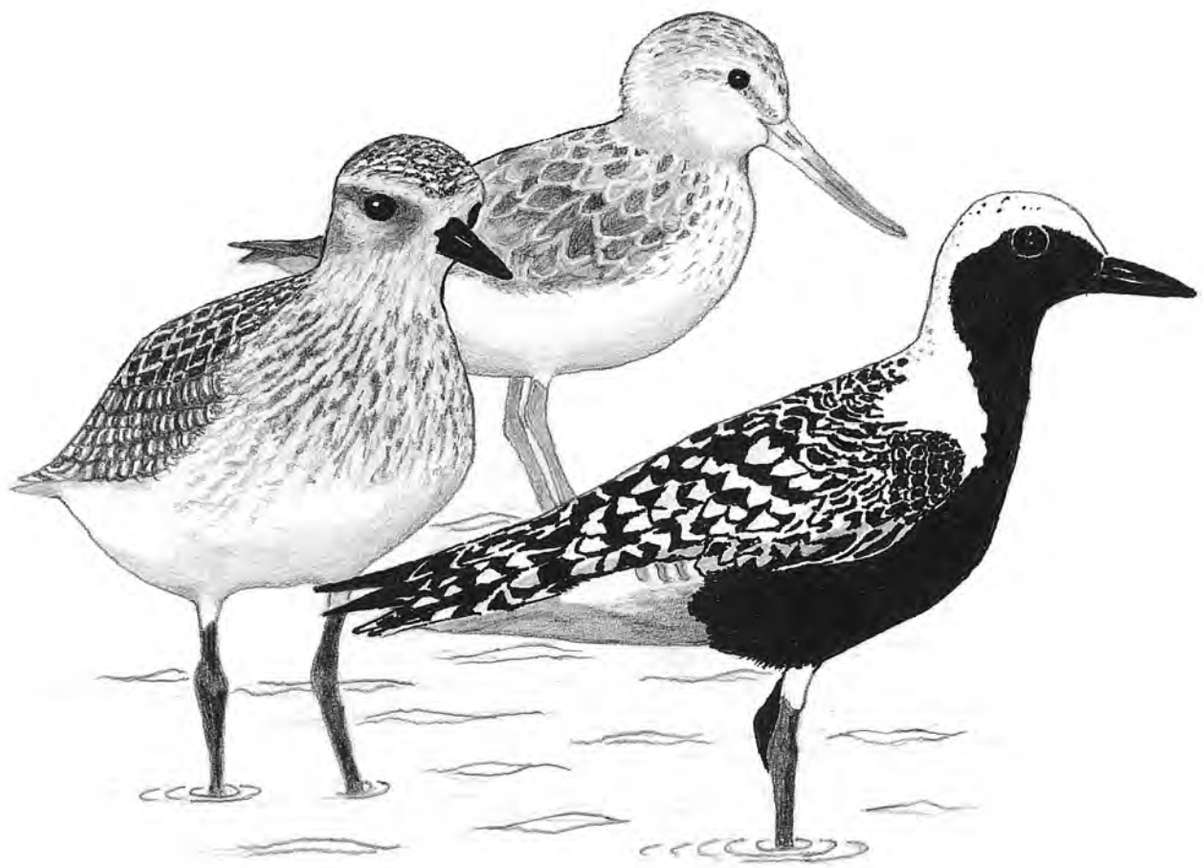
Stilt

The Journal for the East Asian-Australasian Flyway



AWSG
Australasian Wader Studies Group

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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.
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Under the Rules of the AWSG, which is a Special Interest Group of Birds Australia, all positions on the Committee are open and nominations are sought for the following:

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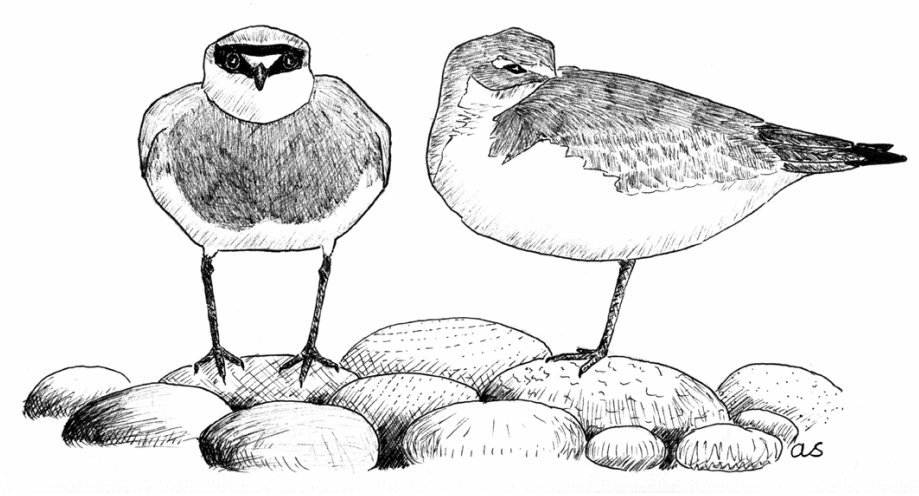
Secretary
Treasurer
Conservation Officer
Communications Officer
Up to 8 Committee members.

Nominations for the above positions, seconded by a Member of the Group should be sent to the Secretary by 31 January 2010. Should an election be necessary ballot papers will be sent out with the April 2010 *Stilt.* As there will be several of the current committee not standing for nomination, members are asked to give consideration to standing for any of these positions.

Penny Johns, *Secretary*



A REVIEW OF THE STATUS OF THE WHITE-HEADED STILT *HIMANTOPUS LEUCOCEPHALUS* IN SUMATRA (INDONESIA)

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The White-headed Stilt *Himantopus leucocephalus* is recognised as regular breeder in Sumatra. However, the status of this species as resident or only a breeding visitor is still open to question. In this paper, we summarize all records of White-headed Stilt *Himantopus leucocephalus* in Sumatra and review the current status of the species in Sumatra.

INTRODUCTION

The White-headed Stilt *Himantopus leucocephalus* is one of the waders listed as occurring in Sumatra, Indonesia. The White-headed Stilt is sometimes treated as subspecies of the Black-winged Stilt *Himantopus himantopus* but most authors (e.g. Sonobe & Usui 1993, Robson 2005) distinguish White-headed Stilt as full species. Most of Indonesian references recognize Australian *Himantopus himantopus* as White-headed Stilt *Himantopus leucocephalu*s a full species (White & Bruce 1986, Andrew 1992, Mackinnon *et al.* 1998, Behleer *et al.* 2001, Sukmantoro *et al.* 2007). We followed this recedence and split the Black-winged Stilt and Australian White-headed Stilt. In addition, splitting the Black-winged Stilt and Australian White-headed Stilt is important for population estimates of global and local shorebird populations developed by Wetland International which has adopted two sub-species (Delany and Scott 2002, Wetland International 2006, Bamford *et al.* 2008). More information on the distribution of this species (or sub-species) is required before any firm conclusions can be made regarding its range (Lopez & Mundkur 1997).

In Indonesia, the bird is a rare breeding visitor to the coast of Java and Bali and an uncommon visitor to Southern Sumatra and Kalimantan (Mackinnon *et al.* 1998), an uncommon visitor in Wallacea (Coates & Bishop 2000) and very common non-breeding visitor for Papua (Beehler *et al.* 2001).

Marle & Voous (1988) considered White-headed Stilt as a non-breeding summer visitor in Sumatra that came from Australia or else was an accidental visitor from West Java where they breed. Based on the occurrence of this species in Way Kambas National Park and a breeding record reported by Verheugt *et al.* (1993), Parrot & Andrew (1996) considered the bird as resident with seasonal movements according to water conditions. In Sumatra, the bird inhabits coastal and freshwater swamps (Marle & Voous 1988). There are several records of White-headed Stilt in Sumatra, but most records are from South Sumatra and Lampung Province (Marle & Voous 1988; Parrot & Andrew 1998; Verheugt *et al.* 1993), and only one record from West Sumatran Island (Kemp 2000). In this paper, we summarized all information and review the current status on White-headed Stilt in Sumatra.

