

## CONSERVATION WATCH

# Red Knot *Calidris canutus*: subspecies and migration in the East Asian-Australasian flyway—where do all the Red Knot go?

CHRIS HASSELL, IAN SOUTHEY, ADRIAN BOYLE &amp; HONG-YAN YANG

## Introduction

The ecology of the enigmatic long-distance migratory shorebird Red Knot *Calidris canutus* is still not fully understood in the East Asian-Australasian flyway (EAAF). Two subspecies *piersmai* and *rogersi* use the EAAF; they breed in different locations in the Siberian Arctic but share non-breeding grounds in Australasia (Rogers *et al.* 2010). Progress has been made on where they stop over during their northward migration. The estimated population 15 years ago was as high as 220,000, but extensive surveys of the Yellow Sea by Mark Barter and Chinese colleagues in the late 1990s and early 2000s failed to find the species in significant numbers. They did however record 14,277 in the north-west part of Bohai Bay during northward migration in 2002 (Barter *et al.* 2003). During a six-day visit in late April 2007 CH from Global Flyway Network (GFN) counted a single flock of 10,650 Red Knot in the same area. In September 2007 HYY commenced a PhD project on the food, foraging and stopover ecology of Red Knots in the area. She has made regular counts since 2003 during northward migration and her work shows that numbers of birds in the study area have increased over the years to peak counts of 66,500 today, presumably due to habitat destruction elsewhere causing more birds to use the study area (Yang *et al.* 2011). Our current knowledge indicates that this location is the single most important site for Red Knot on northward migration. However we think that there are other sites still to be discovered or documented in the EAAF.

Alongside HYY's work, studies by GFN have continued during the northward migration in 2009, 2010 and 2011, including intensive searches for individually marked birds of our main study species Red and Great Knot *C. tenuirostris*, Bar-tailed Godwit *Limosa lapponica* and Black-tailed Godwit *L. limosa*, and recording the proportions of *rogersi* and *piersmai* subspecies in the flocks of Red Knot. These field studies have been remarkably successful and, in view of the many human-related threats to what is the single most important staging area for the two races of Red Knot that make up the entire population of the species wintering in



**Figure 1.** Location of the key areas for Red Knot *Calidris canutus*, Bohai Bay and Liaodong Bay.

Australasia, it is of the utmost importance that the work continues.

The southward migration route of Red Knot remains a complete mystery—there are no records of marked birds and very few records of large flocks. Surprisingly, Red Knot are virtually unknown in north-west Bohai Bay on southward migration, in stark contrast to the 66,000 seen during northward migration. However, a count of 5,000 Red Knot was recorded at Nanxiaohe in the Shuangtaizi Delta National Nature Reserve in Panjin, Liaodong province, China, on 12 August 2011 (Qingquan Bai pers. comm.). This site is only 300 km from our study area in Bohai Bay (Figure 1).

## Relocating marked shorebirds

Shorebirds captured throughout the EAAF are marked with plain coloured flags (Plate 1), engraved leg flags (Plate 2), or combinations of four colour-bands and one flag. Each capture location has its own coloured flag or flags and/or position of the flag on the bird's leg. The focus of our study is the individually colour-banded birds from New Zealand and Roebuck Bay, Broome, north-west Australia, but we record every marked bird we see during our fieldwork.

We are asking for the help of Oriental Bird Club members to report sightings of Red Knot in the

ALL IMAGES BY IAN SOUTHEY



**Plate 1.** Colour flagged Red Knot *Calidris canutus*, 9 April 2009.



**Plate 2.** Red Knot *Calidris canutus* with engraved leg flag, 29 March 2010.

EAAF between early March and late September. The information we need is the colour and position of the flag(s) on birds' legs (including flag position on birds with four colour-bands) along with the date and location. We are also very interested to receive any old records that have not been reported to date. We are trying to find the location and relative importance of any other staging sites in the EAAF. Some earlier work suggested that subspecies *piersmai* makes a direct flight from north-west Australia to Bohai Bay (Battley *et al.* 2005) but our recent 2011 work suggests that this is not the case. No individually marked Red Knot was seen for 25 days after it was last reported at Roebuck Bay and next reported in Bohai Bay (GFN unpublished data)—a Red Knot travelling at about 50–55 km/hr in reasonable weather conditions on a direct line would take just over five days to cover the 6,400 km distance. Did severe weather make

