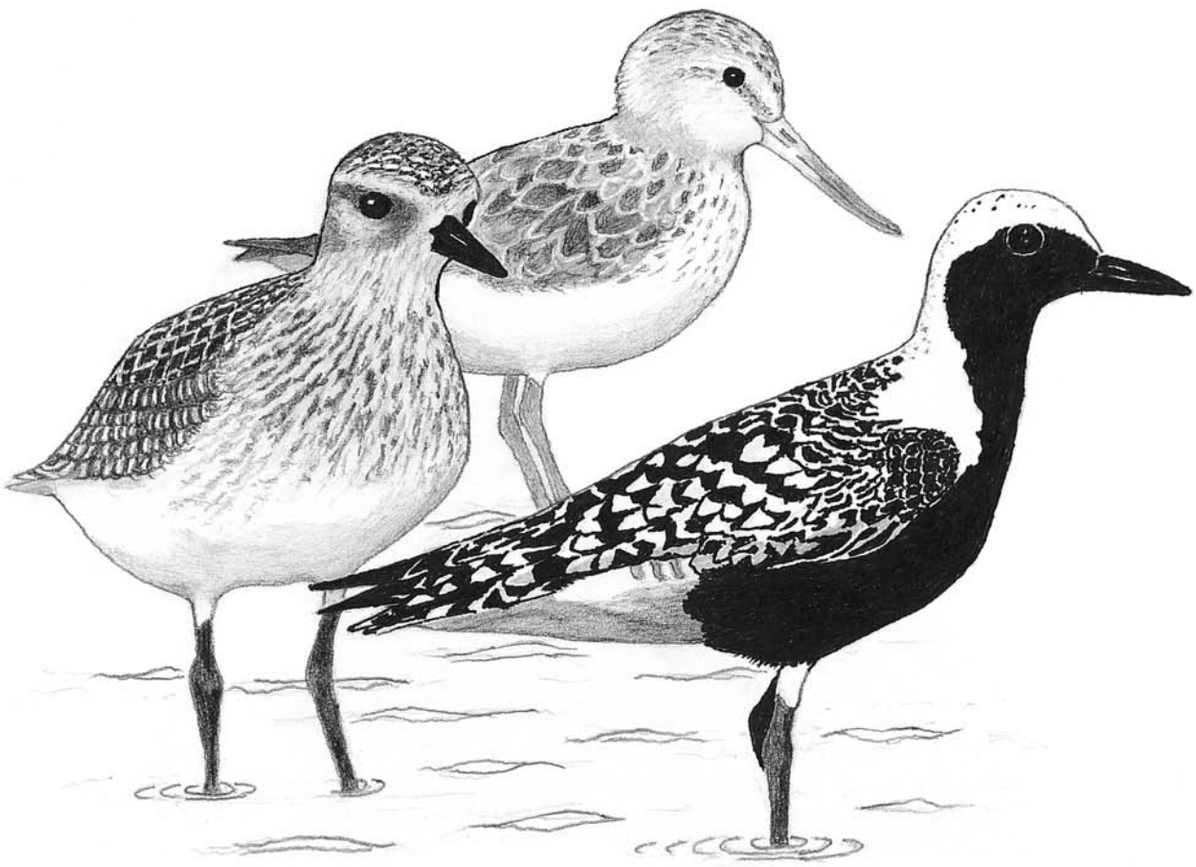
# Stilt

The Journal for the East Asian-Australasian Flyway



AWSG
Australasian Wader Studies Group

Number 57 • April 2010


# Stilt

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**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 *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 *Stilt*, and the quarterly newsletter *The Tattler*. Please direct all membership enquiries to the Membership Manager at Birds Australia (RAOU) National Office, Suite 2-05, 60 Leicester St, Carlton Vic 3053, AUSTRALIA.
Ph: 1300 730 075, fax: (03) 9347 9323.
Email: membership@birdsaustralia.com.au

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

**AWSG WEB SITE**: awsg.org.au

**Cover Illustration**: Annie Rogers.

## A NOTE FROM THE CHAIR

This year, 2010, is the International Year of Biodiversity with a theme of 'Time for Action'. In a recent editorial Dr Marco Lambertini, Chief Executive of Birdlife International, said 'We are living in interesting times. On the one hand the 'value' of natural systems has never been better recognized. On the other hand the destruction of natural habitat has never been faster and the threat to biodiversity greater.' We are continually reminded that the majority of shorebird populations are in decline and/or face serious threats. Fundamentally these trends are the result of wetlands, both coastal and inland, being continuously squeezed by economic development either for agricultural use or, in the case of tidal flats, reclaimed for industrial or recreational use.

Migrant waders need to cope with habitat changes on a global scale; furthermore the ongoing health of a species in one habitat will be influenced by conditions in another which may be half a world away. Over the last 30 years we have learnt an enormous amount about the biology and ecology of these birds but still many are in a state of critical decline. So what is the problem? A basic question to ask is how we get the knowledge that has been presented in publications such as *Stilt* and other journals worldwide, into the public arena to the extent that it influences political priorities. This was the subject of a workshop at the IWSG meeting in Texel last year where the question of whether we have a 'communication gap' between researchers and conservationists was addressed. To me, the wider gap is between those who have the knowledge and the governments and their bureaucracies. At that meeting Dr Alan Baker of Canada gave an inspiring talk on how research and conservation groups should take concerted action immediately. He emphasized that there is much greater need for immediate conservation action than for early warning systems and that essentially we already have sufficient knowledge to implement conservation actions.

Perhaps we need to revaluate our priorities to ensure we focus on issues that address the critical state of shorebirds and their habitats in our flyway which is arguably one of the most severely affected globally. Already the AWSG and its members are making a number of contributions in this regard including surveys of Red Knot at the threatened site of Cao Feidian, supporting the initiatives that Miranda (NZ) undertakes at Yalu Jiang, utilizing the results of the SSMP at Saemangeum, Korea to demonstrate the disastrous impact of major tidal flat destruction. Much of the field work in Australia contributes to the understanding of movements, and identifying hot spots in the flyway; the Shorebirds 2020 and MYSMA programs are highly regarded throughout the flyway in their ability to identify early trends in key species. The use of geolocators on Ruddy Turnstone reported in this volume is an example of the use of technology to identify hotspots for this species; there are several other species for which we need this sort of information before we can propose conservation actions. In addition AWSG-Birds Australia are active members of the East Asian Australasian Flyway Partnership which is a forum where NGO's are equal partners with governments of countries in the flyway. At the recent meeting in Incheon, Republic of Korea, a strategy was put forward which aimed to improve collaboration between countries on monitoring, habitat and potential threats. This will take time to develop but is an important step.

There is much to be done to address the 'gaps'; we need to find ways to get our message into the public and political arenas. This is an immediate challenge to the AWSG and all who have a passion about waterbirds in general. The Committee would like to hear member's views on how this might be achieved.

This is my last note to you as Chair; I am stepping down from this role after 4 years and David Milton is taking up this position. These have been challenging years but I think that the Group can be proud of its achievements in terms of its role and reputation in the flyway and within Australasia in general. I would like to thank the Committee for their support and I wish David and the new Committee every success as they consider these critical issues.

Ken Gosbell
Chair

## NEW AWSG COMMITTEE 2010 TO 2012

As a result of the recent call for nominations for the AWSG Committee I am pleased to advise the following results. In accordance with our Rules the new Committee is appointed for the period 1 July 2010 to 30 June 2012. The Committee will be:

| | | |
|---|---|---|
| David Milton | Chair | Queensland |
| Phil Straw | Vice – Chair | NSW |
| John Renowden | Secretary | Victoria |
| Brian Speechley | Treasurer | NSW |
| Danny Rogers | Chair, Scientific Committee | Victoria |
| Roz Jessop | Editor, Stilt | Victoria |
| Lisa Gale | Editor, Tattler | Queensland |
| Ann Lindsey | Conservation Officer | NSW |
| Ken Gosbell | International Liaison | Victoria |
| Maureen Christie | Committee Member | SA |
| Chris Hassel | Committee Member | WA |
| Jon Coleman | Committee Member | Queensland |
| Clive Minton | Committee Member | Victoria |
| Doug Watkins | Committee Member | ACT |
| Paul Wainwright | Committee Member | SA |
| Arthur Keates | Committee Member | NT |
| Heather Gibbs | Committee Member | Victoria |
| Adrian Riegen | Committee Member | New Zealand |
| Penny Johns | Committee Member | Victoria |

Roz has indicated that she would like to pass on the Editor of Stilt position but has agreed to continue to the end of 2010. To assist with this role the Committee has agreed to appoint an Editorial team who will assist the Editor in this role. Phil Straw is currently putting this team together.

To those leaving the Committee in June we say a sincere thank you for your contribution to the committee in various ways over a number of years. We hope that you will remain actively involved with the Group and allow us to utilise your skills in the future as particular situations arise. To the newly elected members, John Renowden, Jon Coleman, Arthur

Keates and Heather Gibbs, we say a warm welcome and look forward to your contribution.

I am particularly pleased to welcome David Milton as the new Chair for this period; David has served in several roles on the Committee and brings many skills to the position. I am confident he will have the strong support of all of the Committee. In view of my participation and role in Flyway activities, in particular the Flyway Partnership, David has asked that I continue in this role for the forthcoming term. I would like to sincerely thank all of the Committee for their support over the last 4 years as Chair; it has been a time of rapid change both in Flyway activities and within Australia, particularly resulting from changing attitudes within the Australian Government.

With the critical decline in shorebirds that we are witnessing in our Flyway, the next two years will pose a number of challenges to the Group and I look forward to the new Committee working together to achieve the objectives we have set ourselves.

Ken Gosbell
Chairman

## TREASURER'S REPORT FOR 2009

Total payments exceeded receipts by $11,492 during 2009, however this included an excess of contracted expenditure over contract income of $9,467 due to contracts in progress at the start of the year.

The non-contract deficit was $2,025 for the year.

The balance of $70,831 carried forward at 31st December 2009 includes commitments for future expenditure on contracts of $33,641. General (non-contract) accumulated funds were $37,190 at year-end.

**Australasian Wader Studies Group**
**Receipts and Payments**
**1 January 2009 - 31 December 2009**

| RECEIPTS | | | PAYMENTS | | |
|---|---|---|---|---|---|
| **Item** | **2009 $** | **2008 $** | **Item** | **2009 $** | **2008 $** |
| Balance brought forward | 82,322.59 | 111,286.95 | Stationery/Printing | 4,406.94 | 6,117.32 |
| | | | Advertising & promotion | 1,512.00 | 309.40 |
| Subscriptions | 8,436.37 | 9,176.41 | Postage/Courier | 2,043.29 | 3,467.78 |
| Contracts - Federal Govt. | 17,727.27 | 20,000.00 | Consultants/Contracts | 40,430.39 | 88,606.33 |
| Contracts - State Govts. | 8,181.82 | 42,272.73 | Field expenses | 2,250.00 | 1,000.00 |
| Contracts - Other | 22,500.00 | 45,036.52 | Conferences/Meetings | 3,247.45 | 601.95 |
| Sales | 0.00 | 216.87 | Phone/Fax | 51.82 | 38.71 |
| Conferences | 0.00 | 0.00 | Equipment (consumable) | 0.00 | 154.57 |
| Grants and Donations | 1,467.00 | 2,993.00 | Travel & accommodation | 14,362.39 | 47,363.83 |
| | | | Admin fee (BA) | 1,500.00 | 1,000.00 |
| | | | Depreciation | 0.00 | 0.00 |
| Total income | 58,312.46 | 119,695.53 | Total expenses | 69,804.28 | 148,659.89 |
| | | | **Balance carried forward** | **70,830.77** | **82,322.59** |
| | **140,635.05** | **230,982.48** | | **140,635.05** | **230,982.48** |

**Membership Statistics for 2009:**

| The membership at the end of the year was: | **2009** | **2008** |
|---|---|---|
| Australia/New Zealand | 228 | 233 |
| Overseas (excl. NZ) | 27 | 29 |
| Institutions | 15 | 15 |
| Complimentary | 58 | 57 |
| **Total** | **328** | **334** |

This summary of receipts and payments for the past year is not an audited statement. It has been prepared for the information of AWSG members from records of transactions provided by Birds Australia which relate to the Australasian Wader Studies Group.

The AWSG is a Special Interest Group of Birds Australia and members who wish to see the audited accounts of Birds Australia should refer to the Concise Financial Report included in the Birds Australia Annual Report 2009.

Brian Speechley, Treasurer

# DISCOVERY OF AN IMPORTANT SITE FOR SANDERLING *CALIDRIS ALBA* ON THE SOUTH COAST OF JAVA

A. C. CROSSLAND[1], A. S. SITORUS[2] AND H. A. CHANDRA[3]

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## INTRODUCTION

Within the East Asian-Australasian Flyway, the Sanderling *Calidris alba* breeds in the Taimyr Peninsula, the Lena Delta and on islands in the Siberian high Arctic. Following breeding, Sanderlings migrate through East Asia and winter mainly in Australia (Lane 1987; Bamford *et al.* 2008). Although recorded in many parts of South-East Asia, the species is generally of uncommon occurrence and reported mainly as a passage migrant (Coates *et al*. 1997; Wells 1999; Robson 2000; Strange 2001; Round 2006; Li & Ounsted 2007). Higgins & Davis (1988) suggested that Sanderling overfly South-East Asia during migration and Bamford *et al*. (2008) did not record any sites of international importance for this species in the region.

The total Flyway Sanderling population has been recently estimated at 22,000 birds, including 10,000 wintering in Australia and 5000 in Indonesia (Delaney & Scott (2006; Bamford *et al*. 2008). This Indonesian total is a guestimate extrapolated from a maximum country count of 266 birds. In determining sites of international importance to Sanderling, Bamford *et al*. (2008) give the "1% threshold" as 220 birds and the "staging threshold" (which takes migration turnover into account) as 55 birds. They did not identify any sites in Indonesia currently known to meet those thresholds.

## SANDERLING ON THE SOUTH COAST OF JAVA

Strange (2001) states that although not recorded very often in Indonesia, Sanderlings are quite likely numerous on peak migration on remote sandy beaches. MacKinnon & Phillips (1993) report that the Sanderling is of frequent occurrence on the south coast of Java but they give no information as to abundance.

Although Java is one of the most heavily populated islands in the World (pop. 130 million in 2006), much of the south coast has a relatively low population density and many kilometres of shoreline remain in a natural state with minimal development. The high energy wave environment of the Indian Ocean precludes the development of the mangrove and mudflat zones found in other parts of Java. Instead the principle coastal landforms in lowland areas of the south coast are sandy beaches, punctuated by small river-mouth lagoons and the occasional estuary.

On 14 October 2005 (during the southward migration period) we visited a beach and river-mouth lagoon complex at Pantai Glagah, 30 km south-west of Yogyakarta. The area comprised a long sand/shingle beach, a wide sand spit and a shallow lagoon with small areas of mudflat and marsh around it's margins. Shorebirds present included Javan Plover *Charadrius javanicus*, Pacific Golden Plover *Pluvialis fulva*, Common Sandpiper *Actitis hypoleucos* and large numbers of Sanderling.

Sanderling were observed in five flocks numbering 132, 30+, 40+, 60+ and 170, totalling 432+ birds. Flocks were spaced 50-150m apart along the lower beach, with all birds actively foraging behind retreating waves in typical Sanderling fashion. The flocks remained through the late afternoon and into the evening. They were still feeding when we left shortly after dark. Small parties and flocks disturbed by our presence or by the approach of a wave, readily took flight, but quickly returned to the beach to recommence feeding as soon as the threat passed. No movements to the lagoon were noted, nor were any migration departures observed.

## DISCUSSION

Although flocks of Sanderling are known to occur along Java's south coast, the 432+ birds observed at Pantai Glagah seems to be a particularly high number - close to double the maximum country count (266) and close to 10% of the estimated total Indonesian population (Banford *et al*. 2008). This number exceeds both the 1% and the staging thresholds used to identify sites of international importance (Delaney & Scott 2006; Bamford *et al.* 2008). However, we do not know whether Pantai Glagah regularly holds 400+ Sanderling, or whether we chanced upon a one-off event.

We recommend that further wader counts be undertaken in the area to ascertain the site's true importance and to locate any other concentrations of Sanderling in the vicinity. Shorebird monitoring at Pantai Glagah and other beaches should prove interesting - both in terms of gaining an understanding of how the south coast of Java fits into the migration strategy of Sanderlings on passage to Australia, and in ascertaining how many Sanderling remain locally throughout the non-breeding season.

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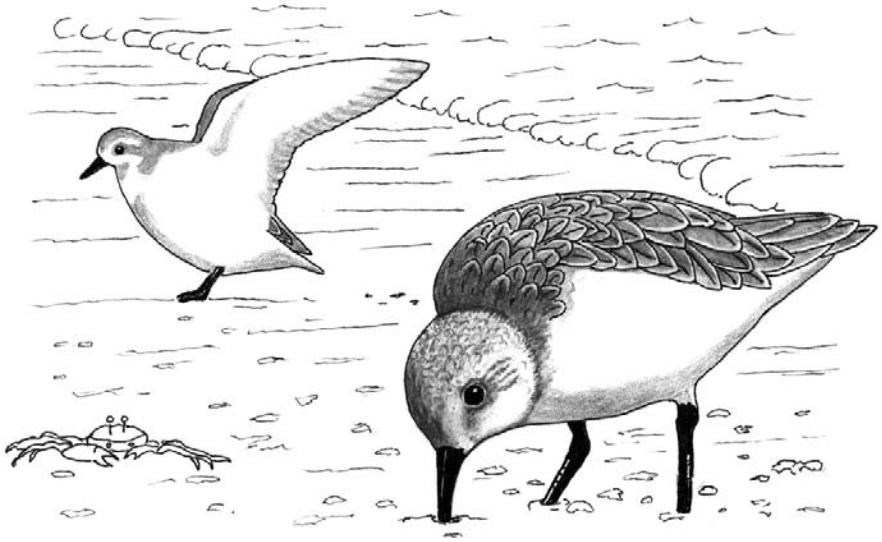

# THE AVON-HEATHCOTE ESTUARY AND THE BROMLEY OXIDATION PONDS, CHRISTCHURCH, NEW ZEALAND: AN IMPORTANT AREA FOR WATERBIRDS

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## INTRODUCTION

The Avon-Heathcote Estuary/Ihutai (43°32'30''S, 172°43'30''E) is located on the eastern fringes of Christchurch City, South Island, New Zealand. The site is separated from the Pacific Ocean by a 4.5 km sand spit and comprises c.880 ha of inter-tidal flats and peripheral salt marsh. The estuary is roughly triangular in shape and fed by three small rivers (Avon River, Heathcote River and Linwood Avenue Canal) which collectively drain a largely urbanised catchment of 188 $km^2$(see Figure 1). Tides are semi-diurnal with a range of 2.1 m for spring tides and 1.1 m for neap tides. Over 11 million cubic metres pass through the estuary on each tidal cycle, flooding to an average depth of 1.4 m at mean high water (Crossland 1993; Cromarty & Scott 1996).

In addition to extensive areas of estuarine mudflat and peripheral salt marsh, the greater Avon-Heathcote area also includes the c.240 ha Bromley Oxidation Ponds/Te Huingi Manu Wildlife Refuge; c.100 ha of lowland wet grassland (Linwood Paddocks); and c.40 ha of human-created tidal wetlands located around the margins of the estuary (Charlesworth, Bexley & Ferrymead wetland reserves). In total, some 1260 ha of habitat is available for waterbirds and at peak times these combined habitats support upwards of 30,000 birds.

## METHODS

Waterbird populations on the Avon-Heathcote Estuary and Bromley Oxidation Ponds have been the focus of a monitoring programme since the mid 1980s (Harris & Crossland 1990; Crossland 1993, 1999, 2005, 2009a). Population monitoring has included regular counts of waders, terns, spoonbills, rails and waterfowl, with irregular counts of gulls, herons, cormorants, kingfishers, swallows and birds of prey. Census techniques have followed those described in Howes & Bakewell (1989).

Seasonal abundance data covering all waterbirds using the Avon-Heathcote Estuary and environs is available for the twelve month period October 1989 to September 1990 (Table 1). This is the only period when co-ordinated counts of "all" waterbird species have been undertaken (Crossland 1993). In other years, selected species groups such as waders and terns have been regularly monitored but logistical difficulties have meant that "all-species" counts have seldom been repeated.

Since 2003 however, the Christchurch City Council has undertaken an "all-species" count most years during the peak January to March post-breeding/moult influx period. This more recent data set is given in Table 2.

## RESULTS AND DISCUSSION

### Waterbird numbers

In 1989-90 peak waterbird numbers exceeded 20,000 individuals from December through June (Table 1). This corresponds with the moulting, post-breeding migration and wintering strategies of many New Zealand waterbirds. These strategies involve seasonal population shifts from inland and southern breeding areas to more northern coastal lowland non-breeding areas (Marchant & Higgins 1990; Heather & Robertson 1996; Crossland 2005).

During 1989-1990, the highest total counts of all waterbirds were c.28,100 in December c.33,360 in January and c.28,620 in February. Subsequent "all-species" counts confirmed that these levels of abundance are typical during the peak period. More recent "all-species" counts include c.33,413 in February 2003; c.27,769 in February 2004; c.27,373 in February 2007; c.24,990 in March 2008; c.36,609 in January 2010 and 34,130 in February 2010 (table 2).

### Shorebird species occurrence

From a total checklist of 136 bird species (Crossland 2009a), some 44 shorebird taxa (30 waders, 3 skuas, 3 gulls and 8 terns) have been recorded in the Avon-Heathcote Estuary area (Table 3). Of these, 17 species (9 waders, 1 skua, 3 gulls, 4 terns) are New Zealand natives; 5 species (2 waders, 3 terns) originate in Australia; and 22 species (19 waders, 2 skuas and 1 tern) are migrants from the Northern Hemisphere.

Six native shorebirds are resident-breeders: Black-winged Stilt *Himantopus himantopus*, Masked Lapwing *Vanellus miles*, Kelp Gull *Larus dominicanus*, Red-billed Gull *Larus scopulinus*, Black-billed Gull *Larus bulleri* and White-fronted Tern *Sterna striata*, with another three species usually present in the estuary area year-round but not breeding: Variable Oystercatcher *Haematopus unicolor*, South Island Pied Oystercatcher *Haematopus finschi* and Caspian Tern *Hydroprogne caspia*.

Of the Northern Hemisphere migrants, one species Bar-tailed Godwit *Limosa lapponica* occurs annually, while another five species: Red Knot *Calidris canutus*, Ruddy Turnstone *Arenaria interpres*, Eastern Curlew *Numenius madagascariensis*, Whimbrel *Numenius phaeopus* and Black-tailed Godwit *Limosa limosa*, occur at least once every two to five years.

### Shorebird abundance

During the 1989-90 monitoring period, total shorebird numbers reached 15,000 from February to May, with a

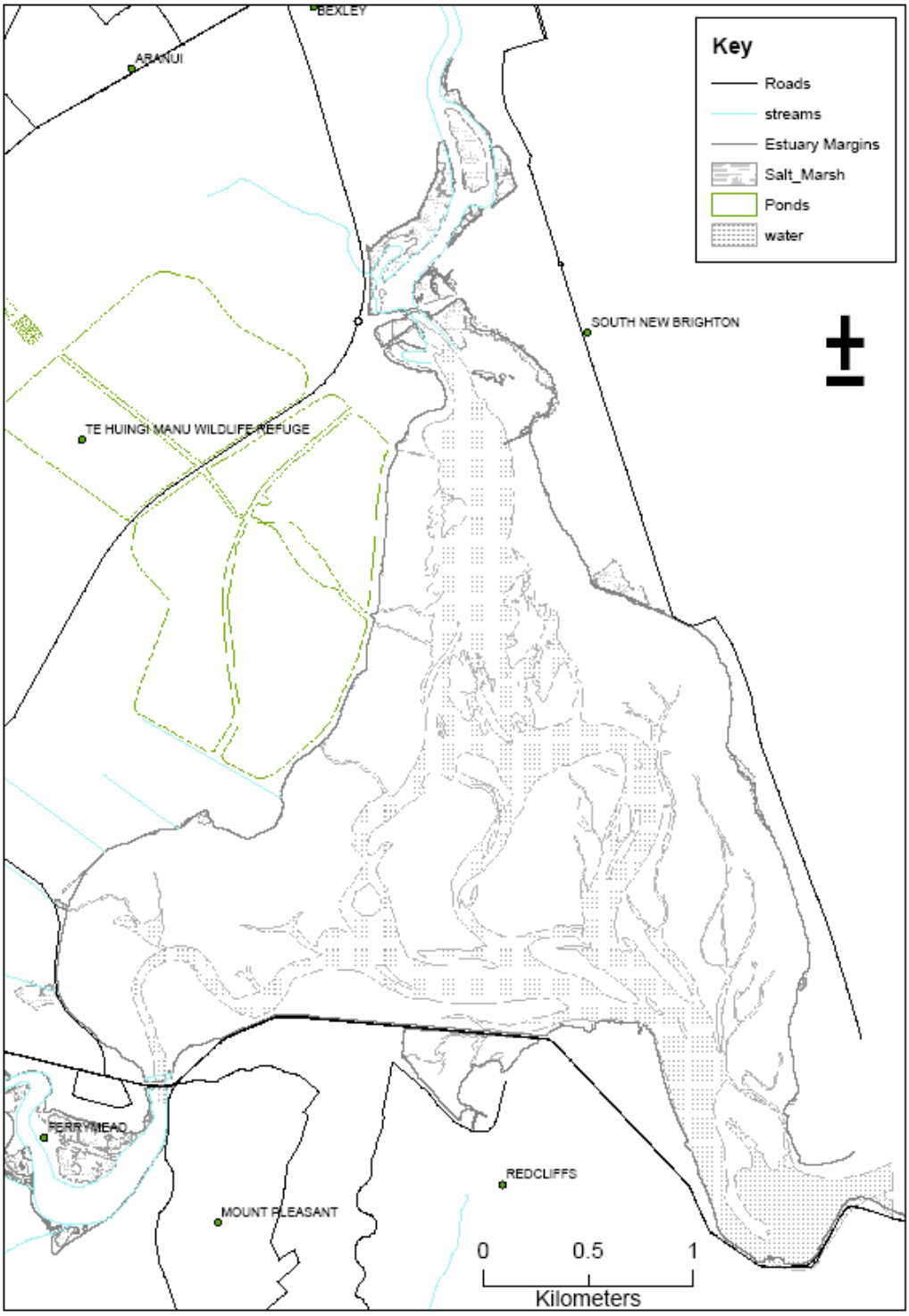


**Figure 1**. Map of Avon-Heathcote Estuary, Bromley Oxidation Ponds and environs.
(map copied by permission of Environment Canterbury)

maximum c.17,030 in May 1990 (Table 1). Gull numbers (principally Kelp Gull) declined during the 1990s and 2000s following the closure of refuse tips near the estuary, but total shorebird numbers still annually exceed 10,000 birds (Table 2).

Maximum wader numbers occur from late January to mid March – a period when native waders arrive back on the coast following breeding and "double-up" with over-summering Arctic waders that are yet to depart on migration. A peak count of c.7400 waders was recorded in 1989/90, while comparative counts in more recent years have included c.6674 in February 2003; c.6312 in February 2004; c.6327 in February 2007 and c.7473 in February 2010 (Table 2).

**Table 1.** Monthly waterbird abundance Avon-Heathcote Estuary and environs: October 1989 – September 1990.

| Species Group | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arctic Waders | 1700 | 2050 | 1600 | 1750 | 2000 | 1700 | 370 | 370 | 370 | 370 | 360 | 350 |
| Native Waders | 750 | 1060 | 2110 | 4370 | 5400 | 5360 | 4790 | 4300 | 3360 | 2340 | 1230 | 740 |
| Gulls | 2500 | 2500 | 5500 | 6500 | 9000 | 9000 | 9000 | 12200 | 8000 | 8000 | 6500 | 6000 |
| Terns | 30 | 50 | 50 | 220 | 170 | 90 | 1050 | 160 | 170 | 20 | 30 | 30 |
| **Total shorebirds** | **4980** | **5660** | **9260** | **12840** | **16570** | **16150** | **15210** | **17030** | **11900** | **10730** | **8120** | **7120** |
| Cormorants/Shags | 220 | 310 | 310 | 410 | 420 | 370 | 360 | 290 | 280 | 220 | 210 | 280 |
| Herons/Spoonbills | 90 | 80 | 100 | 80 | 80 | 80 | 130 | 120 | 100 | 90 | 80 | 80 |
| Waterfowl | 1790 | 3910 | 18210 | 19770 | 11160 | 6550 | 8200 | 10090 | 7170 | 5190 | 3350 | 1580 |
| Swamphen/Coots | 250 | 200 | 180 | 220 | 220 | 220 | 280 | 400 | 400 | 400 | 350 | 200 |
| Kingfisher/Swallow | 40 | 40 | 40 | 40 | 170 | 330 | 280 | 330 | 340 | 180 | 160 | 80 |
| **Total other waterbirds** | **2390** | **4540** | **18840** | **20520** | **12050** | **7550** | **9250** | **11230** | **8290** | **6080** | **4150** | **2220** |
| **Combined Total** | **7370** | **10200** | **28100** | **33360** | **28620** | **23700** | **24460** | **28260** | **20190** | **16810** | **12270** | **9340** |

**Table 2.** Peak period "all-species" counts, Avon-Heathcote Estuary and environs, 2003-2010.

| Species Group | Feb 2003 | Feb 2004 | Feb 2007 | Mar 2008 | Jan 2010 | Feb 2010 |
|---|---|---|---|---|---|---|
| Arctic Waders | 1714 | 1317 | 1656 | 176 | 1827 | 2080 |
| Native Waders | 4960 | 4995 | 4671 | 4912 | 4429 | 5393 |
| Gulls | 6000 | 6000 | 5000 | 8506 | 4740 | 6488 |
| Terns | 545 | 166 | 136 | 242 | 243 | 384 |
| **Total shorebirds** | **13190** | **12478** | **11463** | **13836** | **11239** | **14345** |
| Cormorants/Shags | 525 | 524 | 451 | 475 | 688 | 554 |
| Herons/Spoonbills | 113 | 95 | 65 | 142 | 87 | 148 |
| Waterfowl | 19344 | 14429 | 15050 | 9826 | 24331 | 18838 |
| Swamphen/Coots | 151 | 153 | 254 | 531 | 264 | 245 |
| Kingfisher/Swallow | 90 | 90 | 90 | 200 | n.d. | n.d. |
| **Total other waterbirds** | **20223** | **15291** | **15910** | **11154** | **25370** | **19785** |
| **Combined Total** | **33413** | **27769** | **27373** | **24990** | **36609** | **34130** |

Highest annual counts for wader species are given in Table 4. This shows longitudinal data for the period 2002 – 2009. The two most abundant species are South Island Pied Oystercatcher (range 4493 – 5308; mean 4783) and Bar-tailed Godwit (range 1466 – 2110; mean 1744). Four other species (Variable Oystercatcher, Pied Stilt, Masked Lapwing and Double-banded Plover *Charadrius bicinctus* occur in numbers of between 40 and 300+ birds.

### National and International significance of waterbird populations

The Avon-Heathcote Estuary and Bromley Oxidation Ponds support annual concentrations of 13 waterbird species (including six shorebirds) that meet 1% international importance thresholds as determined by Wetlands International (Delaney & Scott 2006; Li *et al.* (2009). These species are listed in Table 5.

The Avon-Heathcote area has been identified as a nationally important site for one or more species of waterbird by Crossland (1993); Cromarty & Scott (1996); Sagar *et al.* (1999); Dowding & Moore (2006); Melville & Battley (2006); Southey (2009) and Li *et al.* (2009). As yet, no formal recognition of the area's national and international importance to birdlife has occurred, but local level recognition has included the gazetting of wildlife refuge status over the Bromley Oxidation Ponds and the establishment of local nature reserves at high tide roosts and salt marshes.

### Threatened species

Miskelly *et al.* (2008) updated the threat status of New Zealand birds and determined three classes of threatened species – B1 "nationally critical", B2 "nationally endangered", and B3 "nationally vulnerable". Thirteen species from this list are of regular occurrence in the study area (Table 6). These include 6 threatened shorebirds – Black-fronted Tern *Sterna albostriata*, Black-billed Gull, both nationally endangered and Double-banded Plover, Wrybill, Red-billed Gull and Caspian Tern, all nationally vulnerable.

