddish sandy soil; the immediate vicinity was flat, with some very low hills in the distance. Vegetation was low shrubs with occasional bushes to about two metres height. There was no sign of natural water or a stock dam anywhere. The location (19° 55' 32"S, 129° 39' 33"E) was about 3 km north-west of the Lajamanu turn-off near the Tanami Mine, and the time about 3.15 p.m. Central Standard Time.

Some 60 km further on (20° 21' 08"S, 13° 08' 20"E), we stopped briefly to change drivers and noticed what looked like pigeons standing amongst spinifex off the road. These again proved to be Wood Sandpipers. At first only a few were visible, but as we began to move very slowly closer, more became visible moving out from behind the spinifex clumps and low shrubs and watching us carefully. I counted several times the number of birds that I could see, the highest count being 17 birds. We were able to move to within about

15 m of the nearest birds, and at no time did they move quickly or attempt to fly. Again, there was no sign of any water storage or catchment and vegetation was similar to previous sighting, with spinifex and low shrubs to about 40 cm being predominant and occasional taller shrubs, probably mostly acacias. This location was about 21 km south-east of the Rabbit Flat Roadhouse. I recorded the location at 5.16 p.m. after we had observed them for about 15 minutes.

The sightings occurrred during the period in which birds arriving from the northern hemisphere breeding grounds disperse within Australia. We may have chanced upon a resting place during this dispersal. Indeed, they gave the appearance of being tired and very reluctant to move. We did not see any attempt to feed.

The nearest records mentioned in Higgins and Davies (1996) are at Lake Gregory, WA, about 250 km to the west, and Upper Sturt Creek, Birrindudu floodplain, over 200 km to the north-west. These locations are regularly or occasionally inundated, whereas the area of this sighting appeared to be quite dry normally. However, after returning home I spoke to a person who had been involved in heavy transport to the area from Alice Springs who recalled flooding which disrupted transport to the mines about five years ago. The wet season prior to our visit had been dryer than normal, so very little natural water was in creeks etc. There would be water at the mine sites, evidenced by a large bore-head installation at the side of the road near the Tanami mine. Also, maps show a feature called Tanami Rockhole about 8 km south of the first sighting. Barret e*t al*. (2003) shows records very near this area at about 20° 30'S, 129° 30'E.

Could it be that the birds are aware of possible areas of inundation, and travel via these as they move south on the chance that some of them will provide a suitable habitat for a prolonged rest, but have a short rest if conditions are dry?

One wonders also if we would have found more birds off the road had we searched the location of our first single-bird sighting. The two chance sightings could be indicative of more groups in the vicinity. It would be well worth anyone travelling through that area at that time of year to allow time for some searches of the roadside in the hope of further sightings.

REFERENCES

Barrett, G., A. Silcocks, S. Barry, R. Cunningham & R. Poulter. 2003. The New Atlas of Australian Birds. RAOU, Melbourne.

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

UNUSUAL FEEDING SITES OF RUDDY TURNSTONES *ARENARIA INTERPRES* ON LORD HOWE ISLAND

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Schipper *et al*. (1996) reviewed records of unusual feeding behaviour by Ruddy Turnstones *Arenaria interpres* in the Australasian region. This note is intended to supplement their observations. I visited Lord Howe Island over the period 12-22 January 1992. Turnstones were widely distributed around the coast and I made several notes on Turnstone feeding behaviour. Schipper *et al*. (1996) mention an observation of Turnstones on Lord Howe Island accepting food from bathers. I made similar observations; at Ned's Beach, Turnstones regularly patrolled the beach and they were obviously accustomed to taking bread thrown to them. One of the attractions of Ned's Beach is the many fish that have become accustomed to being fed bread by visitors. It seems likely that Turnstones on this beach have become familiar with bread as a result of eating unconsumed morsels, originally intended for the fish, that have later washed up on the shore.

A Turnstone was also observed probing into and pecking at cowpats in a grass paddock close to the shore near Old Settlement Bay. This had the effect of spreading the cowpat and partly breaking it up. Older cowpats in the vicinity appeared to have received similar attention in the past, judging from the fact that grass was growing up through these cowpats in a number of places. Cowpats more distant from the shore were intact and did not have grass growing through them. Presumably the Turnstones were only interested in insect larvae in the cowpats, but the effect of their actions appeared environmentally beneficial, speeding up the breakdown of the cowpats

and the rate at which the grass regenerated beneath them.

A final observation of interest was made at the Island landfill. This is a narrow trench style landfill in the sand dunes behind the beach close to the airport. The site appeared well managed, with the waste covered by a layer of soil. This site was frequented by numbers of Turnstones and a few Bar-tailed Godwits *Limosa lapponica*. The Turnstones were observed pecking repeatedly at the soil surface over the small area of soil covering the most recently deposited waste. It was inferred that these birds were consuming insects attracted to the wastes but even a close look showed no obvious sign of insect life. The waste had been effectively covered so it was not the waste itself in which the birds were interested.

These observations demonstrate the adaptability of Turnstones under favourable circumstances. At the time of my visit no gulls or other bird species that habitually scavenge on beaches were present on Lord Howe Island. This appears to have allowed the Turnstones to expand into feeding niches which would normally be occupied by other species at mainland sites.

REFERENCE

Schipper, C.J., M.A. Weston, and J.M. Peter. 1996. Scavenging behaviour of Ruddy Turnstones *Arenaria interpres*. The Stilt 29, 39-40.

NWA 2004 WADER AND TERN EXPEDITION. 24 JANUARY TO 14 FEBRUARY, 2004

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INTRODUCTION

This was the 23rd Australasian Wader Studies Group visit to Northwest Australia (NWA). The main aims of the expedition were to fill in major gaps in existing moult and weight data and to age samples of as wide a range of species as possible in order to determine juvenile percentages. Information was also sought on first year (juvenile) birds, some of which were starting their first primary moult.

OBJECTIVES

The fieldwork program principally consisted of regular banding and counting of waders and terns at two locations (Roebuck Bay, Broome and 80-Mile Beach). It covered the period when adult waders are completing their primary moult, starting body moult into breeding plumage, and gaining weight in preparation for migration to their breeding grounds. The main objectives of the expedition were:

a) to catch, band, leg flag, and process (age, weight, moult, biometrics) waders of a wide variety of species to fill a gap in the data on the end of the primary moult in adults, the start and initial progress of primary moult in first year birds, and the beginning of the weight build up before the March/April departures on northern migration;

b) to catch samples of infrequently caught species, which may be more readily caught in the wet season (e.g. Oriental Pratincole);

c) to estimate breeding success in the Arctic in 2003 for as wide a variety of species as possible by ageing the samples caught;

d) to extend tern studies in north-west Australia. Eight species of tern occur in good numbers there and few have been caught in January and February.

LOGISTICS

Itinerary

Fieldwork was divided between Roebuck Bay and 80-Mile Beach (Anna Plains) as follows:

Roebuck Bay, Broome (including Broome Sewage Works)	11 days
Anna Plains, 80 Mile Beach	7 days
Travel between locations	2 days

Participants

Twenty-five visitors to Broome took part in the expedition including 18 for the full three-week period. These participants came from Australia (14); UK (8), Taiwan (2), and USA (1). As on previous expeditions about half the participants are based overseas. Seventeen of the team had participated in previous NWA Expeditions.

In addition, considerable help was received from Broome-based members of the Northwest Wader

Study Group and Broome Bird Observatory (BBO) staff.

COUNTING

Oriental Pratincole

During the expedition unprecedented numbers of Oriental Pratincoles *Glareola maldivarum* were noted at 80-Mile Beach (Anna Plains Station). It was decided that, because of the unusual situation, a census by ground counts and aerial survey should be attempted.