WHITE-HEADED STILT RECORDS

Information from historical and our recent records on White-headed Stilt in Sumatra are shown in Table 1. The table summarizes all White-headed Stilt records in Sumatra since 18 January 1977 in the Lampung province, southern Sumatra. Table 1 shows that White-headed Stilt are recorded during periods of southward migration (August-October), winter (November-February), northward migration (March-April) and in summer (May-July). There are several records of White-headed Stilt in Sumatra, but most records are from South Sumatra and Lampung Province (southern Sumatra), and only one record from West Sumatran Island (Kemp 2000). The West Sumatran Island record is known as northernmost record for Sumatra.

Recent fieldwork during 2008 in the east coastal of South Sumatra province recorded single juvenile of White-headed Stilt at the Pasir River on 8 March 2008 and five juveniles at Sugihan Bay on 11 July 2008. Both locations are fishponds along the east coastal of South Sumatra province.

DISCUSSION

White-headed Stilt recorded has been recorded throughout the year in Southern Sumatra. The bird was not recorded in northern Sumatra (Aceh, north Sumatra and Riau) and a single redord was found for West Sumatran Island and is the only known record for this species in central Sumatra. Sugihan Bay was a new locality for White-headed Stilt on the east coast of southern Sumatra line. The previously known northernmost area of White-headed Stilt on the east coast of southern Sumatra line was the Pasir River. The recent record of White-headed Stilt in Sugihan Bay is now the northernmost for White-headed Stilt on the east coast of southern Sumatra line. A distribution map is provided in Figure 1. This record represents a possible expansion in range of White-headed Stilt in the northern area of the east coastal of southern Sumatra line.

The first breeding record of White-headed Stilt was during the summer-southward migration period when adults and two juveniles (less than four weeks of age) were observed on 8 September 1988 in Lebak Pampangan (Verheugt *et al.* 1993). All breeding records of White-headed Stilt in the floodplain of Ogan Komering Lebak were made

Table 1. Historical and recent records of White–headed Stilt in Sumatra.

Localities	Date	Number	Remarks	Source
1977				
Labuhan Maringgai	18 Jan 1977	3	Coastal	Holmes 1977, Marle & Voous 1988
1978				
Way Kambas National Park	Oct 1978	?	?	Marle & Voous 1988
1988				
Lebak Pampangan	8 Sep 1988	1 + 2 juv	Swampy meadow	Verheugt *et al.* 1993
Way Kambas NP	Oct 1988	115	Mudflat	Parrot & Andrew 1996
1989				
Way Kambas NP	Feb 1989	115	Mudflat	Parrot & Andrew 1996
Way Kambas NP	April 1989	16	Mudflat	Parrot & Andrew 1996
Between Lumpur to Pasir river	March 1989	20	Mudflat	Verheugt *et al.* 1993
Between Pasir river to Tanjung Lumut	March 1989	27	Mudflat	Verheugt *et al.* 1993
Between Tanjung Lumut to Sibur river	March 1989	8	Mudflat	Verheugt *et al.* 1993
Between Sibur river to Mesuji river	March 1989	45	Mudflat	Verheugt *et al.* 1993
1999				
Muara Siberut	3 Oct 1999	1	Beach and fallow ricefield	Kemp 2000
2000				
Lebak Bayas-Beti	7 June 2000	8	Swampy meadow	Iqbal 2008
Lebak Pulau Layang	8 June 2000	4 + 5 juv	Swampy meadow	Iqbal 2008
Lebak Kuro	9 June 2000	2 + 1	Swampy meadow	Iqbal 2008
2001				
Lebak Deling	17 Aug 2001	30 + 5 juv	Swampy meadow	Iqbal 2008
Lebak Pulau Layang	18 Aug 2001	6 + 1 juv	Swampy meadow	Iqbal 2008
Lebak Pulau Layang	19 Aug 2001	2 + 2 juv	Swampy meadow	Iqbal 2008
2002				
Lebak Kuro	5 Feb 2002	2	Swampy meadow	Iqbal 2008
Lebak Pulau Layang	Sep 2005	30 + 8 juv	Swampy meadow	Iqbal 2008
2005				
Lebak Deling	Sep 2005	48 + 15 juv	Swampy meadow	Iqbal 2008
2006				
Lebak Pulau Layang	15 Aug 2006	50 + 10 juv	Swampy meadow	Iqbal 2008
2008				
Pasir river	8 March 2008	1 juv	Fishpond	Recent fieldwork
Between Pasir river to Jeruju river	9 March 2008	2	Mudflat	Recent fieldwork
Lebak Deling	7 June 2008	4	Swampy meadow	Recent fieldwork
Pasir river	6 July 2008	12	Mudflat	Recent fieldwork
Sugihan Bay	11 July 2008	5 + 5 juv	Fishpond	Recent fieldwork

during the summer-southward migration period (Iqbal 2008). Unfortunately, there were no reports regarding breeding White-headed Stilt during the winter period.

An observations of a single juvenile of White-headed Stilt in Pasir River on 8 March 2008 show that White-headed stilt also breed during winter and northward migration periods. This juvenile bird is thought to have hatched between December-February in the fishpond along east coastal near Pasir River (Figure 2). After harvest, the owner of fishpond allows his pool to become dry for sustainable use. This condition is would provide suitable breeding habitat for White-headed Stilt. An observation of five adults and five juveniles in a fishpond at Sugihan Bay on 11 July 2008 show that White-headed Stilt also breed outside floodplain of Ogan Komering Lebak (Figure 3).

Marle and Voous (1988) considered White-headed Stiltas "presumably non-breeding summer visitors", from Australia or else "accidental visitors" from West Java where it breeds, but based on the occurrence of this species in Way Kambas National Park and a breeding record reported by Verheugt *et al.* (1993), Parrot and Andrew (1996) considered the bird as a resident with seasonal movement according to water conditions. Iqbal (2008) stated that White-headed Stilt is a regular breeding visitor to the floodplain of Ogan Komering Lebak but did not mention the status of this species in Sumatra.

Observations of a single juvenile on March 2008 prove that White-headed Stilt also breed in winter and northward migration in Sumatra. An observation of five adults and five juveniles of White-headed Stilt in fishpond at Sugihan Bay is record of breeding White-headed Stilt outside floodplain of

Figure 1. Distribution map of White-headed Stilt based on historical and recent records. Square represent juvenile sightings or breeding records and circles is adults records. All sites with *Lebak* in Table 1 are part of Ogan Komering Lebak.

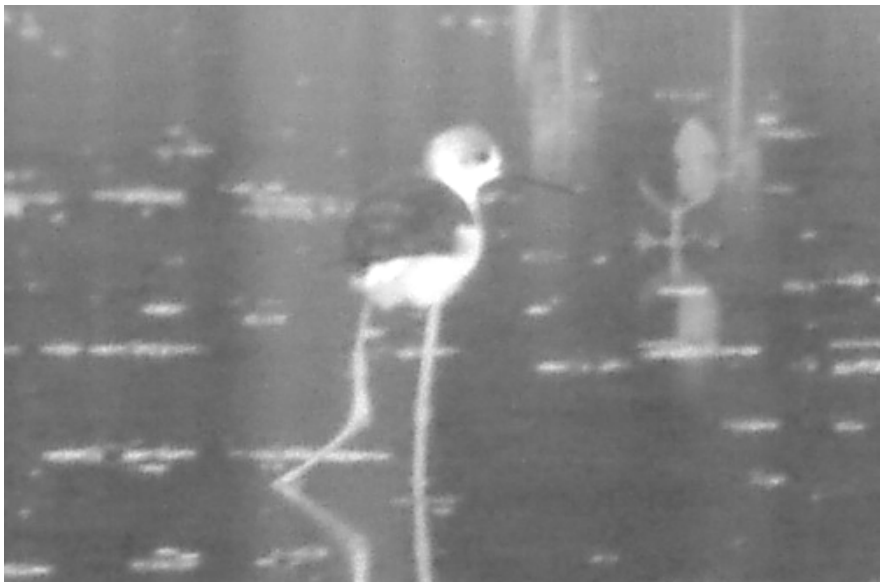

Figure 2. Single juvenile White-headed Stilt at the Pasir River on 8 March 2008.