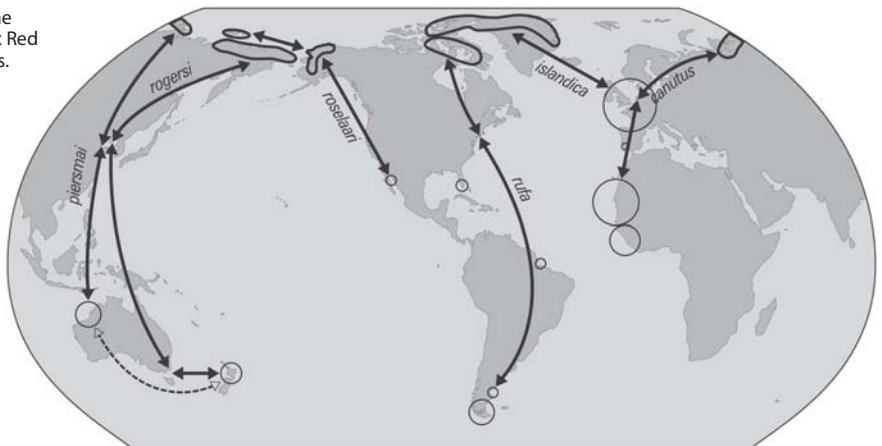
2011 unusual or do one or both subspecies stage somewhere else on their journey to Bohai, and if so where? And what happens on southwards migration?

In addition to reports of marked birds, we hope observers will send us details of all their sightings of Red Knot throughout East Asia and Indonesia between early March and late September, including counts, one-off sightings of big flocks, observations at sites not visited before or where birds have not been seen before, as well as flag sightings and colour-band sightings.

**The identification of Red Knot subspecies in the EAAF**

The Red Knot is a circumpolar-breeding migrant shorebird, with six subspecies recognised worldwide (Figure 2). Historical information indicated that *rogersi* spent its non-breeding season

**Figure 2.** Map showing the migration routes of the six Red Knot *C. canutus* subspecies.





**Plate 3.** Red Knot *Calidris canutus rogersi* in full breeding plumage, 19 March 2007.

**Plate 4.** Red Knot *Calidris canutus piersmai* in full breeding plumage, 19 March 2007.



in New Zealand and south-east Australia and bred in Chukotka, Far East Russia, passing through the Yellow Sea on northward and southward migrations. *Piersmai* was only recently recognised as a valid subspecies (Tomkovich 2001). It breeds on the New Siberian Islands and spends the non-breeding season predominately in north-west Australia and uses the Yellow Sea as a major staging area on northward and probably southward migration. Tomkovich & Riegen (2000) drew attention to the occurrence of these two subspecies in New Zealand and the Gulf of Carpentaria, and the difference in their appearance is very evident when they are in full, fresh breeding plumage in April and May in Bohai Bay. Correspondence with New Zealand colleagues and study of Ian Southey's fine images has helped to clarify the identification characteristics of *rogersi* and *piersmai*, details of which follow. It is very important to remember that these characteristics are only reliable for birds in **fresh and full or near full breeding plumage**, just prior to and during northward migration. We do not believe it is reliable from the late breeding season onwards, as many important features are lost as the feathers wear. The authors use the plumage characteristics discussed in this article for 2–3 weeks before birds leave the non-breeding areas and during field work in Bohai Bay to try to gain a better understanding of the numbers and movements of both subspecies. There are no important discernible differences in male and female plumage to affect results (T. Piersma & P. Tomkovich pers. comm.) and there may be small numbers of subspecies *roselaari* and *canutus* in the EAAF, but again not enough to influence results. One result is that field observations and the many images taken by IS indicate that more *piersmai* winter in New Zealand than previously thought.