On the expedition arrival at Anna Plains on February 2, it was apparent there were large numbers of Oriental Pratincole in the area. For the last 100 km of the journey the bush on either side of the main highway was alive with feeding Oriental Pratincoles. In the late afternoon vast flocks (smokes) of birds could be seen swirling around over many parts of the plains. The flocks gradually descended at dusk to roost for the night. From dawn birds fed extensively all over the grassland of the station and further inland amongst the bush at least as far back as the Great Northern Highway. As the day heated up (the weather was relatively settled and calm and sunny throughout), the birds gradually moved down to the coast where they collected in huge numbers on the upper mud flats and, as the tide rose, on the sandy beaches. This process occurred between about 9 a.m. and 11 a.m. High tides occurred between 10 a.m. and noon. Birds remained on the sandy beaches, or upper mud flats, long after the tide had gone out and did not appear to depart for the coastal plains again until 3 p.m. or 4 p.m. They then fed avidly until dusk before roosting. There were modest numbers (low 1,000s) of Oriental Plovers *Charadrius veredus* behaving in a similar manner and at least 30,000 White-winged Black Terns *Chlidonias leucopterus* in two large aggregations, as well as much smaller numbers spread throughout the Oriental Pratincole flocks. Few Whiskered Terns *Chlidonias hybridus* were seen.

There was no lying water on the plains except for a few puddles during the first day or so from light rain, which fell on January 30. There had been quite a lot of rain some weeks ago and this had caused a small amount of fresh growth of grass; in consequence, most of the grass was still quite short and there were some patches that were still completely bare. This results from being completely underwater for some time. After a few days these areas would also have a first growth of grass. In the late afternoon of February 3 a line of ten monofilament mist nets (two panel) was set as well as two large cannon nets. Fifteen Oriental Pratincoles were caught in the mist nets. About half were caught just before dark and about half just after it was too dark to observe the nets even with binoculars. On the next three days we found it very difficult not to catch Oriental Pratincoles when attempting to catch 'grey waders' on the beach and, in six cannon net catches spread over three tides, we caught a further 235 Oriental Pratincoles. Only 16 (6.4%) birds were tentatively aged as being in their first year so 2003 was probably not an exceptionally good breeding year for this species.

On February 6 a ground count was attempted which covered the area from Cape Missiessy, the northernmost end of 80-Mile Beach, down to almost the southern limit of Anna Plains Station (42 km south of the Anna Plains entrance to the beach, 62 km from Cape Missiessy). Based on this count a rough estimate of the total population came to somewhere between 2.0 and 4.6 million Oriental Pratincoles. This was based on the 46,000 that were counted in a one kilometre long section towards the southern end of the count area where the birds were at maximum density. Given that the previous official population estimate for Oriental Pratincole in Australia was 60,000 (Watkins 1993) and that the total flyway population was estimated at 75,000 (Delaney and Scott 2002), it was felt that an attempt should be made to obtain a more accurate estimate. Through the considerable efforts and kindness of John Stoate, the part owner and manager of Anna Plains Station, a plane and a pilot, who offered to provide his flying time free of charge, were obtained. Grant Pearson, of the Department of Conservation and Land Management of WA, very kindly offered to cover the costs of hiring the plane. The aerial survey was carried out on Saturday, February 7 between 12.30 p.m. and 14.30 p.m. The complete length of 80 Mile Beach was flown twice. The survey started from the Anna Plains entrance to the beach and proceeded southwards to Cape Keraudren - the southern end of the beach, a distance of 200 km. Birds were again counted on the return journey, which proceeded to Cape Missiessy at the northern end of the beach, and also to about 15km beyond this as some pratincoles could be seen roosting on the beaches there also. This meant that there was a check on the counts, which was felt to be essential given the importance of the count. The plane then returned to the station to drop off the passengers before going back to

Broome. Humphrey Sitters, Peter Collins and Brian Etheridge carried out the aerial survey. The two counts recorded 2.45 million and 2.88 million Oriental Pratincoles. There was a noticeable drift of the population southwards during the count; this shown up by the count figures and was observable from the aircraft. The same southwards movement was also very noticeable to the cannon netting team who were operating on the beach 25 km south of the Anna Plains entrance. It is possible that this movement may have been associated with increasing cloud cover gradually building up in the northwest, which gave some unsettled weather soon afterwards. A detailed examination of the figures (Sitters *et al*. 2004) has suggested that the larger estimate of 2.88 million birds is the better, but still conservative, estimate of the Oriental Pratincole population present in the 80 Mile Beach region of northwest Australia in early February 2004.

A similar situation occurred in January 2000 when a minimum of 50,000 Oriental Pratincoles was observed on Anna Plains Station. In that year there was extensive water on the grasslands and the birds did not need to retreat to the beach during the heat of the day. No extensive surveys or wider population estimates were then possible or attempted. It would appear that conditions in 2004 were such that they concentrated enormous numbers of Oriental Pratincoles in a small area. Weather and habitat conditions apparently combined to force them to use the beach during the day where they could readily be observed and counted.

A count of 2.88 million is a quite staggering increase on the previous population estimate of this species. It was truly an amazing sight and one that it must be hard for those who were not there to visualise. The beaches were densely covered with pratincoles in flocks a kilometre or so wide for stretches tens of kilometres long. They vastly exceeded, and almost obscured, the 'grey waders' on the beaches!

The day after the aerial count the monsoonal trough drifted south and it rained heavily. This appeared to disperse the huge flocks around Anna Plains as thousands of birds could be seen moving south. There were almost no Oriental Pratincoles on the northern beaches in the days that followed and very few on the plains. Several large flocks were reported on subsequent days as people from the expedition travelled home via Port Hedland, thus providing further evidence of a big south-westward movement in front of the monsoonal trough.

Almost as amazing as the birds themselves is the coincidence that, at precisely the same time, the right conditions occurred to concentrate the birds and that people in the area could recognise the significance of the phenomenon and, more importantly, could undertake the counts.

Terns

The most significant tern data came with an incidental count of White-winged Black Tern during the counts of Oriental Pratincole. Previous high counts of this species include 15,000 at Port Hedland in 1982 and 6,000 at Anna Plains in 1989. There were several flocks numbering between 5 and 10,000 individuals and the estimate of 30,000 is conservative. The majority were on the Anna Plains to Mandora sections of 80-Mile Beach.

BANDING

Waders

A total of 2,787 waders of 27 species were caught in 20 cannon net catches (Table 1). Three mist net catches (51 waders) were also made. A total of 1,684 waders were caught at Broome and 1,154 at 80 Mile Beach.

Weather conditions throughout the Expedition were almost perfect for cannon netting with mostly dry, calm conditions prevailing throughout and only moderate temperatures (25 to 33 ºC). This was surprising owing to the time of year but only one day, when it rained for 24 hours, was lost to the weather. We were lucky not to encounter any cyclones or tropical depressions. There were, however, some heavy afternoon thunderstorms, especially in Roebuck Bay. A week after the expedition finished a cyclone passed down the coast dumping considerable rain on the western part of the study area.

The average cannon net catch size for waders was 140 birds, which is not that much lower than on other expeditions. This average was greatly influenced by the last catch of 801 birds; catches previous to that averaged 107 birds. The strategy of small catches was adopted to accommodate the high mid-summer temperatures in NWA and to minimise the possibility birds overheating in the net. Other actions to minimise overheating problems are listed below.