Ogan Komering Lebak. In addition, local people in Pasir River and Sugihan bay reported that White-headed Stilt usually breed all over the year depend on water level conditions around fishpond in the area. Sightings of White-headed Stilt during 2008 outside floodplain of Ogan Komering Lebak support Parrot and Andrew (1996) hypothesis on resident status of White-headed Stilt in Sumatra based on seasonal movements according to water level conditions.

CONCLUSION

There are no historical records for White-headed Stilt before Holmes (1977). For this reason, Marle and Voous (1988) considered White-headed Stilt as “presumably non-breeding

Figure 3. Adults and juveniles of White-headed stilt in Sugihan bay on 11 July 2008.

summer visitors", from Australia or else "accidental visitors" from West Java where it breeds. On the basis available data, it is suspected that most White-headed Stilt move to the floodplain of Ogan Komering Lebak during dry season for feeding and breeding. When rainy season, they move along the east coastal of Southern Sumatra between Lampung and South Sumatra province. Productive pairs also used fishponds as breeding ground around the east coast when the pool drying. Based on these reasons, it is concluded that recent status of White-headed Stilt is resident in Sumatra. This resident population possible come from small visitor population from Australian or West Java where it previously breed.

ACKNOWLEGMENTS

Most recent field work in this survey is a part of Milky stork *Mycteria cinerea* population assessment in South Sumatra, supported by WCS RFP (Wildlife Conservation Society Research Fellowship Programme) with additional fund from Rufford Small Grant (RSG) and equipment grant from Idea Wild. We would like to thank Ir. Sumantri (Head of Sembilang National Park) and his staffs for kind cooperation for permit to entering Sembilang National Park. The first author would like to thank WCS RFP secretariat (William Banham, Ph.D., Kate Mastro, Lynn Duda and Dr. Nick Brickle), Rufford Small Grant Secretariat (Josh Cole and Jane Rufford) and Idea Wild (Dr. Wally van Sickle, Henry Stephen, Anne Marie and Sean Kelly). The first author thank to Yus Rusila Noor (Wetland International), Dr. Mike Crosby (Birdlife International) and Dr. Dewi Prawiradilaga (LIPI-Indonesia) for giving recommendation to conducting this project.

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WADER BREEDING SUCCESS IN THE 2008 ARCTIC SUMMER, BASED ON JUVENILE RATIOS OF BIRDS WHICH SPEND THE NON-BREEDING SEASON IN AUSTRALIA

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INTRODUCTION

Monitoring of the proportion of juveniles in wader populations in two different parts of Australia, 3,000 km. apart, was again continued during the 2008/2009 non-breeding season. This systematic long-term data collection program was commenced in south-east Australia (SEA) in the 1978/1979 season and in north-west Australia (NWA, Broome and 80 Mile Beach) in 1998/99. The results of the monitoring program have been published annually in Arctic Birds (Minton *et al*. 2000, 2008), ever since the second edition in 2000.

Breeding productivity is assessed using the percentage of juvenile birds in cannon-net catches of waders in the November/March period, when populations in the non-breeding areas are relatively stable. There are many potential shortcomings to this method of assessing reproduction rates (Minton *et al.* 2005), but at present it is the main method which is employed to obtain a measure of breeding success over a prolonged period on a wide range of wader species. It is not claimed that the figure obtained is other than an *index* of annual breeding success. But it should enable valid comparisons between years to be made and any longer term trends to be identified.

It is also recognised that these measures are obtained on average some six months after birds fledge and that other events in this period (including their first migration) may have variable effects between years. Nor are the figures necessarily an absolute measure of recruitment for the whole population of a species in the Flyway as different segments or age groups may migrate to different areas. Marked examples of the inhomogeneity of the distribution of juveniles in non-breeding areas occur in Red Knot and Bar-tailed Godwit with many of the juvenile birds of the New Zealand populations spending their first non-breeding season in SEA. This has the effect of magnifying the proportion of juveniles in SEA e.g. it averages more than 50% in Red Knot in SEA whereas it is normally less than 5% in North Island New Zealand (Adrian Reigen *pers.com.*).

This paper presents the data collected in the 2008/2009 season on a range of wader species in SEA and NWA. These figures are a measure of the breeding success in the 2008 Northern Hemisphere summer.

METHODS

The fieldwork program in 2008/2009 closely followed that of previous years. Only birds caught by cannon-netting are included. The collection dates were the same as used previously except that Ruddy Turnstones caught in King Island between 28th March and 2nd April 2009 were also included. The normal cut-off date for data is the 21st March but the visit to King Island took place rather later this year. Our flag-sighting and recovery data show that Ruddy Turnstones do not start leaving there until the end of the first week in April. In any case no juveniles were caught so the figures could not have been affected by adult departures!

As in other recent years the SEA data was collected at various places along the coast of Victoria, on the south-east coast of South Australia and on King Island, Tasmania (Ruddy Turnstone only).

The data in NWA was collected during the three week annual expedition in November and an intensive four day catching program in February.

No mist-netting data is included in this year's report. Too few waders were mist-netted in NWA for meaningful figures to be obtained.

Note that two measures of the norm for breeding success are given for SEA. In Table 1 the *median* of the long term dataset is given, together with the number of years for which data exists. In Table 3 the *average* of the mean percentage juvenile figures for the last 11 years is given. This also facilitates a comparison with the NWA data, where datasets are still too short for medians to be an accurate measure.

RESULTS

Adequate samples were obtained in the 2008/2009 season for five of the six species monitored annually in SEA. Red Knot were scarcer than in any previous summer of the 30-year monitoring period and it proved impossible to catch samples at either of the two (only) locations where the species was present. It was also a struggle to build up an acceptable total of Curlew Sandpipers as they were much less numerous than in the previous year. The catch sizes and totals, and the number of juveniles, for SEA are given in Table 1.

Satisfactory catch samples were obtained in NWA for all the main study species, both Arctic and non-Arctic breeders, except Ruddy Turnstone (Table 2). Additionally a good sample was obtained in the 2008/2009 year for Sanderling and Whimbrel, species which are not able to be caught in most years and so which are not therefore part of the portfolio of regularly monitored species.

Great Knot and Bar-tailed Godwit numbers were noticeably lower in NWA in 2008/2009, particularly at 80 Mile Beach, and consequently the numbers of each caught were lower than in the preceding year. The number of Curlew Sandpiper caught was also greatly reduced after the bumper year in 2007/2008.

Table 1. Percentage of juvenile/first year waders in cannon-net catches in south-east Australia in 2008/2009.

Species	No. of catches		Total caught	Juv./1st year		Long term median* % juvenile (years)	Assessment of 2008 breeding success
	Large (>50)	Small (<50)		No.	%		
Red-necked Stint *Calidris ruficollis*	8	3	2564	376	**14.7**	13.8 (31)	Average
Curlew Sandpiper *C. ferruginea*	0	4	80	8	**10.0**	10.0 (30)	Average
Bar-tailed Godwit *Limosa lapponica*	3	1	270	78	**28.9**	18.6 (20)	Very good
Red Knot *C. canutus*	0	1	1	1	**(-)**	52.1 (17)	?
Ruddy Turnstone *Arenaria intepres*	3	9	396	3	**0.7**	9.3 (19)	Very poor
Sanderling *C. alba*	1	2	172	5	**2.9**	12.4 (18)	Very poor
Sharp-tailed Sandpiper *C. acuminata*	2	2	224	8	**3.6**	11.1 (28)	Very poor

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 21 March are inclu ded. King Island Ruddy Turnstones, 28 March to 2 April, are also included.
* Includes the 2008/2009 figures

Table 2. Percentage of juvenile/first year waders in cannon-net catches in north-west Australia in 2008/2009.