**Table 3.** List of shorebirds recorded on the Avon-Heathcote Estuary, Bromley Oxidation Ponds and environs.

| Common name | Scientific name | Provenance | Status |
|---|---|---|---|
| **Waders** | | | |
| Variable Oystercatcher | *Haematopus unicolor* | NZ native | non-breeding resident |
| South Is. Pied Oystercatcher | *Haematopus finschi* | NZ native | non-breeding resident |
| Black-winged Stilt | *Himantopus himantopus* | NZ native | breeding resident |
| Black Stilt | *Himantopus novaezelandiae* | NZ native | vagrant |
| Masked Lapwing | *Vanellus miles* | NZ native | breeding resident |
| New Zealand Plover | *Charadrius obscurus* | NZ native | vagrant |
| Double-banded Plover | *Charadrius bicinctus* | NZ native | domestic migrant |
| Black-fronted Plover | *Elseyornis melanops* | NZ native | vagrant |
| Wrybill | *Anarhynchus frontalis* | NZ native | domestic migrant |
| Red-necked Avocet | *Recurvirostra novaehollandiae* | Australia | vagrant |
| Red-capped Plover | *Charadrius ruficapillus* | Australia | vagrant |
| Pacific Golden Plover | *Pluvialis fulva* | N. Hemisphere | vagrant |
| Grey Plover | *Pluvialis squatarola* | N. Hemisphere | vagrant |
| Ruddy Turnstone | *Arenaria interpres* | N. Hemisphere | annual migrant |
| Wandering Tattler | *Tringa incana* | N. Hemisphere | vagrant |
| Grey-tailed Tattler | *Tringa brevipes* | N. Hemisphere | vagrant |
| Lesser Yellowlegs | *Tringa flavipes* | N. Hemisphere | vagrant |
| Red-necked Stint | *Calidris rufficollis* | N. Hemisphere | vagrant |
| Curlew Sandpiper | *Calidris ferruginea* | N. Hemisphere | vagrant |
| Sharp-tailed Sandpiper | *Calidris acuminata* | N. Hemisphere | vagrant |
| Pectoral Sandpiper | *Calidris melanotos* | N. Hemisphere | vagrant |
| Red Knot | *Calidris canutus* | N. Hemisphere | annual migrant |
| Sanderling | *Calidris alba* | N. Hemisphere | vagrant |
| Eastern Curlew | *Numenius madagascariensis* | N. Hemisphere | near-annual migrant |
| Whimbrel | *Numenius phaeopus* | N. Hemisphere | near-annual migrant |
| American Whimbrel | *Numenius phaeopus hudsonicus* | N. Hemisphere | vagrant |
| Bar-tailed Godwit | *Limosa lapponica* | N. Hemisphere | annual migrant |
| Hudsonian Godwit | *Limosa haemastica* | N. Hemisphere | near-annual migrant |
| Black-tailed Godwit | *Limosa limosa* | N. Hemisphere | near-annual migrant |
| Asian Dowitcher | *Limnodromus semipalmatus* | N. Hemisphere | vagrant |
| **Skuas** | | | |
| Brown Skua | *Stercorarius antarcticus* | NZ native | vagrant |
| Pomarine Skua | *Stercorarius pomarinus* | N. Hemisphere | annual migrant |
| Arctic Skua | *Stercorarius parasiticus* | N. Hemisphere | annual migrant |
| **Gulls** | | | |
| Kelp Gull | *Larus dominicanus* | NZ native | breeding resident |
| Red-billed Gull | *Larus scopulinus* | NZ native | breeding resident |
| Black-billed Gull | *Larus bulleri* | NZ native | breeding resident |
| **Terns** | | | |
| Black-fronted Tern | *Sterna albostriata* | NZ native | domestic migrant |
| Caspian Tern | *Hydroprogne caspia* | NZ native | non-breeding resident |
| White-fronted Tern | *Sterna striata* | NZ native | breeding resident |
| Fairy Tern | *Sternula nereis* | NZ native | vagrant |
| Whiskered Tern | *Childonias hybrida* | Australia | vagrant |
| Gull-billed Tern | *Gelochelidon nilotica* | Australia | vagrant |
| Little Tern | *Sternula albifrons* | Australia | vagrant |
| White-winged Tern | *Chlidonias leucopterus* | N. Hemisphere | vagrant |

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**Table 4.** Highest annual count per wader species 2002 – 2010 - Avon-Heathcote Estuary and Bromley Oxidation Ponds.

| | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 |
|---|---|---|---|---|---|---|---|---|
| **RESIDENT WADERS** | | | | | | | | |
| Variable Oystercatcher | 102 | 137 | 151 | 162 | 173 | 218 | 139 | n.d. |
| S.I. Pied Oystercatcher | 4493 | 4810 | n.d. | 4865 | 4726 | 5308 | 4438 | 4844 |
| Pied Stilt | 278 | 273 | 159 | 276 | 248 | 334 | 273 | 312 |
| Masked Lapwing | 120 | 40 | 48 | n.d. | 45 | 76 | 84 | 116 |
| Double-banded Plover | 123 | 115 | 103 | 101 | 96 | 125 | 95 | n.d. |
| Wrybill | 2 | 7 | 9 | 2 | 1 | 1 | 0 | n.d. |
| **ARCTIC WADERS** | | | | | | | | |
| Ruddy Turnstone | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| Red Knot | 6 | 1 | 14 | 0 | 1 | 0 | 4 | 2 |
| Eastern Curlew | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Whimbrel | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| Bar-tailed Godwit | 1712 | 1512 | 1466 | 1537 | 1655 | 2032 | 1934 | 2110 |
| Black-tailed Godwit | 2 | 1 | 2 | 1 | 1 | 1 | 0 | 0 |

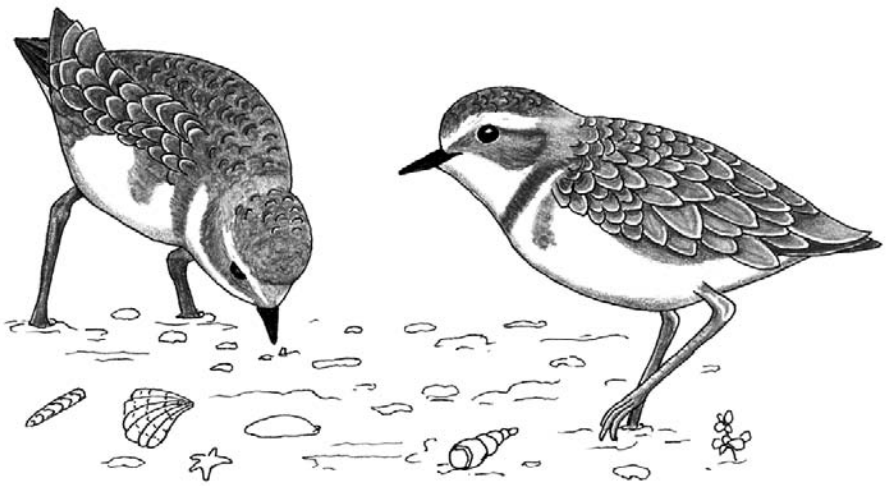
**Table 5.** Species or sub-species of waterbird for which the Avon-Heathcote Estuary and Bromley Oxidation Ponds meet the Wetlands International 1% population threshold (after Delaney & Scott 2006).

| Common name | Scientific name | Population considered | 1% threshold | A-H estuary average annual max | % of pop |
|---|---|---|---|---|---|
| Great Cormorant | *Phalacrocorax carbo* | NZ | 250 | >250 | >1 |
| Pied Cormorant | *Phalacrocorax varius* | NZ | 250 | >250 | >1 |
| Eastern Great Egret | *Ardea modesta* | NZ | 1 | 1-Feb | >1 |
| Paradise Shelduck | *Tadorna variegata* | NZ | 1700 | >1700 | >1 |
| Grey Teal | *Anas gracilis* | NZ | 1000 | >3000 | >3 |
| New Zealand Shoveler | *Anas rhynchotis variegata* | NZ | 1000 | >5000 | >5 |
| New Zealand Scaup | *Aythya novaeseelandia* | NZ | 200* | >5000 | >25 |
| S.I. Pied Oystercatcher | *Haematopus finschi* | NZ | 1100 | >4700 | >4 |
| Variable Oystercatcher | *Haematopus unicolor* | NZ | 40 | >200 | >5 |
| Bar-tailed Godwit | *Limosa lapponica* | Aus/NZ/Alaska | 1600 | >1700 | >1 |
| Black-billed Gull | *Larus bulleri* | NZ | 960 | >1000 | >1 |
| Caspian Tern | *Hydroprogne caspia* | NZ | 50 | >50 | >1 |
| Black-fronted Tern | *Sterna albostriata* | NZ | 60 | >60 | >1 |

* The New Zealand Scaup population estimate of 20,000 given by Heather & Robertson (1996) is followed here as it is more realistic than the estimate of 5000-10,000 proposed by Delaney & Scott (2006).

**Table 6.** Threatened species occurring on the Avon-Heathcote Estuary and Bromley Oxidation Ponds (after Miskelly *et al.* 2008).

| Common name | Scientific name | Threat class | Status |
|---|---|---|---|
| Grey Duck | *Anas superciliosa rogersi* | Nationally Critical | breeding resident/seasonal visitor |
| Eastern Great Egret | *Ardea modesta* | Nationally Critical | seasonal visitor |
| Australasian Bittern | *Botaurus poiciloptilus* | Nationally Endangered | seasonal visitor |
| Black-fronted Tern | *Sterna albostriata* | Nationally Endangered | seasonal visitor |
| Black-billed Gull | *Larus bulleri* | Nationally Endangered | breeding resident/seasonal visitor |
| White-flippered Penguin | *Eudyptula minor albosignata* | Nationally Vulnerable | breeding resident |
| Great Crested Grebe | *Podiceps cristatus* | Nationally Vulnerable | seasonal visitor |
| Pied Cormorant | *Phalacrocorax varius* | Nationally Vulnerable | breeding resident |
| Double-banded Plover | *Charadrius bicinctus* | Nationally Vulnerable | seasonal visitor |
| Wrybill | *Anarhynchus frontalis* | Nationally Vulnerable | seasonal visitor |
| Red-billed Gull | *Larus scopulinus* | Nationally Vulnerable | breeding resident/seasonal visitor |
| Caspian Tern | *Hydroprogne caspia* | Nationally Vulnerable | resident/seasonal visitor |
| New Zealand Falcon | *Falco novaeseelandiae* | Nationally Vulnerable | seasonal visitor |



# SHOREBIRD USE OF A SOUTH ISLAND, NEW ZEALAND, HIGH COUNTRY LAKE DELTA DURING THE BREEDING SEASON

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## INTRODUCTION

New Zealand's South Island high country comprises an extensive region of mountain ranges, intermontane basins, broad river valleys and glacial lakes. This region supports 10 breeding species of shorebird including 6 waders, 2 gulls and 2 terns (Pierce 1983; Heather & Robertson 1996). In recent decades the construction of storage lakes for hydro-electric power generation have added to the range of potential habitats for shorebirds. The largest of these hydro-electric lakes is Lake Benmore (c.74 $km^2$), located on the eastern edge of the MacKenzie Basin. Created in the 1960s, Lake Benmore occupies the flooded river valleys of the Ahuriri, Pukaki and Ohau Rivers. Over the past 40 years, wide deltas have formed where the upper reaches of these rivers now enter the lake (Rebergen *et al*. 1998; Maloney *et al*. 1999).

The Ahuriri Delta (44o30'S, 170o03'E) is located at the south-western end of Lake Benmore, some 98 km inland from the Pacific Ocean and at an altitude of 361m. The delta is 1.7 km wide and consists of more than 10 meandering channels separated by low-lying islands of alluvial silt and shingle. In 1996 vegetation on the central delta islands comprised low grass with exotic weeds and scattered clumps of rushes *Juncus* sp. Dense stands of willow *Salix* sp. covered the shoreline at both edges of the delta, extending into the lake as small islands. Elsewhere, the lake margin was characterised by a zone of bare mud and shingle substrates. This zone varied in width from >200m during low lake levels to <10 m during high lake levels. During the duration of the study there was always bare substrate available as foraging habitat for shorebirds.

## METHODS

During 1996 I was employed by the New Zealand Department of Conservation (DoC) to monitor nesting riverbed birds living upstream of the Ahuriri Delta. Utilising free time at the downstream end of my survey route, I was occasionally able to scan the delta with 10x50 binoculars and conduct a census of shorebirds using the area. I completed counts on 11 dates between 13 September and 19 December 2006, thereby covering the four primary months of the austral spring breeding season. The aim of the study was to ascertain numbers of shorebirds using this lake delta and to investigate the relative extent to which this site is utilised by adult birds and by non-breeding immatures.

Species monitored included six waders - South Island Pied Oystercatcher *Haematopus finschi*, Black Stilt *Himantopus novaezelandiae*, Pied Stilt *Himantopus leucocephalus*, Masked Lapwing *Vanellus miles*, Double-banded Plover *Charadrius bicinctis* and Wrybill *Anarhynchus frontalis*; two terns - Caspian Tern *Sterna caspia* and Black-fronted Tern *Sterna albostriata* and one gull - Black-billed Gull *Larus bulleri*. A second species of gull, Kelp Gull *Larus domincanus* also occurred but as this species was of low conservation interest (due to their high local abundance) they were not included within the surveys.

## RESULTS AND DISCUSSION

Shorebird numbers counted on the Ahuriri Delta between September and December 1996 are given in table 1. Numbers recorded were generally low with 100+ individuals present on only 4 of the 11 survey dates.

### Waders

All six wader species observed breeding upstream on the Ahuriri River visited the delta on a regular basis during the breeding season. Individual adult birds were observed flying between the delta and known breeding territories up to 3 km

**Table 1.** Counts of wetland birds at Ahuriri Delta, September to December 1996.

| **Species** | **13-Sept** | **18-Sept** | **10-Oct** | **21-Oct** | **31-Oct** | **7-Nov** | **21-Nov** | **26-Nov** | **4-Dec** | **12-Dec** | **19-Dec** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SI Pied Oystercatcher | 0 | 0 | 5 | 0 | 3 | 7 | 2 | 3 | 2 | 2 | 13 |
| Black Stilt | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| Hybrid Stilt | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 1 | 3 |
| Pied Stilt | 11 | 6 | 23 | 12 | 28 | 52 | 37 | 16 | 28 | 18 | 32 |
| Masked Lapwing | n.c. | n.c. | 4 | 10 | 28 | 44 | 0 | 2 | 1 | 2 | 0 |
| D-banded Plover | 8 | 9 | 7 | 4 | 10 | 10 | 8 | 8 | 6 | 17 | 26 |
| Wrybill | 2 | 2 | 0 | 2 | 8 | 0 | 3 | 0 | 0 | 0 | 1 |
| **Total waders** | **23** | **16** | **39** | **28** | **77** | **116** | **52** | **29** | **39** | **41** | **86** |
| | | | | | | | | | | | |
| B-billed Gull | 22 | n.c. | 89 | n.c. | 58 | 65 | 6 | 2 | 1 | 3 | 4 |
| Caspian Tern | 6 | 12 | 8 | 2 | 2 | 5 | 3 | 0 | 0 | 4 | 5 |
| Black-fronted Tern | n.c | n.c | 28 | n.c | n.c | 29 | 31 | 1 | 13 | 6 | 16 |
| **Total gulls and terns** | **38** | **12+** | **125** | **2+** | **60+** | **99** | **40** | **3** | **14** | **13** | **25** |
| **Total shorebirds** | **61+** | **28+** | **164** | **30+** | **137+** | **215** | **92** | **32** | **53** | **54** | **111** |

upstream. One pair of the critically endangered Black Stilt regularly took turns visiting from a breeding territory located 2.6 km away.

Only breeding-plumaged adult waders were seen on the delta from September to mid October, with juveniles appearing from late October onwards. There was no evidence that the delta served as a flocking or foraging site for immature birds.

Despite the study occurring during the breeding season when most of the monitored species were highly territorial, very little intra-specific aggression was observed. The delta seemed to be a neutral feeding ground, quite distinct from the high concentration of defended breeding territories on the riverbed upstream.

For all wader species, numbers using the delta were generally low from September to mid October, then increased from late October. This followed the end of the first wave of nesting - the incubation period of most riverbed shorebirds lasting 4-5 weeks (Heather & Robertson 1996). Birds nesting upstream at this time were fully engaged with territorial establishment, courtship and incubation duties, and therefore probably had little opportunity to utilise ex-territorial habitats on the delta. As the breeding season progressed, adult South Island Pied Oystercatchers, Black Stilts, Double-banded Plovers, Wrybill and particularly Pied Stilt were all observed leaving known breeding territories on the riverbed and flying downstream to the delta to feed. Generally one bird in a pair made this flight, leaving its mate behind, but occasionally both birds of a pair were watched flying to the delta together.

Although waders guarding chicks often led their brood away from the direct vicinity of the nest site (Crossland & Sanders 1997), no pairs of any species were observed to relocate their unfledged chicks from the riverbed to the delta. However, from late October onwards, family groups comprising adults and fledged juveniles were regularly observed feeding and roosting on the delta.

Three wader species used the delta for post-breeding flocking: Masked Lapwing (the earliest breeder) formed flocks for a brief period in late October – early November. Pied Stilt flocking was evident right through the study period, but post-breeding congregations of adults and fledged juveniles were evident from early November onwards. Double-banded Plovers began to form post-breeding flocks from mid December. In other years these flocks have been observed on the Ahuriri Delta until late February (pers. obs.).

### Terns and Gulls

Unlike the waders, immatures as well as adults of Caspian Tern, Black-fronted Tern and Black-billed Gull were observed at the delta in each of the four months of the breeding season. Non-breeding immatures seem to accompany the adult population inland to the breeding grounds and loosely associate with them during spring. Individuals and small groups of all three species spent time feeding on river mouth channels and lake waters around the delta, but the major activity observed for both Caspian Tern and Black-billed Gull was roosting on mud banks. Black-fronted Terns however, mainly roosted at breeding colonies located upriver and birds passed through the delta almost continuously as part of their feeding circuits.

Terns and gulls were more mobile than waders and visited the delta from source areas much further upstream. Black-fronted Terns and Black-billed Gulls came from breeding colonies located as far as 7.5 km upriver of the delta. Caspian Terns seemed to be coming from unknown breeding locations at least 9 km upstream as no nest sites were known in the lower Ahuriri River and individual Caspian Terns were followed from the delta to well past the Omarama Bridge, c.8 km away.

## CONCLUSION

The shingle beds and mudflats of the Ahuriri Delta have formed over the last 40 years, following the creation of Lake Benmore and the flooding of a former river valley. The delta now provides a foraging and roosting habitat for 10 native shorebird species, as well as occasional migrants like Bar-tailed Godwit *Limosa lapponica* (pers. obs. 1988).

During the breeding season the Ahuriri Delta was visited by adult waders holding territories up to 3 km upstream, and by adult terns and gulls flying in from nesting colonies upwards of 7 km away. The delta seemed to function as a neutral feeding ground for adult shorebirds, while immature terns and gulls tended to use it as the principle roosting site for a wider area. Following breeding, family parties and small groups move to the delta and generally stay there until they depart on migration to other parts of New Zealand (all species), or to Australia (Double-banded Plover) in late January-February (pers. obs.).

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# BANDING AND FLAGGING SHOREBIRDS AND TERNS IN THAILAND: A PRELIMINARY ASSESSMENT OF WORK DURING 2005–2009

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With its long shoreline and extensive intertidal and freshwater wetland habitats, Thailand is of major conservation importance for shorebird populations of the East Asian-Australasian Flyway (Round 2006).

Although Thailand was the base from which the pioneering studies of the 1963–1971 Migratory Animal Pathological Survey (MAPS) were administered, relatively few shorebirds and terns (252 individuals of 21 species) figured among the 185,472 birds banded in the country during that period (McClure 1974; McClure and Leelavit 1972). More significant efforts were undertaken during1980–1981 when 1744 shorebirds of 23 species were banded (Melville 1982); and in 1984 when a further146 shorebirds of 18 species were banded under the Interwader Programme (Starks 1985). Further attention has been focused on shorebirds in recent years. During 2000–2005, 963 shorebirds and terns of 30 species were banded, predominantly Long-toed Stints (229 birds) and (resident) Malaysian Plovers (272, including 112 pulli). predominantly Long-toed Stints (229 birds) and (resident) Malaysian Plovers (272, including 112 pulli).

From September 2005 onwards, all shorebirds and most terns banded in Thailand were also leg-flagged (black above green, in accordance with the Environment Australia and Wetlands International Colour Flagging Protocol). Initially only mist-nets were used, but following the experience gained by four Thai nationals during the 2006 NWA Wader and Tern Expedition, a cannon-net was constructed for use, and the first successful shorebird cannon-net catches in Thailand were made in September 2007.

This has resulted in a great increase in the numbers captured and flagged—a total of 4523 shorebirds and terns of 39 species during 2005–2009 (Table 1).

Most birds were cannon-netted at high-tide roosts on dry or semi-flooded, out of use, salt-pans, in the Inner Gulf, west of Bangkok (c. N13 15 E100 13) and on sand beaches at Ko Libong, an island c. 4 km off the west coast of the peninsula (N 07 15 E 99 28). Catches have also been implemented at two other peninsular west coast sites: Krabi, (N 08 01 E98 56) and Thungwa, Satun Province (N07 02 E 99.40). Three of the four sites (Ko Libong, Krabi and the Inner Gulf) are recognized as Wetlands of International Importance and Important Bird Areas (BirdLife International 2004). Krabi is additionally recognized as a Shorebird Reserve Network Site.

Mist-netting was chiefly implemented in the Inner Gulf, at a pilot waste-water treatment facility ("sewage farm"), the Laem Phak Bia Environmental Research and Development Project, Phetchaburi Province (N13 03, E100 05), where shorebirds were caught during daylight hours among small, widely spaced mangrove trees in water treatment lagoons. Elsewhere in the gulf nocturnal mist-netting was carried out on open salt-pans and traditional prawn ponds.

Whereas most mist-netting targeted smaller shorebirds, in the first few months after cannon-netting began to be implemented the first catches of larger shorebirds (mainly Bar-tailed Godwits and Whimbrels) were obtained.

Although the numbers and diversity of shorebirds in the Inner Gulf are exceptional, cannon-netting there is more labour-intensive and problematical than at Ko Libong, chiefly due to the great expanse of suitable roosting habitat—roughly 400 sq. km of coastal flats, aquaculture ponds and salt pans. The birds have a lot of sites from which to choose. Additionally mist-netting is problematical because of the gulf's idiosyncratic tidal patterns when, for much of the year, the tide recedes or remains low during the hours of darkness: there are very few days when the ideal mist-netting conditions of a nocturnal incoming tide pushing birds into nettable roosts prevail. Although sample sizes from mist-netting are small, the range of species caught was slightly larger (so far 27 species, compared with 24 species in cannon-nets). Roughly one third to half of all species caught in mist-nets have not yet been caught in cannon-nets, and *vice versa*, illustrating the complementary nature of the two catching methods. In particular, mist-netting has been important in sampling species such as Marsh Sandpipers, (which mainly roost and feed on water-filled ponds), Common Redshanks (which chiefly roost among mangrove stumps or visit water-filled ponds); Little Ringed Plovers, Wood Sandpipers and Long-toed Stints (found chiefly on otherwise under-sampled fresh-water habitats) and Common Sandpipers (which are not usually gregarious).

Among those species for which Thailand holds internationally important wintering or staging populations, yet which remain unsampled, are Asian Dowitcher and Nordmann's Greenshank. Additionally the counts of Red Knots, Great Knots and Black-tailed Godwits that winter in the Inner Gulf have all increased markedly in recent years (Round 2006), and these populations deserve study.

Since flagging started, there have been at least 50 trans-national resightings or recaptures of Thai-flagged birds (a resighting rate of 1.1%). Most of these (33 resightings) were from the E and NE Chinese coast. It is noticeable that neither of the two predominant species flagged in Thailand, Lesser Sand Plover (1751 birds) and Greater Sand Plover (600 birds), have yielded any trans-national resightings, presumably because both of these (races *C. m. schaeferi* and

**Table 1**: Number of shorebirds and terns flagged in Thailand, 2005–2009 (M Mist-netted; C cannon-netted)

| | | Inner Gulf | | South | Total | Number of resighted birds by country | | | | | | | | | Foreign-flagged brds resighted in Thailand | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **Scientific name** | M | C | C | | Australia | China | Indonesia | Japan | Korea | Malaysia | Singapore | Thailand* | Total | Australia | China | Hong Kong | Indonesia | Japan | Korea | Malaysia | Russia | Singapore | Taiwan | Total |
| Greater Painted-snipe | *Rostratula benghalensis* | 2 | | | 2 | | | | | | | | | | | | | | | | | | | | |
| Black-winged Stilt | *Himantopus himantopus* | 3 | | | 3 | | | | | | | | | | | | | | | | | | | | |
| Red-wattled Lapwing | *Vanellus indicus* | 2 | | | 2 | | | | | | | | | | | | | | | | | | | | |
| Pacific Golden Plover | *Pluvialis fulva* | 6 | | | 6 | | | | | | | | | | | | | | | | | | | | |
| Grey Plover | *Pluvialis squatarola* | 2 | | 5 | 7 | | 1 | | | | | | | 1 | | | | | | | | | | | |
| Little Ringed Plover | *Charadrius dubius* | 11 | | | 11 | | | | | | | | | | | | | | | | | | | | |
| Kentish Plover | *Charadrius alexandrinus* | 5 | 25 | 1 | 31 | | | | | | | | | | | | | | | | | | | | |
| White-faced Plover | *Charadrius dealbatus*† | | 1 | | 1 | | | | | | | | 1 | 1 | | | | | | | | | | | |
| Malaysian Plover | *Charadrius peronii* | | 12 | 1 | 13 | | | | | | | | 2 | 2 | | | | | | | | | | | |
| Lesser Sand Plover | *Charadrius mongolus* | 31 | 853 | 867 | 1,751 | | | | | | | | 122 | 122 | 1 | | | 2 | | | | | 3 | | 6 |
| Greater Sand Plover | *Charadrius leschenaultii* | 4 | 59 | 537 | 600 | | | | | | | | 94 | 94 | | | | 2 | | | | | | | 2 |
| Pintail Snipe | *Gallinago stenura* | 3 | | | 3 | | | | | | | | | | | | | | | | | | | | |
| Common Snipe | *Gallinago gallinago* | 17 | | | 17 | | | | | | | | | | | | | | | | | | | | |
| Black-tailed Godwit | *Limosa limosa* | | | | | | | | | | | | | | | 1 | | | | | | | | | 1 |
| Bar-tailed Godwit | *Limosa lapponica* | | | 214 | 214 | | 3 | | | 1 | | | 15 | 19 | | 1 | | | | | | | | | 1 |
| Whimbrel | *Numenius phaeopus* | | 1 | 119 | 120 | | | | | | | | 2 | 2 | | | | | | | | | | | |
| Eurasian Curlew | *Numenius arquata* | | 27 | 23 | 50 | | | | | | | | | | | | | | | | | | | | |
| Common Redshank | *Tringa totanus* | 166 | | 46 | 212 | | | 1 | | | 5 | 2 | | 8 | | | | 2 | | | 1 | | 1 | | 4 |
| Marsh Sandpiper | *Tringa stagnatilis* | 34 | | | 34 | | 1 | | | | | | 1 | 2 | | 1 | | | | | | | | | 1 |
| Common Greenshank | *Tringa nebularia* | 1 | | | 1 | | | | | | | | 1 | 1 | | | | | | | | | | | |
| Wood Sandpiper | *Tringa glareola* | 21 | | | 21 | | | | | | | | | | | | | | | | | | | | |
| Terek Sandpiper | *Xenus cinereus* | 1 | | 112 | 113 | | | | | 1 | | | 7 | 8 | | 1 | | | | | | | | | 1 |
| Common Sandpiper | *Actitis hypoleucos* | 29 | | | 29 | | | | | | | | 5 | 5 | | | | | | | | | | | |
| Ruddy Turnstone | *Arenaria interpres* | 1 | | 28 | 29 | | | | | | | | 1 | 1 | | | | | | | | | | | |
| Great Knot | *Calidris tenuirostris* | | | 52 | 52 | | 2 | | | | 4 | | 1 | 7 | | 2 | | | | | | | | | 2 |
| Red Knot | *Calidris canutus* | | | 4 | 4 | | | | | | 1 | | | 1 | | | | | | | | | | | |
| Sanderling | *Calidris alba* | | 6 | 11 | 17 | | 1 | | | | | | 1 | 2 | | | | | | | | | | | |
| Little Stint | *Calidris minuta* | 3 | | | 3 | | | | | | | | | 0 | | | | | | | | | | | |
| Red-necked Stint | *Calidris ruficollis* | 29 | 347 | 32 | 408 | | 1 | | | 2 | | | 4 | 7 | 1 | 5 | 1 | | 5 | | | | | 1 | 13 |
| Temminck's Stint | *Calidris temminckii* | 2 | 1 | | 3 | | | | | | | | | | | | | | | | | | | | |
| | | Inner Gulf | | South | Total | Number of resighted birds by country | | | | | | | | | Foreign-flagged brds resighted in Thailand | | | | | | | | | |
| **Species** | **Scientific name** | M | C | C | | ali | a | hi | na | si | a | pa | n | dr | ea | si | a | dr | e | ila | nd | Total | ali | a | hi | na | m | g | si | a | pa | n | dr | ea | si | a | si | a | dr | e | w | an | Total |
| Long-toed Stint | *Calidris subminuta* | 86 | 9 | | 95 | | | | | | | | | | | | | | | | 2 | 2 | | | | | | | | | | | | | | | | | | | | |
| Curlew Sandpiper | *Calidris ferruginea* | 21 | 64 | | 85 | | | 4 | | | | | | | | | | | | | 3 | 7 | 3 | 1 | | | | | | | | | | | | | | | | | | 4 |
| Spoon-billed Sandpiper | *Eurynorhynchus pygmeus* | 1 | | | 1 | | | | | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | | | | 2 | | | | | 2 |
| Broad-billed Sandpiper | *Limicola falcinellus* | 17 | 363 | | 380 | | | 20 | | | | | | | | | | | | | 10 | 30 | | | 5 | | | | | | | | | | | | | | | | | 5 |
| Ruff | *Philomachus pugnax* | 3 | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lesser Crested Tern | *Sterna bengalensis* | | | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Common Tern | *Sterna hirundo* | | 85 | | 85 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Little Tern | *Sterna albifrons* | 1 | 33 | 65 | 99 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| White-winged Tern | *Chlidonias leucopterus* | | | 20 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 502 | 1886 | 2139 | 4527 | 0 | 33 | 1 | 0 | 4 | 10 | 2 | 273 | 323 | 5 | 17 | 1 | 6 | 5 | 0 | 1 | 2 | 4 | 1 | 42 |

Numbers of Thai-flagged birds listed as resighted is an underestimate, since locally flagged birds are not always routinely reported

† See Kennerley, Round and Bakewell *Forktail* 24: 63–79 (2009). Status of this taxon (whether a distinct species or a subspecies of Kentish Plover) unresolved

*C. l. leschenaultii* respectively) migrate from Thailand due north into Central Asia, where the land area is vast and observer coverage very limited. Among the most spectacular resightings or controls were two Bar-tailed Godwits resighted in Korea and Liaoning, NE China, only two weeks after they were flagged in S Thailand; and a Sanderling (one of only four then banded) that was controlled by a Chinese bander in the Gulf of Bohai, NE China, in the spring immediately following banding.

Additionally as part of this work, satellite tags have been affixed to two Brown-headed Gulls (*Chroicocephalus brunnicephalus*), one of which has been successfully tracked from the Inner Gulf to both Cambodia, and to presumed breeding grounds in Qinghai, China. Satellite tags were also recently affixed to two Eurasian Curlews.

Thanks partly to the activities of the many Thai bird photographers and birdwatchers, there have also been 42 resightings in Thailand of 12 species flagged elsewhere on the flyway. This has included two critically endangered Spoon-billed Sandpipers, colour-banded as chicks, one each from N Chukotka and S Chukotka, resighted in winter 2005–2006 (Round and Gardner 2008); Broad-billed Sandpipers, Red-necked Stints and Great Knots flagged on the E Chinese coast, and Curlew Sandpipers from both South and NW Australia. Additionally a Common Redshank was controlled in the Inner Gulf 17 years after having been banded in Malaysia.

Analysis of age ratios, geographical variation, weights, biometrics and moult patterns of the increasing sample of shorebirds being caught is planned. Tentative findings from breeding plumage Common Redshanks caught indicate that most have been of the N Asian race *T. t. ussuriensis* (W.G. Hale, *in litt*.).

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# MOULT IN ASIAN DOWITCHERS *LIMNODROMUS SEMIPALMATUS* IN THE INNER GULF OF THAILAND

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The Asian Dowitcher *Limnodromus semipalmatus* is a globally near-threatened shorebird breeding in E and W Siberia, Russia; Mongolia and Heilongjiang Province in NE China; and wintering mainly in S Sumatra (BirdLife International 2009). It occurs on passage on the E Asian seaboard, including the Inner Gulf of Thailand around Bangkok (c. 13 deg N latitude), and the east coast of the Thai-Malay Peninsula (the "Southern Gulf") in both spring and autumn (Jorgensen 1949; Round 2008).

Little has been published on the annual cycle of this species, though Wells (1999) identified the southern Thai Gulf (Pak Phanang, Nakhon Si Thammarat Province, c. 8 deg N latitude) as a "wing moult stop", based on four adult specimens in early to mid-wing moult during late August to late September, and nine others from late November, either in late wing-moult, or which had recently completed moult.

Increased banding of shorebirds in the Inner Gulf since 2005 (Round 2007; Round & Phothieng 2006) has not yielded any captures of dowitchers. The idiosyncratic Inner Gulf tidal patterns (in which tide is almost always low or ebbing during the hours of darkness) is unhelpful for mist-netting, and when dowitchers roost onshore at high tide (during the day) they typically select water-filled ponds, and are therefore not accessible to cannon-nets.

Photographs of Asian Dowitchers in flight offer an alternative means to obtain data on moult status. I examined four high quality digital photographs (successive photos from the same flock of c.130 individuals) that showed 21 different individuals, none of which were juveniles, dated 9 August 2008. The moult status of five of the 21 birds could not be determined; 16 were in active wing moult, and it was possible to estimate the primary moult scores of 13 of these (Fig. 1; Table 1).

That the moult was active could be seen from nine birds in which at least one of p5–p7 (numbered descendantly) were one-third to two-thirds grown. In all birds at least p9 and p10 were old. Primary moult score (following Ginn & Meville 1983) ranged from 23 to 35 (mean 28.6 ± 3.66; Table 1). None of these birds displayed any trace of chestnut colouration on the underparts or chestnut edged scapulars, suggesting that they were most likely second calendar-year birds (first-summer birds) that had never attained breeding plumage. The old, unmoulted, primaries could readily be seen in the images to be bleached, pale brownish, a further likely indication that they were first-summer birds (Prater *et al*., 1977).


**Fig 1**. Presumed first-summer Asian Dowitchers (*Limnodromus semipalmatus*), Khok Kham, Samut Sakhon Province, Thailand, 9 August 2008. (Pinit Saengkaew).
Primary moult score of the right-hand bird estimated as 24 (four innermost primaries full-grown; p 5 moult score 3, p6 moult score 1 or 2; pp7-10 old. That of the left-hand is estimated as 31 (pp1-6 full-grown; p7 moult score 1, pp 8-10 old).

**Table 1**. Primary moult scores of presumed first-summer Asian Dowitchers *Limnodromus semipalmatus* estimated from photographs, Khok Kham, Inner Gulf of Thailand. 9 August 2008

| Observation no. or individual | Photo | p1 | p2 | p3 | p4 | p5 | p6 | p7 | p8 | p9 | p10 | Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | AD-6 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 0 | 0 | 0 | 31 |
| 3 | AD-6 | 5 | 5 | 5 | 5 | 5 | 4 | 1 | 0 | 0 | 0 | 30 |
| 4 | AD-6 | 5 | 5 | 5 | 5 | 5 | 4 | 1 | 0 | 0 | 0 | 30 |
| 11 | AD-2 crop | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 0 | 0 | 0 | 31 |
| 12 | Ad-2 crop | 5 | 5 | 5 | 5 | 5 | 4 | 1 | 0 | 0 | 0 | 30 |
| 13 | 8946 crop | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 1 | 0 | 0 | 35 |
| 14 | 8946 crop | 5 | 5 | 5 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 24 |
| 15 | 8946 crop | 5 | 5 | 5 | 5 | 5 | 4 | 1 | 0 | 0 | 0 | 30 |
| 16 | 8946 crop | 5 | 5 | 5 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 23 |
| 17 | 8946 crop | 5 | 5 | 5 | 5 | 5 | 3 | 1 | 0 | 0 | 0 | 29 |
| 18 | 8946 crop | 5 | 5 | 5 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 24 |
| 21 | AD-3 | 5 | 5 | 5 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 24 |
| 22 | AD-3 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 0 | 0 | 0 | 31 |

The flock roosted and fed on flooded, out of use, saltpans c. 2 km inland, at Khok Kham, Samut Sakhon Province, N 13 31 E 100 19, c. 30 km west of Bangkok) on the Inner Gulf of Thailand. I had first noted the presence of the flock two days earlier, on 7 August, though the birds were said by a local observer, Mr. Suchart Daengphayon, to have first appeared at the site roughly one week earlier.

If the birds had not commenced moult until arrival, their advanced stage of moult (already approximately half-completed) would imply an arrival approximately one month earlier, during the first week of July. This is approximately two weeks earlier than the earliest recorded autumn migrants (the first dowitchers are thought to arrive around 20 July: author, own data, which also roughly accords with the timing of first autumn arrivals in Hong Kong; Carey *et al*. 2001). Although a few (c. 10) birds have been observed in the Inner Gulf in mid-June in recent years, leading to the supposition that some dowitchers may regularly oversummer, it is unlikely that such a large number could have over-summered in the Inner Gulf and remained undetected. How can the relatively advanced stage of moult observed among the present birds be explained? A possible explanation is that they had commenced their moult on an intermediate staging area elsewhere along the flyway; suspended moult before continuing migration, and then recommenced moult immediately after arrival in the Inner Thai Gulf. Further study is needed to resolve the details of the Asian Dowitcher's annual cycle.