Table 1. Waders, terns and gulls caught at Roebuck Bay and 80-Mile Beach – 24 January to 14 February 2004

WADERS

Species		New	Retrap	Total	Juvs	% Juvs
Pin-tailed Snipe	*Gallinago stenura*	1	-	1	-	
Black-tailed Godwit	*Limosa limosa*	5	-	5	-	
Bar-tailed Godwit	*Limosa lapponica*	254	58	312	28	9
Eastern Curlew	*Numenius madagascariensis*	1	-	1	-	
Marsh Sandpiper	*Tringa stagnatilis*	12	-	12	5	42
Common Greenshank	*Tringa nebularia*	6	1	7	2	
Terek Sandpiper	*Xenus cinereus*	229	25	254	47	19
Common Sandpiper	*Actitis hypoleucos*	1	4	5	2	
Grey-tailed Tattler	*Heteroscelus brevipes*	130	28	158	22	14
Ruddy Turnstone	*Arenaria interpres*	44	13	57	-	0
Great Knot	*Calidris tenuirostris*	502	77	579	94	16
Red Knot	*Calidris canutus*	122	35	157	5	3.2
Red-necked Stint	*Calidris ruficollis*	247	56	303	30	10
Curlew Sandpiper	*Calidris ferruginea*	107	15	122	9	7.4
Broad-billed Sandpiper	*Limicola falcinellus*	8	4	12	3	25
Pied Oystercatcher	*Haematopus longirostris*	16	-	16	13	81
Sooty Oystercatcher	*Haematopus fuliginosus*	8	5	13	-	0
Black-winged Stilt	*Himantopus himantopus*	8	-	8	2	
Pacific Golden Plover	*Pluvialis fulva*	3	-	3	-	
Grey Plover	*Pluvialis squatarola*	2	-	2	-	
Red-capped Plover	*Charadrius ruficapillus*	32	-	32	4	13
Lesser Sand Plover	*Charadrius mongolus*	6	3	9	2	
Greater Sand Plover	*Charadrius leschenaultii*	418	81	499	121	24
Oriental Plover	*Charadrius veredus*	18	-	18	4	22
Masked Lapwing	*Vanellus miles*	2	1	3	-	
Oriental Pratincole	*Glareola maldivarum*	250	-	250	16	6.4
TOTAL (27 species)		2432	406	2838	409	

TERNS

Species		New	Retrap	Total	Juvs	% Juvs
Gull-billed Tern	*Sterna nilotica*	9	-	9	-	
Crested Tern	*Sterna bergii*	7	-	7	-	
Little Tern	*Sterna albifrons*	1	1	2	-	
White-winged Black Tern	*Chlidonias leucopterus*	1	-	1	1	
TOTAL (4 species)		18	1	19	1	

Note. In addition 13 Silver Gulls were caught and marked with Broome Bird Observatory bands to study their dispersal.

a. Because there is not much of an onshore breeze at this time of year, we were able to use small mesh nets. Small mesh nets can be emptied extremely rapidly but can only be used in low wind conditions.
b. Shadecloth was erected over the net if it was considered that it was going to take a considerable time to extract birds from the net.
c. Shadecloth was put up over the keeping cages at an earlier stage of the post-firing process than is necessary at other times of the year. We nearly always had to remove 10 centimetres of surface sand before erecting the keeping cages so they were set over a rather cooler substrate.
d. The shadecloth, which is normally put over the keeping cages to make them darker to minimise the birds flapping in the cages, was laid only on the top of the cages, leaving the sides free for additional passage of cooling air.
e. On occasion, covering material was not put over birds in the net, but shadecloth was erected over the net which was emptied quickly.
f. A small compensation, which offset the deliberately reduced size of catches, was that on four occasions on 80 Mile Beach, two catches were made on the one tide. The two nets were set 100 m apart. One net was fired and the birds put in keeping cages with the shadecloth over them in the normal way. In spite of this

obtrusive feature on the beach, it was possible to get birds in front of the other net very easily and thereby get another sample on the same tide.

g. The heat problems were of course greatest when high tide was in the middle of the day, as it was at the start of the Expedition. It was only because high tide on the last fieldwork day of the Expedition (Feb 13) was at 4 p.m., and it was also a partially cloudy day, that we were able to make a large catch of 801 birds. It was a particularly pleasing catch because it took well over an hour of manipulation of a very large flock (5,000 to 10,000 birds) on the beach around the net, first of all to reduce the total catch to an acceptable level, secondly to minimise the proportion of the catch which would be Bar-tailed Godwits, and lastly, and most importantly of all, to get our two specific target species for that day (Red Knot and Ruddy Turnstone) in front of the net in reasonable numbers. At that stage they were the only two target species for which we had insufficient data for juvenile percentage calculations. We were aided by the fact that the tide had already turned by the time it became safe to fire. Because we had to extract, band, age and deal with all the birds in only two and a half hours (before sunset), processing and flagging was restricted to the key target species (Red Knot, Ruddy Turnstone and a few of the other less frequently caught species - Lesser Sand Plover, Black-tailed Godwit, and Little Tern). It was only possible to leg-flag these species in this catch. In all other catches made during the Expedition, every bird was flagged.

Terns

Table 1 also gives details of the small number of terns caught during the Expedition. An attempt to obtain a sample of the White-winged Black Terns on 80-Mile Beach was foiled by the presence of the vast hordes of Oriental Pratincoles!

Moult and Weight Studies

The data collected should greatly aid the determination of the average primary moult finish date for all species, as in all species more than 50% of the adult birds had completed their primary moult before the end of the expedition. It was notable that a number of species, especially Greater Sand Plover, were showing especially large amounts of breeding plumage, even in late January and even more by the second week of February. Weights of some species (especially Great Knot and Greater Sand Plover) were already showing quite marked increases indicative of preparation for the northward migration. This, and the advanced breeding plumage, suggests that many Greater Sand Plover may depart from northwest Australia in the first half of March even though very few have actually been seen leaving at this time during the visible migration departure watches.

Percentage Juveniles

The proportion of birds aged as juvenile/first year in the catches is an indication of the breeding success of each species in the previous year (i.e. in June and July the northern hemisphere for migrant waders). Reproductive success is a key parameter controlling population levels and it is therefore important to monitor it.

The percentage of first year birds in the total catches of each species is given in Table 1. Some tentative conclusions, based on a comparison with similar data from previous years and with data from Victoria for some species in the same 2003/04 season, are given below.

1. Overall wader populations spending the non-breeding season in NWA had, on average, only moderately successful breeding success in 2003. In a number of species the 2002 breeding season had a better outcome.
2. Migratory species with the highest percentage of juveniles were Greater Sand Plover (24%), Terek Sandpiper (19%) and Great Knot (16%). This is the second successive reasonable year for Great Knot after a series of much less productive years. The figure for Greater Sand Plover is about average – they nearly always have a percentage juvenile ratio of above 20%.
3. The percentage juveniles for Red-necked Stint (10%) and Curlew Sandpiper (7.4%) were low and very much lower than the corresponding figures from Victoria for the 2003/04 season. A marked difference has also been observed in some previous years. It suggests that the populations spending the non-breeding season in the two areas may come from different regions of the Siberian Arctic.
4. The apparent breeding success of Red Knot (3.2% juveniles) and Ruddy Turnstone (0%) was very poor in 2003.
5. With only 6.4% juveniles in the 250 Oriental Pratincoles caught it would seem that the extremely high populations of the species

present in NWA were not the result of a bonanza-breeding season in 2003.

6. With 13 of the 16 (81%) of the Pied Oystercatcher caught being juveniles it is clear that we sampled a post-breeding juvenile flock. They were caught at Roebuck Bay but the nearest significant breeding locations are on the southern half of 80 Mile Beach and along the coastline of the Dampier Peninsula (north of Broome).

CONCLUSIONS

The recent expedition was one of the most successful we have had to NWA in terms of achieving objectives. We obtained adequate samples for reasonable percentage juvenile figures to be calculated for all ten of the main target species, and some useful data on a few more as well. The total catch of 2,838 waders was nearly twice the number we normally catch on a three-week expedition to NWA (usually 1,500-1,800). And at long, long last we met one objective by making contact with Oriental Pratincoles and catching some reasonable samples as well as counting unprecedented numbers.

Perhaps the only disappointments were that we didn't catch a few more Common Greenshank, Grey Plover, and Black-tailed Godwits and that terns were virtually absent from the beaches everywhere. There was a flock of up to 1,000 Common Terns *Sterna hirundo* occasionally seen near the Broome port at low tide, but we were never able to locate their high tide roost. A count of 30,000 White-winged Black Terns was made at 80-Mile Beach but few terns of other species were seen.