Table 1 summarises the differences between *rogersi* (Plate 3) and *piersmai* (Plate 4) in the field; *rogersi* has a paler breast with a greyer back and neck whilst *piersmai* has a richer brick-red toned breast, more boldly patterned black and red back and a red or reddish nape. The extremes are obvious and can be seen at a glance, but variation in these features is continuous and a very few individuals are so similar that they cannot be told apart in the field with confidence.

In close-up, more detailed differences may be seen. **Nape:** *rogersi* has a pale silver-grey nape with some dark streaking, and some birds may redden

across the nape, whilst *piersmai* has a reddish nape with dark streaking. **Mantle and scapulars:** *rogersi* has broad silvery-grey fringes to the mantle feathers, feathers are black-centred and a few—under 25%—may have reddish edges. Scapulars tend to have a fine black centre line with a large terracotta-red spot on each side. This gives the upperparts the appearance of being sliver-grey, spangled with pale to bright terracotta-red. By contrast, *piersmai* has narrow chestnut fringes to the mantle feathers, larger black centres and small whitish tips. The scapulars have a broader black centre line and small brick-red spots. **Underparts:** *rogersi* has peachy underparts, solid to level with the legs with little, if any, peachy flecking beyond the legs, i.e. lower belly and undertail-coverts, but this feature is highly variable. In contrast, *piersmai* has brick-red underparts, the colour extending behind the white thighs with some obvious red markings on the lower belly and undertail-coverts, but this feature too is highly variable.

#### Why field observation is urgently needed

Much if not all of the habitat currently used by Red Knot in NW Bohai Bay will be destroyed in the foreseeable future and it is likely that the adaptable species will then use other sites, which today are visited only for short stopovers or in an emergency, as main staging sites. It is therefore of vital importance for the survival of the species that these alternative sites are identified, documented and protected from the same catastrophic change that has already occurred elsewhere in the EAAF—between 1994 and 2010, a total of 450 km<sup>2</sup> of offshore area, including 218 km<sup>2</sup> of intertidal flats (one third of the original tidal area in Bohai Bay), has been claimed in western and northern Bohai Bay for two industrial projects (Tianjin Binhai New Area and Caofeidian New Area) (Yang *et al.* 2011). Further information on the problems may be downloaded from: <http://www.globalflywaynetwork.com.au/reports/GFN-Bohai-Report-2010.pdf>. <http://www.publish.csiro.au/paper/MU10024.htm>.

Any reader who would like to help in the exploration of sites that may hold large numbers of Red Knot should contact CH for further information. The Australasian Wader Studies Group may be in a position to provide a small grant to help defray some costs.

**Table 1** Comparison of main features of Red Knot races *rogersi* and *piersmai*

Race	Nape	Mantle	Overall upperparts	Breast & belly	Undertail-coverts	Overall underparts
<i>rogersi</i>	pale grey/silvery	pale grey/silvery	pale grey/silvery	peachy	white but highly variable	peachy & white
<i>piersmai</i>	brick red	brick red	brick red	red	red but highly variable	red & white

**Acknowledgements**

Thanks go to Birdlife-Netherlands for funding CH and for funding work in Bohai Bay together with WWF-Netherlands, WWF-China and Beijing Normal University through the National Natural Science Foundation of China-Guangdong Joint Fund (Grant No. U0833005). CH and AB thank their team of skilled and dedicated volunteers in Broome and Bohai Bay. Thanks go to Mark Barter and Stephen Holliday for comments on drafts of the article. The authors thank all those who have sent in sighting data from the EAAF in the past and those who will do so in the future.

**References**

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

Battley, P. F., Rogers, D. I., van Gils, J. A., Piersma, T., Hassell, C. J., Boyle, A. & Yang, H.-Y. (2005) How do Red Knots *Calidris canutus* leave northwest Australia in May and reach the breeding grounds in June? Predictions of stopover times, fuelling rates and prey quality in the Yellow Sea. *J. Avian Biol.* 36: 494–500.