Autumn passage in the Inner Gulf is highly protracted, with the largest single-day counts (175–220 birds) in late October, though around 65–100 are now thought to overwinter (Round & Gardner 2008). Many more (up to 600 per day) have been recorded in spring (early to mid-April), during northwards passage. It is therefore clear that the Inner Gulf of Thailand is important as a staging area in both spring and autumn, and additionally as a moulting area in autumn. The "winter wing-moult stop" identified in the southern gulf by Wells (1999) for Asian Dowitchers certainly extends at least as far north as Bangkok.

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# AUSTRALIAN PIED OYSTERCATCHERS *HAEMATOPUS LONGIROSTRIS* IN THE HUNTER REGION OF NEW SOUTH WALES, AUSTRALIA

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In 2008-2009, counts of Australian Pied Oystercatcher *Haematopus longirostris* at roost sites along the coast of the Hunter Region of New South Wales, Australia, indicated that at least 200 birds were regularly present. These counts are significant in the light of previous estimates of just 232-250 birds for the entire NSW coastal population. Port Stephens has been identified as a very important site for this species, with frequent counts of 100-150+ birds during the surveys. There are relatively few breeding records in the Hunter Region, and it is possible that most of the birds at Port Stephens come from breeding territories elsewhere.

## INTRODUCTION AND METHODS

The Australian Pied Oystercatcher is widely distributed in Australia and the total population is estimated at 11,000 birds, including small populations in Southern New Guinea and Aru Island (Delany & Scott 2006). However, in New South Wales the species is relatively uncommon and it is classified as Endangered under the NSW *Threatened Species Conservation Act 1995*. Watkins (1993) estimated the NSW population to be 250 birds. A later estimate was 232 birds comprising 119 birds in the Tweed River-Clarence River area and another 113 birds were thought to be present to the south (Owner & Rohweder 2003). Recent observations of around 200 birds in the Hunter Region of NSW are therefore surprising and significant.

For many years I have collected and collated bird records for the Hunter Region (as defined in the 1989 NSW Regional Environmental Plan), using many data sources including my own and those of Hunter Bird Observers Club. The coastal fringe of the Hunter Region extends from Diamond Head (approx 31° 44'S 152° 48'E) to about 20km south of Swansea (approx 33° 10'S 151° 39'E) (see Figure 1); this represents an estimated shoreline of about 250km. The main locations at which Australian Pied Oystercatchers were recorded were roost sites at Swansea (around the mouth of Lake Macquarie), Newcastle (at Hunter Estuary locations, and Newcastle ocean baths), Newcastle Bight, Port Stephens, Forster/Tuncurry (at the mouth of Wallis Lake), Manning River Estuary (at Harrington and Mudbishops Point/Farquhar Inlet). Pairs and small parties were also recorded at other coastal and estuarine locations.

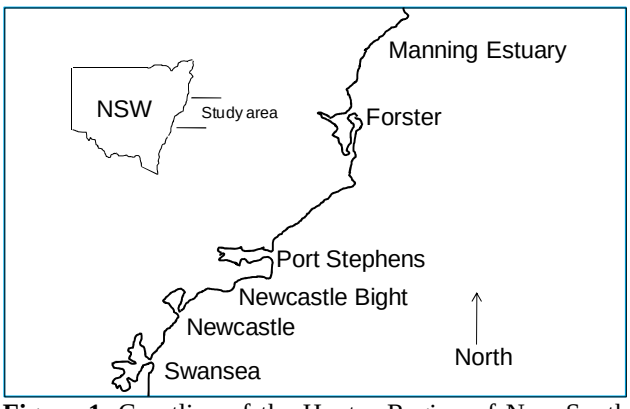


**Figure 1**. Coastline of the Hunter Region of New South Wales. The insert shows the location within New South Wales

Those main roost site locations have been the subject of regular surveys, usually monthly and carried out at high tide, except at Forster/Tuncurry at the entrance to Wallis Lake where the surveys (which commenced in July 2009) have been made in the mid-tide period due to resource constraints. Some of the locations are able to be surveyed using land-based visits to the main roost sites. The methods for the surveys at Hunter Estuary (Newcastle), Port Stephens and Newcastle Bight are more intricate due to the greater size of those locations, and are summarised thus:

- The high tide roost sites around the Hunter Estuary have been surveyed monthly since early 1999. Four teams of observers simultaneously visit the known roost sites in the Estuary, recording all shorebirds and any other waterbirds present.
- Parts of Port Stephens were surveyed regularly in the mid 1980's for the AWSG counts but then the area largely was ignored by shorebird surveyors. Summer counts re-commenced in 2004 and winter counts in 2008; they are boat-based surveys (using 5-6 boats simultaneously) of all the high tide roosts in the Port (see Stuart 2005 for details).
- The 34 km coastline of Newcastle Bight is a popular 4WD leisure destination and as such, for a long time was largely ignored by bird watchers. Recently, most of the area was gazetted for conservation (as the Worimi Conservation Lands) and surveys were commenced in July 2009 with the co-involvement of National Park rangers; the surveys are made from a vehicle driven along the beach and also accessing potential roost sites behind the dunes.

## RESULTS AND DISCUSSION

Table 1 summarises the summer and winter counts of Australian Pied Oystercatcher in the Hunter Region during 2008 and 2009 (prior to 2008, not all of the main roosting sites were surveyed regularly). From these data it is estimated that at least 200 birds were present in the Hunter

**Table 1**. Summer and winter peak counts of Australian Pied Oystercatcher at Hunter Region locations, during 2008-2009

| Location | Summer[1] 2008 | Winter[2] 2008 | Summer[1] 2009 | Winter[2] 2009 |
|---|---|---|---|---|
| Swansea | 5 | 6 | 10 | 5 |
| Newcastle | 7 | 3 | 17 | 18 |
| Port Stephens | 107 | 154 | 134 | 122 |
| Newcastle Bight | *n.c.* | *n.c.* | *n.c.* | 13 |
| Forster/Tuncurry | 40 | *n.c.* | *n.c.* | 15 |
| Manning Estuary | 22 | 13 | 19 | 16 |
| Other sites (estimated) | 10-20 | 10-20 | 10-20 | 10-20 |
| Total (estimated) | 200-220 | 200-220 | 210-240 | 200-220 |

[1]Feb-Mar period [2]June-July period *n.c.* no count

Region in 2008 and 2009. It should be noted that all the winter 2009 counts were made within a two week period – although this does not rule out that movements between locations had occurred, it makes it less likely.

Where pre-2008 data are available for the main locations listed in Table 1, they strongly indicate that high numbers of Australian Pied Oystercatchers have been present in the Hunter Region for a considerable time. The pre 2008 data for the individual locations are discussed below.

Until 2008, the Swansea area was not regularly surveyed, but there were frequent reports of some birds present there (main locations: Coon Island, Black Neds Bay, Marks Point). Since January 2008, there have been several counts of 6-10 birds, and 14 birds were recorded there in January 2009.

Although Australian Pied Oystercatchers are not always recorded in the Hunter Estuary, over 2002-2009 they were present in 93 of 96 surveys. In that time, the average summer (February-March) count has been 12 birds and average winter count (July-August) has been six birds (with summer and winter peak counts of 29 birds in March 2003 and 18 birds in July 2009, respectively).

100+ birds have been present in seven of the nine surveys of Port Stephens to date (Stuart 2007; Stuart unpublished). A much smaller count in March 2005 (30 birds) may have been a consequence of some weather/operational problems on that survey (Stuart 2007).

Several pairs and small parties of Australian Pied Oystercatchers were regularly present along Newcastle Bight. The count of 13 birds in July 2009 is preceded by opportunistic records of 13 birds December 1998 and July 2001, 22 birds in July 2002 and 11 birds in December 2001.

Since the regular surveys commenced at Forster/Tuncurry, 13-18 birds have been present most months. These counts were preceded by opportunistic records of 20 birds present June 2002 and 15-20 birds in January 2005 and April 2006, while 47 birds were reported present in March 2003.

The two main high tide roost sites in the Manning Estuary (at Harrington, and at Mudbishops Point near Old Bar) have been surveyed monthly since January 2008, with >10 Australian Pied Oystercatchers recorded in 75% of the surveys and 15+ birds in 33% of them. Prior to 2008, there are several opportunistic records including 22 birds in November 2002, 29 birds in March 2003 and 26 birds in January 2005.

Australian Pied Oystercatchers have been recorded at several other locations in the Hunter Region in recent years – for example, shorelines at Broughton Island, Dora Creek, Saltwater NP, Booti Booti NP, Diamond Head, Crowdy Bay NP, and in particular along the coastline between Seal Rocks and Hawks Nest (most of this area is in Myall Lakes NP). The latter coastline was known to have at least three resident pairs in the late 1990's and there is a record of 22 birds present there in January 2000 and some other records of >10 birds. Unfortunately, there have been no systematic surveys done for the area.

Assuming that 10+ birds continue to be present at the Myall Lakes NP coastline, there would have been up to 20 birds at Hunter Region locations other than those named in Table 1 at the times of the summer and winter counts. Coupled with peak summer/winter counts of 5-10 birds at Swansea, 6-12 at Newcastle, 10-15 at Newcastle Bight, 120-150 at Port Stephens, 15-20 at Forster/Tuncurry and 15-20 at Manning Estuary, there were at least 200 birds, and perhaps as many as 240 birds, present each year in the Hunter Region of NSW.

Breeding records for a population of at least 200 birds in the Region were relatively sparse. There were occasional records of pairs with young at two Hunter estuary locations (Stockton Sandspit and Kooragang Dykes); two pairs attempted to breed along Newcastle Bight in 2009; four pairs are known to have bred in the Manning Estuary in late 2009; and there are pre-2008 breeding records from Myall Lakes NP and the Forster/Tuncurry area. There was at least some influx of immature birds from other places:

- A bird I recorded in the Manning Estuary in September 2008 had been banded as a pullus at Bundjalung NP near Ballina in northern NSW in November 2007 (G. Clancy *pers. comm.*)
- Two birds banded in the Ballina area (at Beswicks Beach in October 2006 and Bundjalung NP in October 2008) were at Lemon Tree Passage in Port Stephens in May 2009 (M. Kearns *pers. comm.*)
- Two other Ballina birds (banded at Bundjalung NP in October 2006 and Broadwater NP in November 2008) were present on Newcastle Bight in July 2009 and subsequently were frequently recorded in the Hunter Estuary (roosting on the Kooragang Dykes) over September-December 2009 (M. Newman *pers. comm.*, C. Herbert *pers. comm.*).

Not all such movements are in the southerly direction; there is an older record where a bird banded at Corner Inlet Victoria in August 1994 was at the Forster/Tuncurry site (at Wallis Lake) in October 1995 (Morris and Burton 1997).

Despite the high counts in summer and winter at Port Stephens, there are no known breeding records from within Port Stephens. That area seems to have suitable (and undisturbed) habitat for only a small number of breeding pairs. It is possible that a proportion of the birds may disperse and nest outside of Port Stephens; similar behaviour has been noted elsewhere (Newman 1982). On the other hand there seems to be evidence that birds move between roosting sites from time to time. For example, the counts of 47 birds at Forster/Tuncurry on March 2003 and 40 birds in February 2008 are considerably above the normal situation there, similarly the counts of 29 birds in the Manning Estuary in March 2003 and 26 birds in January 2005. It is interesting that both Forster/Tuncurry and Manning Estuary had peak counts at about the same time, in March 2003; unfortunately, there was no count made at Port Stephens at that time.

## CONCLUSIONS

At least 200 Australian Pied Oystercatchers appear to be present in the Hunter Region each year, based on systematic surveys at most of the key locations and numerous opportunistic observations. This is an important finding in view of the previous estimates of 232-250 birds in all of New South Wales; those now appear to have been under-estimates.

Counts of Australian Pied Oystercatcher from Port Stephens represent up to 1.5% of this species total world population and thus Port Stephens is an internationally significant location for this species. There are no known breeding records for Port Stephens, and there appears to be few suitable and undisturbed habitats where breeding might occur. Indeed there is scant evidence of successful breeding anywhere in the Hunter Region. Newly fledged birds are easily identified and they are seldom seen during the extensive survey work conducted in the Region. Possibly, the birds at Port Stephens breed elsewhere and move to Port Stephens after the breeding season.

There seems to be scope for a detailed study of how the Australian Pied Oystercatcher utilises the Hunter Region. Such a study might focus, for example, on identifying the breeding territories for the Hunter Region population and on determining the extent and timing of movements within the Region and into/out of it. The results of the study could help to develop improved conservation strategies for this species in New South Wales, where the Scientific Committee has recently reclassified it as Endangered.

## ACKNOWLEDGEMENTS

I thank the Hunter Bird Observers Club for access to its database. Many members of HBOC have participated in the surveys at Swansea, Newcastle/Hunter estuary and Port Stephens; the stalwarts are Jack Adams, Judi Thomas, Chris Herbert, Liz Crawford, Ann Lindsey, Neville McNaughton, Mick Roderick, Mike Newman, Lois Wooding, Sue Hamonet and AS. Richard Ghamraoui and Warren Mayers and their colleagues from NSW National Parks & Wildlife Service (NSW Department of Environment, Climate Change and Water) have always provided invaluable support for the Port Stephens and Newcastle Bight surveys, respectively. I thank Mike Newman and Ann Lindsey for helpful comments on a draft version of this paper.

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# INITIAL RESULTS FROM LIGHT LEVEL GEOLOCATOR TRIALS ON RUDDY TURNSTONE *ARENARIA INTERPRES* REVEAL UNEXPECTED MIGRATION ROUTE

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With the development of archival light level geolocators weighing only 1g, their deployment on medium size waders is now possible. Trials showed that attachment via leg flag rather than backpack harness was preferable because of the large weight gains of Ruddy Turnstone during preparation for migration. Geolocators attached to leg flags were fitted to six Ruddy Turnstones at Flinders, Victoria, SE Australia, and four were retrieved the following season. All four birds had made an initial non-stop 7,600 km flight, in six days, to Taiwan, with three probably travelling in the same flock. Individuals then followed separate paths through E Asia before locations became indiscernible in early June in E Siberia as birds encountered continuous daylight. Brief data were recorded for two birds at the beginning of southward migration through E Siberia in early August before the damaged light sensor stalk on the geolocator failed, as another had also done on the breeding grounds. The fourth bird, without a stalked light sensor in its geolocator, was in the Aleutian Islands, SW Alaska, when locations again became discernible on 26 July. It remained there until 15 October and then made a 6,200 km non-stop flight to the Gilbert Islands, western central Pacific in four days. After another prolonged stopover it departed on 29 November reaching E Australia in four days (5,000 km) and arrived back at Flinders on 8 December. This bird had made a round trip migration of around 27,000 km. Between 26 June and 14 July, when it was in the Arctic, the light data record of this bird suggested that it had been incubating. A further 60 geolocators will be deployed on Ruddy Turnstones in SE Australia in March/April 2010.

## INTRODUCTION

Band recoveries and sightings of colour-marked birds have, for many years, been the principal means of determining migration routes, stopover locations, and breeding and non-breeding (wintering) locations of migratory shorebirds. Whilst much data has been generated and broad migration patterns have been established for many species in the East Asian Australasian Flyway (Minton 2005, Minton *et al.* 2006), the techniques also have limitations, particularly because reports of marked birds are inevitably influenced by the distribution and habits of the human population. The use of electronic devices, where birds' daily positions are recorded, potentially overcomes these problems and can lead to a much clearer understanding of migratory strategy.

Satellite transmitters have been used on some of the larger waders over the last 15 years (e.g. Driscoll & Ueta 2002, Gill *et al.* 2005) but the early results appeared to be partly affected by adverse effects on the flight aerodynamics caused by the 26g transmitter harnessed to the birds' backs. Smaller transmitters (down to 9.5g) appear to have overcome this problem (e.g. Whimbrel in N Virginia (Watts *et al.* 2008)), as has surgical implantation of transmitters (Gill *et al.* 2009)

Light level geolocators that record time-stamped periodic ambient light levels have long been used on large seabirds (hence the involvement of the British Antarctic Survey (BAS) in their development and supply). Conklin & Battley (2010 ) have successfully applied leg-band mounted geolocators to Bar-tailed Godwits *Limosa lapponica* in New Zealand and Raymond Klaassen (pers. comm.) to Redshank *Tringa totanus* in Sweden (harness mounted). It was the publication by Stutchbury *et al.* (2009) which showed that geolocators had now become small enough to be applied to migratory birds weighing as little as 50g. A disadvantage of current archival geolocators is that birds must be recaptured and the devices removed to obtain the data collected; not an easy task with a migratory shorebird.

The Victorian Wader Study Group (VWSG) has been monitoring the development of electronic tracking devices ever since its involvement in placing satellite transmitters on Eastern Curlew *Numenius madagascarensis* in 1998 (Driscoll & Ueta 2002). When the VWSG learned, in February 2009, of the success of 1.4g BAS-supplied geolocators on passerines in North America (Stutchbury *et al* 2009) it decided to commence trials on medium-size waders. Ruddy Turnstone was the species selected because:

a) Relatively high recapture rates could be achieved due to small populations (<100) present in limited

locations and with birds exhibiting strong site fidelity (VWSG data).

b) An intensive banding study had revealed much about migratory stopover locations in Asia, but there had been no recoveries or flag sightings close enough to the possible breeding grounds to indicate where these were (Minton *et al.* 2006).

c) They are the most robust of the medium-size waders visiting Australia (the Starling *Sturnus vulgaris* of the wader world). Fat free birds typically weigh 90–100g.

## METHODS

Eight archival geolocators were obtained from British Antarctic Survey (BAS) in Cambridge, England. Two were Mk10 and six were Mk10-S. In the latter the light sensor was at the end of a stalk, intended to keep it above the feathers when mounted with a backpack harness.

Trials (see Results) indicated that the harness attachment method was not satisfactory once Ruddy Turnstones gained weight (up to 198g) prior to migration. The birds became so round – almost like a tennis ball – that the harness tended to slip down towards the rear, impeding leg movement and potentially dropping off completely when the legs were held up close to the body during flight.

Attachment of the geolocator to a plastic (PVC) leg flag, however, seemed acceptable to birds and this method was adopted. The leg flag was similar to those that have been used on waders in Australia for the last 20 years, and was placed on the opposite (left) tibia to the normal flag (which is engraved with an alphanumeric code in the case of Ruddy Turnstones).

The geolocator was attached with epoxy resin applied to one face of the flag, prior to catching birds, and then subsequently reinforced with a strong, durable thread (Kevlar®) after the flag had been placed on the bird (Fig.1). This cumbersome process was later eliminated for future deployments by a modified design allowing the Kevlar binding to be put on before catching (Fig.2).

The geolocators were switched on by BAS before supply and BAS also downloaded data from units later retrieved from birds. In future these operations will be done by the VWSG with the aid of an interface box supplied by BAS.

Ruddy Turnstones were captured with a cannon-net at high tide roosts or feeding locations on ocean shores. This is the main catching method used by the VWSG for the past 30 years, with annual wader catch totals varying between 5,000 and 13,000. Because Ruddy Turnstone catches are small, all birds are normally banded, processed and released within 1-2 hours, and this was the case for birds to which geolocators were attached.

## RESULTS

### Geolocator Attachment methods

It was originally intended to use the Rappole-Tipton style harness attachment employed by Stutchbury *et al* (2009) and others, including R. Klaassen (pers. comm.) on Redshank. Wooden dummy geolocators were placed on captured Ruddy Turnstones during fieldwork in South Australia during 12-17 March 2009. Birds were placed in keeping cages made of shade-cloth and were observed regularly for up to two hours. Harnesses with and without elasticated components were tested and birds generally appeared to be comfortable and to be moving normally. These birds mostly weighed 95-110g and had therefore only just started pre-migratory weight gain.

Further trials with Ruddy Turnstones on King Island, Tasmania, during 28 March to 2 April produced very different results. All birds seemed uncomfortable with the


**Figure 1.** Ruddy Turnstone 9Y with geolocator attached to leg flag and secured with Kevlar

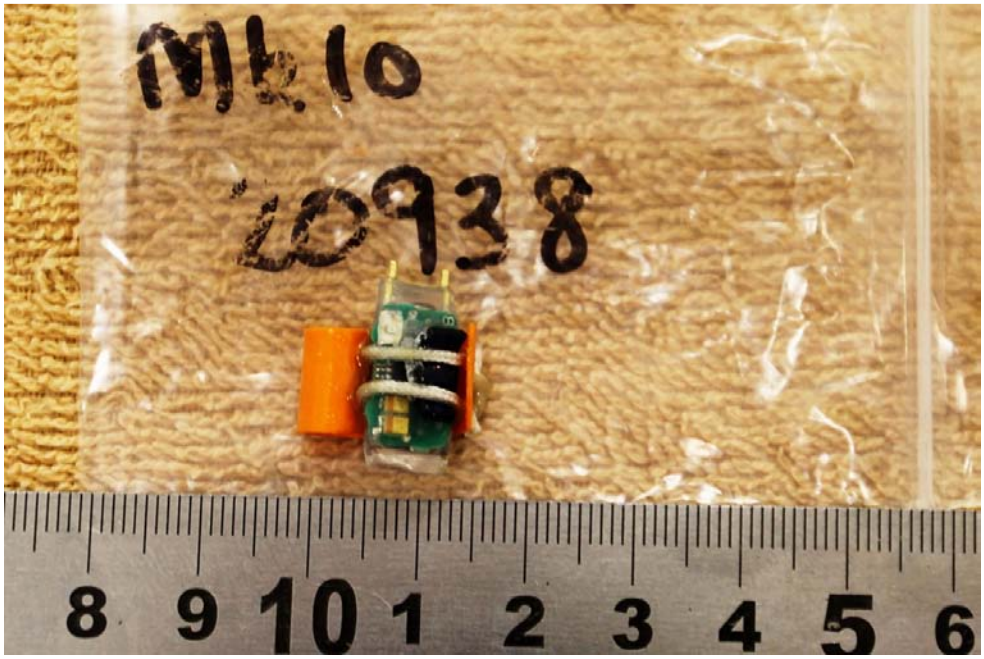



**Figure 2.** Modified design to be used in 2010 allowing attachment of geolocator to the leg flag prior to deployment in the field.

harnesses and had some difficulty in walking. Furthermore, it was possible to slide the harness off the rear of the bird if its feet were up as they would be in flight. Birds were noticeably fatter, mostly 140–180g (one 198g), and had no 'waist' to help hold the harness in place. Many were so round that the problem was likened to one of trying to put a harness on a tennis ball.

Trials then switched to a dummy geolocator glued onto the flap of a conventional leg flag. This seemed acceptable to the birds and of course eliminated any effects of profile changes related to migratory fat deposition. The flag height was increased from the usual 7mm to 11mm to cater for the geolocator being mounted vertically. The flag flap lengths were shorter (8mm) than normal as they only needed to be as wide as the geolocator. Slight profiling allowed the Kevlar securing thread to remain in place.

**Geolocator deployment and retrieval**

One Mk10 geolocator was deployed on a Ruddy Turnstone at Flinders on 8 April 2009; another Mk10 and four Mk10-S units were deployed on 21 April. All were put on adults and five out of the six were retraps which had been caught at Flinders previously; three were males and three females. Two further Mk10-S units were put on retraps at Carpenter Rocks, South Australia, on 23 April.

There was some concern that the light sensor stalks on the Mk10-S might hamper leg movement, even though the stalks were facing outwards, but this did not seem to be the case. The Mk10-S units had been requested when backpack attachment was envisaged and it was not possible to replace them with Mk10 units in the time available.

All Ruddy Turnstones had departed from Flinders by early May and the first returned birds were seen on 11 September 2009. The first two birds carrying geolocators were seen on 18 October and, by the time of the first catching attempt with a cannon-net on 20 October, three were present. At one stage all three were in the catching area but, the net could not be fired because of some Red-necked Stints *Calidris ruficollis* standing too close to the net, in the danger area. Seventeen Ruddy Turnstones were eventually caught but only one carried a geolocator. It took a further four catching attempts, in three of which the net was not even fired, before other geolocators were retrieved on 8 January 2010. Although only two birds with geolocators had been seen beforehand, three were caught. No further geolocator-carrying birds have been seen and neither of the two birds from South Australia have been seen again. All four of the turnstones from which geolocators were retrieved had had them fitted on 21 April 2009. Their leg flag codes (which are used to identify them throughout this paper) were ANB, APU, ANC and 9Y; APU was a female, the rest were males.

**Migratory movements**

The accuracy of locations derived from geolocators depends on a number of factors including season, latitude, weather conditions, attachment method and the behavior of the bird. To determine the likely location error, a calibration analysis was carried out on data gathered from birds at a known location. For ANC the variation in location when it was known to be at Flinders had a mean error of 244km, SD = 139, n = 27; for 9Y at Flinders the mean error was 262km, SD = 157, n = 6. This bird was also observed in Taiwan on 11 May 180km to the west of the fix provided by the geolocator. Taken together these results suggest that for the purpose of this study an accuracy of ±300km can be assumed. This is less accurate than reported by Phillips *et al.* 2004. Our data was calibrated from birds on the shore whose daily behavior is likely to include resting on one leg or feeding amongst mounds of seaweed, thus potentially

creating variability in apparent shading to the light sensor at the critical times of dusk and dawn. Errors in longitude values were approximately one third of the errors in latitude.

Data were processed using a fixed light threshold value and edited using BASTrak TransEdit software to reject false and noisy transitions caused by obvious shading. The chosen light threshold level corresponded to an average sun elevation angle of -3.5 degrees with the Flinders data. This was used to compute all location fixes with the BASTrak BirdTracker software (Fox, 2009). Information downloaded from the retrieved geolocators was initially plotted on Google Earth©; these maps displayed considerable noise at stopover sites and were simplified by plotting a single point representing the average position of such stopovers.

The first reported sighting of a geolocator bird was of 9Y, seen and photographed in Taiwan on 11 May by Huang Ming-Tang (Fig. 3). Many other Ruddy Turnstones marked in SE Australia were also seen in Taiwan in late April/May.

At the start of their northward migration all four turnstones made a non-stop flight of 7,600 km in six or seven days, from Flinders to Taiwan (Figs. 4-7). One left Flinders on 27 April and the other three on 4 May. The synchronous paths of the latter suggest they travelled in the same flock (Fig. 8).

All four birds followed similar, but not identical, paths towards breeding areas in NE Siberia after staging in Taiwan for 8, 14, 17 and 17 days respectively (Figs 4-7). One to three stops of 3-8 days duration were made as birds travelled north-north-eastwards a further 4,500–5,000 km across China and Korea to the north Sakhalin / Sea of Okhotsk / East Yakutia region in Siberia. There locations became indiscernible between 4 and 12 June as birds encountered continuous daylight.

The geolocator on one bird (9Y) started showing intermittent light and dark periods of around 7 hours per day on 26 June and these continued until 14 July, suggesting that nesting activity may have been occurring.

Locations were once again discernible from three of the four geolocators in late July or early August (Fig. 5-7) when night time darkness reappeared in the data. The fourth (ANB) had apparently failed by then and when this bird was recaptured at Flinders in October the light sensor stalk was missing. Both APU and ANC, which appear to have nested near the Yakutia coast, moved to the southeast at the start of southward migration, passing close to the Sea of Okotsk They then briefly visited the Amur region before their stalk-mounted light sensors ceased to function on 8 and 11 August in Korea and the Vladivostok region respectively. When recaptured at Flinders in January the stalks were still attached but their casings had been damaged and fatal sea water ingress had occurred.

**Figure 3.** Ruddy Turnstone 9Y photographed in Taiwan on 11 May 2009 after departing Flinders on 27 April (photo: Huang Ming-Tang).

Shortly after the location of 9Y was again discernible, on 26 July, it was in the Aleutian Islands off SW Alaska (Fig. 7). Light sensor recordings on 23 and 25 July indicate that the bird moved to the Aleutian Islands through NE Siberia. It remained in the Aleutians until 15 October and then flew non-stop for 6,200 km, in four days, to the Gilbert Islands in the central western Pacific. There it paused for a further six weeks before departing on 29 November on a 5,000 km flight, again achieved in four days, to the coast of E Australia. The bird arrived back at Flinders five days later, on 8 December. Its round trip migration covered 27,000 km rivalling the 29,000 km journey of the Bar-tailed Godwit E7 between Alaska and New Zealand (Gill *et al.* 2005). The return route is very close to a great circle route.

## DISCUSSION

The outstanding feature of these results is the unexpected return route through the Aleutian Islands off SW Alaska and the central Pacific used by one bird, 9Y. Its late arrival back in its non-breeding area (8 December) is also a surprise as VWSG banding/flagging/recapture/moult data all suggest that most adults have completed their southward migration by mid-November.

There is some previous evidence of movements by Ruddy Turnstones between the islands off SW Alaska and Australia. Extensive banding and colour marking of Ruddy Turnstones (18,500 birds) in the Pribiloff Islands in the mid 1960s (Thompson 1974) showed that the large numbers feeding there on slaughtered seal carcasses in July-September were mainly from the Chukotka breeding grounds. Most spent the winter on Pacific islands but three (out of 198 recoveries) reached the coast of E Australia, one in Queensland and two in New South Wales. Davidson & Gill (2008) refer to the potential importance of the Trans-Pacific Flyway for a small number of shorebird species including Ruddy Turnstone.

However there has only been one report from a Pacific island of an Australian-marked Ruddy Turnstone. This was a bird retrapped in Guam, Western Pacific, in early September 2008. In contrast, there are six other recoveries, 55 sightings of individually identifiable birds (from engraved leg flags) and 75 sightings of plain flagged Ruddy Turnstones in Asia during the late July to November southbound migration period. This suggests that the trans-Pacific return route followed by 9Y is not widely used by Ruddy Turnstone which spend the non-breeding season in Australia.

The distance travelled by 9Y on its apparently circuitous route on southward migration is little more than its northward migration through Asia (14,000 versus 13,000 km). There may be advantages if there are rich food supplies in the SW Alaska islands and periodic strong tail winds to assist migration as shown to be used by juvenile Sharp-tailed

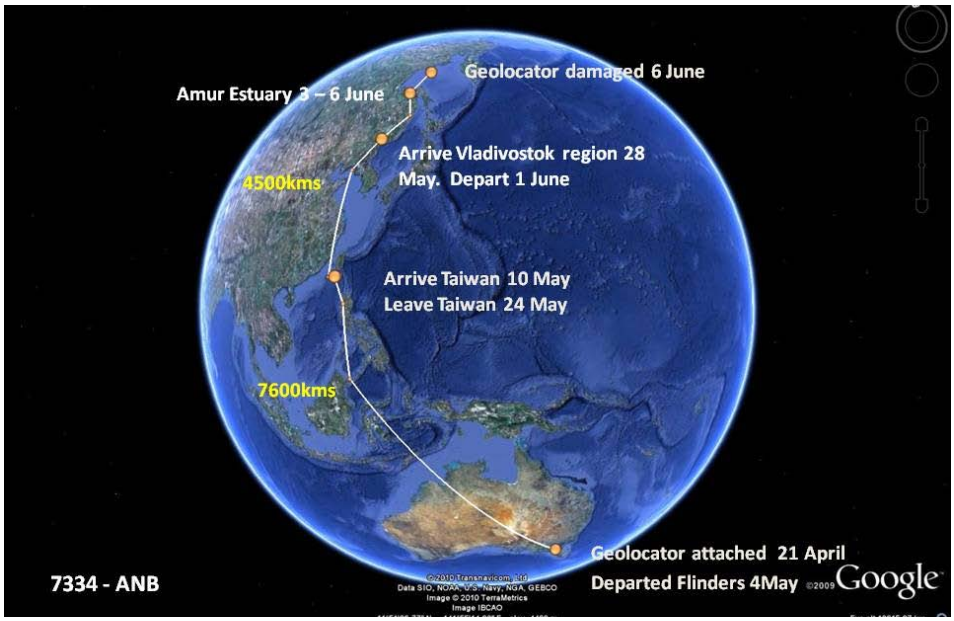



**Figure 4.** Migration route recorded by geolocator for Ruddy Turnstone with leg flag ANB.

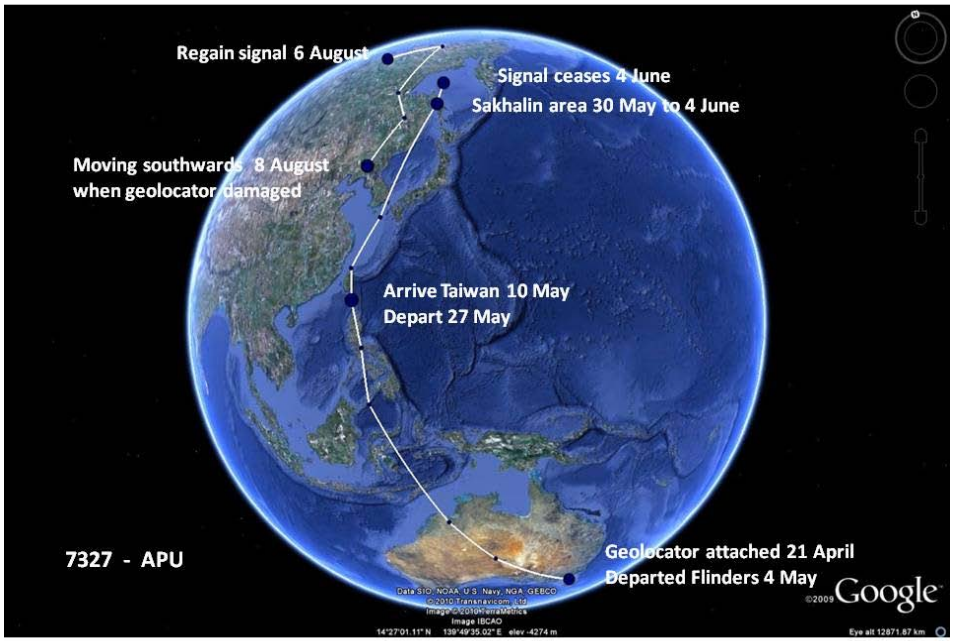
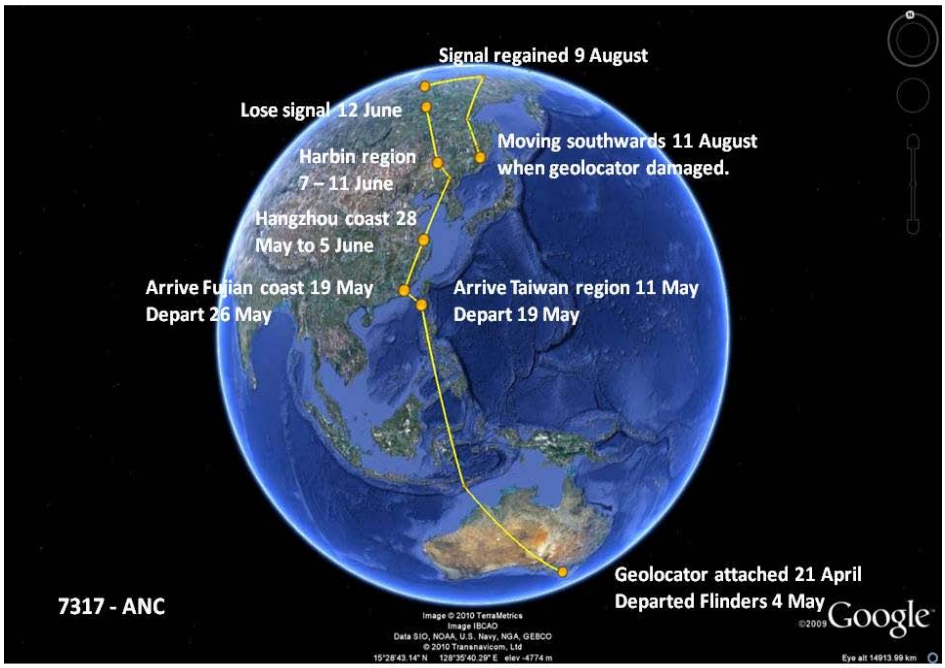



**Figure 5.** Migration route recorded by geolocator for Ruddy Turnstone with leg flag APU.

Sandpipers *Caldris acuminata* from Siberia and Bar-tailed Godwits from Alaska (Gill *et al.* 2009, Handel & Gill in press). However, the late return to the moulting/non-breeding area and the potentially more hazardous long sea-crossings would seem to be potential disadvantages. Future deployments of geolocators will reveal how regularly such return routes are used by Ruddy Turnstone with non-breeding areas in SE Australia.