ACKNOWLEDGMENTS

Thanks are due to all members of the Expedition for their great efforts in the field and all the supporting activities which need to be undertaken each day (e.g. cleaning and reloading cartridges/cannons, purchasing and cooking food, mending nets and stools, laundry, etc.). Helen Mcarthur is particularly thanked for her catering planning, food purchasing and cookie cooking support. Thanks also to Birgita Hansen for organising food on site. Joy Tansey (the warden at BBO) and her assistants, the whole of the Broome Bird Observatory Management Committee and other members of the Northwest Wader Study Group (particularly Liz Rosenburg) provided great support in the field. Alan Ralph, BBO, CALM and Liz Rosenburg very kindly loaned trailers for transporting equipment. Car owners (Pete Collins, Chris Hassell, Frank O'Connor, Humphrey Sitters and BBO) who made vehicles available to the Expedition, are also greatly thanked. Particular thanks are due to Humphrey Sitters who has made his car available to AWSG NWA expeditions for the last seven years. And most of all we thank John Stoate, part owner of Anna Plains Station, for great kindness in allowing us the use of a house near the main homestead, the use of cool storage and laundry facilities, and allowing us to go anywhere on the Station looking at and banding birds. We also thank him for organising a pilot and plane at very short notice to enable us to do a complete aerial census of the whole of 80-Mile Beach for Oriental Pratincole.

REFERENCES

Delaney, S. and D.A. Scott. 2002. Waterbird Population Estimates. Third Edition. Wetlands International Global Series No. 12. Wageningen, The Netherlands.

Watkins, D.W. 1993. A National Plan for Shorebird Conservation in Australia. RAOU Report No. 90

Sitters, H., C. Minton, P. Collins, B. Etheridge, C. Hassell, and F. O'Connor. 2004. Extraordinary Numbers of Oriental Pratincoles in NW Australia. Wader Study Group Bull. 103.

NEXT EXPEDITION

AWSG has been giving detailed consideration to the dates of the next expedition to NWA. Saturday, February 12 to Sunday, March 6 2005 are the currently favoured dates. When details are finalised, a brochure will be prepared and circulated to all participants in NWA 2004, as well as being publicised through our e-mail network, Tattler, IWSG Bulletin, *The Stilt* etc. We particularly hope that as many people as possible who took part in NWA 2004 will return for 2005 so that we have the most experienced team obtainable for operating in the difficult conditions that can be experienced in NWA at that time of year.

SIGHTINGS OF WADERS AND TERNS LEG-FLAGGED IN N.W. AUSTRALIA:

REPORT NUMBER 8

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INTRODUCTION

Since colour marking started in northwest Australia (NWA) in August 1992, around 56,000 waders have been yellow leg-flagged. This is the eighth periodic report in *The Stilt* detailing sightings of these birds away from the flagging areas (Roebuck Bay near Broome, 80 Mile Beach, and Port Hedland Saltworks) and the first since October 2002. Details are given of sightings since then that have been received up to the end of March 2004. Interesting sightings of terns and Silver Gulls yellow-flagged in NWA are also included. Although they are not waders, they are target species of AWSG and Broome Bird Observatory studies in NWA.

There are several purposes in publishing these lists in Stilt. A principal objective is to inform as wide an audience as possible of the pattern and numbers of leg-flag sightings that have resulted from flagging in a particular region. It also acknowledges the contribution made by all those who have reported flag sightings throughout the East Asian/Australasian Flyway and in Australia and it enables finders to see how their reports fit into the total picture for each species.

It is not intended that these records be used by other researchers for their own publications, at least not without prior reference to and permission from the AWSG (contact Clive Minton). These flag sighting records have already been extensively used in papers which have been published, or are being used in a wide range of papers currently in preparation, mostly by AWSG members.

There has been a delay in the reporting of flag sightings made in Japan, and to a lesser extent Korea, over the last two years. In consequence, there will be fewer records from these countries than might be expected from previously published lists.

BLACK-TAILED GODWIT *LIMOSA LIMOSA*

KOREA

Date seen	No	Location seen	Finder
26/08/2002	2	Mankyung Estuary, Kunsan City	Seok-Won Lee and Jeong-Yeon Yi
26/04/2003	1	Geum River Estuary, Chungham Province	Tim Allison

Korea always features strongly in the pattern of flag sightings reported from the relatively modest numbers of Black-tailed Godwits flagged in Australia (almost all in NWA). It seems that this species particularly concentrates along the Yellow Sea coast of Korea as its principal stopover location en route to its eastern Siberian breeding grounds. As indicated by the above records, this area is used on both northward and southward migration.

BAR-TAILED GODWIT *LIMOSA LAPPONICA*

KOREA

Date seen	No	Location seen	Finder
16/04/2000	1	Kum Estuary	Mark Barter and Jin-Han Kim
24/04/2001	1	Okku, Mangyeung	(unknown)
23/08/2002	1	Okku, Mangyeung	Nial Moores
27/08/2002	4	Dongjin Estuary	Jin-Young Park
17/08/2003	1	North shore of Man-gyeong river mouth	David Mac Lennan and Peter Nebel
28/08/2003	1	Okku, Mangyeung	Nial Moores

CHINA

9/08/3003	1	Zuidong, near Tanshang, Heibei Province	Yang Hong Yan

NEW ZEALAND

24/10/2001	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
14/10/2002	1	Miranda, Firth of Thames, South Auckland	Bruce Keeley
20/01/2003	1	Big Sand Island, Kaipara Harbour, North Island	Gwen Pulham
12/03/2004	1	Omaha, North Auckland	Gwen Pulham and Simon Chamberlin

New South Wales **AUSTRALIA**

24/12/2003	1	Stockton Sandspit, Hunter Estuary, near Newcastle	T. Clarke

Two subspecies of Bar-tailed Godwits occur in Australia. The *menzbieri* subspecies is the principal one occurring in NWA and migrates to its breeding grounds in the Yakutia region of northern Siberia, using the Chinese and Korean coasts of the Yellow Sea as a principal stopover location on both northward and southward migration. In contrast the *baueri* subspecies, which mainly spends the non-breeding season in eastern Australia and New Zealand, only uses the Yellow Sea as a stopover location on northward migration, making its return from its Alaskan breeding grounds by a direct flight to Australia/New Zealand across the Pacific Ocean.

The most recently reported leg-flag sightings conform to this pattern. They also show that a small number of Bar-tailed Godwits flagged in NWA do finish up spending the non-breeding season in New Zealand or on the east coast of Australia. It is not clear which subspecies these are. However, it is considered that the most likely explanation is that they are *baueri* Bar-tailed Godwits from Alaska which accidentally strayed as far west as NWA on their southward migration, where they were caught and flagged before moving on to their intended non-breeding area in eastern Australia and New Zealand.

MARSH SANDPIPER *TRINGA STAGNATILIS*

Western Australia **AUSTRALIA**

Date seen	No	Location seen	Finder
17/10/2003	1	Pond 1A, Dampier Saltworks, near Karratha	Colin Davis and Tony Kirkby
11/12/2003	1	Derby Sewage Works	Lewis Leidwinger

These are the first two Marsh Sandpipers, out of about 120 yellow-flagged birds, to be seen away from the main flagging areas in NWA. Both appear to have changed their non-breeding areas slightly, one by moving westwards to Karratha and the other north-eastwards to Derby.

COMMON REDSHANK *TRINGA TOTANUS*

HONG KONG

Date seen	No	Location seen	Finder
8/09/2002	1	Mai Po Marshes	Ying Hak King
7/10/2003	1	Mai Po Marshes	Yu Yat-Tung

Amazingly, these two sightings in Hong Kong, which may possibly even refer to the same bird in successive years, derived from only five Common Redshank flagged in NWA. Northern Australia is at the very southern end of the non-breeding range of this species, with probably fewer than 500 spending the non-breeding season here, mostly in Roebuck Bay, Broome. It would appear that the bird(s) seen in Hong Kong may have changed its non-breeding area and decided to remain further north as the sighting dates are rather late in the Hong Kong southward migration season for adult waders.