Species	No. of catches		Total caught	Juv./1st year		Assessment of 2008 breeding success
	Large (>50)	Small (<50)		No.	%	
Great Knot *Calidris tenuirostris*	5	5	797	50	**6.3**	Poor
Bar-tailed Godwit *Limosa lapponica*	5	7	454	17	**3.7**	Poor
Red-necked Stint *C. ruficollis*	1	13	317	32	**10.1**	Poor
Red Knot *C. canutus*	0	7	33	4	**12.1**	Poor
Curlew Sandpiper *C. ferruginea*	3	9	283	28	**9.9**	Poor
Ruddy Turnstone *Arenaria intepres*	0	3	7	0	**(0)**	?
Sanderling *C. alba*	0	3	43	0	**0**	Very poor
Non-Arctic northern migrants						
Greater Sand Plover *Charadrius leschenaultii*	6	10	541	147	**27.2**	Good
Terek Sandpiper *Xenus cinereus*	0	10	110	17	**15.4**	Average
Grey-tailed Tattler *Heteroscelus brevipes*	0	11	153	58	**37.9**	Very good
Common Greenshank *Tringa nebularia*	0	5	45	2	**4.4**	?
Little Curlew *Numenius minutus*	0	1	49	0	**0**	Very poor
Whimbrel *Numenius phaeopus*	1	1	79	3	**3.8**	?

All birds cannon netted in period 1 November to mid-March

DISCUSSION

South-east Australia (SEA)

The overall outcome of the Northern Hemisphere 2008 breeding season for the migratory wader populations which are monitored annually in SEA was probably the poorest of any of the 30 years for which data has been collected. Only Bar-tailed Godwits, which breed in Alaska, had an above average outcome, whether measured by median or mean percentage juvenile figures. Red-necked Stint and Curlew Sandpiper productivities were only slightly below the norm but Ruddy Turnstone, Sanderling and Sharp-tailed Sandpiper figures were exceptionally poor. Indirect evidence (low overall population, complete absence from areas frequented by juveniles) suggest it was also a poor year for Red Knot breeding success.

It is now five years since Red-necked Stint (Table 3) had an above average level of breeding success. Count data shows that their population has declined significantly from the extremely high levels of the late 1990s/early 2000s, when a series of exceptionally good breeding seasons occurred.

Curlew Sandpiper continued their roller coaster ride with good and bad years alternating. The relatively poor outcome this year followed an exceptionally productive 2007 breeding season. A sustained period of above average breeding success is badly needed to reverse, as opposed to halt, the long downward trend in numbers of this species.

Sharp-tailed Sandpipers had their worst breeding outcome for 20 years. The long run of above average breeding success which this species experienced between 2002 and 2007 seems to have come to an abrupt end with only 3.6% juveniles in the 2008/2009 summer populations. Overall numbers of Sharpies are, however, still at much higher levels than they were between the late 1980s and early 2000s, as a result of the extended breeding bonanza period.

Sanderling quite regularly seem to have extremely poor breeding outcomes, but these are partly offset by occasional exceptionally good breeding success years. The 2.9% juveniles in 2008/2009 is the sixth time in the 18 years of data collection that the figure has been below 3%. Ruddy Turnstone fared even worse with only 0.7% juveniles - just three juveniles in 396 birds caught in 12 catches. This is the lowest ever figure for Ruddy Turnstone and is the second really bad breeding outcome in the last three years. Turnstones populations are noticeably reduced in Victoria, the south-east of South Australia and in King Island.

The sole good breeding outcome for SEA wader populations in 2008 was Bar-tailed Godwit. The figure was particularly good when measured against the long-term

Table 3. Percentage of first year birds in wader catches in south-east Australia 1998/1999 to 2008/2009.

Species \ Years	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	*Average (11 yrs)*
Ruddy Turnstone *Arenaria intepres*	6.2	29	10	9.3	17	6.7	12	28	1.3	19	0.7	*12.7*
Red-necked Stint *Calidris ruficollis*	32	23	13	35	13	23	10	7.4	14	10	15	*17.5*
Curlew Sandpiper *C. ferruginea*	4.1	20	6.8	27	15	15	22	27	4.9	33	10	*16.8*
Sharp-tailed Sandpiper *C. acuminata*	11	10	16	7.9	20	39	42	27	12	20	3.6	*18.9*
Sanderling *C. alba*	10	13	2.9	10	43	2.7	16	62	0.5	14	2.9	*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	*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) but do include 2008/2009 figures

median. Four of the last five years have now had an above-average percentage of juveniles. One result is that the over-wintering population in 2009 at the main habitat in Victoria (Corner Inlet) was high and has only been exceeded in three of the last 28 years. Catch data has shown that over-wintering birds are predominantly one- and two-year old birds with just a small number of three-year-olds.

The overall conclusion is that the 2008 breeding season was universally poor in the regions of the Siberian Arctic from which waders come to spend the non-breeding season in SEA. In contrast the Bar-tailed Godwits, which come from Alaskan breeding grounds, experienced a good breeding season.

North-west Australia (NWA)

The outcome of the 2008 breeding season for waders which travel from Arctic Siberia to spend the non-breeding season in NWA was the worst since regular monitoring commenced in 1998/1999 (see Table 4). All six Arctic-breeding waders showed poor or very poor breeding success. Although the Ruddy Turnstone sample was too small to obtain a realistic measure, this species also probably had a very poor breeding year.

The result for Great Knot (6.3%) was the lowest since 2004 and the Bar-tailed Godwit figure (3.7%) was the lowest since 1998. Whilst it is tempting to attribute this to the major loss of feeding habitat at Saemangeum in South Korea and other parts of the Yellow Sea in China, it is not possible to separate any such effect from the clearly widespread effects of poor weather conditions throughout the Siberian Arctic breeding region in the 2008 summer.

The Red-necked Stint and Curlew Sandpiper figures were similar to each other and close to the figures obtained for these species in SEA. It would appear that the outcome of the breeding season in 2008 was more uniform than usual over most of the area in Arctic Siberia from which wader populations come to both NWA and SEA. Ruddy Turnstone and Sanderling also seem to have had disastrous breeding seasons, again similar to the populations of those species which go to SEA. The Red Knot sample was only small but again suggested low breeding success.

In marked contrast, wader populations breeding in non-Arctic regions of Siberia and southwards into north-west China appear to have had a generally good breeding outcome for 2008. Grey-tailed Tattlers (37.9% juveniles) appear to have fared exceptionally well, the figure being higher than in any of the previous ten years of monitoring. This exceptionally high figure was exhibited in almost all the 11 individual catches.

Little Curlew seem to have been the exception amongst these less northerly breeding waders. In all previous years in which they have been sampled they have shown an exceptionally high proportion of young birds (30–57%). A complete breeding failure, as the 2008/2009 figures suggest, is therefore unexpected. It is unfortunate that a second catch was not made to check for extreme sampling inhomogeneity (or even incorrect age classification?).

Whimbrel and Common Greenshank are caught too irregularly for any datum to be obtained on what is the norm for these species. In absolute terms the percentage juvenile

Table 4. Percentage of first year birds in wader catches in north-west Australia 1998/1999 to 2008/2009.

Species \ Years	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	*Average (11 yrs)*
Red-necked Stint *Calidris ruficollis*	26	46	15	17	41	10	13	20	21	20	10	*21.7*
Curlew Sandpiper *C. ferruginea*	9.3	22	11	19	15	7.4	21	37	11	29	10	*17.5*
Great Knot *C. tenuirostris*	2.4	4.8	18	5.2	17	16	3.2	12	9.2	12	6	*9.6*
Red Knot *C. canutus*	3.3	14	9.6	5.4	32	3.2	(12)	57	11	23	12	*17.0*
Bar-tailed Godwit *Limosa lapponica*	2.0	10	4.8	15	13	9.0	6.7	11	8.5	8	4	*8.4*
Non-Arctic northern migrants												
Greater Sand Plover *Charadrius leschenaultia*	25	33	22	13	32	24	21	9.5	21	27	27	*23.2*
Terek Sandpiper *Xenus cinereus*	12	(0)	8.5	12	11	19	14	13	11	13	15	*12.9*
Grey-tailed Tattler *Heteroscelus brevipes*	26	(44)	17	17	9.0	14	11	15	*28*	25	38	*20.0*
Little Curlew *Numenius minutus*	57	33	-	36	30	-	(40)	-	-	47	0	*33.8*

All birds cannon-netted in the period 1 November to mid-March. Averages (for last 11 years) exclude figures in brackets (small samples) but **include** 2008/2009 figures

figures appear low. On the other hand in most years when samples have been obtained no juveniles at all have been caught. So the figures could indicate a good outcome for these species in 2008. This is supported by an exceptional number of one year old Whimbrel still present in NWA in the Austral "winter" of 2009.