Two of the other three Ruddy Turnstones (APU and ANC) appear to have initially moved east before starting on a return migration route through Asia, not dissimilar to that used on northward migration. There are many recoveries and flag sightings in Asia in the July/September period supporting such a route (Minton *et al.* 2006). Future studies using geolocators should reveal full details of southward migration routes.

Another conclusion from this trial is that Taiwan is an important stopover location during northward migration. This seemed to be the case from previous recoveries and flag sightings but that impression could have resulted simply from the intense activities of the Taiwan Wader Study Group. It is not clear at present why Taiwan should be so favoured by this species relative to other locations used by waders in the East Asian Australasian Flyway.




**Fiure 6.** Migration route recorded by geolocator for Ruddy Turnstone with leg flag ANC.

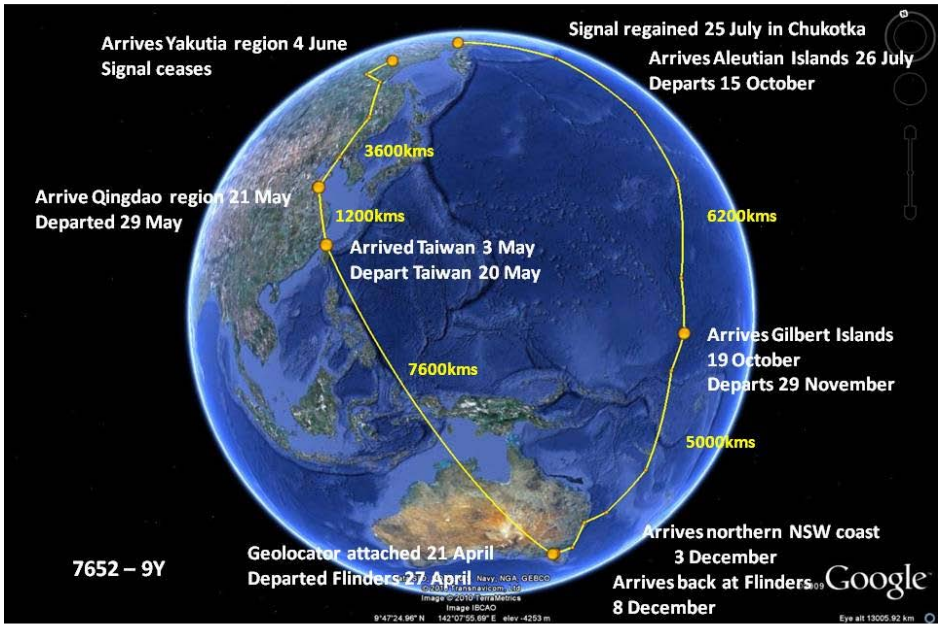



**Figure 7.** Migration route recorded by geolocator for Ruddy Turnstone with leg flag 9Y. This bird departed Flinders (Victoria) 27 April, 2009 and returned 8 December, 2009 after a journey of 27,000kms.

All four Ruddy Turnstones followed similar paths but used different northward migration strategies after their initial stopover in Taiwan. Shorter flights, with short stopovers between them, seem to be employed with no particular further preferred staging site. All birds appeared to be heading towards the breeding areas in Eastern Siberia. The data show it unlikely that any were aiming for breeding grounds in Alaska. 9Y, a male, which later staged in Aleutian Islands, was exhibiting nesting activity between 26 June and 14 July, which appears rather late for Alaska where the breeding season is generally earlier than in N Siberia (P. Tomkovich & R. Gill pers. comm.). There are sufficient data to show that this bird approached the Aleutian Islands from Siberia rather than Alaska.

Some of the longer flights recorded in this study afford the opportunity to calculate migratory flight speeds. For example the 7,600 km first leg of the northward migration appears to have been covered at an average ground speed of 50-55 kph. The 6,200 km flight from the Aleutian Islands to the Gilbert Islands averaged around 65 kph, which lends

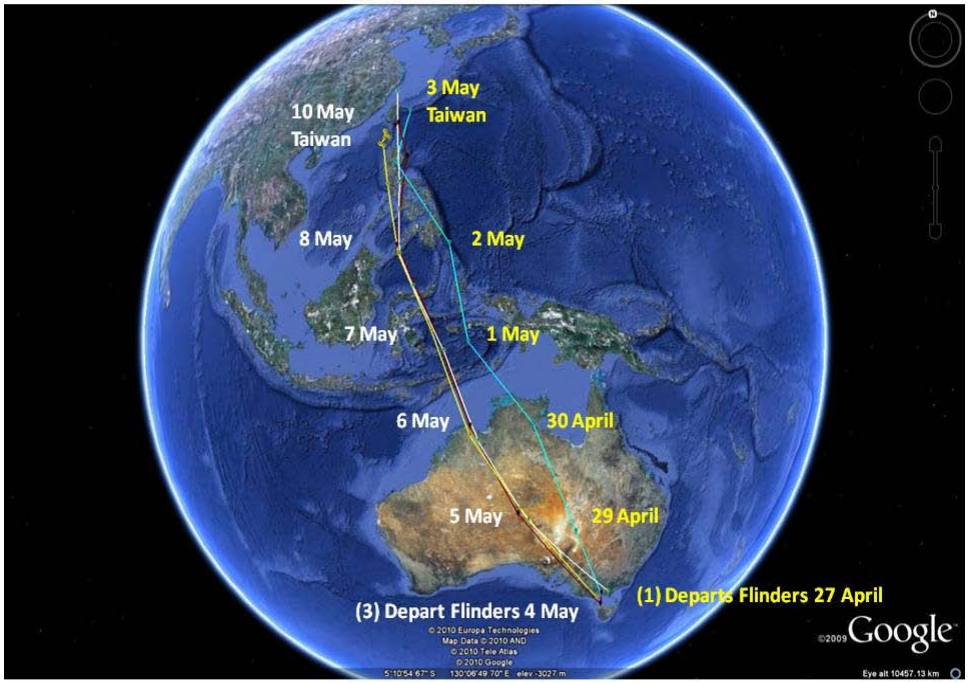



**Figure 8.** Migration routes of the four Ruddy Turnstones from Flinders (Victoria) to Taiwan.

support to the view that birds generally set off from Alaska when they have favourable tail winds (Gill *et al.* 2009). The 5,000 km onward flight to Australia seems to have averaged 50-55 kph. These speeds are similar to those reported previously for waders on long non-stop steps in their migration (Driscoll & Ueta 2002).

This trial on Ruddy Turnstones has confirmed the huge potential of geolocators to provide much greater insights into the migratory strategy of waders than previously obtainable from banding recoveries and flag sightings. Attachment of the Mk10 BAS geolocators via a plastic leg flag on the tibia seems to be acceptable for medium size waders and the geolocator appears to operate satisfactorily in that position. Not unexpectedly, geolocators with light sensors on stalks are not suitable for deployment using leg attachments on waders as they are probably damaged when birds walk through vegetation on the breeding grounds or during incubation.

As archival geolocator weights continue to be reduced (the latest BAS model Mk12 is only 0.75g), their deployment even on small waders seems a possibility. However, two practical difficulties remain: the inability to pinpoint breeding locations in the high Arctic precisely (due to continuous daylight) and the need to recapture birds to obtain the stored data (always difficult to achieve on waders).

### The future

The Victorian Wader Study Group plans to deploy a further 60 geolocators on Ruddy Turnstones at three locations in SE Australia in March/April 2010, with 30 additional geolocators to be applied to Greater Sandplover *Charadrius leschenaultii* at Broome in NW Australia (an Australasian Wader Studies Group / Deakin University joint project). Some will also be placed on Sharp-tailed Sandpipers at Werribee Sewage Farm in Victoria (a Marcel Klaassen, Deakin University project). The next few years should see some exciting developments in wader migration studies using geolocators.

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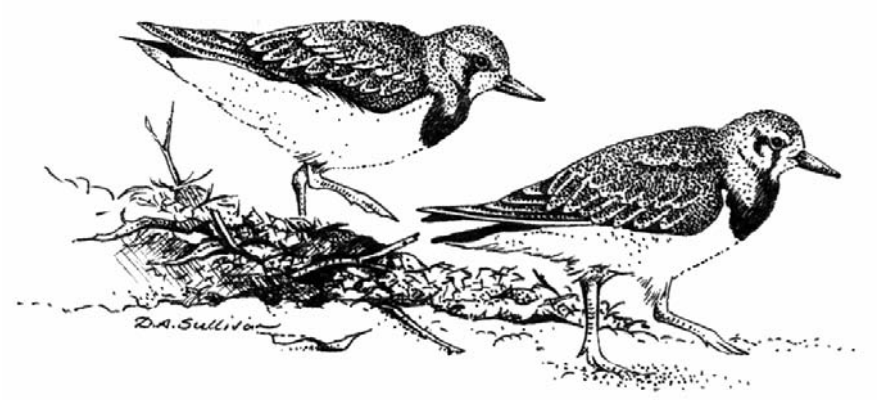

# THE ROLE OF NORTH-EAST COAST OF SAKHALIN FOR *CALIDRIS ALBA* (PALL.) ON ASIAN-AUSTRALASIAN FLYWAY

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Original data on quantity, dates of flights and location of stop-over sites of Sanderling *Calidris alba* in Sakhalin Island and continental coast of northern part of Tatar Strait are presented. The results of 20-years research show, that northeast Sakhalin and in particular Chayvo Gulf is a key area for Sanderling on the Asian-Australian migratory way. Information on timing of sightings of flagged birds from Australia and China are also presented.

## INTRODUCTION

Sanderling *Calidris alba* are a long distance migratory shorebird mostly inhabiting the seashore except during the breeding season. Information about the dispersal, population, duration of stay and migration routes of Sanderling inhabiting Far East of Russia is scant. We know that these waders normally appear in autumn in Primorye (Panov 1973; Polivanova & Glushchenko 1975; Labzyuk 1979; Glushchenko 1988) and on Sakhalin (Nechaev 1991; Nechaev 1998), and have been ocassionally reported on the Kuril Islands, in Kamchatka, Priamurye, near Magadan and in Chukotka (Nechaev 1969; Dorogoy 1997; Artyukhin *et al.* 2000; Babenko, 2000). We have managed to collect a considerable amount of new information about duration of stay, migration routes and other biological features of migratory Sanderling on Sakhalin and the continental coast of the Tatar Strait. The data presented in this article will considerably challenge the existing concept of the regions role in Sanderling migration on East Asian-Australasian flyway.

## METHODS

We observed Sanderling during migratory birds monitoring on the Okhotsk sea coast of North Sakhalin during spring and autumn migration in 1988-1991, 1999-2009 and on the continental coast of the Tatar Strait in 2001-2008. Most detailed research was conducted in the Chayvo Gulf in 2005-2008 where the Kleyye Strait (52°21' N, 143°11' E) connecting the Chayvo gulf with the Sea of Okhotsk is of special importance.

Migration of Sanderling was monitored from May to October. Dispersal and number of waders were determined on walkovers and vehicle rides. For monitoring purposes we counted all birds on the seaside and interpolated the data for the seaside area in kilometers. Certain parts of the seaside were also monitored and recorded with the help of 12X magnification binoculars.

Population dynamics was determined using waders score per day; the day with the maximum number of Sanderling recorded being assumed a transit peak. Some Sanderling stay together with Dunlin *Calidris alpina*, Red-necked Stint *C. ruficollis* and other wader species making records still more difficult. In such cases we counted the total number of waders and percentage ratio of species, whenever possible. The total number of migrants was determined by summing up birds recorded on different days. Regularity of Sanderling visits to a certain point of the seaside during transit period, total number of feeding and resting birds and duration of Sanderling accumulations were assumed to be an index of the area attractiveness for the birds.

## STUDY AREA

Sea gulfs of north-west and north-east Sakhalin are represented by vast shallow reservoirs of lagoon type up to 1.5-2 m deep. All gulfs are separated from sea by sand spits 10 m to 8 m wide. The gulfs are connected to the sea through narrow straits more than 5 m in depth. Due to partial desalination by coastal river waters seawater salinity reduces away from the entrances. The gulfs have muck and muck-sandy bottom. The shores are plain and low, with some steep parts up to 10-15 m high, peat-like in some points, but generally sandy or sand-muck.

Navigable Chikhachev Bay located on the continental coast of the Tatar Strait is bordered by high cliffy shore. There are bays with muck bottom and flows. In particular, large shallow Nevelskoy Bay near the Kamenny Cape has muck bottom and low coast.

Snow cover normally appears in the second or third week of October and stays by the middle of March. Fast ice and large ice floats stay in littoral by the middle of June. The snow and ice conditions as well as storms, snowstorms and frost to a great extent determine conditions for migrating Sanderling, their dispersal and numbers in May and June.

In 2001-2008 habitats of waders, including Sanderling, were considerably affected by technogenic factors, in particular shore line, sea bottom and littoral landscape changing by shelf plate development and shore facility construction by gas producing enterprises. During drilling operations, off-shore sub-sea and shore pipelining large amounts of original soil was replaced by foreign soils, so that space and mechanical structure of sea bottom and coast was changed dramatically. These transformations seem to have disturbed the original appearance of Sanderling habitat and reduced its effectiveness. The natural landscape was transformed on the coast of Piltun, Astokh, Chayvo Gulfs, at the Uangi Cape, at the Kamenny Cape in the Nevelskoy Bay and in the Chikhachev Bay.

## RESULTS

First Sanderling were noticed in the Chayvo Gulf on May 12-23, median was recorded on May 19 ($n$ = 8). Spring transit finished in the end of May (2005, 2008) or first decade of June (2006, 2007) (Table 1). 31-38% of the migrating birds were recorded in May, 62-69% of them recorded in June respectively.

Maximum number of Sanderling, over three thousands, was recorded in the period of spring migration in 2007. In the same season the transit period appeared to be the longest (24 days from May 16 to June 8, see Figure 1) and most intensive, with maximum records per day both in May (796 specimens on 30.05) and in June (1242 specimens on 2.06). In 2005 and 2008 Sanderling completed transit in May in 16 and 10 days respectively. The largest mono-species accumulations consisted of 300 (25 May 2008) to 400 (2 June 2007) birds.

Sanderling is one of the most numerous sandpiper species in the region during spring migration.

The number of mixed flocks was different depending on observation point and seasonal conditions. Normally feeding accumulations consisted of 150-300 birds with Sanderling making about 70 to 90% of the total number. Maximum number of birds (2500) in a poly-species accumulation (including 2000 Sanderling, 80%) was recorded on 30 May 2007 at the sea coast of the Chayvo Gulf.

In daytime during low tide Sanderling used elevations and the shore littoral zone for rest. In 2007 more than 50% of birds stopped for rest on near-shore ice fields and ridges because of the insufficient area of littoral free from ice (in other years we did not observe flocks resting on ice blocks). Sanderling were waiting for the moment when low tide moved ice floated off the coast to occupy sand littoral zone for feeding and rest. Regular pattern of high and low tide seems to directly influence the feeding time for sandpipers. When low tide falls on darkness hours, waders feed at night and continue migration at daytime because they can hardly find any place for resting and feeding during high tide.

We found several points of interest for a great number of Sanderling on the seaside of the Chayvo Gulf north spit and in the Kleyye Strait which connects the gulf to the sea. For the 20 years of observations location and attractiveness of the areas of shore changed slightly depending on ice cover, storms, surge, wind and technogenic effects (Figure 2).

Size of Sanderling flocks and duration of their stay for rest are also influenced by activity of birds of prey, especially falcons: Peregrine Falcon *Falco peregrinus*, Hobby *F. subbuteo* and Merlin *F. columbarius*. For the

**Table 1.** Number of Sanderling (individuals) and observation dates (in brackets) in the Chayvo Gulf area in 2005-2009 (poly-species flock Sanderling excluded).

| Year | Spring migrations | | | | | | |
|---|---|---|---|---|---|---|---|
| | Number | | | Max. per day | | Max accumulations, flocks | |
| | May | June | Total | May | June | May | June |
| 2005 | 262 (12-27) | _ | 262 | 111 (22.05) | _ | 40 (24.05) | _ |
| 2006 | 394 (18-31) | 879 (01-08) | 1273 | 175 (31.05) | 543 (06.06) | 120 (31.05) | 200 (06.06) |
| 2007 | 1213 (16-31) | 2026 (01-08) | 3239 | 796 (30.05) | 1242 (02.06) | 150 (30.05) | 400 (02.06) |
| 2008 | 2692 (20-30) | _ | 2692 | 756 (28.05) | _ | 300 (25.05) | _ |
| 2009 | 1050 (23-31) | 1657 (01-12) | 2707 | 453 (28.05) | 1124 (04.06) | 200 (31.05) | 350 (04.06) |
| | **Summer and autumn migrations** | | | | | | |
| | Number | | | Max. per day | | Max accumulations, flocks | |
| | Summer | Autumn | Total | Summer | Autumn | Summer | Autumn |
| 2005 | 1024 (13.07-31.08) | 224 (03.09-31.10) | 1248 | 252 (17.08) | 97 (03.09) | 100 (17.08) | 50 (21.10) |
| 2006 | 573 (31.07-31.08) | 116 (01.09-08.10) | 689 | 202 (13.08) | 47 (04.10) | 95 (13.08) | 30 (04.10) |
| 2007 | 1985 (18.07-28.08) | 97 (23.09-04.10) | 2082 | 552 (28.08) | 50 (04.10) | 300 (28.08) | 50 (04.10) |
| 2008 | 1195 (04-16.08) | _ | 1195 | 317 (07.08) | _ | 271 (06.08) | _ |
| 2009 | 383 20.07-31.08) | 1005 (01.09-06.09) | 1389 | 360 (07.08) | 324 (03.09) | 100 (07.08) | 60 (03.09) |

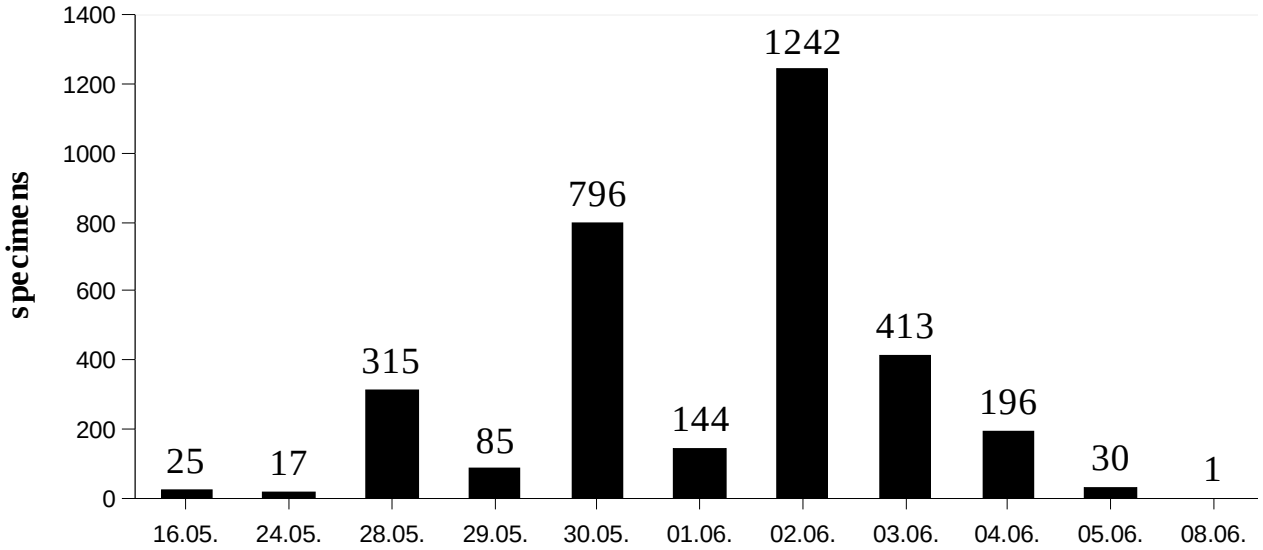


**Figure. 1**. Sanderling spring migration in the Chayvo gulf, 2007.

seven spring migration periods we managed to see 58 wader hunting episodes including 38 Peregrine Falcon episodes, 14 Hobby and six Merlin episodes. All of the falcon hunting efforts failed. There were no Sanderling among 13 waders species (n = 71) who died for various reasons (including varmint hunting) and were examined for many years of research.

The presence of falcons made birds move from one place to another more often and facilitated formation of large temporary wader flocks.

Return flights of Sanderling to the south start in July or the first 10 days of August. Some years ago transit started about July 7 to 13. Every season 82 to 95% Sanderling were recorded in July and August and 5-18% in September and October. Young birds appear in flocks in August. In a flock of 50 Sanderling observed on 21 August 2003 10% of birds were juveniles. The latest adult recorded on passage in the Chayvo Gulf was 27 August 2007.

The latest Sanderling left the Chayvo Gulf as soon as coastal and shallow parts of the gulf and littoral soils froze and night temperatures fell below –10°C. The earliest transit completion was recorded on October 4 and 8; the latest was on October 31 (Table 1). In September the number of Sanderling on the east coast of Sakhalin reduces compared with August, but in October a slight increase is recorded (Figure 3). In the northern hemisphere autumn months young Sanderling can make up to 100% of flocks. For instance, on 10 October 1999 we recorded flock of 800 young Sanderling having roosting on two sq m of the littoral zone after a night flight in a storm.

The maximum number of Sanderling, more than two thousands, was recorded during summer and autumn transit in 2007, and greatest number of Sanderling per day (552) was recorded in the same period, on August 28 (Figure 2). The largest mono-species accumulations of Sanderling consisted of 270 (6 August 2008), 300 (28 August 2007) and 800 (10 October 1999). Normally the maximum number of Sanderling recorded during a day is up to 100 birds in flocks of 20- 50.

As in spring, in autumn transit Sanderling were one of the most numerous wader species. In the Chayvo Gulf in 1999 Sanderling were co-dominant in the period from August 7 to 9 and dominated on August 19-20, September 21-28 and October 2-15 (Blokhin & Kokorin 2002).

In the spring migration period Sanderling were noticed on Sakhalin at the coast of the Aniva, Mordvinov and Terpeniya Bays in the south (Nechaev 1991; Nechaev 1998), in the Chayvo and Odoptu Gulfs in the north, and in the mouth of the Lakh River on the north-west coast (Figure 4). We saw one Sanderling on the Piltun Gulf shore on June 16 (2007). The species was not found on the continental coast of the Tatar Strait in spring.

In the period of summer and autumn migrations Sanderling can be found over a wider geographic area. The birds were recorded in the Aniva and Terpeniya Bays in the south (Nechaev 1991); along the east coast of the island in the north; in the Baikal Gulf, near Golovachev and Uangi Capes on the west coast; and in the Chikhachev Bay and near Kamenny Cape on the continental coast (Table 2).

Thus, Sanderling can be found much more frequently in the post-nesting period than in spring, and their population and duration of stay on certain seaside grounds increase. According to our observational data some Sanderling flocks can stay at the seaside for 7-10 days or more moving within the limits of, say, the Chayvo Gulf and the nearest sea shore.

The first two Sanderling with color flags on the legs were seen on the sea shore in the Chayvo Gulf in 2000. In other observation points no ringed Sanderling were recorded. Over time the researchers gained information about wader gathering locations and experience in searching for ringed/banded birds, which helped to find more tagged specimens. In total 108 flagged Sanderling were recorded from 2000 through to 2009. The largest number of flagged Sanderling (37) was seen in 2007. Sanderling with color flags were observed from May to August, i.e. in the period of adult bird migration. The earliest flagged Sanderling was recorded on May 22 (Figure 5). Summer and autumn migration period is July 20 through August 27 (Figure 6).

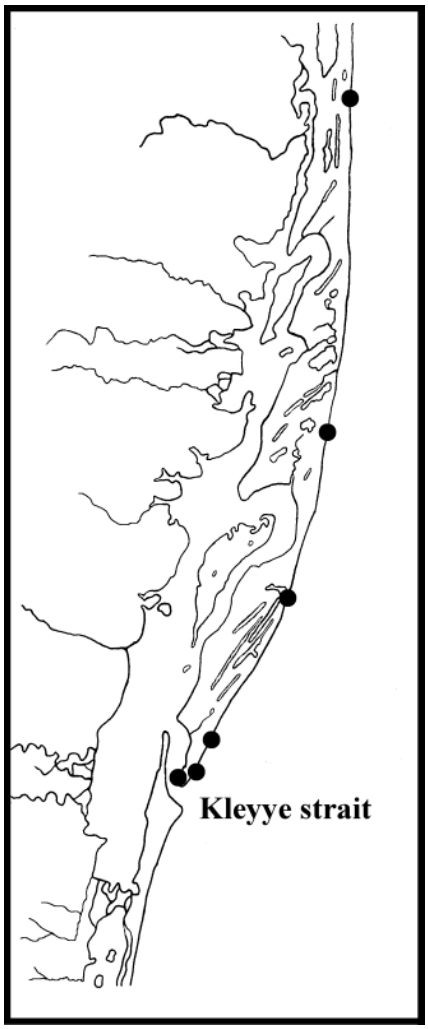


**Figure 2**. Outline map of the Chayvo Gulf. Shore areas most attractive for Sanderling are marked with dots.

47% flagged Sanderling (51 birds) were met in spring transit period, 12 % (13 birds) in July, 41% (44 birds) were recorded in August. In September and October, young bird migration time, no flagged Sanderling were noticed.

Recorded Sanderling were banded in China (2 records) and Australia (106 records), including South Australia (76 birds), Victoria (16 birds) and north part of Western Australia (14 birds) (Figure 7). Length of flight from Sanderling banding locations in South Australia to record point on Sakhalin is more than 10,050 – 10,090 km. Distances from north-west Australia and China to Sakhalin record points are over 8,220 km and about 2,900 km respectively.

Sanderling with flags of different colors was noticed at the same period of time, often in the same flock. Up to 1-8 banded birds were recorded in a flock. For instance, on 06 June 2006 five birds with color flags were noticed in a flock of 200 Sanderling (two of them were banded in South Australia, two in north-west Australia and one in Victoria). Eight flagged birds were noticed in a flock of 80 Sanderling on 19 August 2007, where four were banded in South Australia, one in Victoria, one in north-west Australia and two in China.

Some of the caught birds were banded one or two years ago, one Sanderling caught on 24 August 2007 was banded 10 years ago (on 19 January 1998) in Australia. Median age of the caught birds (n=16) was four years.

## DISCUSSION

The number of Sanderling inhabiting East Asian-Australasian flyway is estimated at the level 22 thousand (Bamford *et al*. 2008). Adult birds migrate annually from wintering areas in Australia to nesting areas somewhere on the New Siberian Islands (Higgins & Davies 1996; Minton *et al*. 2006). Stops for the largest number of birds on their migration route are known to be located in China, South Korea and Japan (Brazil 1990; Barter 2002; Bamford *et al.* 2008). The latest summary of waders accumulation points on East Asian-Australasian flyway in the Russian Far East states 60 as the maximum number of Sanderling recorded in the north of Sakhalin (Bamford *et al.* 2008). In fact, Sanderling accumulations in the Russian Far East have been

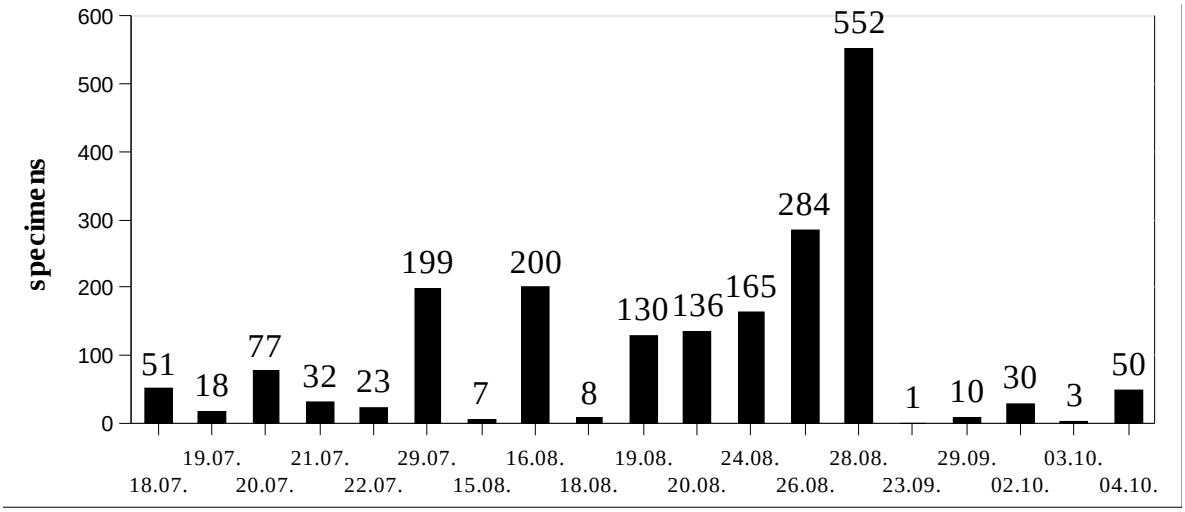


**Figure 3**. Sanderling summer and autumn migration in the Chayvo Gulf, 2007.

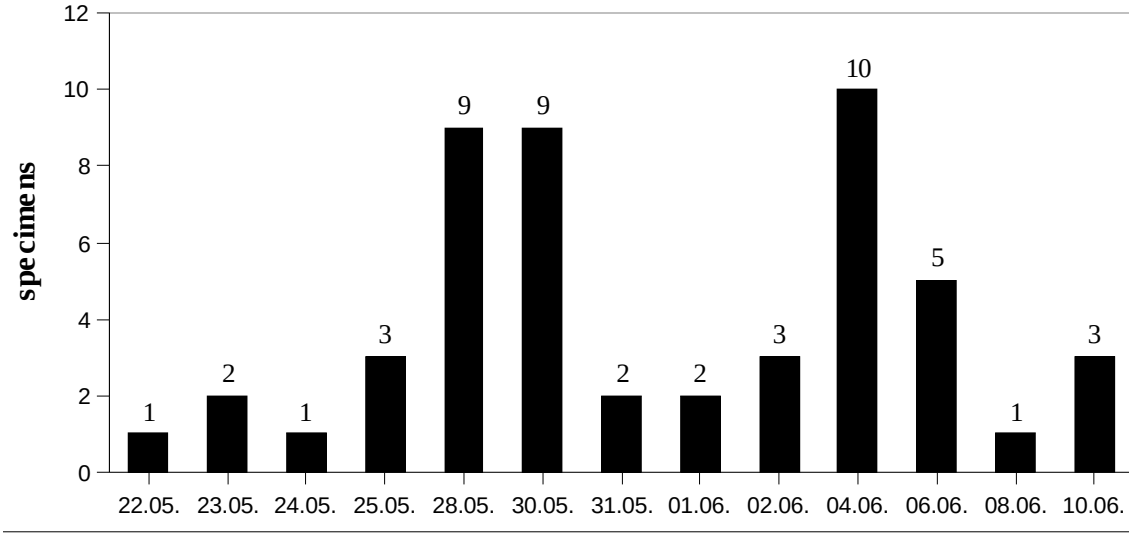


**Figure 4**. Number of colour flagged Sanderling seen during spring migrations in 2000-2009.

**Table 2.** Observation points and number of Sanderling in research areas other than the Chayvo Gulf.

| Point | Coordinate | Data | Number |
|---|---|---|---|
| **North-east coast of Sakhalin Island** | | | |
| Tropto Gulf | 53°52' N; 142°53' E | 27.08.2006 | 30 |
| | 53°24' N; 143°09' E | 20.05.2009 | 21 |
| | 53°24' N; 143°09' E | 08-11.07.2009 | 70 |
| Odoptu Gulf | 53°24' N; 143°09' E | 07.08.2009 | 360 |
| | 53°24' N; 143°09' E | 23-30.08.2009 | 9 |
| | 53°24' N; 143°09' E | 09-10.09.2009 | 2 |
| | 53°05' N; 143°15' E | 27.07.2002 | 12 |
| | 53°06 N; 143°17' E | 16.06.2007 | 1 |
| Piltun Gulf | 53°05' N; 143°15' E | 11-17.07.2007 | 420 |
| | 52°58' N; 143°18' E | 18.08.2008 | 6 |
| | 53°17' N; 143°09' E | 08.10.2008 | 9 |
| | 52°54' N; 143°19' E | 05.08.2009 | 47 |
| Astokh Gulf | 52°43' N; 143°18' E | 24.07.2003 | 159 |
| | 52°08' N; 143°07' E | 31.07.2007 | 50 |
| Nyyskiy Gulf | 52°08' N; 143°07' E | 13.10.2007 | 9 |
| | 52°08' N; 143°07' E | 16.07.2009 | 100 |
| Lunskiy Gulf | 51°10' N; 143°30' E | 18.07.2003 | 8 |
| **North-west coast of Sakhalin Island** | | | |
| Baikal Gulf | 51°10' N; 143°30' E | 26.08.2008 | 12 |
| Cape Uanga | 52°06' N; 141°38' E | 25-26.09.2004 | 11 |
| | 52°06' N; 141°38' E | 08-09.08.2007 | 46 |
| Cape Lakh | 51°56' N; 141°40' E | 28-29.05.2008 | 361 |
| **Continental coast of Tatar Strait** | | | |
| Chikhachev Bay | 51°25' N; 140°48' E | 13.10.2008 | 1 |
| Cape Kamenniy | 52°03' N; 141°20' E | 08-15.07.2006 | 1012 |

recently reported to consist of up to 200 birds in Primorye and on Sakhalin (Polivanova & Glushchenko 1975; Glushchenko 1988; Nechaev 1991).

Our research detected local mono-species accumulations of up to 400 Sanderling in spring and up to 800 birds on their return flight to the south. Single day recordings in the Chayvo Gulf amounted to 1200 in spring and 550 in post-nesting migration period. These figures rank the Chayvo Gulf among the largest accumulation points for the subject species presently known on East Asian – Australasian flyway. This means that north-east Sakhalin, in particular the Chayvo Gulf, is a key ground for Sanderling on the flyway. Based on our observations and reference data we can suggest that continental coast of the Tatar Strait, north, west and south Sakhalin are poor resting and feeding grounds for Sanderling. Few Sanderling are known to stay in spring near Vladivostok (Omelko 1971), almost none of them stay in any other points. Therefore north-east Sakhalin is the principal area of Sanderling regular spring stops in the south of the Russian Far East. According to annual changes in the number of birds and duration of their stay, in spring most of the birds proceed northwards along the Far East coast without a stop (probably due to lack of proper resting grounds).