COMMON GREENSHANK *TRINGA NEBULARIA*

HONG KONG

Date seen	No	Location seen	Finder
27/03/2003	1	Mai Po Marshes	Richard Lewthwaite

This is the first sighting of a Common Greenshank flagged in NWA. Only about 150 have been yellow-flagged there so far.

TEREK SANDPIPER *XENUS CINEREUS*

KOREA

Date seen	No	Location seen	Finder
23/08/2002	1	Okku, Mangyeung	Nial Moores

TAIWAN

22/08/2002	1	HanBou (Hanpou), Changhua County	Chung-Yu Chiang and Vincent Tzeng
21/04/2003	1	Han-Pao, Changhua County	Chung-Yu Chiang and Hsin-de Yaung

HONG KONG

22/04/2002	1	Mai Po Marshes	David Melville
1/05/2002	1	Mai Po Marshes	Paul Leader
1/05/2002	1	Mai Po Marshes	Geoff Carey
12/05/2002	1	Mai Po Marshes	Yu Yat-Tung
1/04/2003	1	Mai Po Marshes	Richard Lewthwaite
17/04/2003	1	Mai Po Marshes	Geoff Carey
29/04/2003	2	Mai Po Marshes	Yu Yat-Tung
3/05/2003	1	Mai Po Marshes	John Allcock

Terek Sandpipers are most frequently seen, as in the above listing, in Hong Kong and Taiwan, mainly on northward migration. However sightings as far east as Korea also regularly occur and it is notable that some of these (like the one above) are on southward migration.

GREY-TAILED TATTLER *HETEROSCELUS BREVIPES*

JAPAN

Date seen	No	Location seen	Finder
19/08/2001	1	Shiokawa Tidal Flat, Atsumi, Aichi	Eriko Fuijoka

KOREA

23/08/2002	1	Okku, Mangyeung	Nial Moores
4/08/2003	1	Nakdong Estuary	Nial Moores
26/08/2003	1	Namdae Cheon, Gangeung City, Gangwon Province	Choi Soon-kyoo

TAIWAN

16/08/2002	2	Chung-kang Estuary, Miao-li County	Mr. Huang, Ke-li
22/08/2002	1	HanBou (Hanpou), ChangHwa County	Chung-Yu Chiang and Vincent Tzeng
30/08/2002	1	Tao-Yuan county coastal area	Ms. Chu Y-U
22/04/2003	1	Han-Pao, Changhua County	Chung-Yu Chiang
1/05/2003	1	Han-Pao, Changhua County	Chung-Yu Chiang and Yan-feng Wu
3/05/2003	1	Ne-Hai, Tayuan County	Mr. Chu, Li-Chun
6/05/2003	1	Han-Pao, Changhua County	Chung-Yu Chiang
8/05/2003	1	Tan-Pein, Peng-hu County	Ms. Kuo, Yi-Ping
14/05/2003	3	Han-Pao, Changhua County	Chung-Yu Chiang
15/05/2003	2	Tatu River Estuary, Changhua County	Chung-Yu Chiang
16/05/2003	2	Han-Pao, Changhua County	Chung-Yu Chiang
17/05/2003	1	Ne-Hai, Tayuan County	Ms. Yu, Su-Lien
19/05/2003	1	Ne-Hai, Tayuan County	Mr. Chu, Li-Chun
19/05/2003	1	Han-Pao, Changhua County	Chung-Yu Chiang
20/05/2003	1	Tatu River Estuary, Changhua County	Chung-Yu Chiang
3/09/2003	1	Han-Pao, Changhua County	Chung-Yu Chiang and Yan-feng Wu

HONG KONG

24/05/2002	1	Mai Po Marshes	Geoff Carey
5/05/2003	2	Mai Po Marshes	Yu Yat-Tung

A noticeable difference is gradually emerging in the flag sighting and recovery patterns of Grey-tailed Tattlers which spend the non-breeding season in NWA and on the east coast of Queensland. As the above list indicates, NWA birds are most frequently seen, on both northward and southward migration in Taiwan and Hong Kong. In contrast, Grey-tailed Tattlers flagged in southeast Queensland have mostly been seen in Japan, and most Japanese flagged Grey-tailed Tattlers that have subsequently come to Australia have occurred in Queensland and elsewhere along the east coast of Australia. Note also that Grey-tailed Tattler is another species which occurs in good numbers in Korea on southward migration.

RUDDY TURNSTONE *ARENARIA INTERPRES*

KOREA

Date seen	No	Location seen	Finder
26/09/2002	1	Korean Peninsula	Rolf Jensen

TAIWAN

16/08/2000	1	HanBou (Hanpou), ChangHwa County	Ecological Lab., Env. Dept., Tunghai University
22/08/2002	1	HanBou (Hanpou), ChangHwa County	Chung-Yu Chiang and Yen-Fong Wu

South Australia **AUSTRALIA**

18/02/2003	1	Gerloff Bay, Carpenter Rocks	Lorraine Moore

Western Australia **AUSTRALIA**

26/09/2002	1	Pond 1A, Dampier Saltworks, near Karratha	Tony Kirkby, Colin Davis, Stewart Simmonds

Surprisingly, Ruddy Turnstones give a low return rate for flagged birds. We still have a far from complete outline of the migration of this species but it does appear that Taiwan is quite favoured as a stopover location by birds from NWA.

Each year we receive additional sightings in southern Australia of Ruddy Turnstones which have been flagged in NWA. It would thus appear that NWA is used as a migratory stopover location for at least some of the Turnstones which ultimately spend the non-breeding season in the southern half of Australia.

GREAT KNOT *CALIDRIS TENUIROSTRIS*

KOREA

Date seen	No	Location seen	Finder
16/04/2000	4	Gulmae-ri, Asan Bay	Jin-Young Park
24/04/2001	1	Okku, Mangyeung	Nial Moores
23/08/2002	1	Okku, Mangyeung	Nial Moores

27/08/2002	4	Dongjin Estuary	Jin-Young Park
28/08/2003	1	Okku, Mangyeung	Nial Moores

CHINA

9/04/1996	1	Chongming Island, Shanghai	(unknown)
3/04/2003	1	Chongming Island, Shanghai	Michael Yuan

TAIWAN

28/03/2003	1	Fang-Yuan, Changhua County	Mr. Yeh, Chih-Wei
11/04/2003	1	Hsia-Pu, Ilan County	Mr. Lin, Fang-Tse

HONG KONG

31/03/2002	1	Mai Po Inner Deep Bay Ramsar Site	Paul Leader
22/04/2002	1	Mai Po Inner Deep Bay Ramsar Site	David Melville

Great Knots very strongly favour the Chinese and Korean coasts of the Yellow Sea as their main stopover location on northward migration to their northeast Siberian breeding grounds. Up to 40% of the world population of this species can occur on the west coast of Korea in April/May and this is why there is so much concern for this species over the huge Saemangeum reclamation project which will remove almost the whole of the intertidal areas of two large adjacent estuaries (some 30km of coastline). It is strongly predicted that this will eventually result in a marked reduction in the Great Knot population because of the reduction in important refuelling areas available to Great Knot in this critical area of their annual northward migration.

Most Great Knot are thought to fly directly into the Yellow Sea area in a non-stop flight from NWA if weather conditions en route are satisfactory. It is probable that the flagged birds seen in Taiwan and Hong Kong had been forced down somewhat prematurely by poor weather conditions and were making a short refuelling stop before continuing to their intended Yellow Sea main stopover location.