CONCLUSION

The 2008 breeding season for wader populations which visit NWA and SEA in the non-breeding season was the worst ever recorded in these long-term monitoring programmes. No detailed examination of snowmelt and weather conditions, and predator levels, has yet been made by us but it is likely that an extremely unfavourable combination of these occurred widely across the Arctic breeding regions of Siberia in the Northern Hemisphere summer of 2008. The only previous comparable summer was in 1992 when widespread breeding failures occurred right around the Arctic regions, mainly because of a 2 deg. C. lowering of temperature by the cloud and ash cover from the recently erupted Mount Pinatubo in The Philippines (Ganter and Boyd 2000). But in that year somehow the Sanderling population which visits SEA managed to breed quite successfully.

In contrast breeding conditions in 2008 in Alaska for the SEA population of Bar-tailed Godwit and in the more central regions of Siberia for a range of other wader species seem to have been quite favourable. Grey-tailed Tattlers in particular had a record breeding year.

As we assemble these figures and write the text of this paper the 2009 breeding season will be unfolding across the Arctic. As always we shall be most anxious to commence our monitoring programs next November to find out what happened. Let us hope it is a big improvement on 2008 – it can't be worse!

ACKNOWLEDGEMENTS

The fieldwork programs which are necessary to generate sufficient data each year in SEA and NWA for an accurate assessment of breeding success are extensive and demanding. Without the tenacity, perseverance, and considerable physical effort of a great many people these extremely valuable long-term datasets could not have been obtained. Each year we face again the daunting task of keeping the program up to previous levels of achievement. It has only been done, and can only be continued, by the dedicated efforts of the large number of wader banders who take part in cannon-netting activities in SEA and NWA each summer. Huge thanks to everyone who has been involved.

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CONTINUING DECLINE IN WADER POPULATIONS AT PELICAN POINT, WESTERN AUSTRALIA, SINCE 1971

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Surveys of waders at Pelican Point, on the Swan River estuary in Perth WA, have been made weekly from November to February since 1971. There has been a general decline to almost zero in numbers of individuals and in frequency of 9 trans-equatorial migrants, but not of 4 local non-migratory waders. Non-wader water birds were also monitored. Some species have been seen less frequently than in earlier years (e.g. larger cormorants, terns, Silver Gull, Grey Teal). However, others have been relatively constant or were present more often than in earlier years (e.g. smaller cormorants, Fairy Tern, Black Swan). Changes at Pelican Point include greater recreational use especially by water craft and kite surfers. There has been a marked decrease in rainfall in the catchment area so that the water may be more saline. However the continued presence of local waders and other waterbirds suggests these changes cannot explain the decline in trans-equatorial waders.

INTRODUCTION

Pelican Point (Point Currie) is a triangular area 500m X 200m which projects into the Swan River at Nedlands, 5km west of central Perth, Western Australia (Creed & Bailey 1998). It contains small trees/shrubs, low sand dunes and a lagoon, and has been separated from the rest of the river fore-shore by a fence since 1976. In 1990 Pelican Point, together with the adjacent shallow area of the Swan River, Alfred Cove and Milyu, was designated the "Swan Estuary Marine Park" for the protection of waders (Figure 1).

The bird life on the Swan River was first reported by Alexander in 1921 and a description of Pelican Point and its birds was published by Serventy in 1938. The occurrence and behaviour of waders, which were present then in thousands, were studied extensively by Serventy for many years. Since 1971 a group has been has been visiting the

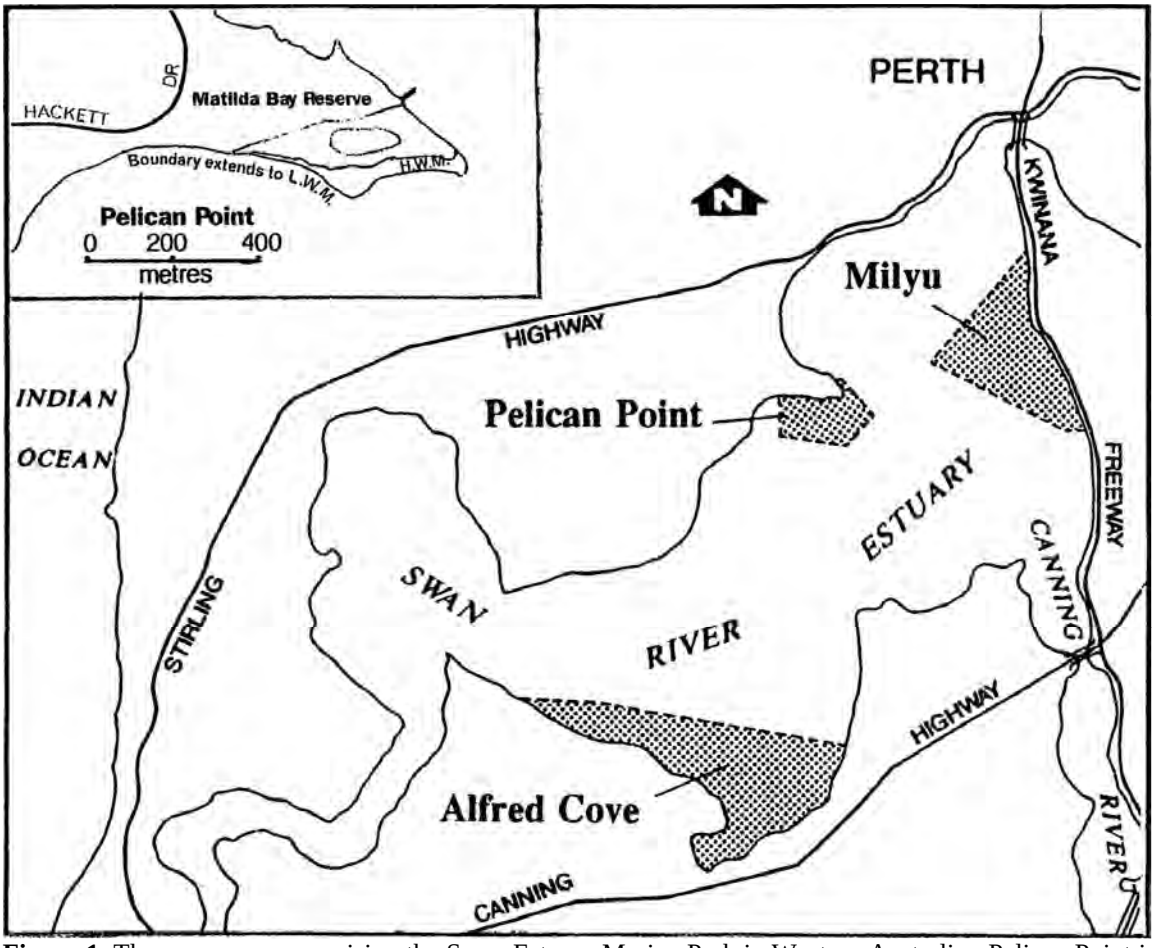

Figure 1. Three reserves comprising the Swan Estuary Marine Park in Western Australia. Pelican Point is enlarged in the inset.

Point weekly, originally in the summer months, to monitor the waders and other water birds. In 1985, the Metropolitan Bird Survey of all birds in Perth was initiated and from that time all species were monitored at Pelican Point throughout the year. The presence of all birds, compared with earlier records, was published in 1989 (Bailey & Creed 1989, Job 1972, Serventy 1938).

Subsequently, the frequency of occurrence of waders and the number of individual birds showed that there was a decrease in some species in 1981-91 compared with 1971-81 (Bailey & Creed 1993). By 1998 three species, Curlew Sandpiper, Sharp-tailed Sandpiper and Bar-tailed Godwit, were rarely seen and most other equatorial species had declined sharply. By contrast, there was little change in local waders (Creed & Bailey 1998).