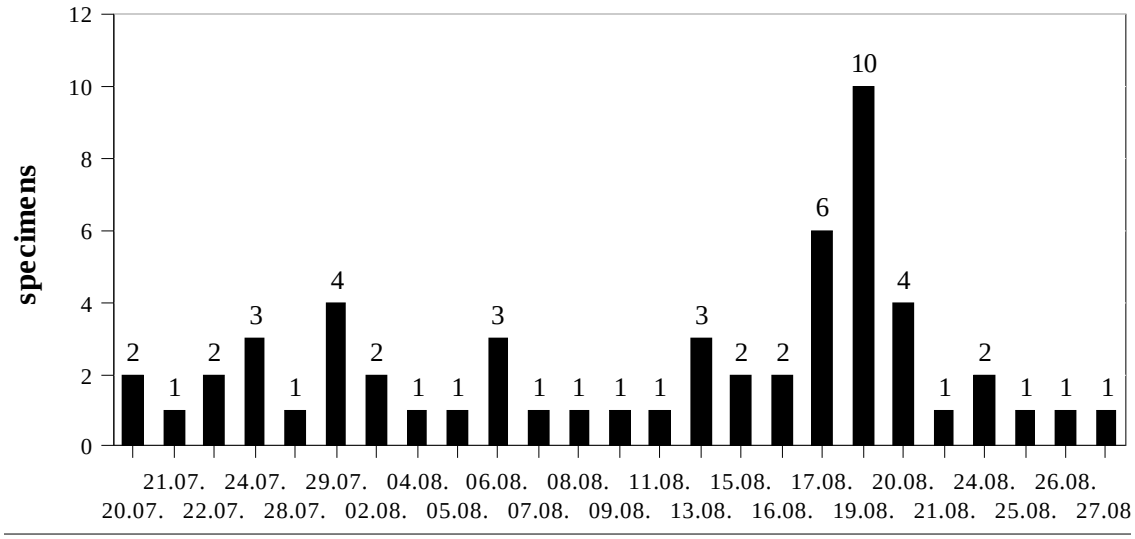


**Figure 5**. Number of colour flagged Sanderling seen during summer and autumn migrations in 2000-2009.

In the period of summer and autumn migration Sanderling stay on a larger area including gulfs of the north-east Sakhalin, the Nevelskoy Bay on continental coast of the Tatar Strait and other gulfs and river estuaries in the south of the Far East.

Unfortunately, we have not contacted ringing center in China to learn whether the birds we recorded belong to the population wintering in China or they were ringed on the flyway.

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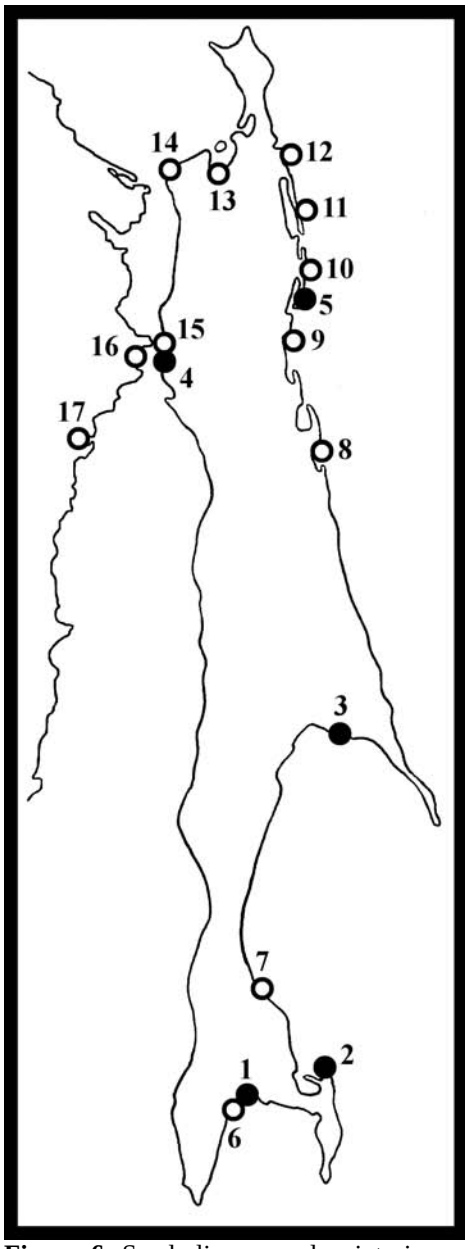


**Figure 6**. Sanderling record points in spring (shaded) and summer-autumn (non-shaded) migration on the Sakhalin Island and continental coast of the north Tatar Strait: 1 — the Aniva Bay (the Lososey Bay and mouth of the Lyutoga River); 2 — the Mordvinov Bay (Svobodny Cape; 3 — the Terpeniya Bay (mouth of the Vladimirovka River); 4 — mouth of the Lakh River; 5 — the Chayvo Gulf; 6 — the Aniva Bay (the Lososey Bay); 7 — the Terpeniya Bay (mouth of the Nayba River); 8 — the Lunsky Bay; 9 — the Dagi Gulf; 10 — the Astokh Gulf; 11 — the Piltun Gulf; 12 — the Odoptu Gulf; 13 — the Baikal Gulf; 14 — the Sakhalinsky Bay (Golovachev Cape); 15 — mouth of the Uanga River; 16 — Kamenny Cape; 17 — the Chikhacheva Bay.

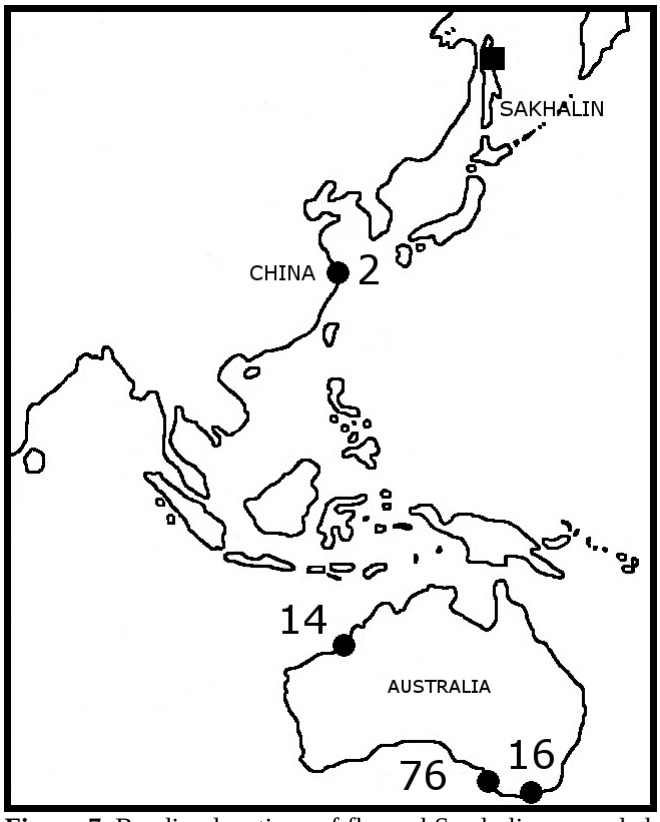


**Figure 7**. Banding locations of flagged Sanderling recorded in the north-east of Sakhalin (16 Victoria, 76 south-east of South Australia, 14 Broome/80 Mile Beach, 2 from China).

# RECORD NUMBERS OF GRASSHOPPER-EATING SHOREBIRDS (ORIENTAL PRATINCOLE, ORIENTAL PLOVER, LITTLE CURLEW) ON COASTAL WEST-KIMBERLEY GRASSLANDS, WESTERN AUSTRALIA IN MID FEBRUARY 2010

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During field work on Eighty-Mile for the Global Flyway Network's colour-banding project between February 11th and 13th 2010 we encountered big numbers of Oriental Pratincoles *Glareola maldivarum* 519,400, Oriental Plovers *Charadrius veredus* 144,300 and Little Curlew *Numenius minutus* 14,200 (see Figure 1). These three species feed on the open grass plains of the adjacent Anna Plains Pastoral Lease and move to roost on the beach during the heat of the day.

They roost in with the marine shorebirds at high tide. However as the tide recedes and the marine birds resume feeding on the mudflats the pratincoles, plovers and Little Curlews remain on the damp sand left by the receding tide and this allows them to be counted some 3 to 4 hours after the high tide peak. We counted a 75km section of the beach on February 11th. One observer (TP) counted pratincoles and plovers by the 100s with the naked eye using a handheld counter as the vehicle steadily drove on at 30-50 km/h. Very regularly the car was stopped to ascertain that the Oriental Plovers were being accurately distinguished from the somewhat greyer marine shorebirds. After every 5 km interval, the accumulated numbers on the counter were recorded. On February 13th we repeated the process along a 45km section of the same area of beach as on the 11th but this time focused on Pratincoles and Little Curlew. The birds seemed to choose roosting areas on the beach in relation to the width of the beach at high tide not in relation to the area of grassland available to them close by or its closeness to the beach. Therefore, just like shorebirds using inter-tidal flats to forage and beaches to roost, these grassland species thus seemed to try and avoid the proximity of vertical landscape features from which raptors can launch surprise attacks (e.g. Rogers *et al*. 2006, van den Hout *et al*. 2008).

In the evenings we searched the grass plains in close proximity to the Anna plains Homestead and witnessed thousands of Oriental Pratincoles. Oriental Plovers and Little Curlew were in small numbers in this area of grassland. All species seemed to be feeding by running and grabbing small grasshoppers in the vegetation.

On our return to Broome on the evening of February 13th we crossed an area of grassland called Roebuck Plains and here we witnessed up to 60,000 Oriental Pratincoles in huge

**Figure 1**. Huge numbers of Oriental Pratincole on 80 Mile Beach, Western Australia. (Image: C Hassell)

Figure 2. Grasshoppers covering the road that dissects Roebuck Plains, near Broome, Western Australia. (Image: T Piersma)

swirling flocks of up to 25,000 birds. Plovers and Little Curlew were conspicuous by their absence.

This is very likely an underestimate of the total numbers using the Roebuck Plains as we could only see a relatively small area of suitable habitat available to the birds.

On the ground we found concentrations of 5-8 dry droppings (ca. 1-2 cm long, 8 mm diameter) containing the pinkish remains ground-up arthropods, each spot separated from another by 40-70 cm. We interpreted these little dung-piles as each representing a roosting Oriental Pratincole but we were unsure if this was from during the day, or at night.

Our count of half a million Oriental Pratincole would have raised eyebrows prior to February 2004 when a count of 2.88 million Oriental Pratincoles was recorded by Sitters *et al*. (2004), but due to that extraordinary count we now know that half a million Oriental Pratincoles is a quite expected count when conditions are such that the birds at midday concentrate at Eighty Mile Beach where counts can be conducted. Had we had time and access to a small plane, it is possible that we may have found many more. The count of Oriental Plovers doubles the previous estimate of the world population of 70,000 (Bamford *et al.* 2008). This is not surprising given that they use the grassland habitats and cool midday beach-roosting option as do Oriental Pratincole and the 2004 'pratincole-event' multiplied that population by a factor of 38! It is interesting to note that we saw fewer than 10 Oriental Plovers amongst the 60,000 Oriental Pratincoles on Roebuck Plains. The count of Little Curlew represents 8% of an estimated world population of 180,000 (Delany & Scott 2006), but is not unique for the Anna Plains/Eighty Mile Beach where 12,000 were counted on 31 March 1985 (Jaensch 1989).

In view of the large densities of small and medium grasshoppers (as illustrated in Fig. 2), both at the Anna Plains grasslands and at the Roebuck Plains, would explain the fact that many grasshopper-eaters congregated in the West-Kimberley in February 2010. Grasshoppers do not occur in these densities every wet season (pers. obs.) and the factors driving this seasons abundance is unknown. The Yellow-winged Grasshoppers that were so abundant during the 2004 event at Anna Plains were relatively uncommon this year.

In conclusion, our new chance encounters with the grasshoppers and the grasshopper-eating shorebirds have taught us that. (1) That the number of Oriental Plovers counted at Eighty Mile Beach in February doubles the current population size estimate, suggesting that such records can easily be broken again. (2) This is unlikely to be due to increasing population size, but rather to limited observer efforts — during appropriate times of the year and in years with appropriate rainfall patterns— of species that by their very nature (are nomadic, have a group-living lifestyle and easily disappear from sight in their preferred habitats) are hard to count.

## ACKNOWLEDGEMENTS

The trip to Anna Plains/Eighty Mile Beach was made in the pleasant company of Petra de Goeij, Claire and Grant Morton and Liz Rosenberg, and all contributed to the observations reported here. In addition, Adrian Boyle, Nik Ward and Mary Pfaffko joined trips to the Roebuck Plains and helped locating the widely dispersed flocks. Brian Hanich and Terry Houston of The Western Australia Museum kindly made identifications of the grasshoppers on

the basis of photographs. Adrian Boyle and Liz Rosenberg kindly made photos available, and Broome Bird Observatory a congenial platform for the writing of this note. We thank John, David and Helen Stoate for their great hospitality at Anna Plains Station, and Doug Miller of Roebuck Plains Station for permission to access the paddocks.

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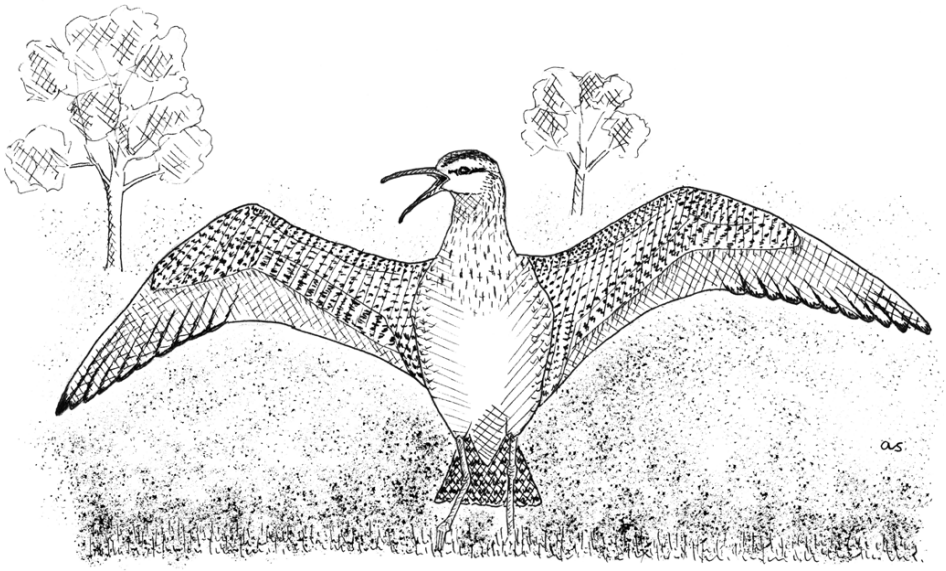

# RECENT INTERESTING SIGHTINGS OF SHOREBIRDS IN SOUTHERN SUMATRA, INDONESIA

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During a short survey of an oil palm plantation in the Ogan Komering Ilir District of South Sumatra Province from 24-28 September 2009, three interesting shorebirds sightings were recorded at the settling ponds of the estate's processing mill. The shorebirds recorded were the Little Ringed Plover *Charadrius dubius*, Wood Sandpiper *Tringa glareola*, and Curlew Sandpiper *Calidris ferruginea*. The habitat surrounding the plantation is not typical shorebird habitat. The occurrence of these three shorebirds in the location and habitat described make these significantly interesting records for Southern Sumatra. This paper discusses the significance of these records. More surveys of inland and freshwater wetland habitats as well as artificial habitats of this type are required to assess the true abundance of these shorebird species in Sumatra.

## INTRODUCTION

Six main natural wetland habitat types have been identified in Southern Sumatra: coastal waters, mudflats, mangroves, inland swamps, swamp forests and lebaks (Verheugt *et al.* 1993). The coastal area of the South Sumatra Province rank as one of the most important stop-over sites for shorebird in the East Asian-Australasian flyway (Danielsen & Verheugt 1990). Other wetland habitats provide additional shorebird habitat. A few shorebird species are not typically observed in intertidal mudflats, and so have received poor coverage in wader surveys conducted in northern and southern Sumatra.

## METHODS

Between 24-28 September 2009, a survey of remnant wetland habitat areas at an oil palm plantation was made in three areas of Wilmar International's estate located in the Ogan Komering Ilir District of South Sumatra Province. The three main survey areas were Burnai Timur, Burnai Barat and Bambu Kuning (Figure 1). During this survey, incidental observations of shorebirds were made in settling ponds in Burnai Timur (S $03.62191^0$ E $104.86839^0$) (Figure 2). All shorebirds observed were documented.

## RESULTS AND DISCUSSION

In total, four shorebird species were recorded during the surveys. There were three unusual sightings of shorebird species in a settling pond at the palm oil plantation in the Wilmar International's estate located in the Ogan Komering Ilir District. The shorebirds recorded were the Little Ringed Plover *Charadrius dubius*, Wood Sandpiper *Tringa glareola*, and Curlew Sandpiper *Calidris ferruginea*.

### Little Ringed Plover *Charadrius dubius*

A pair of Little Ringed Plover was observed in settling pond of palm oil in Burnai Timur on 24 September 2009 (Figure 3). The occurrence of this migratory shorebird in an oil palm plantation is very surprising. The Little Ringed Plover was first recorded in South Sumatra in 1918 (Marle & Voous 1988), and absent from records of intensive shorebird surveys in the lowland and east coast of South Sumatra province between 1984-1989 (Silvius 1988; Danielsen & Skov 1989; Verheugt *et al.* 1990; Verheugt *et al.* 1993). This is the first record for the South Sumatra province for 82 years (Nash & Nash 1985a; Nash & Nash 1985b; Marle & Voous 1988; Holmes 1996; Iqbal 2005; Iqbal 2006). In Lampung province of Southern Sumatra, Little Ringed Plover are listed in Way Kambas National Park without details (Milton 1985; Parrot & Andrew 1996) and were reported from Metro on 11 August 1976 (Marle & Voous 1988).

There are some more recent records from northern Sumatra, in Aceh on November-December 1995 with maximum count 123 birds (Crossland 2000), in Batam Island eight birds on 28 December 2001 and two bird on September 2002 (Crossland 2005) and 14 birds on the east coast of Aceh on 30 December 2008 (Iqbal *Pers. Obs*). Crossland *et al.* (2006) stated that this bird is relatively common in Aceh area of the north-east, but generally scarce elsewhere.

### Wood Sandpiper *Tringa glareola*

A flock of approximately 100 individuals was recorded in a settling pond at the palm oil plantation mill at Burnai Timur on 25 December 2009 (Figures 4 & 5). This large number of Wood Sandpipers was surprising, as this species usually occurs in small flocks. During a survey in 1986, Silvius (1988) recorded a total of 27 Wood Sandpipers in Jambi and South Sumatra Provinces. Marle & Voous (1988) reported flocks of up to 20 in Sumatra. This record is thought to be the largest congregation of this species known for Sumatra.

The Wood Sandpiper is not typically a species of intertidal mudflats so it has received poor coverage in wader surveys conducted in north and south Sumatra. The species was absent from recent shorebird surveys in the east coast of Northern Sumatra (Crossland 2000; Crossland & Sinambela 2005; Crossland *et al.* 2006; Crossland *et al.* 2009). Mackinnon *et al.* (1998) state that this species is common and widespread in the Greater Sundas. Holmes & Nash (1990) list this as one of the common waders inland in Sumatra and Kalimantan, while Parrot & Andrew (1996) report it as common in agricultural land surrounding Way Kambas National Park, Lampung province. More surveys of rice field and freshwater wetland habitats are required before the true abundance of this species in Sumatra can be assessed (Crossland *et al.* 2006).

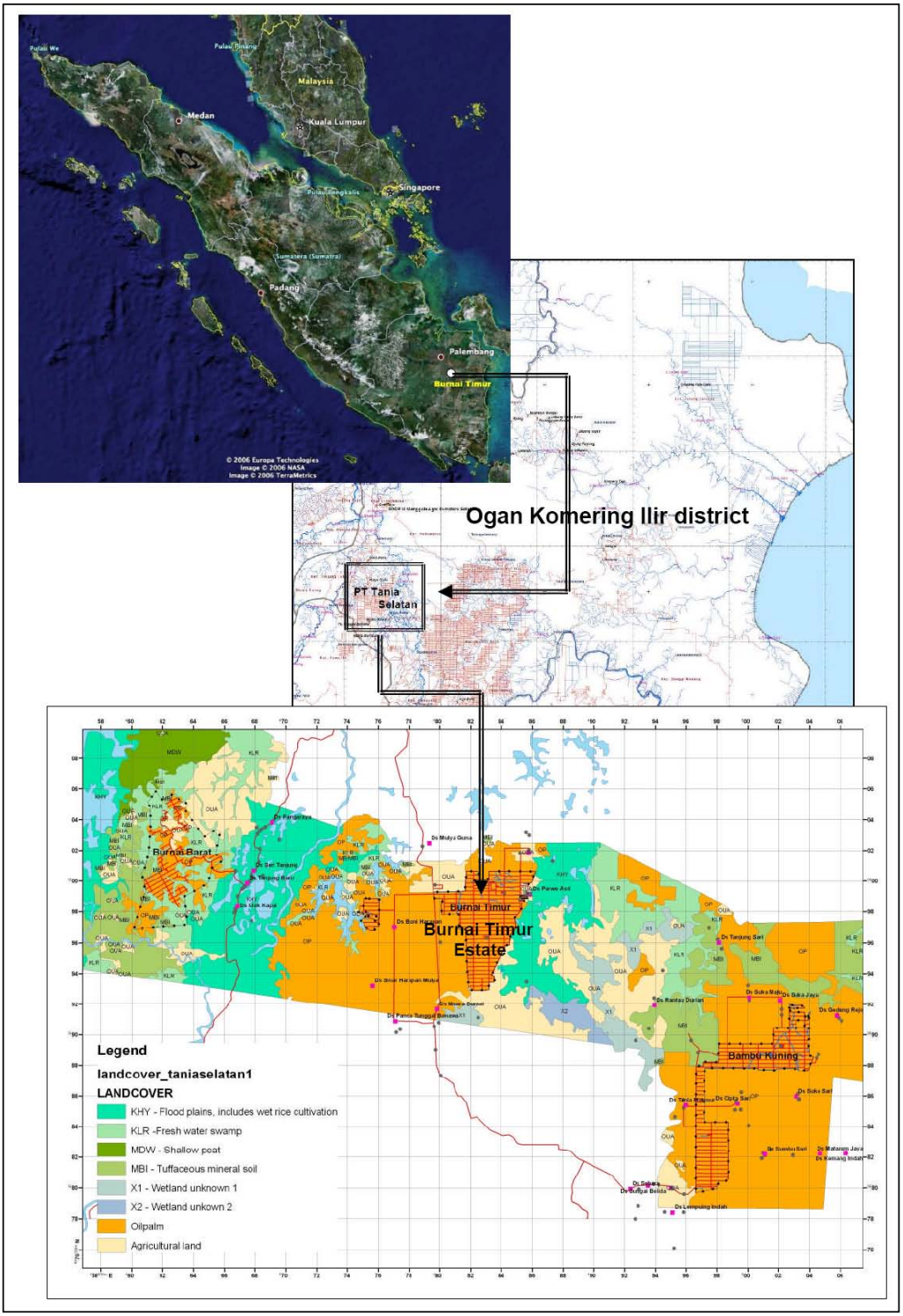


**Figure 1.** Map showing the three main survey areas were Burnai Timur, Burnai Barat and Bambu Kuning

**Curlew Sandpiper *Calidris ferruginea***

One Curlew Sandpiper was observed on 24 September in settling pond at Burnai Timur. Curlew Sandpiper is locally common in flocks on mudflats along the coast of Sumatra (Marle & Voous 1988). This is a new inland record for this species in Sumatra. The furthest inland record for this species in South Sumatra is currently in the rice fields at Delta Upang, about 25 km inland. However, the Curlew Sandpiper recorded in our recent survey of the plantation at Burmai Timur were about 100 km inland from the coast. This is most likely the furthest inland record for this species for South Sumatra, and possibly even Sumatra.

**Figure 2.** Settling ponds in a palm oil plantation in Burnai Timur, southern Sumatra.

**Figure 3.** A pair of Little Ringed Plover in a settling pond in the palm oil plantation in Burnai Timur.

## CONCLUSIONS

The observation of three shorebirds species above during a short survey in the settling ponds of palm oil plantation mill is interesting. Many wetland habitats and forests in Sumatra were converted as palm oil plantation. Monoculture plantations like this tend to have very low avian diversity, however, they may provide attractive staging habitat for migratory shorebirds, including the species described here.

In our survey area, the artificial settling ponds were attractive to migratory shorebirds as they provided feeding and roosting habitat. There is no other published information that provides evidence for the importance of palm oil plantation settling ponds for shorebirds, despite there being many palm oil plantations in Sumatra. It seems that if managed well, monoculture palm plantations could potentially provide habitat and therefore support the survival of key shorebird species. It is clear that further work is needed to determine the importance of these artificial habitats for migratory shorebird species in Sumatra.

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**Figure 4.** A flock of about100 Wood Sandpipers in flight, in a palm oil plantation in Burnai Timur, southern Sumatra.

**Figure 5.** A flock of about 100 Wood Sandpipers foraging in a settling pond in Burnai Timur.

# NOTES ON THE WINTERING WADERS AT NORTH-EASTERN TIP OF SUMATRA (ACEH PROVINCE), INDONESIA

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Thirteen waders species were recorded wintering at eight selected coastal wetlands at the north-eastern tip of Sumatra (Aceh province) in 29 December 2008-1 January 2009. A maximum of 716 waders were counted in the study area with a new record for the island and Greater Sunda region (Western Indonesia: Sumatra, Kalimantan, Java and Bali), Grey-headed Lapwing *Vanellus cinereus*.

## INTRODUCTION

The coastal of northern tip of Sumatra is located in Indonesia special territory of Aceh province. Many coastal wetlands in Aceh province have been affected by the large inflow of salt-water and wreckage during the Tsunami 26 December 2004, with longer effects including changes in their hydrology caused by changes to coast lines and damage to sea-defences (Sykes 2005). The waders are one group of birds that are dependent on coastal mudflats. Many factors affect the spatial distribution of shorebirds on an intertidal flat, including: prey density; the properties of the substrate and intertidal flat; the evolutionary adaptations of each species; competition; age, sex and status of bird; proximity to high-tide roost sites; disturbance; and the prevailing environmental conditions (Finn 2007).

There is very little known information on waders along the east coast of the northern tip of Sumatra (Aceh province), although there are reports on wader from northern parts of Sumatra (Marle & Voous 1988; Ollington & Parish 1989; Holmes 1996; Crossland 2000; Crossland & Sinambela 2005; Crossland *et al.* 2006; Crossland *et al.* 2009). Crossland (2000) provided a report on the waders wintering at three sites at the north-western tip of Sumatra. In this paper, we report our records on wintering waders during 29 December 2008-1 January 2009 in the east coast of north-eastern tip Sumatra. It is hoped that this report will help to fill another gap in wader knowledge along the east coastal of Sumatra island and provide basic data for monitoring waders along the coast of Aceh province after Tsunami hits.

## METHODS

A bird survey was conducted during wintering season of migratory waders along the north-eastern tip of Sumatra from 29 December to 1 January 2009. The North-eastern tip of Sumatra is administratively located at Indonesia special territory of Aceh province (Figure 1). Geologically the area is comprised of a coastal belt of sandy beach, mudflat, mangrove forest and fish pond. During December 2008, we visited selected sites in the North-eastern tip of Sumatra from northern part (Banda Aceh district) to the southern part (Aceh Timur district). A total of eight sites were visited. The sites mentioned here are located from north to south of Aceh province (Figure 1); Lempase (Banda Aceh district), Kuala Raja (Aceh Besar district), Lhokseumawe (Aceh Utara district), Alue Puteih (Aceh Utara district), Simpang Ulim (Aceh Timur district), Pusong Langguk (Aceh Tamiang), Pulau Perling/Peurolin (Aceh Tamiang) and Gedong Pakat (Aceh Tamiang).

### Study Area

*Lempase*
Lempase is a large tidal mudflat located in the Capital city of Aceh province. The site is one of the coastal in Aceh affected by Tsunami hits on 26 December 2004. There are many settlements around Lempase. It was visited by us on 29 December 2009.

*Kuala Raja*
Kuala Raja (N $05^0$14’50, E $096^0$43’39) is a coastal area surrounded by fish ponds. It was visited by us on 30 December 2008. Administratively, it is located in Bireun district.

*Lhokseumawe*
Lhokseumawe is capital city of Aceh Utara district. The small coastline of Lhokseumawe city (N 05°10’26, E 97°08’45) visited by us on 31 December 2008. There is small mangrove forest remaining in the east coast of Lhokseumawe city, but many settlement around there.

*Alui Puteih*
Alui Puteih (N 05°08’51, E 97°23’06) is located in Aceh Utara district, Baktia sub-district. It was visited by us on 31 December 2008. When visited, it was a flooded freshwater rice field that had recently been harvested.

*Simpang Ulim*
Simpang Ulim (N 05°08’34, E 97°35’34) visited by us on 31 December 2008. It was a marsh swamp mixed with rice field habitat. Administratively, it is located in Bantaian village, Seunodon sub-district, Aceh Timur district.

*Pusong langguk*
Pusong langguk (N 04°33’00, E 98°01’36) visited by us on 31 December 2008. It is a sandy beach. Administratively, it is located in Muara Langsa village, Kuala Langsa sub-district, Aceh Tamiang district.

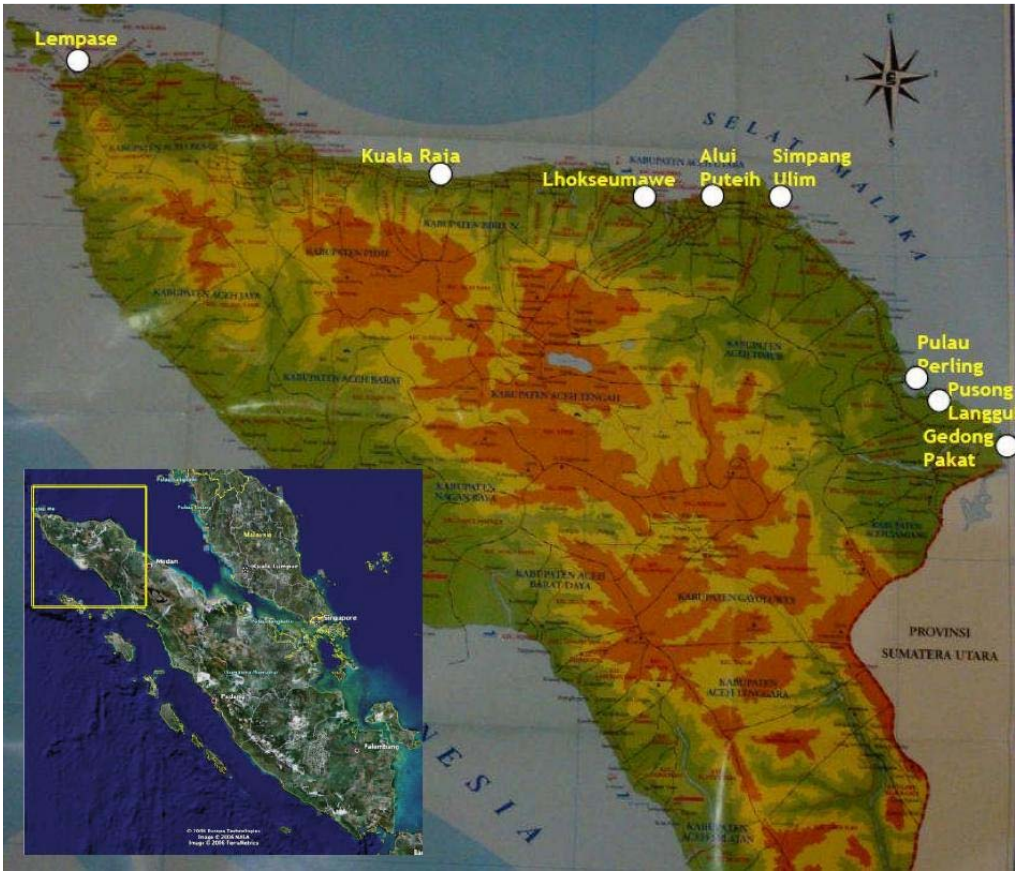


**Figure 1.** Map of survey area.

*Pulau Perling or Peurolin*
Pulau Perling or Peurolin (N 04°35'16, E 98°01'04) visited by us on 01 January 2009. It is a sandy beach. Administratively, it is located in Muara Langsa village, Kuala Langsa sub-district, Aceh Tamiang district.

*Gedong Pakat*
Gedong Pakat (N 04°22'00, E 98°14'06) visited by us on 01 January 2009. It is a sandy beach habitat. Administratively, it is located in Muara Langsa village, Seruih sub-district, Aceh Tamiang district.

## RESULTS

The following annotated list provides details waders recorded during survey on 29 December 2008 to 1 January 2009. Distribution and number of species are summarised in Table 1. Taxonomy and English names of each species follow Sukmantoro *et al.* 2008 as reference for Indonesian birdlist.

### Species Account

Pacific Golden Plover *Pluvialis fulva*
Most wide spread wader during this survey. Recorded at five sites with maximum count of eight birds in fish pond at Kuala Raja on 30 December 2008. This first record since 74 birds were seen at Dunjung Batee on 10 December 1995 and 69 birds on 12 December 1995 (Crossland 2000).

Little ringed plover *Charadrius dubius*
A total of 14 birds was observed on 30 December 2008 at a fish pond in Kuala Raja (Figure 2). Previously reported from Banda Aceh on 26 November 1975 without details (Marle & Voous 1988). The most numerous small plover in the north-western Sumatra during November-December 1995, with maximum count of 123 birds at Krueng Aceh on 11 December 1995 (Crossland 2000).

Greater Sand Plover *Charadrius leschenaultii*
Recorded twice, two at Kuala Raja on 30 December 2008 (Figure 3) and three at Pusong Langguk on 31 December 2008. (Crossland 2000) stated that they are less common than Lesser Sand Plover with a maximum of four birds seen at Dunjung Batee and four at Krueng Aceh on 10 December 1995.

Lesser Sand Plover *Charadrius mongolus*
The most numerous species with a total of approximately 60 birds at Pusong Laangguk on 31 December 2008. It is suspected that more than half of the 500 unidentified shorebird recorded in Pulau Perling were possibly this species. Small numbers occurred at all three sites with a maximum of 31 birds during wintering survey in December 1995 (Crossland 2000).