RED KNOT *CALIDRIS CANUTUS*

TAIWAN

Date seen	No	Location seen	Finder
11/04/2003	1	Hsia-Pu, Ilan County	Mr. Lin, Fang-Tse

HONG KONG

2/05/2003	1	Mai Po Marshes	Paul Leader

NEW ZEALAND

30/09/2001	2	Miranda, Firth of Thames, South Auckland	Will Perry
28/01/2002	1	Walker Island, Kaipara Harbour	Tony Habraken
17/02/2002	1	Miranda, Firth of Thames, South Auckland	Tony Habraken and Will Perry
14/09/2002	1	Miranda, Firth of Thames, South	Tony Habraken

		Auckland	
12/10/2002	1	Lake Ellesmere, Canterbury, South Island	Colin Hill
15/10/2002	1	Lake Ellesmere, Canterbury, South Island	Colin Hill, Jan Walker and Professor Chu
27/10/2002	1	Lake Ellesmere, Canterbury, South Island	Steve Wrattens
9/11/2002	1	Mangawhai Spit, North Auckland	Gwen Pulham, Tony Moore, Gordon Gorbey
10/11/2002	1	Thames, Firth of Thames	Tony Habraken
17/11/2002	1	Clark's Bay, Manukau Harbour, South Auckland	Tony Habraken
2/12/2002	1	Miranda, Firth of Thames, South Auckland	Nigel Milius
7/12/2002	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
10/12/2002	1	Miranda, Firth of Thames, South Auckland	Nigel Milius
24/12/2002	1	Motueka Sandspit, near Nelson	Colin Miskelly Dept Conservation, New Zealand
4/01/2003	1	Miranda, Firth of Thames, South Auckland	Betty Seddon
20/01/2003	1	Miranda, Firth of Thames, South Auckland	Keith Woodley
24/01/2003	1	Miranda, Firth of Thames, South Auckland	Martin Day
23/03/2003	1	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
13/09/2003	1	Karaka, Manukau Harbour, South Auckland	David Lawrie and Tony Habraken
6/10/2003	2	Miranda, Firth of Thames, South Auckland	Phil Battley
15/10/2003	2	Miranda, Firth of Thames, South Auckland	Phil Battley
15/11/2003	1	Takahiwai, Whangarei Harbour	G. Grant and M. Twyman
16/11/2003	1	Miranda, Firth of Thames, South Auckland	David Lawrie et al.
26/12/2003	1	Waihou River, Thames, Firth of Thames	David Lawrie and Tony Habraken
27/12/2003	1	Karaka, Manukau Harbour, South Auckland	David Lawrie et al.
1/01/2004	1	Mangere Sewage Ponds, Manukau Harbour	G. Pulham and R. Clough
8/01/2004	2	Tapora Wildlife Refuge, South Kaipara Harbour	Gwen Pulham
18/01/2004	1	Maketu Bay of Plenty, North Island	John Groom
6/02/2004	1	Papakanui Spit, Kaipara Harbour	Gwen Pulham

Victoria **AUSTRALIA**

12/06/2002	1	Barry Beach, Corner Inlet	Peter Anton
10/08/2002	2	French Island beach, Westernport	Friends of French Island (Martin O'Brien et al)

Queensland **AUSTRALIA**

25/10/2003	1	Manly Boat Harbour, Moreton Bay	Sandra Harding, David Milton, Barry and Joanna Morgan

Northern Territory **AUSTRALIA**

19/02/2004	1	Buffalo Creek Beach	Arthur and Sheryl Keates
22/02/2004	1	Buffalo Creek Beach	Arthur and Sheryl Keates

The migration of the Red Knot which spend the non-breeding season in Australia and New Zealand is still somewhat of an enigma. There have still been no flag sightings or recoveries on the breeding grounds from any of the banding/flagging locations in Australasia. The only hard evidence is a bird of the subspecies *piersmai*, banded on the New Siberian Islands off the north coast of Siberia, which was identified by its unique colour band combination in two different non-breeding seasons in NWA. In spite of the considerable effort and reasonable success in banding Red Knots in NWA there are only two sightings reported of birds on migration through Asia.

There are again a large number of flag sightings from New Zealand. As in the Bar-tailed Godwit it is not clear to which subspecies these belong. It has always been assumed that the Red Knot population spending the non-breeding season in New Zealand (and eastern Australia) is from the *rogersi* subspecies. If that is the case then these numerous sightings of yellow flagged Red Knot in New Zealand indicate that significant numbers of *rogersi* must migrate through NWA, either intentionally or accidentally, on either northward or southward migration (or both). Maybe, as proposed for *baueri* Bar-tailed Godwits, the *rogersi* Red Knot population fans out over a wide arc on its southward migration with birds at the western edge of this arc occurring in NWA.

An alternative explanation for at least some of the flag sightings may relate to the habit of Red Knot making quite extensive northward partial migrations during the austral winter at the end of their first or second years. So some of these birds could be New Zealand birds which have spent a winter holiday in NWA, were banded there in the May/July period, and later returned to New Zealand for the next non-breeding season.

One of the reasons for the very large number of flag sightings of Red Knot (and Bar-tailed Godwit) in New Zealand is the high intensity and quality of the wader watching in New Zealand. It is probable that a significant proportion of overseas-flagged waders that occur in New Zealand are spotted by observers, whereas the same cannot be said for the eastern coast of Australia or perhaps anywhere else in the flyway except the Mai Po Marshes in Hong Kong and perhaps around Tokyo Bay in Japan.

Note the paucity, as usual, of flag sightings linking Victorian Red Knot with those in NWA.

The bird seen near Darwin in the Northern Territory could possibly be one which had changed its non-breeding area. Red Knot throughout the world are less faithful to a particular non-breeding area than most other wader species.

SANDERLING *CALIDRIS ALBA*

RUSSIA

Date seen	No	Location seen	Finder
24/05/2003	1	Chaivo Bay, NE Sakhalin	Andrej Blokhin
21/07/2003	1	Astokh Bay, NE Sakhalin	Andrej Blokhin
22/07/2003	1	Astokh Bay, NE Sakhalin	Andrej Blokhin

Victoria **AUSTRALIA**

7/10/2002	1	Box Bank Island, Corner Inlet	Pete Collins

South Australia **AUSTRALIA**

8/11/2003	1	Nora Creina, near Beachport	Iain Stewart
23/03/2004	2	Danger Point	Pete Collins

Some nice sightings in eastern Siberia as well as further examples of birds which have clearly used NWA as a staging point on their migration to/from non-breeding areas in southeastern Australia.

Normally Japan features very strongly in Sanderling flag sightings and the delayed reporting of flagged birds from that country in the last two years is probably the main reason for there being no Sanderling flag sightings in Japan included here.

RED-NECKED STINT *CALIDRIS RUFICOLLIS*

JAPAN

Date seen	No	Location seen	Finder
5/05/2001	1	Yatsu Tidal Flat, Narashino-Shi, Chiba, Tokyo Bay	Tsutomu Ishikawa

TAIWAN

25/07/2002	1	HanBou (Hanpou), ChangHwa County	Chiang Chung-Yu, Wu Yen-Fong
11/08/2002	1	HanBou (Hanpou), ChangHwa County	Chiang Chung-Yu, Wu Yen-Fong

HONG KONG

1/05/2002	2	Mai Po Marshes	Geoff Carey
12/05/2002	1	Mai Po Marshes	Yu-Yat Tung
24/04/2003	2	Mai Po Marshes	Paul Leader/Geoff Carey/Mike Leven
29/04/2003	1	Mai Po Marshes	Richard Lewthwaite
2/05/2003	1	Mai Po Marshes	Paul Leader
5/05/2003	1	Mai Po Marshes	Yu Yat-Tung
21/05/2003	1	Mai Po Marshes	Yu Yat-Tung
11/08/2003	1	Mai Po Marshes	Yu Yat-Tung

BRUNEI

4/08/2002	3	Seria, near Bandar Seri Begawan	Bryon Wright

MALAYSIA

26/04/2003	1	Teluk Mahkota Beach, Sedili (se Johor state)	Yang Chong Malaysia Nature Society Member

Victoria **AUSTRALIA**

18/01/2003	1	Kirk Point, Western Treatment Plant, Werribee	John Harris, Tim Dolby, Greg Oakley
19/11/2003	1	Borrow Pit Lagoon, Western Treatment Plant, Werribee	Pete Collins
16/12/2003	1	Cheetham Saltworks, Pt Cook Rd, Laverton	Bernie McCarrick
17/01/2004	1	Queenscliff	VWSG Members

South Australia **AUSTRALIA**

7/11/2003	1	Nene Valley	Maureen Christie and Lorraine Moore

Western Australia **AUSTRALIA**

22/12/2002	1	Alfred Cove, Swan River, Perth	Toni Webster
30/12/2002	1	Burke Drive Foreshore, Swan Estuary MP, Perth	Colin Davis
6/02/2004	1	Causeway, Gov House Lake, Rottnest Island	Clive Napier and Colin Davis

As usual there were widespread sightings of Red-necked Stints on migration through Asia, again particularly at Mai Po Marshes in Hong Kong. The sightings in Brunei and Malaysia were "firsts". The Malaysian record is probably at the very western edge of the northward migration route.