The present paper reports further changes in the last 10 years of local and equatorial waders. In addition, the populations since 1971 of three other groups of water birds (ducks, terns and cormorants) is presented in order to establish whether the decline in waders can be due to local changes that make this part of the Swan River less attractive to all species.

METHODS

Visits were made to Pelican Point weekly, usually at 5.30pm on a weekday in summer and 4.30pm in winter. Between 1971 and 1985 most visits were made in the summer months (September to April). Subsequently, visits were made throughout the year. During each visit, all waders and water birds were recorded and the numbers of each species was noted. If more than 100 birds were present, an estimate was made by comparing the total area occupied by the group with the area occupied by 50 or 100 birds. A detailed analysis of wader species was carried out for the months of November to February, in order to assess any changes since 1998 in the frequency (% of visits that birds were present) and numbers of individuals present per visit (Creed & Bailey 1998). The average frequency for 5 successive year periods was calculated (5 year moving average) to smooth out annual fluctuations and make overall trends more obvious. For other water birds (ducks, terns and cormorants) records from 1971 for the entire year were analysed for % of visits, and in addition number of individuals, which month they were present and the preferred habitat was noted.

RESULTS

The Waders

In the 1998 paper (which reported on November to February observations from 1971 to 1998) it was found that almost all species of migratory waders were seen less frequently in the later years. The only exception was Greenshank (*Tringa nebularia*) which had changed little. Since 1998, 3 of these species have rarely been seen: Bar-tailed Godwit (*Limosa lapponica*) was seen twice, Sharp-tailed Sandpiper (*Calidris acuminata*) once and Curlew Sandpiper (*Calidris ferruginea*) five times. Outside the months November to February individuals were occasionally recorded. Individual Common Sandpipers (*Actotis hypoleucos*) were recorded every year up to 2008, for several successive weeks, but were then absent for intervals.

Three migratory waders, Red-necked Stint (*Calidris ruficolis*), Greenshank and Grey Plover (*Pluvialis squatarola*) were present in 50 to 70% of visits up to 1998 but have declined in the subsequent 10 years to 20 to 40% of recent visits (Fig 2A). At any one time there were often only single birds present of the latter 2 species but up to 100 individual Red-necked Stints have occasionally been seen. The Greenshank was normally seen in the lagoon, whereas the smaller waders preferred the sandy beach of the river.

In parallel with the decline in frequency, the number of individual birds present has also decreased since 1971. Table 1 shows the total number of each wader seen between November and February at 5 year intervals. All the migratory species appeared in fewer numbers.

Local non-migratory waders present included Black-winged Stilt (*Himantropis himantropus*), Red-capped Plover (*Chadrius ruficapillus*) and Red-necked Avocet (*Recurvirostris novaehollandiae*). These have continued to be present throughout the 36 year period. Though the frequency shows some variation for each, overall there is no marked change (Fig 2B). Total number of individual birds seen is also shown in Table 1. For comparison with migratory waders, only birds seen in November to February are included. Numbers are variable but all three species are still regularly present. Pied Oystercatchers (*Haematopus longirostris*) were first seen in 1986. Then the % of visits, when they were seen, increased to a maximum (77%) in 1990. They are still seen on the beach each year (usually 2 birds) but the frequency is variable. Stilts, Red-capped Plovers and Oystercatchers have all nested in the adjacent vegetation in the past 5 years.

Other Water Birds

A detailed list of water birds observed at Pelican Point has been published (Bailey & Creed 1989). Three groups of non-waders were selected for comparison with the waders on changes in numbers over the 36 years.

Ducks

Australian Shelduck (*Tadorna tadornoides*), Black Duck (*Anas superciliosa*) and Grey Teal (*Anas gracilis*) are regularly seen at Pelican Point with variable frequency (Fig 3A). Up to 20 Shelduck have been present at any one time on the lagoon but were usually fewer. In 10 of the last 18 years a pair of adults has reared up to 9 young. At these times all other ducks were chased away by the male Shelduck. Black Duck, which have bred 9 times since 1980, swim in the lagoon and on the river. They occur throughout the year and are often in pairs with total numbers up to 75.

As many as 60 Grey Teal have been seen at any one time mostly in autumn (February to June). Until 1990 up to 60 birds were seen on about 60% of visits (Fig 3A). Since then the number of visits when seen has declined to about 10% and it is unusual to see more than 10 birds and often just a pair. Other ducks occasionally recorded are Australasian Shoveler, Hardhead, Wood Duck, and Chestnut Teal. Black Swans have been recorded in 9 of the previous 10 years (up

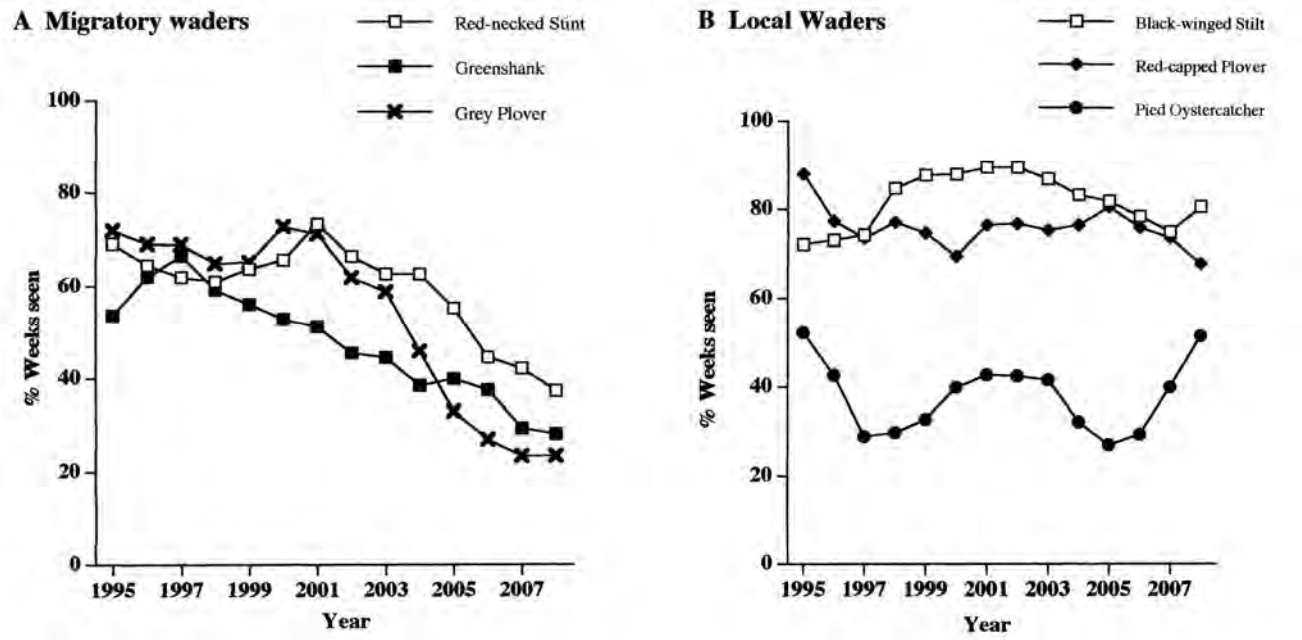

Figure 2. Frequency of occurrence of (A) 3 migratory waders and (B) 3 local waders recorded at Pelican Point during weekly visits from November to February. Each point represents the mean over 5 years up to the year indicated.

Table 1. Total number of waders seen on weekly visits to Pelican Point over 4 months, November to February, at 5 year intervals. The number of visits when species were present is shown in brackets.