Rogers, D. I., Yang, Y.-H., Hassell, C. J., Boyle, A. N., Rogers, K. G., Chen, B., Zhang, Z.-W. & Piersma, T. (2010) Red Knots (*Calidris canutus piersmai* and *C. c. rogersi*) depend on a small threatened staging area in Bohai Bay, China. *Emu* 110: 307–315.

Tomkovich, P. S. (2001) A new subspecies of Red Knot *Calidris canutus* from the New Siberian Islands. *Bull. Brit. Orn. Club* 121: 257–263.

Tomkovich, P. S. & Riegen, A. (2000) Mixing of Red Knot populations in Australasia: some thoughts. *Stilt* 37: 25–27.

Yang, H.-Y., Chen, B., Barter, M. A., Piersma, T., Zhou, C.-F., Li, F.-S. & Zhang, Z.-W. (2011) Impacts of tidal land reclamation in Bohai Bay, China: ongoing losses of critical Yellow Sea waterbird staging and wintering sites. *Bird Conservation International* 21: 241–259.

Chris HASSELL & Adrian BOYLE  
 Global Flyway Network, PO Box 3089, Broome, WA  
 6725, Australia  
 E-mail: [turnstone@wn.com.au](mailto:turnstone@wn.com.au)  
 E-mail: [adrianboyle@westnet.com.au](mailto:adrianboyle@westnet.com.au)

Ian SOUTHEY  
 82 Red Hill Road, Papakura 2110, Auckland,  
 New Zealand  
 E-mail: [iansouthey@yahoo.co.nz](mailto:iansouthey@yahoo.co.nz)

Hong-Yan YANG  
 Key Laboratory of Ministry of Education for  
 Biodiversity and Ecological Engineering  
 College of Life Science, Beijing Normal University  
 100875, Beijing, China  
 E-mail: [boganick@mail.bnu.edu.cn](mailto:boganick@mail.bnu.edu.cn)

# INDIA

Endemics of Southern India's Western Ghats  
*Thattekad · Periyar · Eravikulam · Anaimalai · Ooty & the Nilgiris*

Gujarat - Kachchh and the Kathiawar Peninsula  
*Velavadar · Gir · Gulf of Kachchh · Little and Great Ranns*


North India and the foothills of the Western Himalaya  
*Ranthambhore · Bharatpur & Chambal · Kumaon Himalaya · Corbett*

Assam and Western Arunachal Pradesh  
*Kaziranga · Nameri · Eaglenest*

East Assam and the Mishmi Hills  
*Dibru-Saikhowa & Digboi · Mishmi · Kaziranga*

- ✓ all India & parts of the subcontinent
- ✓ fixed departure & custom travel
- ✓ expert guiding
- ✓ meticulous logistics
- ✓ competitive prices


Contact us for further details or meet us at the Birdfair M1/35



INDIA NATURE  
 +91 (0) 9850469472 | [indianature@live.in](mailto:indianature@live.in)  
[www.indianaturetours.com](http://www.indianaturetours.com)

## FOR BIRDWATCHERS TO NORTH EAST INDIA

- We arrange birdwatching tours for groups and individuals to North East India
- We provide experienced guides and can organise all local transport and accommodation



### CONTACT

SANJIV GOGOI,  
 KAMALA MARKETING POINT, 2ND FLOOR  
 OPP. GUWAHATI COMMERCE COLLEGE  
 R.G. BARUAH ROAD, GUWAHATI-3, ASSAM, INDIA  
 Web : [www.flamingotravels.com](http://www.flamingotravels.com)  
 e-mail: [info@flamingotravels.com](mailto:info@flamingotravels.com)  
 PH: 91-(0)361-2454669, FAX: 2454669

## FLAMINGO

Travels & Adventures (A) Pvt. Ltd.

RECOGNISED BY GOVT. OF INDIA TOURISM  
 MEMBER : INDIAN ASSOCIATION OF TOUR OPERATORS

**We make the difference !**