There were also the usual significant number of sightings in southeastern Australia of Red-necked Stints which had presumably used NWA as a staging point on their migration. It was nice to have three sightings in Perth of birds which have also probably done this.

SHARP-TAILED SANDPIPER *CALIDRIS ACUMINATA*

HONG KONG

Date seen	No	Location seen	Finder
10/05/2003	1	Mai Po Marshes	Yu Yat-Tung

Victoria **AUSTRALIA**

15/10/2003	1	The Spit Reserve, Western Treatment Plant, Werribee	Lauren Beasley

Not many Sharp-tailed Sandpipers are caught and flagged in NWA and there have only been a handful of flag sightings previously.

The one seen at Werribee on 15 October 2003 had a bright shiny yellow flag and was almost certainly one of 60 Sharp-tailed Sandpipers leg flagged at Lake Eda, caught by mist netting, in early September, only a month previously. There is earlier evidence that this species uses NWA as a stopover site on migration to non-breeding areas in southeastern Australia.

CURLEW SANDPIPER *CALIDRIS FERRUGINEA*

HONG KONG

Date seen	No	Location seen	Finder
5/04/2002	2	Mai Po Marshes	Geoff Carey
14/04/2002	2	Mai Po Marshes	Geoff Carey
20/04/2002	2	Mai Po Marshes	Geoff Carey
21/04/2002	5	Mai Po Marshes	Geoff Carey
27/04/2002	2	Mai Po Marshes	Ying Hak King
28/04/2002	2	Mai Po Marshes	Geoff Carey
1/05/2002	2	Mai Po Marshes	Geoff Carey
1/05/2002	1	Mai Po Marshes	Paul Leader
10/04/2003	1	Mai Po Marshes	Yu Yat-Tung
17/04/2003	1	Mai Po Marshes	Geoff Carey
23/04/2003	1	Mai Po Marshes	Yu Yat-Tung
23/04/2003	1	Mai Po Marshes	Geoff Carey
24/04/2003	2	Mai Po Marshes	Paul Leader/Geoff Carey/Mike Leven
25/04/2003	1	Mai Po Marshes	Paul Leader
2/05/2003	1	Mai Po Marshes	Yu Yat-Tung
2/05/2003	1	Mai Po Marshes	Paul Leader
3/05/2003	1	Mai Po Marshes	John Allcock

Western Australia **AUSTRALIA**

23/09/2002	1	Permanent Water, Lake Macleod, Gascoyne	Rolf Jensen
29/09/2002	4	Concentration Pond 6, Dampier Saltworks	Tony Kirkby, Colin Davis, Stewart Simmonds
15/03/2003	1	Central Basin, Lake MacLeod, Gascoyne	Tony Kirkby and Colin Davis
24/04/2003	1	Mitchell River, approx 520km NE of Broome	Chris Hassell

Victoria **AUSTRALIA**

14/10/2003	1	Borrow Pit Lagoon, Western Treatment Plant, Werribee	Pete Collins

South Australia **AUSTRALIA**

7/11/2003	1	Stony Point, Port Macdonnell	Maureen Christie and Lorraine Moore
4/01/2004	1	Yanerbie beachfront, Sceale Bay, Eyre Peninsula	Julian Reid

New South Wales **AUSTRALIA**

19/12/2003	1	Stockton Sandspit, Hunter Estuary, near Newcastle	Ann Lindsey

As always, Hong Kong features by far the most strongly in the pattern of overseas leg flag sightings of Curlew Sandpipers. Flagged birds are almost always seen only on northward migration with a peak occurring in the fourth week of April.

Onward migration to non-breeding areas in other parts of Australia is also evidenced by the above flag sightings. A little puzzling is the sighting of a yellow-flagged bird at Mitchell River, about 500km northeast of Broome on 24 April. What was the bird doing? Had it come down prematurely on northward migration?

PIED OYSTERCATCHER *HAEMATOPUS LONGIROSTRIS*

Western Australia **AUSTRALIA**

Date seen	No	Location seen	Finder
7/10/2001	1	Lacepede Islands	Clive Minton

This is the first sighting of a yellow-flagged Pied Oystercatcher outside the marking location of Roebuck Bay, Broome. The nearest main breeding locations, which presumably give rise to the small flocks which occur in Roebuck Bay, are at the south end of 80 Mile Beach (200km south) and along the coasts of the Dampier Peninsular to the north of Broome. Several breeding pairs occur on the Lacepede Islands, which is just off this coast about 100km north of Broome.

Individually lettered/numbered yellow leg-flags have been put on Pied (and Sooty) Oystercatchers in Roebuck Bay since mid 2003 and hopefully these will lead to a more detailed understanding of the origin and movements of Oystercatchers in NWA.

GREATER SAND PLOVER *CHARADRIUS LESCHENAULTII*

TAIWAN

Date seen	No	Location seen	Finder
4/08/2000	1	Yan-Shui river mouth, Tainan City	Mr. Fu, Yung-Tsang
5/04/2003	1	Han-Pao, Changhua County	Yan-feng Wu

HONG KONG

5/04/2002	1	Mai Po Marshes	Geoff Carey
24/04/2003	1	Mai Po Marshes	Paul Leader/Geoff Carey/Mike Leven
19/08/2003	1	Mai Po Marshes	Ying Hak King
2/04/2003	1	Mai Po Marshes	Richard Lewthwaite
5/05/2003	1	Mai Po Marshes	Paul Leader and Mike Leven
11/08/2003	1	Mai Po Marshes	Yu Yat-Tung

Greater Sand Plovers breed further to the west and south than other migrant waders visiting NWA. Hong Kong and Taiwan always feature strongly in flag sightings of birds on northward and southward migration. Very few flag sightings have ever occurred further east, but there are some further southwest in Vietnam.

SILVER GULL *LARUS NOVAEHOLLANDIAE*

Western Australia **AUSTRALIA**

Date seen	No	Location seen	Finder
28/02/2002	1	Lacepede Islands	Dan and Wendy Blunt

This is the second year in succession that a yellow flagged Silver Gull has been seen on the Lacepede Islands. Silver Gulls are only yellow-flagged in Roebuck Bay (using Broome Bird Observatory bands).

Silver Gulls are quite significant predators of eggs and young chicks of some of the seabirds nesting on the Lacapede Islands. The link with the much larger flocks which occur, but do not breed, around Broome is interesting.

LITTLE TERN *STERNA ALBIFRONS*

KOREA

Date seen	No	Location seen	Finder
28/06/2000	1	Si-Hwa Lake, Kyungee Province, Central West Coast	Prof. Y. Moo-Boo

TAIWAN

6/07/2003	1	Changhua Coastal Industrial Park, west Taiwan	Shoou Jong Kuo

These two further sightings during the northern hemisphere breeding season of Little Terns yellow-flagged in NWA further confirm that most of the large flocks of Little terns occurring in NWA are probably birds from the northern hemisphere. Only very modest numbers of Little Terns breed along the coast of NWA and nothing is known at present about their movements.