	1972-73 16 visits	1977-78 18 visits	1982-83 14 visits	1987-88 17 visits	1992-93 17 visits	1997-98 17 visits	2002-03 17 visits	2007-08 17 visits
Pied Oystercatcher	0	0	0	46 (14)	11 (4)	19 (4)	16 (4)	33 (14)
Grey Plover	107 (15)	89 (18)	83 (9)	66 (9)	79 (9)	20 (5)	5 (3)	4 (3)
Red-capped Plover	194 (14)	648 (16)	330 (13)	140 (17)	307 (12)	696 (15)	284 (14)	53 (10)
Black-winged Stilt	72 (13)	145 (13)	37 (12)	137 (14)	48 (6)	192 (13)	137 (11)	161 (16)
Red-necked Avocet	104 (6)	56 (5)	56 (3)	144 (8)	4 (1)	0	0	54 (4)
Common Sandpiper	4 (4)	3 (3)	2 (2)	10 (9)	3 (3)	0	1 (1)	3 (3)
Greenshank	6 (6)	1 (1)	1 (1)	2 (2)	9 (9)	4 (3)	4 (2)	1 (1)
Bar-tailed Godwit	285 (15)	59 (9)	5 (4)	12 (3)	0	0	0	1 (1)
Red Knot	311 (13)	1 (1)	164 (8)	0	2 (1)	16 (1)	0	0
Great Knot	0	0	12 (2)	0	55 (2)	0	0	0
Sharp-tailed Sandpiper	80 (12)	0	0	5 (1)	0	1 (1)	0	0
Red-necked Stint	6000 (13)	8000 (16)	3195 (13)	3733 (16)	1008 (13)	281 (12)	383 (9)	9 (5)
Curlew Sandpiper	3795 (14)	4572 (13)	450 (13)	18 (5)	3 (2)	9 (3)	2 (1)	3 (1)

Total number of waders seen on weekly visits to Pelican Point over 4 months, November to February, at 5 year intervals. The number of visits when species were present is shown in brackets.

to 19% of visits); they were never seen between 1973 and 1983.

Gulls and Terns

In 80-90% of weekly visits, up to 1990 Silver Gulls (*Larus novaehollandiae*), Crested Terns (*Sterna bergii*) and Caspian Terns (*Sterna caspia*) were present (Fig 3B). Several 1,000 gulls were regularly over the Point or on the beach. Since then they have been present in 90-100% of visits but the number of individuals is much reduced. After 1990 there has been a decline in the % of visits when Crested and Caspian Terns were recorded. Crested Terns are now seen on about 60% of visits and fewer birds are seen either on the beach or flying singly over the shallow water of the river. Caspian Terns have declined further to about 30% of visits but the number of individuals has remained constant (up to 10).

Fairy Terns appear between October and April in most years. Up to 25 individuals were often seen but in December 2006, 92 birds were breeding on the sandy beach. Previously single birds have nested.

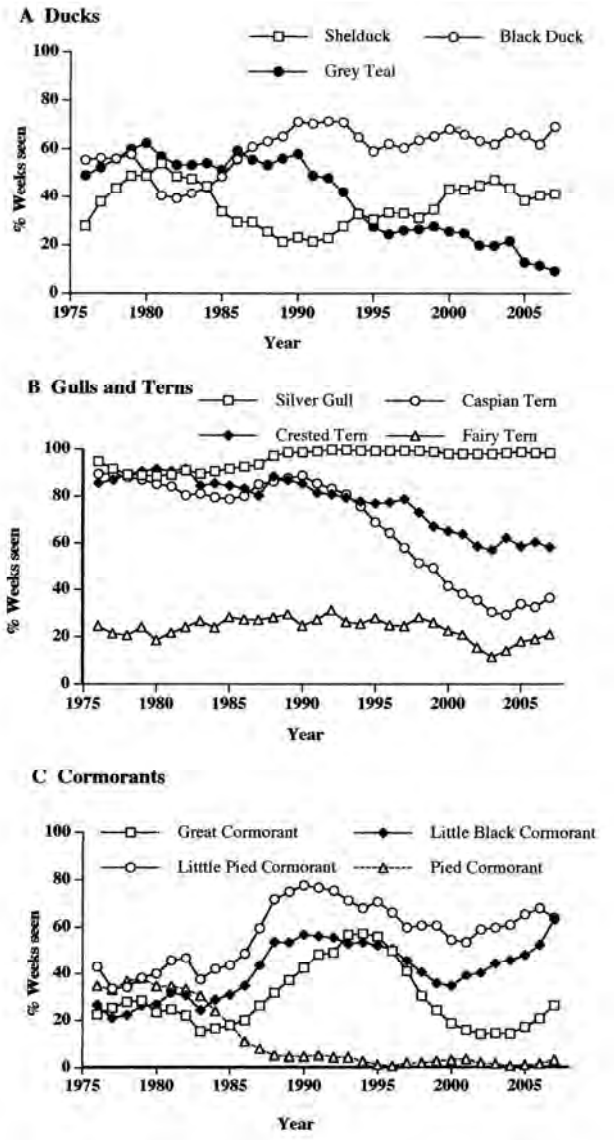

Figure 3. Frequency of occurrence of (A) ducks, (B) gulls and terns and (C) cormorants recorded at Pelican Point throughout the year. Each point is the mean over 5 years up to the year indicated.

Cormorants

Throughout the year, all four species of cormorant and also Darters have been recorded at Pelican Point. A few individuals of the two larger species (Great Cormorant, *Phalacrocorax carbo,* and Pied Cormorant, *P.varius*) were mostly seen on the point, together with gulls, terns and the two smaller species. Pied Cormorants have declined since 1981 and have been seen on less than 8% of visits since 1984 (Fig 3C). Great Cormorants increased to a maximum (66% of weekly visits) in 1987 and have since declined.

Up to 20 individuals of Little Black Cormorants (*P.sulcirostris*) have been seen on the point but at times large flocks (up to 1,000), often with a few gulls and Little Pied Cormorants, *P.melanoleucos*, were seen on the river above shoals of fish into which they dived periodically. At other times they flew over the point in several groups of 10-50 birds along the river from west to east. Little Pied Cormorants were not seen in such large groups. Both species have been seen more frequently since 1980 (Fig 3C).

Darters (*Anhinga melanogaster*) have been seen since 1985 on up to 30% of visits. There are often only 1 or 2 birds drying themselves but occasionally up to 10 birds were present. They are most commonly seen in the winter months (May to August).

DISCUSSION

The results reported in this paper confirm the trend in appearance of trans-equatorial migratory waders at Pelican Point reported by Creed & Bailey in 1998. Most species seen in large numbers in the early 1900s (Alexander 1921; Serventy 1938) are now rarely seen. By contrast, local non-migratory waders (especially Red-capped Plover and Black-winged Stilt) still occur frequently and numbers have changed little in 36 years. A similar decline in migratory waders has been recorded elsewhere on the Swan River (Singor 2009). In Eastern Australia wader surveys indicate that numbers of birds have also decreased dramatically. In the Coorong, South Australia, the number of migratory shorebirds recorded in 2002 had declined by 85-90% compared with 1982 including Red-necked Stint, Curlew Sandpiper, Sharp-tailed Sandpiper and Common Greenshank (Wainwright & Christie 2008). Local waders remained relatively consistent since 2000. Aerial surveys of the eastern 1/3 of Australia indicated that migratory birds were down by 73% and residential waders by 81% between 1983 and 2006 but much of this was on inland wetlands that have been progressively reduced by water extraction (Nebel *et al.* 2008).

There have been several possible explanations for the decline in migratory waders. Firstly a reduction in breeding in the northern hemisphere may have occurred. Data is not generally available for this but the % first year birds netted in Australia between 1998 and 2006 does not support a general decline (Minton et al. 2006a). Secondly, habitat degradation at stop-over sites along the east Asia flyways has occurred. Recovery of banded birds has been used to determine migration routes and stopover locations (Minton *et al.* 2006b). There are many reports of reclamation of mudflats and coastal regions for human development in both China and Japan (e.g. Ge *et al.* 2006). Both countries are important areas for migratory birds to refuel and rest and have signed agreements with Australia. Finally, in Australia, changes in waterways due to reclamation, climate change or pollution have occurred or birds are habitually disturbed by increased use for human recreation.