Grey-headed Lapwing *Vanellus cinereus*
A total of 20 birds was recorded at Alui Putih on 31 December 2008 (Figure 4). This is the first record for

**Table 1.** Wintering waders count during 29 December 2008-1 January 2009 in the coast of north-eastern tip of Sumatra.

| Species | Lempase | Kuala Raja | Lhokseumawe | Alui Putih | Simpang Ulim | Pusong Langguk | Pulau Perling | Gedong Pakat | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Pacific Golden Plover | | 8 | 1 | | | 1 | 1 | 1 | 12 |
| Little Ringed Plover | | 14 | | | | | | | 14 |
| Greater Sand Plover | | 2 | | | | 3 | | | 5 |
| Lesser Sand Plover | 1 | | | | | 60 | | | 61 |
| Grey-headed Lapwing | | | | 20 | | | | | 20 |
| Snipe | | | | | 2 | | | | 2 |
| Common Greenshank | | 10 | | | | | | | 10 |
| Common Sandpiper | | 6 | 5 | | | | | 4 | 15 |
| Terek Sandpiper | | | 8 | | | | | | 8 |
| Ruddy Turnstone | | | | | | 1 | 1 | | 2 |
| Eurasian Curlew | 2 | | 1 | | | | | | 3 |
| Bar-tailed Godwit | 2 | | | | | | | | 2 |
| Common Redshank | | | | | | | | 1 | 1 |
| Unidentified | | 35 | 26 | | | | 500 | | 561 |
| **TOTAL** | 5 | 75 | 41 | 20 | 2 | 65 | 502 | 6 | **716** |

**Figure 2.** Little ringed plover in Kuala Raja on 30 December 2008 (© Muhammad Iqbal).

Sumatra and second record in Indonesia after 139 years (see Iqbal *et al*. 2008 for details).

Common Greenshank *Tringa nebularia*
Ten birds were observed in the fish pond at Kuala Raja on 30 December 2008. Among these birds, it is possible one of them was a Nordmann's Greenshak *Tringa guttifer*. Unfortunately, specific characters could not been seen for further identification. It is second record of Common Greenshank for Aceh province after four were seen foraging on the muddy edge of a prawn pond at Lamnga on 30 November 1995 (Crossland 2000).

Common sandpiper *Actitis hypoleucos*
Widespread in ones and twos, but not numerous. It is possibly overlooked in the field. A total of at least 15 birds were recorded at three sites during this survey.

Terek Sandpiper *Xenus cinereus*
Eight bird seen at Lhokseumawe on 31 December 2008. Marle & Voous (1988) stated that Terek Sandpiper occur throughout mainland of Sumatra, but no records were from Aceh. Several bird were seen at Lhokseumawe on 20 February 1980 and is the first record from Aceh (Holmes 1996). Another recent record is a maximum 39 birds seen at Krueng Aceh on 10 Desember 1995 (Crossland 2000).

Ruddy turnstone *Arenaria interpres*
Twice recorded as single birds in Pusong Langsa and Pulau Perling on 1 January 2009 (Figure 5). Occur throughout the mainland of Sumatra, but no records from Aceh and the west coast Marle & Voous (1988). This is the second record for Aceh after one was seen at Krueng Aceh on 10 December 1995 (Crossland 2000).

Snipe *Gallinago* sp
Two birds were observed in marshes swamp at Simpang Ulim on 31 December 2008. It could not be identified to species level, but based on historical records of Snipe in Aceh province (Marle & Voous 1988; Buij *et al.* 2006), it could possibly be Pintail Snipe *Gallinago stenura*.

Eurasian Curlew *Numenius arquata*
A couple of bird at Lempase on 29 December 2008 and single bird at Lhokseumawe on 31 December 2008. This record is the first for Aceh province.

**Figure 3.** Two Greater Sandplover in Kuala Raja on 30 December 2008 (© Agus Nurza).

**Figure 4.** A couple of Grey-headed Lapwing on 31 December 2008 at Alui Putih, Baktia sub-district, Aceh Utara district (© Agus Nurza).

Bar-tailed Godwit *Limosa lapponica*
Two birds observed in the mudflat at Lempase on 29 December 2008. This is the first record for Aceh province.

Common redshank *Tringa totanus*
Single bird observed in fish pond at Gedong Pakat on 1 January 2009. This is the first record for Aceh province.

Unidentified wader
There are approximately 561 unidentified wader recorded during this survey. Recorded at three sites: 35 birds at Kuala Raja on 30 December 2008, 26 birds at Lhokseumawe 31 December 2008 and 500 birds at Pusong Langguk 1 January 2009.

## DISCUSSION

The list details 13 species of waders as having occurred on the coast of north-eastern tip of Sumatra. Of these four species were recorded first time for Aceh province: Grey-headed Lapwing, Eurasian Curlew, Bar-tailed Godwit and

**Figure 5.** A Ruddy turnstone on 1 January 2009 in Pusong langguk, Langsa (© Agus Nurza).

Common Redshank. Grey-headed Lapwing is the first record for Aceh province and also the first record for the Island and Greater Sunda (Western Indonesia; Sumatra, Kalimantan, Java and Bali). The occurrence of Grey-headed Lapwing in the north-eastern tip of Sumatra shows the importance of this area for waders during wintering migratory season. Previously, Ollington & Parish (1989) reported the occurrence of Lesser Yellowlegs *Tringa flavipes* in shallow pools near Lhokseumawe on 27 September 1983. This record is not only new for Sumatra or Indonesia, but also a new record for Southeast Asia. Based on these records, it is still open to find other species of waders from north-eastern tip of Sumatra as a new species for the Island or new for Indonesia.

This survey recorded small numbers of thirteen wader species wintering on the coast of north-eastern tip of Sumatra. The wader community was dominated by Lesser Sand Plover. The most wide spread species was Pacific Golden Plover. Common Redshank were the rarest wader found in the northern tip of Sumatra, followed by Bar-tailed Godwit and Snipe. All these waders were found only at one site. Crossland (2000) stated that most waders recorded in the northern-tip of Sumatra were small waders. Our survey shows that large other waders are present on the north-eastern tip of Sumatra. These waders are Eurasian Curlew, Bar-tailed Godwit and Common Redshank. The occurrence of these species in Northern Aceh shows that coastal wetlands in the north-eastern tip of Sumatra still support materials for feeding ground of large waders, although high levels of settlements are commonly found along the east coast of Aceh province.

This study was a short survey of the wader community in the coast of north-eastern tip of Sumatra. It is fills a gap in knowledge of wader distribution in Sumatra, where many areas known as important habitat for shorebird located in Southern Sumatra. Crossland (2000) stated that large estuarine areas in Aceh province such as Teluk Langsa, as well as a chain of smaller estuaries and lagoons all potentially hold concentrations of waders that as yet have never been surveyed. The observation of 500 waders in Kuala Langsa (Teluk Langsa) on 1 January 2009 supports this statement. We believe that intensive surveys along the east coast of north-eastern tip of Sumatra will find significant sites for waders in the East Asia-Australasian flyway.

## ACKNOWLEGMENTS

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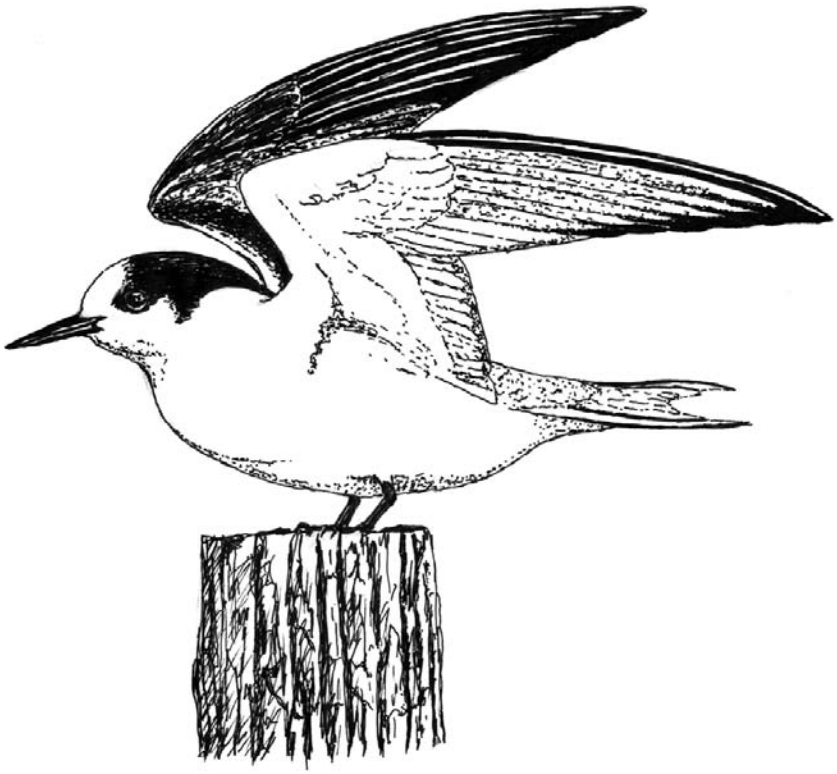

# MOVEMENTS OF GREY-TAILED TATTLERS AND TEREK SANDPIPERS IN THE EAST ASIAN/AUSTRALASIAN FLYWAY

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Key words: Grey-tailed Tattler, *Heteroscelus brevipes*, Terek Sandpiper, *Xenus cinereus*, migration, stopover site, non breeding area

We examine the movements of Grey-tailed Tattlers *Heteroscelus brevipes* and Terek Sandpipers *Xenus cinereus* in the East Asian/Australasian Flyway based on banding recoveries and flag sightings of birds marked in Australia, Japan, Taiwan, Hong Kong, China, Indonesia and Russia.

Although in the East Asian/Australasian Flyway the two species have similar breeding and non-breeding distributions, there are significant differences in their migration strategies. Moreover within each species, birds spending the austral summer in NW Australia have different migration strategies to those from E Australia.

Grey-tailed Tattlers from E Australia stop in Japan on both north and south migration. Those from NW Australia mainly stage in S China and Taiwan on north migration, but also use Korea and Japan on south migration, with a two-stop migration strategy.

Terek Sandpipers from E Australia occur widely along the SE Asia mainland, as well as in Japan, on both migrations, but those from NW Australia initially stage in Taiwan and S China on north migration, before moving on to Korea. In contrast, only a single stop seems to be made in E Asia on south migration. There is also a passage of Terek Sandpipers along the SE Asia mainland coast to non-breeding areas in Malaysia.

It is likely that Terek Sandpiper populations have been adversely affected by major loss of intertidal habitat around the Yellow Sea as many pass through that area on migration. However, few Grey-tailed Tattlers stop there, so they are less likely to have been affected.

## INTRODUCTION

Critical to the conservation of the many shorebirds that make lengthy migrations between arctic breeding and southern hemisphere non-breeding areas is a detailed knowledge of the routes they take, the locations where they stop to feed, and the times of year when they use those sites. Such knowledge is especially necessary for the waterbird populations of Asia where 63% of known populations are decreasing or extinct (Wetlands International 2006).

Recent studies show that many shorebird populations which spend the non-breeding season in Australia have declined, probably because of habitat loss at stopover sites along the East Asian/Australasian Flyway (EAAF) (Gosbell & Clemens 2006, Rogers *et al.* 2008, Clemens *et al.* 2009, Gosbell *et al.* 2009, Minton *et al.*, *in prep* (a), Moores & Rogers, *in prep*.).

This paper focuses on the migrations of the Grey-tailed Tattler *Heteroscelus brevipes* and Terek Sandpiper *Xenus cinereus* populations of the EAAF, about which little has previously been published (Higgins & Davies 1996, Minton *et al.* 2006). These populations have similar breeding distributions at broadly the same latitudes in Siberia, and their main non-breeding ranges are in N Australia. There they can frequently be found mixed together at high tide roosts. The largest concentrations are around 15,000 Grey-tailed Tattlers and 11,000 Terek Sandpipers at Roebuck Bay (Broome) and Eighty Mile Beach in NW Australia (Watkins 1993, Bamford *et al.* 2008, Minton *et al.*, *in prep* (b)). Smaller numbers can be found in S Australia, in Indonesia, and elsewhere in Asia north to Singapore and Malaysia (Higgins & Davies 1996).

The world population of the Grey-tailed Tattler is estimated at 50,000, of which about 90% spends the non-breeding season in Australia (Bamford *et al.* 2008).

The Terek Sandpiper has a much wider breeding distribution than the Grey-tailed Tattler, extending across Siberia as far as E Europe. Western populations winter along the coasts of Africa, the Middle East and India (Cramp & Simmons 1983). There are about 50,000 Terek Sandpipers in the EAAF, of which almost half migrate to Australia.

Migrants of both species begin to arrive in Australia in late August. Most adults arrive in September, followed by juveniles in October (Australasian Wader Studies Group (AWSG), unpublished data). Peak departures from NW Australia are in the third week of April (Jessop & Minton *in prep*.), with the main movement through Asia in April and May. Southward migration in Asia takes place from late July to early October (including juveniles).

A broad-ranging analysis has shown that most of the shorebirds that breed in the northern hemisphere and migrate to Australia stopover in the Taiwan/China/Korea/Japan

region of E Asia (Minton *et al.* 2006). This study examines the migratory strategies of Grey-tailed Tattlers and Terek Sandpipers in more detail. It is the first to combine data from all relevant countries in the EAAF.

## METHODS AND DATA SOURCES

This analysis uses band recovery and colour-flag sighting data from throughout the EAAF including: the AWSG leg flag sighting database (646 records), the Australian Bird and Bat Banding Office recoveries database (85 records), Japanese Banding Office (698 records), Taiwan Wader Study Group/Wild Bird Federation Taiwan (256 records), Chongming Dao near Shanghai (35 records), Chinese Banding Office (11 records), Russian Banding Office (14 records), Hong Kong (5 records) and Indonesia (1 record). The paper considers all data available to September 2009 (except in respect of Japan for which only data to December 2007 are included).

In the case of metal band recoveries, both the date and place of banding and recovery are known. However, within each of the countries/regions of the EAAF all birds are given the same flag or flag combination (one or two flags per bird). Therefore, for sightings of colour-flagged birds the country/region of origin and the date and place of re-sighting are known, but the precise date and place on which the bird was flagged is not known. Moreover, although band recoveries can be ascribed to a known individual, flag re-sightings may be of the same bird on different dates and places, so the number of records may sometimes be more than the actual number of individual birds seen.

Throughout the flyway, almost twice as many Grey-tailed Tattlers have been banded or flagged as Terek Sandpipers, the majority of both in Japan and NW Australia (Table 1). Numbers caught within Australia reflect the northern distribution of both species and the heavy concentration of banding activity in the northwest over 29 years. Few have been caught in the Northern Territory, though both species are widespread there (Chatto 2003).

Over the last 30 years, Grey-tailed Tattler has been the most frequently marked wader in Japan (Yamashina Institute for Ornithology 2002), where most are caught in the far north (northern Hokkaido) and central parts of the country (the Tokyo area). In Taiwan, most banding has taken place in the last 25 years (Liu *et al.* 2005), at Chongming Dao, China, since 2002, and in Indonesia since 2006.

Both species have been colour marked regularly in SE Australia since 1991 and in NW Australia since 1992. However, in SE Queensland and New South Wales most flagging took place in the 1990s, with relatively small numbers since 2000. These temporal differences may have had some influence on the pattern of flag-sighting results.

Four main sources of data were used in the analysis:

(i) The movements of 32 Grey-tailed Tattlers and 30 Terek Sandpipers banded in Australia and found abroad, and of 15 Grey-tailed Tattlers and 8 Terek Sandpipers banded abroad and found in Australia.
(ii) 264 sightings of Grey-tailed Tattlers and 112 of Terek Sandpipers carrying Australian colour flags and recorded outside Australia. Different colour combinations enable birds from NW Australia (Broome and Eighty Mile Beach), Queensland (Moreton Bay, Brisbane) and Victoria to be separately identified in the field.
(iii) 239 sightings of Grey-tailed Tattlers and 31 sightings of Terek Sandpipers flagged overseas and recorded in Australia.
(iv) 50 movements (recoveries and flag sightings) of birds between EAAF countries other than Australia – mostly involving Japan or Taiwan – and 299 movements of birds between Hokkaido and the southern islands of Japan.

Both recovery and flag sighting data are strongly influenced by the geographical distribution of people and their relative interest in wildlife. Sight records of flagged birds depend on the sites chosen for observation and on observer coverage. In the first few years after colour-flagging commenced in the early 1990s, sighting efforts were rather *ad hoc*, but now many of the principal stopover sites along the EAAF are being covered systematically, though inevitably coverage is incomplete.

Recovery and flag sighting rates for waders in the EAAF, based on birds marked in Australia to the end of 2003, were very low (0.2% and 1.4% respectively for Grey-tailed Tattler, and 0.17% and 1.4% for Terek Sandpiper (Minton 2005)). However, recalculation based on the data in this

**Table 1.** Numbers of Grey-tailed Tattlers and Terek Sandpipers banded and colour-flagged in countries/regions of the East Asian/Australasian Flyway up to the end of 2009.

| Banding/flagging location | Numbers banded | | Numbers colour-flagged | |
|---|---|---|---|---|
| | Grey-tailed Tattler | Terek Sandpiper | Grey-tailed Tattler | Terek Sandpiper |
| Australia - North-west | 6,905 | 6,720 | 5,168 | 5,053 |
| - Queensland | 427 | 25 | 328 | 21 |
| - New South Wales | 279 | 771 | 0 | 0 |
| - Victoria | 38 | 37 | 5 | 13 |
| Taiwan | 1,721 | 837 | 215 | 87 |
| Chongming Dao, China | 300 | 2,500 | 290 | 2,400 |
| Japan | 14,144 | 3,263 | 9,581 | 384 |
| Indonesia | 4 | 384 | 4 | 384 |
| **Total** | **23,818** | **14,357** | **15,591** | **8,342** |

paper shows that reporting rates have increased to an average of 0.46% and 3.9% for Grey-tailed Tattler and 0.46% and 2.0% for Terek Sandpiper. There are now sufficient data on the movements of both species to support a detailed assessment of their migration strategies.

## RESULTS AND DISCUSSION

### Migration routes

Altogether there are 550 records of movements by Grey-tailed Tattlers between Australia and other countries in the EAAF and 181 of Terek Sandpipers (Table 2, Fig. 1). There are also a substantial number of recoveries and flag sightings relating to Taiwan and Japan (Fig. 2). Records involving other Asian countries are covered in the text.

*Grey-tailed Tattler*

Data on Grey-tailed Tattlers caught or re-sighted in Australia show that birds from E Australia migrate through Japan on both north and south migration, avoiding Taiwan, Hong Kong, mainland China and Korea (Fig. 1, Table 2). Similarly Queensland is a major destination for birds migrating through Japan, with 283 records there compared to 37 in the more intensively studied area of NW Australia (Fig. 2b). In contrast, Grey-tailed Tattlers from NW Australia mainly migrate through Taiwan, with lesser numbers on the mainland coast of Asia between Hong Kong and Korea, and with only a relatively small proportion passing through Japan (Table 2, Fig. 2a).

Grey-tailed Tattlers also show a strong tendency to migrate through Japan rather than the Yellow Sea when they are passing through the northern parts of the SE Asia stopover region (Table 2, Figs. 1 & 2).

There have only been three recoveries and 12 flag sightings of Grey-tailed Tattlers moving between SE Asian countries. This is surprisingly few considering the volume of banding and flagging in Japan, Taiwan and Chongming Dao, China (Table 1) and the intensive searching for flagged birds in all three countries. It suggests that most individuals are faithful to individual stopover sites in SE Asia and only use one site in that region.

A few records suggest that some birds might use different routes during north and south migration or might use more than one SE Asia stopover site in the same season; for example two tattlers banded in Taiwan on northward migration were recovered in Japan on southward migration. There are also nine flag sightings relating to movements between Taiwan and Japan, but because flagging dates are not known these cannot be ascribed to any particular pattern. Similarly, two Japanese flagged birds have been seen in Korea.

There are a large number of records of Grey-tailed Tattlers marked at one location in Japan and subsequently reported at another (275 flag sightings and 10 recoveries; most (241) involving Hokkaido). Many are consistent with birds making an initial stopover in Hokkaido on south migration and then a further stop in central or S Japan (including five in Okinawa). Two southerly movements recorded in the same season were of a bird banded in

**Table 2.** Numbers of recoveries & colour-flag sightings showing movements of Grey-tailed Tattlers and Terek Sandpipers between Australia and other countries in the East Asian/Australasian Flyway (NWA = NW Australia (Broome & Eighty Mile Beach); EA = E Australia (SE Queensland, New South Wales & Victoria)).

| | ***Country of Recovery/Flag Sighting or Banding/Flagging*** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Philippines | Vietnam | Hong Kong | Taiwan | China (mainland) | Japan | Korea | Russia | Total |
| **Grey-tailed Tattler** | | | | | | | | | |
| Banded in NWA | – | 1 | 1 | 12 | 3 | 2 | 1 | 2 | 22 |
| Recovered in NWA | – | – | – | 7 | 1 | 2 | – | – | 10 |
| Flagged in NWA | – | – | 8 | 142 | 1 | 18 | 6 | 1 | 176 |
| Sighted in NWA | – | – | – | 22 | 8 | 15 | – | – | 45 |
| ***Total NWA*** | | **1** | **9** | **183** | **13** | **37** | **7** | **3** | **253** |
| Banded in EA | – | – | – | – | – | 9 | – | 1 | 10 |
| Recovered in EA | – | – | – | – | – | 5 | – | – | 5 |
| Flagged in EA | – | – | – | – | – | 88 | – | – | 88 |
| Sighted in EA | – | – | – | – | – | 194 | – | – | 194 |
| ***Total EA*** | **–** | **–** | **–** | **–** | **–** | **296** | **–** | **1** | **297** |
| **Terek Sandpiper** | | | | | | | | | |
| Banded in NWA | 1 | – | 1 | 6 | 8 | – | 4 | 6 | 26 |
| Recovered in NWA | – | – | 3 | – | – | 1 | 2 | – | 6 |
| Flagged in NWA | – | – | 47 | 15 | 4 | – | 40 | – | 106 |
| Sighted in NWA | – | – | – | – | 24 | – | – | – | 24 |
| ***Total NWA*** | **1** | **–** | **51** | **21** | **36** | **1** | **46** | **6** | **162** |
| Banded in EA | – | – | – | 1 | 1 | 2 | – | – | 4 |
| Recovered in EA | – | – | – | – | – | 2 | – | – | 2 |
| Flagged in EA | – | – | 1 | – | 1 | 1 | 3 | – | 6 |
| Sighted in EA | – | – | – | 5 | – | 2 | – | – | 7 |
| ***Total EA*** | **–** | **–** | **1** | **6** | **2** | **7** | **3** | **–** | **19** |

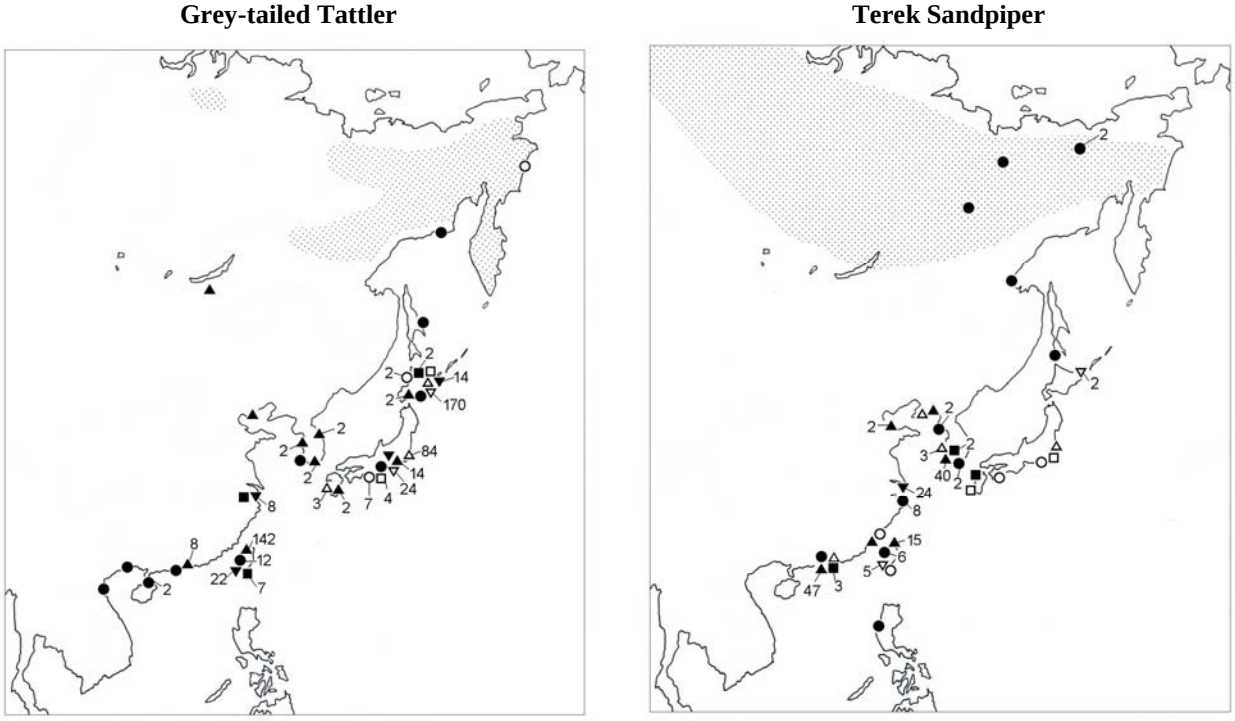


**Figure 1.** All known movements of Grey-tailed Tattlers and Terek Sandpipers between NW and E Australia and E Asia

Closed symbols relate to birds from NW Australia and open symbols to birds from E Australia (Queensland, New South Wales and Victoria). Numbers indicate the number of records if there are >1. The shaded areas indicate the breeding areas (based on Hayman *et al*. 1986, Andreev *et al.* 2005).

● ○ Recovery sites of birds banded in NW and E Australia respectively
■ □ Banding sites of birds re-captured in NW and E Australia respectively
▲ △ Sighting locations of birds colour-flagged in NW and E Australia respectively
▼ ▽ Colour-flagging sites of birds sighted in NW and E Australia respectively

Hokkaido on 2 August 1996 and reported 28 days later at Tokyo Bay, and of a bird banded in Hokkaido on 10 August 1997 and reported 22 days later also at Tokyo Bay.

Not all tattlers that migrate through Japan spend the austral summer in Australia. Two birds banded in Japan were found in Vanuatu in September, one was in Papua New Guinea in November, two went to Guam (September and December) one to the Solomon Islands in January and one to Irian Jaya in March.

A tattler banded in early November in The Philippines, where it was probably on its main non-breeding site, was subsequently reported on the Russian breeding areas. However, two from Taiwan seen in The Philippines in September were probably on passage.

Two Grey-tailed Tattlers from Australia have been recorded in the Siberian breeding range (Fig. 1). One from NW Australia was in the Sea of Okhotsk on 30 May; the other from E Australia was near the eastern limit of the breeding range on 20 July. Two other NW Australia tattlers have been recorded in Siberia: one was found on 30 May near Lake Baikal, still well southwest of the breeding areas; another was already on southward migration through Sakhalin on 27 July.

Three tattlers banded in Japan have also been found in the breeding area, the most northerly being at 69ºN. Another was reported during migration through Sakhalin (Fig. 2).

*Terek Sandpiper*

During both north and south migration, most Terek Sandpipers from NW Australia stopover in the vicinity of Korea, the east coast of mainland China and to a lesser extent Taiwan (Fig. 1, Table 2). There is no evidence that different routes are used during each migration.

There is less information on Terek Sandpipers from E Australia because fewer have been caught there (Table 1). However, compared with birds from NW Australia, a greater proportion of E Australia birds have been reported from Japan, though birds have also been reported from all the other main stopover locations. It appears that E Australian birds also use the same areas on both migrations (Fig. 1).

Recoveries and flag sightings related to both Japan and Taiwan confirm that Terek Sandpipers use a wide variety of stopovers sites in SE Asia and have a greater tendency, compared with Grey-tailed Tattler, to occur on the shores of the Yellow Sea (Fig. 2). They also show that Terek Sandpipers from all parts of Australia mix together on passage in SE Asia.

Table 3 shows that many Terek Sandpipers marked in Australia stop in Taiwan in April on their northward migration before completing their final staging at sites further north in May. All of the 13 birds flagged on the Yellow Sea shores of China and Korea and later seen in Taiwan were found there in April, further illustrating the

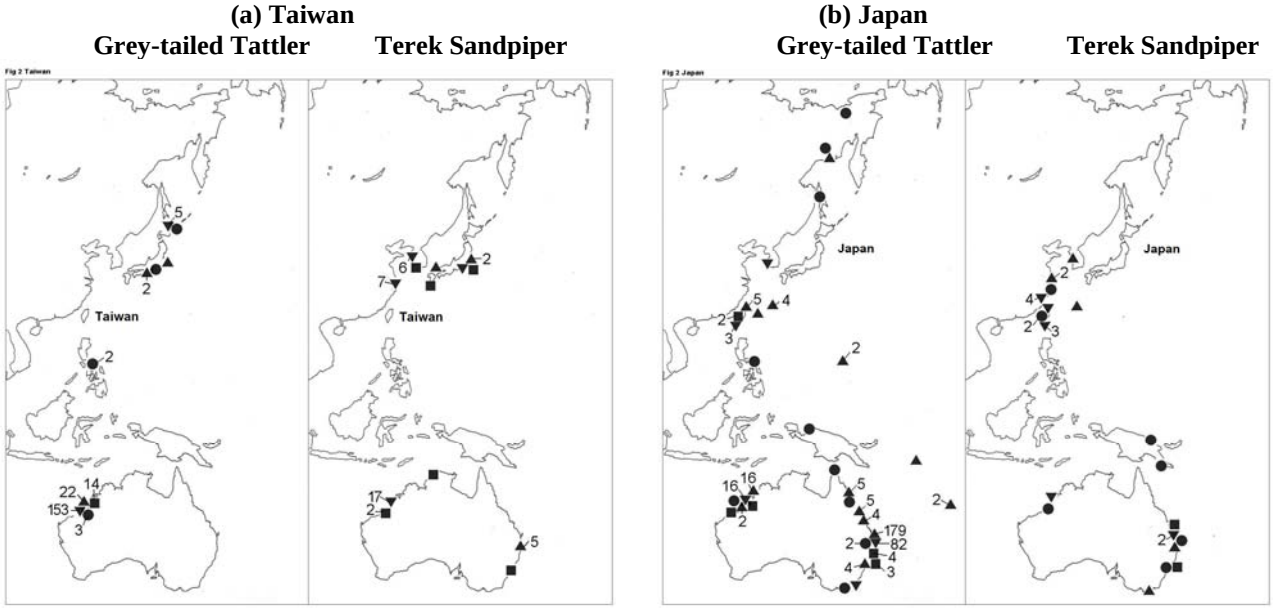


**Figure 2.** All known movements of Grey-tailed Tattlers and Terek Sandpipers to and from Taiwan and Japan

Figures indicate the number of records if there are >1.

- ● Recovery sites of birds banded in (a) Taiwan and (b) Japan
- ■ Banding sites of birds re-captured in (a) Taiwan and (b) Japan
- ▲ Sighting locations of birds colour-flagged in (a) Taiwan and (b) Japan
- ▼ Colour-marking sites of birds sighted in (a) Taiwan and (b) Japan

importance of Taiwan as an April staging post for the flyway as a whole.

Data on Terek Sandpiper movements related to Japan are similar to that for Grey-tailed Tattler in that more reports are for E Australia (8) than for NW Australia (2) (Fig. 2b). This is despite the fact that Terek Sandpipers are more numerous in NW Australia and have been studied more intensively there.

One Terek Sandpiper banded in Hokkaido on 6 August 1999 was recovered 18 days later in S Japan, and one flagged in Hokkaido was sighted in Okinawa in September. In addition, there were 31 movements of Terek Sandpipers flagged in Hokkaido and sighted at locations in S Japan (one in May and 30 in July-September). These results suggest that, as with Grey-tailed Tattler, at least some birds passing through Japan stop in both Hokkaido and S Japan during south migration. Also two Terek Sandpipers banded in Japan were found in Papua New Guinea in October and November respectively, possibly indicating their non-breeding season site.

Records relating to China show that there is a movement of Terek Sandpipers along the Chinese coast to non-breeding areas in Malaysia. Two birds flagged at Chongming Dao near Shanghai were seen in Malaysia, in late September and October. Also, a bird banded in Malaysia in October was recovered at Chongming Dao in early April the following year. This passage is also indicated by two Terek Sandpipers marked in Hong Kong: one, banded in mid-October, was found in Malaysia after just six weeks and recaptured again at the same place in Malaysia two years later; similarly a Hong Kong-flagged bird was seen at another location in Malaysia in late September.

Four Terek Sandpipers from NW Australia have been found within the breeding range; the earliest was recorded there on 15 May, the others on 24 May and 2 June (Fig. 1). Other Siberian recoveries were of a bird at the southern end of Sakhalin during northward migration on 24 May and one already southbound in the south of the Sea of Okhotsk on 15 July. Another banded in Korea was found in the breeding area in Yakutia at 68ºN on 14 June.

### Timing of migration

The dates on which birds marked in Australia were recorded on migration through Asia (Table 3) provide information on the timing of passage and facilitate an understanding of migration strategy.

*Grey-tailed Tattler*

Birds migrating north from NW Australia have mostly been recorded in S China and Taiwan between 22 April and 19 May, with the earliest record on 18 April (Table 3). This timing is consistent with a direct flight from NW Australia, where most migratory departures take place in the last three weeks of April (Fig. 3). The lack of reports in May from well-watched locations further north in Asia (Table 3), including the coast of Korea (D. Rogers, *pers. comm.*) and Yalu Jiang at the north end of the Yellow Sea (A. Riegen, *pers. comm.*), suggests that most birds probably fly direct to Siberia after a single stopover.

Birds from E Australia also seem to have a single-stop strategy on northward migration, but further north in Japan (Table 3). However the timing of their stopover there is later

**Table 3.** Earliest, median and latest dates during northward and southward migration of recoveries and flag sightings of Grey-tailed Tattlers and Terek Sandpipers marked in NW and E Australia at stopover sites in SE Asia (locations are listed from south to north; S China comprises Hong Kong and the coast bordering the South China Sea south of latitude 25ºN; N China covers the coast bordering the East China Sea and the Yellow Sea north of latitude 25ºN; S Japan refers to the whole of Japan, apart from Hokkaido which is shown separately).

| Stop-over site | Grey-tailed Tattler | | | | Terek Sandpiper | | | |
|---|---|---|---|---|---|---|---|---|
| | No. of records | Earliest date | Median date | Latest date | No. of records | Earliest date | Median date | Latest date |
| **Northward migration: Birds from NW Australia** | | | | | | | | |
| S China | 12 | 29 Apr | 9 May | 29 May | 48 | 1 Apr | 23 Apr | 25 May |
| Taiwan | 131 | 18 Apr | 8 May | 25 May | 17 | 18 Apr | 25 Apr | 11 May |
| N China | 1 | | 27 Apr | | 10 | 15 Apr | 30 Apr | 21 May |
| Korea | 1 | | 16 May | | 38 | 25 Apr | 10 May | 27 May |
| S Japan | 2 | 15 May | – | 16 May | | – | | |
| Hokkaido | 1 | | 29 May | | | – | | |
| **Northward migration: Birds from E Australia** | | | | | | | | |
| S China | | | – | | 1 | | 11 Apr | |
| Taiwan | | | – | | 1 | | 7 Apr | |
| N China | | | – | | 1 | | 10 May | |
| Korea | | | – | | 1 | | 10 May | |
| S Japan | 21 | 5 May | 10 May | 25 May | 1 | | 27 Apr | |
| **Southward migration: Birds from NW Australia** | | | | | | | | |
| S China | 1 | | 2 Sep | | 1 | | 27 Aug | |
| Taiwan | 21 | 1 Aug | 22 Aug | 14 Sep | 4 | 1 Aug | 17 Aug | 22 Aug |
| N China | 2 | 16 Aug | 16 Aug | 16 Aug | 2 | 29 July | – | 1 Sep |
| Korea | 6 | 25 July | 14 Aug | 31 Aug | 6 | 12 Aug | 19 Aug | 6 Sep |
| S Japan | 15 | 3 Aug | 19 Aug | 7 Sep | | – | | |
| Hokkaido | 2 | 8 Aug | 8 Aug | 8 Aug | | – | | |
| **Southward migration: Birds from E Australia** | | | | | | | | |
| Korea | | | – | | 2 | 23 Aug | – | 9 Sep |
| S Japan | 74 | 23 July | 16 Aug | 30 Aug | 2 | 25 July | – | 7 Aug |
| Hokkaido | 3 | 26 July | 29 July | 29 July | | – | | |

and shorter (5-25 May). This is consistent with data on the departure of birds from Moreton Bay Queensland where adults are caught close to departure weight between mid April and the first week of June (Queensland Wader Study Group data, Jon Coleman, *pers. comm.*). Such birds are much heavier (mean 132g, max. 178g) than those that depart in mid April from NW Australia (mean 98g, max. 120g; Barter & Minton 1998), facilitating the longer journey to their first stopover (7,000 km vs. 4,500 km). The fact that a bird banded on 4 May in Moreton Bay was found in central Japan on 16 May supports the suggestion of a direct flight.