ACKNOWLEDGEMENTS

Considerable thanks are due to everybody who has been involved in any way in the generation of the information associated with this Yellow Flag List Report Number 8. Firstly a huge effort has been put in by many people over many years in catching and flagging the birds. Then a great many individual people and ornithological organisations throughout the Flyway and around Australia have put in an enormous amount of effort in searching for and reporting flagged birds. They are acknowledged against each sighting record. But the coordination efforts of Adrian Reigen for New Zealand records, Dr. Woei-horng Fang for sightings in Taiwan and Paul Leader, Geoff Carey and Yu Yat-Tung for Hong Kong sightings are especially greatly appreciated.

For the last three years Environment Australia has provided funding to employ someone (part time) to handle all the flag sightings relating to Australia by promptly acknowledging these with a report to the sighter, by informing the original flagger and by building up a comprehensive database of all leg flag sightings known for each species. EA is greatly thanked for this financial support and the Australia Bird and Bat Banding Scheme for handing over responsibility for processing flag sightings entirely to the AWSG.

BOOK REVIEW

Rogers, D.I., T. Piersma, M. Lavaleye, G.B. Pearson, and P. de Goeij with photographs by J. van de Kam. Life Along Land's Edge – Wildlife on the Shores of Roebuck Bay, Broome. Department of Conservation and Land Management (WA). 162 pp. ISBN 0 7307 5540 1. RRP Aus $39.95.

Roebuck Bay in north-western Australia is held in the highest regard by shorebird enthusiasts. Those who have visited long to return, while those who have not inevitably plan a visit. A place of such importance, spirit and beauty deserves to be celebrated in a book. A very special publication is required to capture successfully the nature of a place such as Roebuck Bay. I am pleased to report that Rogers *et al.* have produced a splendid book that does their challenging subject matter justice. I would go so far as to say that it is a rare pleasure to review a book of this quality, and can recommend it to any and all.

As the title suggests, this book does not confine itself to shorebirds, but to all coastal organisms. Shorebirds, being such a prominent feature of the biodiversity in the bay, get ample attention, as do the invertebrates and other organisms upon which shorebirds rely so heavily. Thus, there is plenty in this book for those who tend to be a little "one-eyed" about their interests. However, there is also much more on offer. Non-shorebirds, even songbirds, get their fair share of the limelight. Elements of Aboriginal connections with the bay, background on the tides, climate, geography, the physical processes that shape the bay, and human use of the area are all presented in a series of highly readable "sections" across the eight chapters. The sum of all this is a wonderfully holistic account which somehow manages to relay the intense dynamism of the bay and its biota.

The writing is a joy – clear, concise and precise – all without being highly technical. This book is not a scientific publication, although it contains much highly readable science. As such, it offers an avenue for increasing awareness among those who know little or nothing of the bay or its birds. My wife, who is not a birdwatcher, was captivated by this book. In my experience, few "coffee table" books such as this are able to balance aesthetic appeal with meaningful content, but Rogers *et al.* have struck the balance admirably. The affection and passion of the authors for this place is infectious and obvious. They openly admit that they have let the photographs do much of the talking, yet to their credit they have used their text intelligently in a manner that complements the imagery. They have created a special package.

The images are as delightful as they are numerous. I can't find a page without at least a few spectacular photographs (there are over 20 colour photographs by page 10). Readers are blessed with photographs such as roosting shorebirds being tormented by a wet season downpour (p. 27), a just-hatched shorebird chick on the far northern Russian tundra (p. 86-7), crabs clambering up a steep embankment (p. 47), mudskippers lunging through the air (p. 81), and so many more. The landscape A4 format, high quality paper, hard cover and sound binding are the perfect substrate for such a visual feast.

At a little under $40 (Aust.) the book represents excellent value. An added bonus is that copies purchased from Birds Australia's Broome Bird Observatory (BBO) will help fund the Observatory's ongoing work to protect the bay. BBO is located beside Roebuck Bay and has been at the centre of research and conservation efforts for many years.

The authors plea *"….we hope our readers will come away with a sense that Roebuck Bay warrants strong protection"*. In my opinion, they have served the bay admirably. This book is to Roebuck Bay what the photographs of Bob Brown and Peter Dombrovskis were to the Tasmanian wilderness. This book and its images will invigorate conservation measures already proposed, and may inspire and inform the future battles that will probably be needed to save the integrity of the bay.

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ERRATA

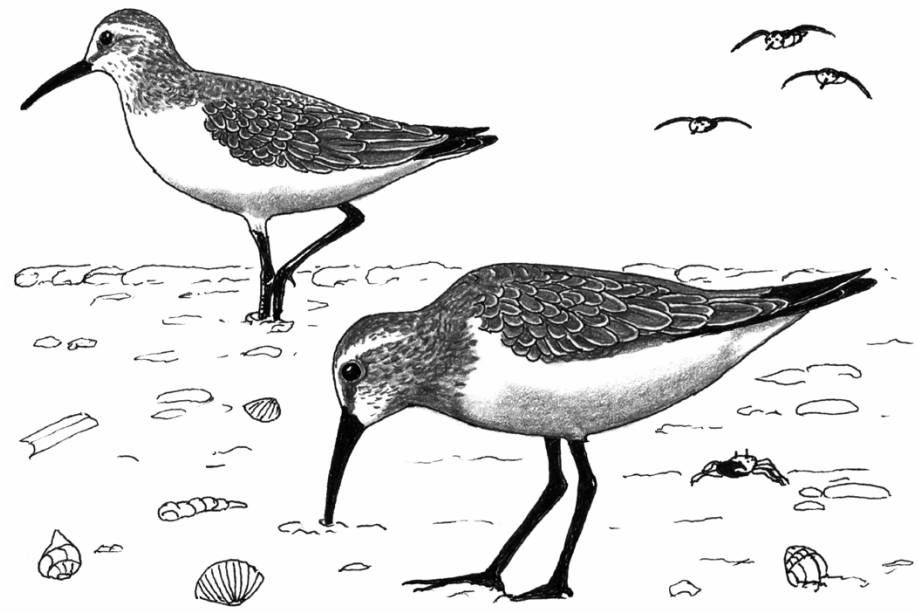
Three records in Minton *et al*. (2002) have been found to be in error and are withdrawn. These are:

- the Common Sandpiper *Actitis hypoleucos* reported at Mai Po Marshes, Hong Kong on 29 July 2000; and
- the Curlew Sandpiper *Calidris ferruginea* reported at Langebaan Lagoon, West Cape, South Africa on 24 and 29 March 2002.

The first of these was a reporting error. It has subsequently become known that wader banders from France had placed yellow flags on some Curlew Sandpipers in West Africa. This is most probably the source of the bird sighted in South Africa.

REFERENCE

Minton, C., R. Jessop, P. Collins, C. Hassell, J. Deleyev, and L. Beasley. 2002. Sightings of waders and terns leg-flagged in N.W. Australia: Report Number 7. *The Stilt* 42: 38-51.



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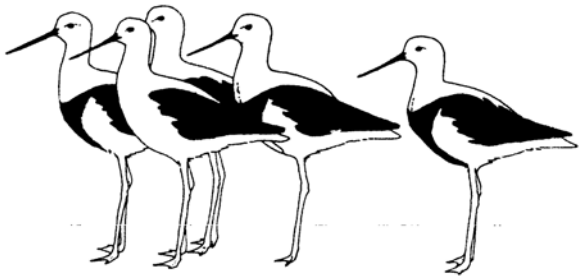
Volumes Indexed	Volume containing Index
1-6	7
7-12	13
13-18	19
19-24	25
25-30	31

Deadlines:

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



Stilt 45 - April 2004
Table of Contents