Grey-tailed Tattlers from NW Australia appear to have a two-stop strategy during southward migration. The earliest record of a NW Australia bird returning through SE Asia is 25 July in Korea. Most are found in Japan and Korea in August, but only in the second half of August further south in Taiwan (Table 3). Data on birds marked in Japan and Taiwan also show that some birds can visit two different locations in the Asian stopover region before a final flight to Australia (see below). The main departure of adults from E Asia appears to be at the end of August, with only a few marked birds remaining by the beginning of September.

Like tattlers from NW Australia, those from E Australia also start appearing in Japan in the last week of July and occur throughout August; none are recorded in September in Japan or elsewhere in Asia (Table 3). If these birds also have a two-stop strategy, it would seem likely that any such movements are within Japan because none have been recorded anywhere else. Probably they make a direct flight from Japan to Queensland.

*Terek Sandpiper*

Terek Sandpipers from NW Australia start arriving in S China from the beginning of April (Table 3). This is earlier than Grey-tailed Tattlers, and even before the first dates that Terek Sandpipers have been recorded departing from Broome (Fig. 3). However, the main arrivals in S China do not take place until about 20 April. Marked birds have been recorded in Taiwan from 18 April, with most records spread over the following two weeks, which is consistent with departures from NW Australia. There have been few records in S China or Taiwan after the first week of May, but during 5-21 May there are many from Korea (Table 3). Similarly, in 2006 and 2007, few Terek Sandpipers were found in South Korea during systematic counts until the end of April, and the peak of northward migration was in mid-May (D. Rogers, *pers. comm.*). Taken together, these observations – and a bird banded in Hong Kong on 8 April and recovered on the coast of N China on 10 May the same year – suggest that Terek Sandpipers move between different staging sites within the E Asia region during northward migration. They also imply that departures for the Siberian breeding areas take place from the shores of the Yellow Sea around mid May.

There are insufficient data on Terek Sandpipers from E Australia to indicate whether they also employ a two-stop migration strategy on northward migration. However the

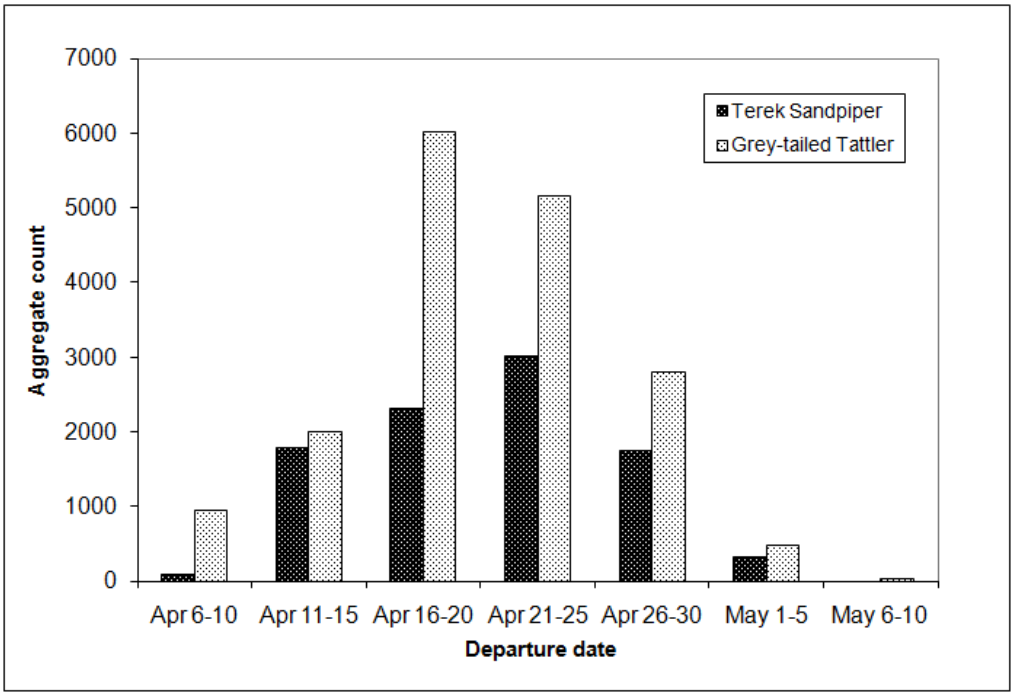


**Fig. 3.** Aggregate counts of Grey-tailed Tattlers and Terek Sandpipers seen departing on migration from Broome, NW Australia, during 1993–2007.

dates of records in the north of the stopover area (Korea and N China) are a month later than those in the southern part (Taiwan and S China), suggesting they might also employ a two-stop strategy.

On southward migration, Terek Sandpipers from both NW and E Australia start to appear at SE Asia stopover sites in the last week of July. Most records are in August, with a few into early September. There is no indication of temporal differences between occurrences at different locations, suggesting that Terek Sandpipers make a single stop in SE Asia on southward migration.

### Movements within Australia

There are records of ten movements by Grey-tailed Tattlers and four by Terek Sandpipers within Australia.

Six of the tattlers and three of the Terek Sandpipers were birds re-sighted during migration along the east coast of Australia at sites away from where they were banded. Two of the other tattlers were birds marked with leg flags in NW Australia in August 1992 (the month when flagging started in NW Australia) and seen later in the same austral summer in SE Queensland at separate locations on 23 November 1992. Given the large numbers flagged in NW Australia, the re-sighting effort in Queensland and the fact that these are the only recorded movements between NW and E Australia, it would seem likely that such movements are quite unusual. The remaining two Grey-tailed Tattlers were immatures that made short movements within Western Australia.

The only records of movements between the two species' strongholds in NW Australia, Eighty Mile Beach and Roebuck Bay, Broome (which are 200 km apart), relate to the two Grey-tailed Tattlers referred to above and one Terek Sandpiper. One Grey-tailed Tattler was a juvenile caught in Roebuck Bay on 14 October 2007 and recaptured at Eighty Mile Beach only five weeks later. The other was banded as a second-year bird on 26 September 1992 at Eighty Mile Beach and recaptured in Broome on 6 March 1996. An adult Terek Sandpiper banded on 7 April at Eighty Mile Beach was recaptured at Roebuck Bay on 1 September 1992 weighing only 60g (normally 70-80g) and was clearly a new arrival. Whether it later moved on to Eighty Mile Beach is not known.

Large numbers of Grey-tailed Tattlers and Terek Sandpipers have been caught at both Eighty Mile Beach and Roebuck Bay (Table 1) and are frequently retrapped at both sites between years (AWSG data). Therefore the fact that there have been so few between-site movements suggests that both species are highly site-faithful to their non-breeding grounds.

### Age of first northward migration

Most one year old Grey-tailed Tattlers and Terek Sandpipers do not migrate to their breeding grounds until they are two years old (Minton 2005); instead they remain in their non-breeding areas during their first austral winter. There has, however, been one record of a northward movement by a one year old Terek Sandpiper that was banded in NW Australia in mid May, after the main migratory departures (Fig. 3), and found in the Philippines the following August. Another record which could also relate to a first year bird was a flagged Terek Sandpiper from NW Australia seen in Taiwan on 11 June.

## CONCLUSIONS

The data summarised here show that there are similarities and differences in the migration routes and strategies used by

Grey-tailed Tattlers and Terek Sandpipers and also between birds which spend the non-breeding season in NW and E Australia.

**Northward migration**

Both species leave NW Australia during the same period in April (the median departure date of both is 21 April; Fig. 3), and appear to fly non-stop to E Asia in view of the dates they arrive there and the lack of reports from intermediate locations. Mass gains before departure appear insufficient for the 4,500 km journey to Taiwan and Hong Kong (Barter & Minton 1998, Summers & Waltner 1979). This is presumably one reason why migrants usually only depart from NW Australia when they have the assistance of a tail-wind (Jessop & Minton, *in prep*.).

Mostly, Grey-tailed Tattlers seem to remain at their initial stopover location in SE Asia until they are ready to fly to their breeding areas in Siberia. In contrast Terek Sandpiper appear to move northwards within SE Asia, concentrating in Korea and on the Yellow Sea coasts of China in May, before flying on to Siberia.

The main stopover location for Grey-tailed Tattlers from E Australia appears to be Japan and this conclusion is supported by mass gain and timing data from Queensland consistent with a 7,000 km direct flight. The migration is later than from NW Australia, with birds not reaching Japan until May. Again it appears that birds then fly direct to Siberia.

There are insufficient data to determine the northward migration strategy of Terek Sandpipers from E Australia, but it seems likely that they also move within SE Asia before onward flight to the breeding grounds.

**Southward migration**

Marked birds of both species – which must all be adults – start to appear in SE Asia during the last week of July. Most migrate through the region during August with only a few remaining into early September. The juveniles follow later, reaching northern Australia in October.

Grey-tailed Tattlers from NW Australia occur over a wider area of SE Asia during south migration, with proportionately more passing through Japan than on north migration. Birds from E Australia again concentrate in Japan. At least some birds, possibly all, make two stops in SE Asia before a direct flight to Australia. This contrasts with their one-stop northward migration.

Terek Sandpipers seem to change from two stops in SE Asia going north to one stop going south. However, the latter conclusion is somewhat tentative, being based on only 17 recoveries and flag sightings in July-September. Birds from NW Australia occur over a wide range of locations during southward migration in SE Asia, as they do during northward migration, with many records from Korea but none from Japan.

**Conservation Implications**

A striking feature of the routes taken by Grey-tailed Tattlers though SE Asia is that they largely avoid the coast of mainland China to the north of Hong Kong, and the Yellow Sea. Instead they pass through the offshore islands, such as Taiwan and Japan. This means that Grey-tailed Tattlers are less likely than many other shorebird species to be affected by the huge losses of intertidal habitat which have taken place in the Yellow Sea over the last two decades (Barter 2002, Moores & Rogers *in prep*.).

In contrast, Terek Sandpipers make extensive use the shores of the Yellow Sea where it is likely that they have been adversely affected by major habitat loss. Certainly numbers using the Saemangeum estuary complex in South Korea declined sharply after the new 35 km sea wall was completed in 2006 (Moores & Rogers *in prep*.).

The AWSG's long-term monitoring programme of high tide roost counts in the non-breeding areas – particularly in the stronghold of Grey-tailed Tattlers and Terek Sandpipers of NW Australia – will eventually reveal the full impact of habitat loss in SE Asia. Ongoing banding and flagging throughout the EAAF will continue to accumulate data on movements. Moreover the increased use of light-level geolocators and satellite transmitters will lead to a more detailed insight into the migratory strategies of different shorebird populations. Together these datasets will underpin the conservation of Grey-tailed Tattlers, Terek Sandpipers and the many other shorebirds that use the EAAF.

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# ODOPTU GULF (NORTHERN SAKHALIN) RUSSIA — IMPORTANT SITE FOR MIGRATORY WADERS OF EAA FLYWAY

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In 2009 the observations of shorebirds were carried out at Odoptu Gulf (Northern Sakhalin), Russia to investigate the importance of the area to migratory waders. During August and September many thousands of waders were seen on mud shoals of the gulf. 77 waders of five species including colour flagged birds banded in Australia, Japan, China and Taiwan. It is carried out ringing of 276 waders of 16 species were ringing by authors.

## INTRODUCTION

Sakhalin lies in migration flyways of many bird species related to seaside and reservoirs. Considerable meridian length of the island, large number of small lakes and rivers rich in food, shallow lagoons and vast littorals form favorable environment for many birds. Although over 90% of waterfowl travel in transit or stop here for a short period of time, we should not diminish or underestimate importance of some key ornithological territories of the Sakhalin Island. North-east coast, which is a unique point of rest and molt for hundred thousands of waterfowl, water-march and water birds migrating on the Asian-Pacific flyway, should be especially noted (Nechaev 1998). Gulfs and coastal waters of this part of the Okhotsk sea are included into the list of Russian promising wetlands of international importance according to Convention on the Wetlands of International Importance Especially as Wildlife Habitat (Ramsar Convention 1971) (Krivenko 2000).

## METHODS

The material was collected in the period from 6 May to 15 October 2009. Records were made regularly, but not daily, once a day on walkovers, by counting all the birds met or by interpolation of birds number per a single point to a certain area (express method). In our research we also used data previously obtained during one-time visits to the gulf.

## STUDY AREA

The Odoptu gulf (53°24 N, 143°08 E) is located on the north-east coast of the island, and it is the southernmost gulf in a chain of small occasionally swept away gulfs (Odoptu, Ekhabi, Urkt, Kolendo, Tropto) between the large Piltun gulf and Schmidt peninsula (Fig. 1). The gulf consists of two parts, south and north, the latter being connected with the Okhotsk sea by a strait. Both parts of the gulf have large mud shoals exposed by low tide. The gulf has clear tideway patterns 2-3 m deep and low tide elevations, which make up 55% of the territory in the north and 20% in the south. Since the strait is located in the north part of the gulf, tidal effects are much more intensive there, whereas in the south part small tides and/or repelling wind (south-south-east-east) leave water level almost unchanged. It is not typical for this part of the Okhotsk sea where tidal oscillations are relatively high (up to 2.5 meters). Another specific feature of the gulf is periodical blockage of the strait. Normally this phenomenon occurs in late August or early September and is caused by a series of seasonal cyclones. Water prevented from returning to the gulf by tidal mouth gradually rises, flooding all the shoals and low grassy lands, and freezes as soon as cold season comes. In spring (in 2009 the strait exposed by May 27) full-flowing gulf with substantial ice-water inflow sweep the strait away, and the gulf stays in such condition by August or September (by August 25-30 in 2008, by September 10-12 in 2009). Waterbirds migrating through North Sakhalin use this repeating pattern. Before the mouth is washed out in spring, river and diving ducks can find food and shelter in grass and bushes covered by water, or a resting point in the center of the gulf. In the period of tidal effects and mud shoal formation thousands of migrating waders can find food and place for rest here. These birds can be found in the gulf up to the time when the mouth is blocked and the gulf is fills with water. As the water rises

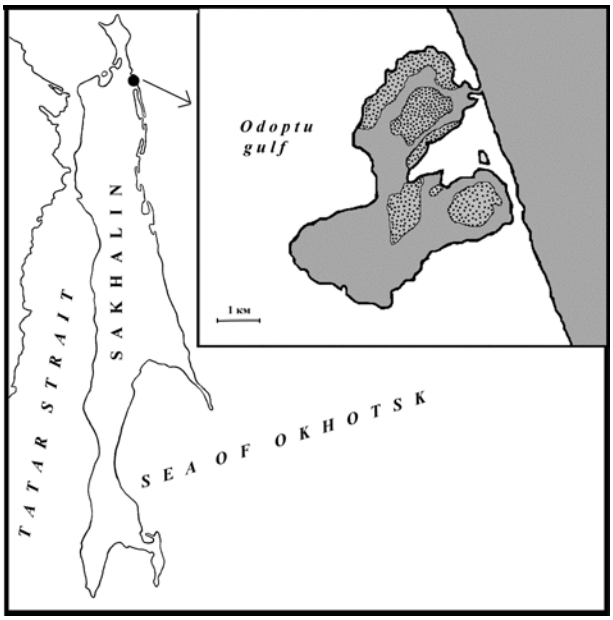


**Figure 1.** Outline map of the Odoptu gulf and its low tide elevations.

and the gulf becomes deeper, it provides food and resting place for alternating bird species: swans, river ducks, diving ducks and mergansers.

## RESULTS

During the observation period 870 waders (16 species) were noticed in the Odoptu gulf in spring and more than 367 thousand specimens (28 species) in summer and autumn migration season (50% identified down to species).

The first spring waders were noticed on May 12 (Little Ringed Plover *Charadrius dubius*). Maximum number of flying over waders was recorded on May 20 (583 specimens). Species dominating in spring included Great Knot *Calidris tenuirostris* (28.8%), Common Greenshank *Tringa nebularia* (25.1%) and Black-tailed Godwit *Limosa limosa* (11.6%). Waders were mostly flying in transit because the gulf and its flooded shores were all frozen, and the littoral was blocked with ice, so there was no place for feeding and rest.

Mass migration of waders to the south was observed beginning from the first decade of July. Dominating species in summer and autumn migration (among waders identified down to species) included Red-necked Stint *Calidris ruficollis* (26.9%), Dunlin *Calidris alpina* (25.8%), Black-tailed Godwit *Limosa limosa* (21.6%) and Great Knot *Calidris tenuirostris* (19.8%). Dominating species were alternating during the observation period (Fig. 2).

From July 6 to September 9 several thousand strong mono- and poly-species accumulations of waders were observed daily in the north and south parts on mud shoals of the Odopty gulf.

**Black-tailed Godwit *Limosa limosa*.** Accumulations were recorded on July 9 (1 thousand specimens), 14 (15 thousand specimens), 30 (6 thousand specimens) and 31 (3 thousand specimens); August 24 (3.2 thousand specimens), 25 (2.3 thousand specimens) and September 9 (2.2 thousand specimens). The total of 33,200 birds were noticed in the Odoptu gulf in summer and autumn season.

**Great Knot *Calidris tenuirostris*.** Mono-species accumulations were recorded on July 9 (11.5 thousand specimens), 10 (1 thousand specimens), 11 (2.7 thousand specimens), 13 (10 thousand specimens) and August 9 (4.5 thousand specimens). The total of 30,400 birds were noticed in the Odoptu gulf in summer and autumn season.

**Red Knot *Calidris canutus*.** Accumulations were noticed on July 9, 10 and 11 (2 thousand specimens, 200 and 600 specimens respectively). The birds stayed in the same place with *Calidris tenuirostris*. The total of 2,800 birds were recorded.

**Red-necked Stint *Calidris ruficollis*.** Mono-species accumulations were noticed on July 7 (1.5 thousand specimens), 13 (10 thousand specimens), 14 (15 thousand specimens) and August 9 (1 thousand specimens). The total of 30,500 birds were noticed in the Odoptu gulf in summer and autumn season.

**Dunlin *Calidris alpina*.** Accumulations of the species were observed in July, August and September (Fig. 3). The graph has three peaks. The first peak (July 14) is probably formed by adult female specimens. The second peak (August 22) was associated with adult males, and the third peak (September 9) related to young birds. The total of 28,200 birds were noticed in the Odoptu gulf in summer and autumn season.

Besides, we noticed poly-species accumulations with almost equal shares of species:

**Red-necked Stint *Calidris ruficollis*+Dunlin *Calidris alpina*** — July 10 (14,7 thousand specimens), 11 (16,2 thousand specimens), 13 (1 thousand specimens) and 22 (3,5 thousand specimens).

**Great Knot *Calidris tenuirostris*+Red-necked Stint *Calidris ruficollis*+ Dunlin *Calidris alpina*** — July 22 (3 thousand specimens).

**Great Knot *Calidris tenuirostris*+Black-tailed Godwit *Limosa limosa*** — July 11 (4,5 thousand specimens).

**Black-tailed Godwit *Limosa limosa*+Great Knot *Calidris tenuirostris*+Whimbrel *Numenius phaeopus*** — August 21 and 22 (3 и 5 thousand specimens respectively).

**Black-tailed Godwit *Limosa limosa*+ Whimbrel *Numenius phaeopus*** — August 23 (3 thousand specimens).

Thus, more than 360 thousand waders were observed in the Odoptu gulf in summer and autumn season (from July 6 to October 15). Fig. 4 show two migration peaks, one in the

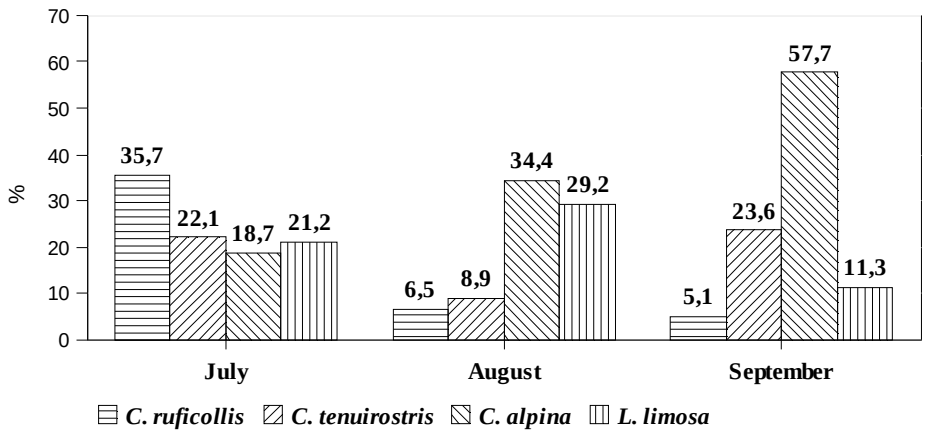


**Figure 2**. Proportions of dominating species during summer and autumn migration in July through September in the Odoptu gulf in 2009.

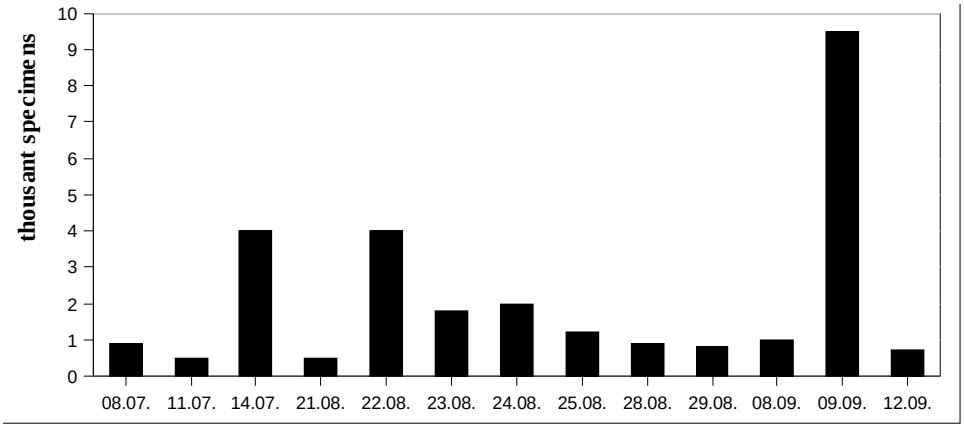


**Figure 3**. Mono-species accumulations of Dunlin *Calidris alpina* in the Odoptu gulf in 2009.

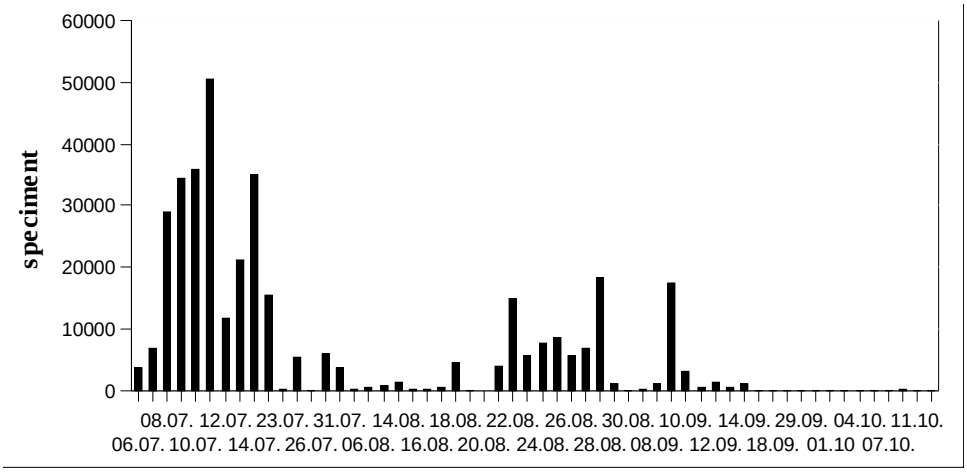


**Figure 4.** Waders population dynamics in the period of summer and autumn migrations in the Odoptu gulf in 2009.

middle of July and the other in the third decade of August through first decade of September. The first peak of migration activity is probably related to return flight to wintering grounds of propagating birds of those who completed propagation season for any reason. The second peak was formed by young migrating birds of the year and, theoretically, this peak could be longer and flatter. However, on September 10-12 the strait was blocked, and the gulf started to fill with water and flood soundings, mud shoals and shores making the gulf unusable for waders.

Rare and small species noticed in the Odoptu gulf included Far Eastern Curlew *Numenius madagascariensis* (3 specimens on July 7 and 1 specimen on August 19), Nordmann´s Greenshank *Tringa guttifer* (1 specimen on July 8), Temminck´s Stint *Calidris temminckii* (5 specimens on August 20), Curlew Sandpiper *Calidris ferruginea* (1 specimens on September 10), Spoon-billed Sandpiper *Eurynorhynchus pygmeus* (one specimen on August 19 and one on 27), and Broad-billed Sandpiper *Limicola falcinellus* (237 specimens on August 21-29).

We estimated the total number of waders, determined their species pertain and also observed birds with color flags. 77 birds of 5 species with colored flags were registered.

**Great Knot *Calidris tenuirostris*.** The total of 32 birds were registered. (25 birds on July 9 and 7 birds on July 10). The waders were banded in north-west Australia (Right leg: yellow flag on tibia) – 17 specimens and China (Right leg: black flag (up)+white flag (down) on tibia – 8 specimens and 2 specimens- Right leg: white flag (up)+black flag (down) on tibia). We also met 5 birds with unknown color combinations: 2 birds – Left leg: yellow flag on tibia; one bird – Right leg: yellow flag on tibia, Left leg: orange flag on tarsus; one bird – Right leg: yellow flag on tibia, Left leg: orange ring on tarsus; one bird – Left leg: yellow ring on tarsus.

**Red Knot *Calidris canutus*..** We met 6 birds, one of them was banded in north-west Australia (Right leg: yellow flag on tibia), one in Victoria (Right leg: orange flag on tibia) and three in China (Right leg: black flag (up)+white flag (down) on tibia – 2 specimens and one specimens- Right leg: white flag (up)+black flag (down) on tibia). One bird had an unknown color combination – Right leg: white flag on tarsus, Left leg: yellow flag on tarsus.

**Red-necked Stint *Calidris ruficollis*.** From July 8 to 14 we noticed 34 birds with flags. According to color scheme 8 of them were banded in north-west Australia (Right leg: yellow flag on tibia), 13 in Victoria (Right leg: orange flag

on tibia), 4 in China (Right leg: black flag (up)+white flag (down) on tibia – 3 specimens and one specimens- Right leg: white flag (up)+black flag (down) on tibia), 1 in Japan (Left leg: blue flag on tibia) and 3 in Taiwan (Left leg: white flag on tibia(upper leg) above blue flag on tarsus). 5 birds had unknown color code: one bird – Right leg: blue flag on tibia; one bird – Right leg: orange flag (up)+blue flag (down) on tibia; 3 birds - Right leg: yellow flag (up)+blue flag (down) on tibia.

**Dunlin *Calidris alpina.*** We recorded 4 birds with color flags on September 9 through 10. Two of the birds were banded in Victoria (Right leg: orange flag on tibia), two more had unknown combination of flags – Right leg: blue flag (up)+orange flag (down) on tibia. Besides, on August 28 a young *Calidris alpina actites* was caught into a mist net banded by researchers of Amur-Ussury Center for Birds Biodiversity Studies on June 27 2009, when the bird was 2 days old, on the north spit of the Chayvo gulf.

From August 15 to September 10 we performed waders catch and ringing. Of the total 1158 waders caught by researchers 276 specimens of 16 species were banded by a metal ring (left tarsus). 168 of the said specimens pertaining to 14 species (see Table 1) were banded by metal rings and colored flags (Right leg: yellow flag on tibia (upper leg) above white flag on tarsus).

During the waders ringing repeated catches occurred on the next day after the first catch and in 11 days (two specimens of *Calidris ruficollis*). 2 returns were recorded on the 9 day (*Calidris ruficollis*), returns on the 8 day (*Charadrius mongolus*, *Calidris ruficollis* and *Limicola falcinellus*), 3 returns on the 7 day (*Limicola falcinellus* and two *Calidris ruficollis*), and 3 returns on the 6 day (*Calidris alpina* and two *Calidris ruficollis*). Moreover, we sometimes recorded waders with our flags feeding on the shoals. For example, on September 12 on the Odoptu gulf coast a wader with our flags was noticed in *Calidris alpina* flock (up to 50 specimens). It is notable that we ringed the last *Calidris alpina* specimen on August 20.

In 2009 we received the first message about *Limicola falcinellus* met in Japan (Saga city, Kyusyu Island) on October 6 with the flags we out on in the Odoptu gulf.

## DISCUSSION

Thus, wader accumulations that we recorded in the Odoptu gulf, up to 50 thousand specimen each, make this territory one of the most important rest points of migrating waders in Sakhalin, Sakhalinskaya oblast and, generally, in the Russian Far East. Judge by the behavior of feeding a resting waders and repeated catches and recording of waders with color flags, we can suggest that the Odoptu gulf is one of the gathering points with rest and food potential for a number of wader species migrating from their nesting to the shores of Japan, China, Korea and Australia. One of the negative factors in the gulf is unauthorized hunting from spring to autumn. Several thousand strong flocks of waders, even so small as Red-necked Stint *Calidris ruficollis* and Dunlin *Calidris alpina*, are attractive for hunters. Shooting make the birds uneasy and disturb natural migration patterns. The birds become extremely shy, and researchers have to distance themselves for the observation purposes.

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**Table1**. Waders, which we banded on a Odoptu gulf in 2009

| | **Species** | **Banded by a metal ring** | **banded by metal rings and colored flags** |
|---|---|---|---|
| Lesser Sand Plover | *Charadrius mongolus* | 6 | 4 |
| Terek Sandpiper | *Xenus cinereus* | 3 | 2 |
| Common Sandpiper | *Actitis hypoleucos* | 3 | 1 |
| Grey-tailed Tattler | *Heteroscelus brevipes* | 1 | 1 |
| Common Greenshank | *Tringa nebularia* | 3 | 3 |
| Common Redshank | *Tringa totanus* | 2 | 2 |
| Wood Sandpiper | *Tringa glareola* | 27 | 23 |
| Great Knot | *Calidris tenuirostris* | 1 | 0 |
| Red Knot | *Calidris canutus* | 1 | 1 |
| Red-necked Stint | *Calidris ruficollis* | 119 | 68 |
| Long-toed Stint | *Calidris subminuta* | 10 | 3 |
| Temminck´s Stint | *Calidris temminckii* | 4 | 4 |
| Dunlin | *Calidris alpina* | 35 | 19 |
| Curlew Sandpiper | *Calidris ferruginea* | 1 | 0 |
| Spoon-billed Sandpiper | *Eurynorhynchus pygmeus* | 2 | 2 |
| Broad-billed Sandpiper | *Limicola falcinellus* | 58 | 35 |
| Total | | 276 | 168 |

# WADER BREEDING SUCCESS IN THE 2009 ACTIC SUMMER, BASED ON JUVENILE RATIONS OF BIRDS WHICH SPEND THE NON-BREEDING SEASON IN AUSTRALIA

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## INTRODUCTION

For many years the breeding success of waders from the Northern Hemisphere which spend the non-breeding season in Australia has been estimated from the percentage of juveniles in cannon-net catches. Since 2000 the results have been published each year in Arctic Birds (Minton et al 2000, Minton et al 2008, Soloviev & Tomkovich 2010).

Data is collected in two regions of Australia 3,000km apart – north-west Australia (Broome and 80 Mile Beach) and south-east Australia (Victoria, the south-east of South Australia, and King Island, Tasmania). This paper covers information gathered during the 2009/10 non-breeding season and relates to breeding success in the 2009 Northern Hemisphere summer.

## METHODS

Fieldwork operations were similar in 2009/10 to those of previous years. Only cannon-net catches are included in the tabulated data because mist-net catches tend to show a different, higher, percentage of juveniles. In north-west Australia (NWA) the main sampling period – usually in the second half of November – was a little earlier than usual (1st - 20th November). This is not considered to be likely to affect the results as most juveniles have reached that region by the end of October. In south-east Australia (SEA) the usual range of sites was sampled, at similar dates to previous years.

Previous papers have detailed potential limitations of this method of measuring breeding success (Minton et al 2005). However, in the absence of other proven techniques and established monitoring programs, it is the only comprehensive quantitative breeding success information available on arctic and Northern Hemisphere waders in the East Asian/Australasian Flyway at the present time. Given the comparability of sampling techniques used each year the data is considered to, at least, provide a good index of annual variations in breeding success.

## RESULTS

Catch and percentage juvenile data collected in SEA and NWA in 2009/10 are given in Tables 1 and 2. The results for this most recent year have also been added to the long term datasets from these two regions given in Tables 3 and 4.

Sampling in SEA was again satisfactory for six of the seven main study species. However, for the third successive year, sampling was inadequate on Red Knot. No Red Knot at all were caught. This is mainly as a result of the large decrease in Red Knot population which has taken place over many years, with numbers now reduced to a level which makes them difficult to catch at all.

Good samples were obtained in NWA for all of the usual species except Little Curlew and Ruddy Turnstone. The latter is only present in relatively low numbers at Broome, and only in scattered birds in the parts of 80 Mile Beach which we visit, and therefore obtaining an adequate sample is difficult in most years. Little Curlew are also ephemeral in their numbers and location and in some years no suitable catching opportunity is available. As an offset, reasonable samples were obtained of four species which are not normally caught in sufficient numbers (Sharp-tailed Sandpiper, Broad-billed Sandpiper, Oriental Plover and Eastern Curlew).

It should be noted that the median (Table 1) and average (Tables 3 and 4) percentage juvenile data is calculated on a different basis to that used in previous years. The figures do

**Table 1.** Percentage of juvenile/first year waders in cannon-net catches in south-east Australia in 2009/2010

| Species | No. of catches | | Total caught | Juv./1st year | | Long term median* % juvenile (years) | Assessment of 2009 breeding success |
|---|---|---|---|---|---|---|---|
| | Large (>50) | Small (<50) | | No. | % | | |
| Red-necked Stint *Calidris ruficollis* | 7 | 4 | 1856 | 227 | **12.2** | 13.8 (31) | Average |
| Curlew Sandpiper *C. ferruginea* | 2 | 4 | 302 | 82 | **27.2** | 10.0 (30) | Very good |
| Bar-tailed Godwit *Limosa lapponica* | 1 | 1 | 184 | 57 | **31.0** | 18.6 (20) | Very good |
| Red Knot *C. canutus* | 0 | 0 | 0 | 0 | **(-)** | 52.1 (17) | ? |
| Ruddy Turnstone *Arenaria intepres* | 0 | 15 | 336 | 62 | **18.5** | 9.3 (19) | Good |
| Sanderling *C. alba* | 1 | 2 | 366 | 71 | **19.4** | 12.4 (18) | Good |
| Sharp-tailed Sandpiper *C. acuminata* | 2 | 3 | 374 | 120 | **32.1** | 11.1 (28) | Very good |

All birds cannon-netted in period 15 November to 28 February except for Red-necked Stint, Ruddy Turnstone, and Sanderling, for which catches up to 22 March are included - brackets indicate small sample size and figures should be viewed with caution and are not included in calculating averages – see other tables.
* Does **not** include the 2009/2010 figures

**Table 2.** Percentage of juvenile/first year waders in cannon-net catches in north-west Australia in 2009/2010

| Species | No. of catches | | Total caught | Juv/1st year | | Assessment of 2009 breeding success |
|---|---|---|---|---|---|---|
| | Large (>50) | Small (<50) | | No. | % | |
| Great Knot *Calidris tenuirostris* | 4 | 8 | 927 | 381 | **41.1** | Excellent |
| Bar-tailed Godwit *Limosa lapponica* | 2 | 9 | 232 | 65 | **28.0** | Very good |
| Red-necked Stint *C. ruficollis* | 2 | 8 | 1183 | 198 | **16.7** | Average |
| Red Knot *C. canutus* | 2 | 9 | 296 | 153 | **51.7** | Excellent |
| Curlew Sandpiper *C. ferruginea* | 2 | 11 | 293 | 102 | **34.8** | Very good |
| Ruddy Turnstone *Arenaria intepres* | 0 | 3 | 9 | 5 | **(55.5)** | (? Excellent) |
| Sanderling C. *alba* | 1 | 3 | 156 | 16 | **10.3** | Below average |
| Sharp-tailed Sandpiper *C. acuminate* | 1 | 7 | 263 | 15 | **5.7** | Poor |
| Broadbilled Sandpiper *Limicola falcinellus* | 1 | 2 | 53 | 8 | **10.9** | (?Below average) |
| Non-arctic northern migrants | | | | | | |
| Greater Sand Plover *Charadrius leschenaultii* | 4 | 8 | 489 | 170 | **34.8** | Very good |
| Terek Sandpiper *Xenus cinereus* | 0 | 4 | 122 | 23 | **18.8** | Good |
| Grey-tailed Tattler *Heteroscelus brevipes* | 0 | 9 | 99 | 24 | **24.2** | Good |
| Common Greenshank *Tringa nebularia* | 0 | 1 | 21 | 1 | **(4.8)** | (? Poor) |
| Whimbrel *Numenius phaeopus* | 0 | 1 | 25 | 1 | **(4.0)** | (? Poor) |
| Oriental Plover *Charadrius veredus* | 0 | 4 | 26 | 4 | **7.5** | (?Poor) |
| Eastern Curlew *Numenius madagascarensis* | 0 | 2 | 26 | 4 | **15.4** | (?Good) |

All birds cannon-netted in period 1 November to mid-March - brackets indicate small sample size and figures should be viewed with caution and are not included in calculating averages – see other tables.

**Table 3**. Percentage of first year birds in wader catches in south-east Australia 1998/1999 to 2009/2010

| Species | 98/99 | 99/00 | 00/01 | 01/02 | 02/03 | 03/04 | 04/05 | 05/06 | 06/07 | 07/08 | 08/09 | 09/10 | *Average (11 yrs)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ruddy Turnstone *Arenaria intepres* | 6.2 | 29 | 10 | 9.3 | 17 | 6.7 | 12 | 28 | 1.3 | 19 | 0.7 | 19 | *12.7* |
| Red-necked Stint *Calidris ruficollis* | 32 | 23 | 13 | 35 | 13 | 23 | 10 | 7.4 | 14 | 10 | 15 | 12 | *17.5* |
| Curlew Sandpiper *C. ferruginea* | 4.1 | 20 | 6.8 | 27 | 15 | 15 | 22 | 27 | 4.9 | 33 | 10 | 27 | *16.8* |
| Sharp-tailed Sandpiper *C. acuminate* | 11 | 10 | 16 | 7.9 | 20 | 39 | 42 | 27 | 12 | 20 | 3.6 | 32 | *18.9* |
| Sanderling *C. alba* | 10 | 13 | 2.9 | 10 | 43 | 2.7 | 16 | 62 | 0.5 | 14 | 2.9 | 19 | *16.1* |
| Red Knot *C. canutus* | (2.8) | 38 | 52 | 69 | (92) | (86) | 29 | 73 | 58 | (75) | (-) | (-) | *53.1* |
| Bar-tailed Godwit *Limosa lapponica* | 41 | 19 | 3.6 | 1.4 | 16 | 2.3 | 38 | 40 | 26 | 56 | 29 | 31 | *24.6* |

All birds cannon-netted between mid November and third week in March (except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only). Averages (for last 11 years) exclude figures in brackets (small samples) and **exclude** 2009/2010 figures.

*not* include the current year's data. This change has been made to facilitate a better comparison between the new results and those collected in earlier years.

## DISCUSSION

In Australian terms this was the "year we had to have"! It was a record "good" year for breeding success for most of the wader populations which spend the non-breeding season in NWA and a good/very good year for all but one of the species regularly monitored in SEA. This welcome turn-round from the disastrous breeding success experienced by most of these species in 2008 is especially welcome. Presumably it resulted from most of the factors affecting breeding success being favourable in 2009 (Soloviev & Tomkovich 2010)... There must have been a propitious combination of an early snowmelt, above average June/July temperatures, absence of late snowfalls and low predation levels.

### South-east Australia

In recent years Curlew Sandpiper seem to have fluctuated between particularly good and particularly bad breeding success. The 2009/10 percentage of juveniles (27%) was the second highest in the last 12 years. Their current population is still well below previous levels and a more sustained period of good breeding success is required. In contrast Sharp-tailed Sandpiper returned to a high level of breeding success (32% juveniles), continuing a long series of eight good years which was only interrupted by the poor performance of 2008 (3.6%). Bar-tailed Godwit (31%) also continued their recent run of six consecutive above-average breeding years. Ruddy Turnstone and Sanderling (both 19%) showed a welcome return to good breeding success after a disastrous performance in 2008.

It is a pity that no data could be collected on Red Knot. However there was a marked increase in the population counted in the main Victorian habitat (Corner Inlet) and it is probable that 2009 was a good breeding season for this species.

Red-necked Stint again had a breeding outcome slightly below the long-term average. It is now seven years since Red-necked Stint had an above average breeding performance.

Table 4. Percentage of first year birds in wader catches in north-west Australia 1998/1999 to 2009/2010

| Species | 98/99 | 99/00 | 00/01 | 01/02 | 02/03 | 03/04 | 04/05 | 05/06 | 06/07 | 07/08 | 08/09 | 09/10 | *Average (11 yrs)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Red-necked Stint – *Calidris ruficollis* | 26 | 46 | 15 | 17 | 41 | 10 | 13 | 20 | 21 | 20 | 10 | 17 | *21.7* |
| Curlew Sandpiper – *C. ferruginea* | 9.3 | 22 | 11 | 19 | 15 | 7.4 | 21 | 37 | 11 | 29 | 10 | 35 | *17.5* |
| Great Knot – *C. tenuirostris* | 2.4 | 4.8 | 18 | 5.2 | 17 | 16 | 3.2 | 12 | 9.2 | 12 | 6 | 41 | *9.6* |
| Red Knot – *C. canutus* | 3.3 | 14 | 9.6 | 5.4 | 32 | 3.2 | (12) | 57 | 11 | 23 | 12 | 52 | *17.0* |
| Bar-tailed Godwit – *Limosa lapponica* | 2.0 | 10 | 4.8 | 15 | 13 | 9.0 | 6.7 | 11 | 8.5 | 8 | 4 | 28 | *8.4* |
| Non-arctic northern migrants | | | | | | | | | | | | | |
| Greater Sand Plover – *Charadrius leschenaultii* | 25 | 33 | 22 | 13 | 32 | 24 | 21 | 9.5 | 21 | 27 | 27 | *35* | *23.2* |
| Terek Sandpiper – *Xenus cinereus* | 12 | (0) | 8.5 | 12 | 11 | 19 | 14 | 13 | 11 | 13 | 15 | *19* | *12.9* |
| Grey-tailed Tattler – *Heteroscelus brevipes* | 26 | (44) | 17 | 17 | 9.0 | 14 | 11 | 15 | *28* | 25 | 38 | *24* | *20.0* |

All birds cannon-netted in the period 1 November to mid-March. Averages (for last 11 years) exclude figures in brackets (small samples) and **exclude** 2009/2010 figures

**North-west Australia**

It was a wonderful experience to be catching juvenile birds in such large numbers during our main sampling period in NWA in the 2009/10 season. Almost all species which are regularly sampled had a good/very good/excellent breeding outcome in 2009. For Curlew Sandpiper (35%), Great Knot (41%), Bar-tailed Godwit (28%) and Greater Sand Plover (35%) breeding success was the highest recorded in 12 years of monitoring in NWA. In Red Knot (52%) it was the second highest figure ever. Of the main study species only Red-necked Stint (17%) had an outcome below (only slightly) the long-term average.

The high productivity of Great Knot and Bar-tailed Godwit is particularly welcome given the huge losses of feeding habitat these species have experienced in their main migratory stopover regions of the Yellow Sea. One might speculate whether the high breeding success is an indication of density dependent factors coming into play. However this seems unlikely on the arctic breeding grounds. Considering the high breeding success values for other species in 2009 it seems more likely an effect of favourable climatic and predation conditions in their breeding areas.

It is interesting that Broad-billed Sandpiper (11%) and Sanderling (10%), the two species most similar in size to Red-necked Stint, also appear to have had relatively poor breeding outcomes in 2009. In contrast Eastern Curlew, which are rarely sampled, had 15% juveniles – unexpectedly high for a large species and well above the occasional data collected on this species in previous years.

Sharp-tailed Sandpiper do not normally occur in sufficient numbers on the shores in NWA for their breeding success to be monitored annually. However unusually large numbers were present on the shores in November 2009 and these proved to be mostly adults. Only 5.7% were juveniles which compares with a much higher figure (32%) for Sharp-tailed Sandpipers sampled in SEA. It is also interesting to compare the 5.7% figure from cannon-netted birds in NWA with the figure for 72 Sharp-tailed Sandpipers mist-netted (58%) at the inland freshwater site of Lake Eda, near Broome.

## CONCLUSION

There is no doubt that the 2009 breeding season was a very good one – in several cases a record one - for most of the wader populations which spend the non-breeding season in SEA and NWA. Quite why Red-necked Stint seem to have had a below average outcome in so many recent years, in both regions, is not apparent. Breeding success in 2009 appears to have been especially good many species nesting in the high arctic including Red Knot (piersmai), Curlew Sandpiper and Ruddy Turnstone but not for Sanderling. It was also generally good for many species nesting in the lower latitudes.

Percentage juvenile monitoring in SEA and NWA will continue in the 2010/2011 season. However the main monitoring period in NWA will move from November to the late February/early March period, (for non-wader reasons). This is still within the specified 1st November to mid-March sampling period, when adult and juvenile populations are considered stable. The ongoing monitoring of breeding productivity is fundamental to understanding reasons for population changes recorded in the long-term wader count programs.

## ACKNOWLEDGEMENTS

Enormous thanks are due to those in the Victorian Wader Study Group, and those who have taken part in north-west Australia wader expeditions and other catching activities there, for all their hard work which enabled good samples of the main wader species to be caught in the 2009/10 season. Their preparedness to go into the field regularly, often at some inconvenience and under difficult climatic conditions,

is fundamental to our achieving the required minimum samples of key monitoring species each year.

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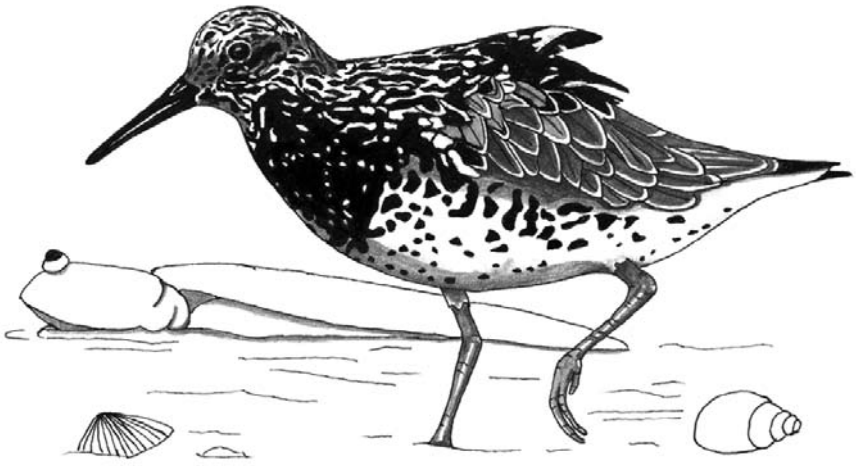

# REPORT OF NORTH-WEST AUSTRALIA WADER AND TERN EXPEDITION 31ST OCTOBER TO 21ST NOVEMBER 2009

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## INTRODUCTION

Special visits to north-west Australia have been undertaken almost every year since 1981 to carry out intensive wader banding and counting studies. Initially the emphasis was on determining wader populations in the different areas and on finding out the migration routes and destinations of each species. More recently the emphasis has switched to counts to monitor fluctuations in population levels (via the MYSMA Project) and on catching birds to measure annual reproduction (via % juveniles) and survival rates. Throughout the 28 year period the NWA Expeditions have also fulfilled an important role in training researchers, from within Australia and from overseas, in the techniques of catching, banding, ageing and processing (including recording primary moult) waders (and terns).

The 2009 visit took place in the period 31st October to 21st November. These dates are slightly earlier than normal, because of the timing of suitable tides, but still within the window in which the annual sampling needs to take place (1st November to mid-March). The results are detailed below.

## MAIN ACHIEVEMENTS

### Catching

The catching pattern in 2009 was rather different from that of other years. Although one or more catches was made on every day, except one, on which nets were set the success rate at the beginning and end of the expedition was much greater than during the middle 10-day period (Table 1). The net result was that the sample of birds caught at 80 Mile Beach (632) was less than half the normal level even though the total for the expedition (4282) was the highest ever for a three-week visit (Table 2).

**Table 1**. NWA 2009 expedition catch totals

| CATCHES | LOCATION | NEW | RE-TRAP | TOTAL | |
|---|---|---|---|---|---|
| 1/11/2009 | Broome | 8 | 1 | 9 | |
| 1/11/2009 | Broome | 87 | 3 | 90 | All terns |
| 2/11/2009 | Broome | 203 | 1 | 204 | |
| 2/11/2009 | Broome | 1069 | 200 | 1269 | |
| 3/11/2009 | Broome | 7 | 3 | 10 | |
| ***Sub-total*** | | ***1374*** | ***208*** | ***1582*** | |
| 5/11/2009 | 80 Mile Beach | 101 | 10 | 111 | |
| 6/11/2009 | 80 Mile Beach | 220 | 14 | 234 | including 3 terns |
| 8/11/2009 | 80 Mile Beach | 54 | 1 | 55 | |
| 8/11/2009 | 80 Mile Beach | 35 | 1 | 36 | |
| 9/11/2009 | 80 Mile Beach | 1 | 0 | 1 | |
| 9/11/2009 | 80 Mile Beach | 95 | 2 | 97 | |
| 10/11/2009 | 80 Mile Beach | 37 | 0 | 37 | |
| 11/11/2009 | 80 Mile Beach | 61 | 0 | 61 | |
| ***Sub-total*** | | ***604*** | ***28*** | ***632*** | |
| 13/11/2009 | Lake Eda | 115 | 1 | 116 | including 17 terns |
| 14/11/2009 | Broome | 52 | 1 | 53 | |
| 15/11/2009 | Broome | 321 | 84 | 405 | |
| 16/11/2009 | Broome | 575 | 114 | 689 | |
| 17/11/2009 | Broome | 168 | 34 | 202 | |
| 18/11/2009 | Broome | 124 | 20 | 144 | |
| 19/11/2009 | Broome | 25 | 0 | 25 | |
| 19/11/2009 | Broome | 195 | 24 | 219 | |
| 20/11/2009 | Broome | 197 | 18 | 215 | |
| ***Sub-total*** | | ***1772*** | ***296*** | ***2068*** | |
| **TOTAL** | | **3750** | **532** | **4282** | |

**Table 2**. Comparison of catches during the 2006, 2007, 2008 and 2009 expeditions

| CATCHES | YEAR | NEW | RE-TRAP | TOTAL |
|---|---|---|---|---|
| Broome | 2006 | 857 | 174 | 1031 |
| | 2007 | 985 | 223 | 1208 |
| | 2008 | 807 | 184 | 991 |
| | 2009 | 1374 | 208 | 1582 |
| 80 Mile Beach | 2006 | 1619 | 55 | 1674 |
| | 2007 | 1690 | 95 | 1785 |
| | 2008 | 1215 | 62 | 1277 |
| | 2009 | 604 | 28 | 632 |
| Broome | 2006 | 1120 | 176 | 1296 |
| | 2007 | 861 | 192 | 1053 |
| | 2008 | 567 | 88 | 655 |
| | 2009 | 1772 | 296 | 2068 |
| **TOTAL** | **2006** | **3596** | **405** | **4001** |
| | **2007** | **3536** | **510** | **4046** |
| | **2008** | **2589** | **334** | **2923** |
| | **2009** | **3750** | **532** | **4282** |

The main reason for the relatively poor catching performance at 80 Mile Beach was that birds were spread out over a much greater length of the coast than usual, and overall populations of some species were significantly smaller than in the past. Instead of most waders being concentrated in the section of 80 Mile Beach between 10 and 26 km south of the Anna Plains entrance, they were spread right down to at least 60 km south. Even though catching was attempted down there on two days success was poor because of the much wider sandy beaches which led to birds not being concentrated along the tide edge. It was a strange experience having to try really hard to catch Great Knot and Bar-tailed Godwits on 80 Mile Beach when in the past one of the problems was having to keep such species from dominating catches.

Some of the highlights of the catching program are detailed below:

a) The expedition got off to a good start with a catch of 90 terns, 70 of which were Roseates, at Coconut Well (12 km north of Broome) on 1 Nov. A net was also fired on a potential catch of up to 200 Sanderling but the wind, and excessive sand camouflage, held the net back and only eight were caught.

b) The next day was one which will be remembered by all participants for a long time. Taking advantage of the large team (30+) we split into two groups to catch at locations about 1 km apart. One group made an excellent catch of 204, including the unusual number (for the tidal shores) of 161 Sharp-tailed Sandpiper. The other group made a rather bigger catch than planned – 1269, including 944 Red-necked Stints, 129 Curlew Sandpipers and 63 Broad-billed Sandpipers (a record for this species for Broome). One of the Broad-billed Sandpipers carried a Chinese band.

c) During seven days' catching at 80 Mile Beach the largest of the eight catches was 234 and only one other catch exceeded 100. The mixture however was quite good, with Oriental Plovers present in most catches resulting in a total of 53 for the expedition.

d) As usual a night of mist-netting at Lake Eda took place immediately after the return from 80 Mile Beach to Broome. Of the 116 birds caught Sharp-tailed Sandpipers (72), as usual, dominated.

e) Catch sizes increased again back at Roebuck Bay, Broome, with a notable total of 689 on the 16th November. This included 425 Great Knot (including 4 controls from China) and 171 Red Knot (also including a Chinese control). Other good catches at Broome included one with 25 Whimbrel and another of 25 Eastern Curlew (the largest catch of this species for some years). Unusually large numbers of Sharp-tailed Sandpipers also continued to be caught on the shore.

f) Catching concluded with a return to Coconut Well on 20th November when 139 Sanderling were caught and 69 Great Knot (including two from China).

The catch totals for each species are given in Table 3. For nine wader species the total exceeded 100. Numbers for these species were Red-necked Stint 1171, Great Knot 849, Greater Sand Plover 343, Sharp-tailed Sandpiper 335, Curlew Sandpiper 287, Red Knot 284 and Bar-tailed Godwit 232. This is probably the largest catch of Sharp-tailed Sandpipers made on any expedition. The totals for Red Knot and Curlew Sandpiper were also good but Bar-tailed Godwit numbers were well down. Grey-tailed Tattler and Terek Sandpiper catch totals were also a little below normal.

**Retraps and Controls**

The proportion of waders already carrying bands (12.7%) was similar to recent years. This mainly derives from the high proportion of birds in Roebuck Bay carrying bands, with the retrap rate there (13.8%) greatly exceeding that at 80 Mile Beach (4.4%).

Old birds were retrapped from a wide variety of species (Table 4), the oldest individuals for each species were Bar-Tailed Godwit (22 years), Great Knot (21+), Lesser Sand Plover (17+), Red Knot (17+), Curlew Sandpiper (16), Grey-tailed Tattler (15+), Greater Sand Plover (15+), Red-necked Stint (14), Sanderling (10+), Little Tern (10+). Ages of 15-20 years are achieved by a small proportion of all the wader species in Australia, but few survive for longer than that. The record in N.W. Australia is held by a Bar-Tailed Godwit (29 years).

We also controlled eight birds originally banded overseas. All were from China – 6 Great Knot, 1 Red Knot and 1 Broad-billed Sandpiper.

**Proportion of Juveniles**

The number of juveniles of each species caught is given in Table 3. Figures for the % of juveniles of the species which are monitored annually in north-west Australia are given in Table 5. It can be seen, from a comparison with the average % of juveniles in catches during the previous 11 years, that

**Table 3**: NWA 2009 Expedition - Wader and Tern catch Details

| SPECIES | Catch Totals | | | | |
|---|---|---|---|---|---|
| | ***New*** | ***Retrap*** | ***Total*** | ***Juveniles*** | % juv |
| Bar-tailed Godwit | 193 | 39 | 232 | 65 | *28* |
| Black-fronted Plover | 6 | 0 | 6 | 0 | *0* |
| Black-tailed Godwit | 1 | 0 | 1 | 0 | *0* |
| Black-winged Stilt | 2 | 0 | 2 | 0 | *0* |
| Broad-billed Sandpiper | 72 | 1 | 73 | 8 | *11* |
| Common Greenshank | 21 | 2 | 23 | 1 | *4* |
| Curlew Sandpiper | 229 | 58 | 287 | 102 | *36* |
| Eastern Curlew | 26 | 0 | 26 | 4 | *15* |
| Great Knot | 744 | 105 | 849 | 371 | *44* |
| Greater Sand Plover | 311 | 32 | 343 | 135 | *39* |
| Grey Plover | 4 | 1 | 5 | 1 | *20* |
| Grey-tailed Tattler | 86 | 13 | 99 | 24 | *24* |
| Lesser Sand Plover | 4 | 1 | 5 | 1 | *20* |
| Little Curlew | 1 | 0 | 1 | 0 | *0* |
| Long-toed Stint | 3 | 0 | 3 | 3 | *100* |
| Marsh Sandpiper | 3 | 0 | 3 | 2 | *67* |
| Masked Lapwing | 5 | 0 | 5 | 0 | *0* |
| Oriental Plover | 53 | 0 | 53 | 4 | *8* |
| Pied Oystercatcher | 2 | 0 | 2 | 1 | *50* |
| Red Knot | 256 | 28 | 284 | 148 | *52* |
| Red-capped Plover | 37 | 3 | 40 | 2 | *5* |
| Red-necked Stint | 972 | 199 | 1171 | 198 | *17* |
| Ruddy Turnstone | 7 | 2 | 9 | 5 | *56* |
| Sanderling | 140 | 16 | 156 | 16 | *10* |
| Sharp-tailed Sandpiper | 321 | 14 | 335 | 57 | *17* |
| Sooty Oystercatcher | 6 | 3 | 9 | 0 | *0* |
| Terek Sandpiper | 112 | 10 | 122 | 23 | *19* |
| Whimbrel | 23 | 2 | 25 | 1 | *4* |
| Wood Sandpiper | 3 | 0 | 3 | 2 | *67* |
| **TOTAL WADERS (28 species)** | **3643** | **529** | **4172** | | |
| Common Tern | 15 | 1 | 16 | 0 | *0* |
| Crested Tern | 1 | 0 | 1 | 0 | *0* |
| Little Tern | 4 | 1 | 5 | 1 | *20* |
| Roseate Tern | 69 | 1 | 70 | 1 | *1* |
| Whiskered Tern | 18 | 0 | 18 | 0 | *0* |
| **TOTAL TERNS (5 species)** | **107** | **3** | **110** | | |
| **TOTAL Waders + Terns** | **3750** | **532** | **4282** | | |

NB mist-netted birds are included in the totals

almost all the wader populations spending the non-breeding season in north-west Australia had good breeding success in the 2009 arctic summer. Overall it was probably one of the best ever breeding seasons.

It was particularly pleasing that Red Knot (52%) and Great Knot (44%) both had record breeding success – much needed in these two species where populations have declined so markedly in recent years. The Bar-tailed Godwit (28%) figure was also a record and the figure for Curlew Sandpiper (36%) was only marginally less than the previous highest ever. Even Greater Sand Plover (39%) had a record year. Only for Red-necked Stint was the outcome below average (17% versus 21%).

In contrast Sharp-tailed Sandpiper appear to have had a poor breeding year in 2009 with only 6% juveniles (if the mist-netting sample is excluded, because mist-netting always gives an above average figure). For Sanderling also breeding success does not appear to have been particularly good (10%).

The 2009 generally good breeding outcome is especially welcome after the extremely poor performance achieved in the 2008 breeding season.

**Avian Influenza Testing**

John Curran again collected faecal samples, on behalf of AQIS, from waders caught at Broome during the third week of the expedition. These will be tested for Avian Influenza and other avian-borne diseases (live viruses and antibodies from previous infections).

**Table 4**. Oldest Recaptures made during NWA 2009 expedition

| SPECIES | DATE BANDED | BANDING LOCATION | AGE AT BANDING | RETRAP DATE | RETRAP LOCATION | MINIMUM AGE AT RETRAP |
|---|---|---|---|---|---|---|
| Bar-tailed Godwit | 25/03/1988 | Roebuck Bay | 1 | 15/11/2009 | Roebuck Bay | 22 |
| Bar-tailed Godwit | 31/03/1990 | Roebuck Bay | 2+ | 15/11/2009 | Roebuck Bay | 21+ |
| Bar-tailed Godwit | 3/03/1994 | Roebuck Bay | 2+ | 16/11/2009 | Roebuck Bay | 17+ |
| Curlew Sandpiper | 28/07/1994 | Roebuck Bay | 1 | 2/11/2009 | Roebuck Bay | 16 |
| Curlew Sandpiper | 2/07/1995 | Roebuck Bay | 1 | 2/11/2009 | Roebuck Bay | 15 |
| Greater Sand Plover | 24/09/1998 | Roebuck Bay | 3+ | 15/11/2009 | Roebuck Bay | 13+ |
| Greater Sand Plover | 11/04/1996 | Roebuck Bay | 2+ | 15/11/2009 | Roebuck Bay | 15+ |
| Great Knot | 31/03/1990 | Roebuck Bay | 2+ | 15/11/2009 | Roebuck Bay | 21+ |
| Great Knot | 12/10/1992 | Roebuck Bay | 3+ | 15/11/2009 | Roebuck Bay | 19+ |
| Great Knot | 5/03/1994 | Roebuck Bay | 2+ | 16/11/2009 | Roebuck Bay | 17+ |
| Great Knot | 20/07/1996 | Roebuck Bay | 2+ | 17/11/2009 | Roebuck Bay | 15+ |
| Grey-tailed Tattler | 5/03/1996 | Roebuck Bay | 2+ | 18/01/2009 | Roebuck Bay | 15+ |
| Lesser Sand Plover | 31/03/1994 | Roebuck Bay | 2+ | 15/11/2009 | Roebuck Bay | 17+ |
| Little Tern | 10/10/2001 | Coconut Well | 2+ | 1/11/2009 | Coconut Well | 10+ |
| Red-necked Stint | 28/08/1998 | Roebuck Bay | 2 | 2/11/2009 | Roebuck Bay | 12 |
| Red-necked Stint | 10/04/1996 | Roebuck Bay | 1 | 2/11/2009 | Roebuck Bay | 14 |
| Red-necked Stint | 26/10/1998 | 80 Mile Beach | 2 | 15/11/2009 | Roebuck Bay | 12 |
| Red Knot | 21/08/1998 | 80 Mile Beach | 2 | 9/11/2009 | 80 Mile Beach | 12 |
| Red Knot | 22/10/1998 | 80 Mile Beach | 3+ | 9/11/2009 | 80 Mile Beach | 13+ |
| Red Knot | 12/10/1998 | Roebuck Bay | 3+ | 15/11/2009 | Roebuck Bay | 13+ |
| Red Knot | 16/04/1994 | Roebuck Bay | 2+ | 16/11/2009 | Roebuck Bay | 17+ |
| Sanderling | 30/10/2001 | Coconut Well | 3+ | 20/10/2009 | Coconut Well | 10+ |
| Sanderling | 30/10/2001 | Coconut Well | 3+ | 20/10/2009 | Coconut Well | 10+ |

**Table 5**. % Juveniles in N.W. Australia Cannon-net Catches 1-21 November 2009

| SPECIES | Total Catch | % Juv. | % Juv 98/99 to 08/09 | Assessment of 2009 breeding success |
|---|---|---|---|---|
| Great Knot | 849 | 44 | 9.7 | Excellent |
| Bar-tailed Godwit | 232 | 28 | 8.2 | Very good |
| Red Knot | 284 | 52 | 17.0 | Excellent |
| Curlew Sandpiper | 287 | 36 | 17.4 | Very good |
| Red-necked Stint | 1171 | 17 | 21.8 | Average |
| Grey-tailed Tattler | 99 | 24 | 19.9 | Good |
| Terek Sandpiper | 122 | 19 | 14.0 | Good |
| Greater Sand Plover | 343 | 39 | 23.2 | Very good |

## OTHER MATTERS

### Participants

The 2009 team (37 in total) was larger than for many years, with typically 30 to 34 people present at any one time. 25 participants came from Australia and 12 from overseas.

25 Australia (12 VIC, 7 WA, 2 QLD, 2 NT, 1 SA, 1 NSW)
5 UK
2 Netherlands
2 China
1 Canada
1 Hong Kong
1 New Zealand

### Itinerary

Slightly more days were spent catching at Broome (10) than at 80 Mile Beach (7). As usual the visit to 80 Mile Beach was sandwiched between a short period at Broome at the beginning of the expedition and a longer period at the end. Locations are governed by the heights/times of the high tide each day.

### Finances

Costs of the expedition were largely borne by the participants, who paid $30 per day towards food and equipment costs and $250 per week for transport costs. The 2009 expedition's finances appear headed for a successful outcome, though some income, expenditure and items still have to be finalized. To date income has been $40,790 and expenditure $37,575, giving a current surplus of $3215. Any surplus will be carried forward to the next expedition.

### Passerines

A total of 190 birds of 21 species were caught in four early morning mist-netting sessions and several afternoon sessions at Anna Plains Station and around the Broome Bird Observatory (Table 6). Double-barred Finch (58), Brown Honeyeater (29) and Singing Honeyeaters (25) were the most numerous species caught, with 21 Budgerigars probably being the most enjoyable to see in the hand. Other highlights included a group of Grey-crowned Babblers, a Tawny Frogmouth and a Sacred Kingfisher.

**Table 6**. NWA 2009 Expedition - Passerine species summary

| **Location** | **Anna Plains Station** | | | **Broome** | | |
|---|---|---|---|---|---|---|
| SPECIES | Hidden Valley | Homestead | Passerine Bore | Lake Eda | Observatory | Total |
| Australasian Pipit | | | | 1 | | 1 |
| Bar-shouldered Dove | | | 1 | | | 1 |
| Black-chinned Honeyeater | | | 1 | | | 1 |
| Brown Honeyeater | | | 19 | | 10 | 29 |
| Budgerigar | | | 21 | | | 21 |
| Double-barred Finch | | | | | 58 | 58 |
| Grey-crowned Babbler | | | 5 | | | 5 |
| Little Friarbird | | | | | 1 | 1 |
| Mistletoebird | | | 1 | | 1 | 2 |
| Peaceful Dove | 2 | | 2 | | 4 | 8 |
| Pied Butcherbird | | 2 | | | | 2 |
| Red-wing Parrot | | | 1 | | | 1 |
| Rufous Whistler | | | 2 | | 3 | 5 |
| Rufous-throated Honeyeater | 2 | | 8 | | 5 | 15 |
| Sacred Kingfisher | | | 1 | | | 1 |
| Singing Honeyeater | 9 | | 16 | | | 25 |
| Spiny-cheeked Honeyeater | | | 1 | | | 1 |
| Tawny Frogmouth | | 1 | | | | 1 |
| White-breasted Woodswallow | | | | 4 | | 4 |
| White-throated Gerygone | | | 2 | | | 2 |
| Yellow-throated Miner | 2 | 2 | 2 | | | 6 |
| **TOTAL** | **15** | **5** | **83** | **5** | **82** | **190** |

**Next Expedition**

For the next expedition to NWA we will be departing from the usual November dates. The next expedition will therefore take place in 2011 - from 19th February to 12th March.

We will be aiming for 25 to 28 people in the team, with as many experienced people as possible. This will be particularly important given the less-settled weather likely to be experienced at that time of year. Previous participants in NWA expeditions are strongly urged to come again in 2011. An added attraction of that time of year is the large number of Oriental Pratincole (500,000 were seen on part of 80 Mile Beach in February this year).

**Please put up your hand as soon as possible, by contacting one of the expedition leaders, if you are potentially interested in coming to NWA in February/March 2011.**

## ACKNOWLEDGEMENTS

The 2009 team was an extremely strong one and all are thanked for their huge input which resulted in a record catch total. As usual, different members of the expedition took on additional responsibilities with Maureen Christie, as the catering coordinator, carrying out the most difficult task. We again greatly thank Broome Bird Observatory (Nik Ward and his team) and the owners of Anna Plains Station (John, David and Helen Stoate) for hosting the expedition and providing accommodation. Our visits would be much less enjoyable if we were not able to live in the excellent surroundings which offset the sometimes testing tropical environment.

Several expedition members greatly assisted in minimising travel costs by making their vehicles available (Maureen Christie, Prue Wright, Chris Hassell, Maurice O'Connor, Pete Collins and Sue Abbotts). The Department of Environment and Conservation (WA) also very kindly loaned a vehicle and trailer. Other trailers were provided by Chris Hassell, George Swann, BBO and AQIS.

DEC WA again funded the participation of two people from China and BBO provided them with free accommodation. AQIS made a generous financial contribution in recognition of help provided in obtaining samples for disease testing.

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**Vignettes:**
Annie Rogers, p4, p10, p66
Debbie Sullivan, p28
Andrew Silcocks, p38
Kevin Bartram, p49

**Back Issues:**
Most volumes of *The Stilt* are available as back issues. Please contact the Secretary for details of costs and availability.

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

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