At Pelican Point local wader numbers have changed little and Pied Oystercatchers are now seen. The non-waders, Great Cormorant, Grey Teal, Caspian and Crested Terns have declined but other species are little changed. Breeding occurred in several groups. This suggests that the local area is still capable of supporting a considerable water bird population, with adequate food and shelter. There have been no marked changes in vegetation on the point in the last 10 years, although more plants grew immediately after the fence was erected in1970. However, some changes have occurred which will discourage birds. The annual rainfall in the Perth region has decreased, particularly over the past 10 years, so

that the amount of fresh water entering the Swan River from catchment areas will be less with possible effects on salinity, pollution and food availability. Some ephemeral lakes on the coastal plain also dry earlier in summer affecting bird distribution. Furthermore, there has been much increase in the use of the Swan River for recreation. Ferries and private motor boats produce wash that undermines the beaches and the presence of wind surfs and particularly kite surfs have greatly increased in the water adjacent to Pelican Point and walkers with dogs regularly use the beach.

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The authors acknowledge the enthusiasm, support and contribution that have been provided by innumerable people over many years in the compiling of bird lists of Pelican Point.

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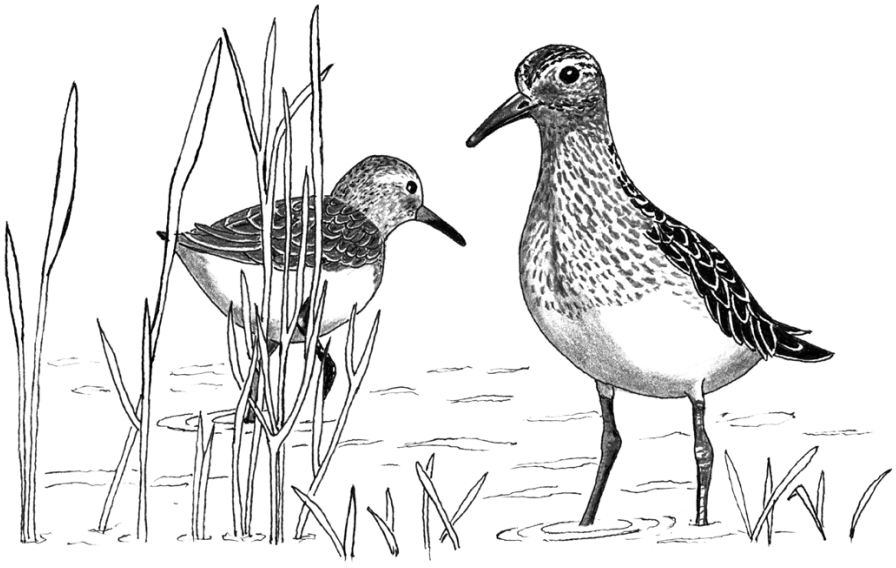

CLUTCH SIZE AND NEST-SITE FIDELITY FOR DOUBLE-BANDED PLOVERS *CHARADRIUS BICINCTUS* NESTING ON BRAIDED RIVERBEDS IN NEW ZEALAND

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INTRODUCTION

The Double-banded Plover (*Charadrius bicinctus)* is endemic to the main islands of New Zealand where it is known as the Banded Dotterel or Tuturiwhatu. This species is unique among shorebirds with part of the population undertaking an annual east-west migration between breeding grounds in New Zealand and wintering areas in Australia (Pierce 1999; Bamford *et al.* 2008). The total population has been estimated at c.50 000 birds (Heather & Robertson 1996; Wetlands International 2006), with the majority nesting on stoney braided riverbeds, lake shores, mountain tops, short grasslands, coastal herb fields and beaches in the South Island (Falla *et al.* 1978; Higgins & Davies 1996).

The ecology of the Double-banded Plover has been well studied and most aspects of breeding biology and behaviour have been described (Potts 1884; Stead 1932; Stidolph 1944; Soper 1963; Phillips 1980; Pierce 1983, 1989; Heather *et al*. 1985; Bomford 1986, 1988; Dann 1991; Crossland & Sanders 1997; Rebergen *et al*. 1998; Hughey 1998; Maloney *et al*. 1999). Previous studies of breeding biology have generally involved samples of less than fifty nests. In this paper we provide further insight into nesting behaviour based on a much larger sample size.

In the spring and summers of 1997-98 and 1998-99 we monitored 601 Double-banded Plover nests on four braided riverbeds in the Mackenzie Basin, central South Island, New Zealand. The nests were monitored as part of suite of Landcare Research-Maanaki Whenua and Department of Conservation (DoC) research projects investigating inter-relationships between mammalian predators, rabbit (*Oryctolagus cuniculus*) abundance and the breeding success of ground-nesting riverbed birds. The methodology and results of this work have been published elsewhere (Norbury & Heyward 2008). Although the breeding biology of Double-banded Plovers was not the primary focus of the research, useful data were gathered on several aspects of nesting. These merit publication and in this paper we examine clutch size and nest-site fidelity for riverbed-nesting Double-banded Plovers.

STUDY AREA

Our study area comprised seven sites on stretches of four braided riverbeds - the Ahuriri, Ohau, Tekapo and Pukaki Rivers in the MacKenzie Basin, inland central South Island. Our research sites comprised identical or similar nesting habitat to most previous Double-banded Plover breeding studies, particularly Bomford (1988); Pierce (1989); Crossland & Sanders (1997); Rebergen *et al*. (1998) and Maloney *et al*. (1999). The study sites varied in size from 55 to 290 ha and were located between 400 and 600m a.s.l. Annual rainfall in the study area is about 700 mm and the mean average temperature is 9.1 ^{o}C (Norbury & Heyward 2008).

Braided rivers are a feature of the South Island of New Zealand and are characterised by unstable, longitudinally braided river channels with many shingle bars and partially consolidated islands (O'Donnell & Moore 1983). Much of the riverbed habitat comprises bare shingle or silt, with more stable areas covered by low mat-forming vegetation and stands of exotic willow (*Salix* sp.) and scrub, particularly lupins (*Lupinus sp*.), broom (*Cytisus sp*), sweet briar (*Rosa rubiginosa)* and gorse (*Ulex sp*.). Braided river landforms are highly dynamic due to the erosional/depositional effects of frequent flooding (O'Donnell & Moore 1983).

Seven species of wader, three species of tern and two species of gull breed on these riverbeds. Most of these species have evolved breeding systems that allow rapid re-nesting after the loss of eggs or chicks to catastrophic events such as river flooding, heavy snowfall or predation (O'Donnell & Moore 1983).

The bird breeding season (late August to early February) on South Island braided rivers coincides with snow melt and high spring precipitation in the mountain catchments, often resulting in nests being washed away by sudden floods. This seasonal flooding remains a common occurrence on the Ahuriri River but is no longer prevalent on the other three rivers within the study area. This is because flows on the Tekapo, Pukaki and Ohau Rivers are controlled by discharges from hydro-electric dams and large flooding events now only occur at times of dam spillage. Spills occurred on the Pukaki River in winter 1998 and on the Tekapo River for seven weeks in October and November 1998. The effects of dam spills replicate those of natural floods but they differ in that peaks may be sustained over periods of weeks rather than just two or three days.

METHODS

Double-banded Plovers nest on the ground in open, flat areas of riverbed and construct a nest scrape lined with a small quantity of dry plant material. Active nests were either found by observing foraging adults until they returned to their nest site or by flushing incubating birds off nests. Nesting plovers were either first spotted at close quarters by an observer on foot, or were observed from a vehicle driven slowly along riverbed tracks. All nest sites were marked with a stone cairn placed approximately 1.0 - 2.5 m from the nest scrape. This facilitated monitoring during the incubation period and enabled relocation of nests afterwards. Following discovery, all nests were revisited at intervals of 1-4 days until a clutch outcome was detected and parent birds no longer attended the nest. Brood survival was not monitored.

RESULTS

601 Double-banded Plover nests were located and monitored during the study period.

Clutch size

Double-banded Plovers are known to lay clutches of two to five eggs, with a complete clutch of three being the norm (Heather *et. al*. 1985; Higgins & Davies 1996). Of 40 incubated nests found by Bomford (1988), two (5%) contained one egg, two (5%) contained two eggs, and 36 (90%) contained three eggs. Bomford was unsure whether the smaller clutches had lost eggs or were complete.

From our study of 601 nests, some 560 remained intact and were incubated long enough to conclude that a final clutch size had been attained. Like Bomford (1988) we do not know how many of these nests lost eggs during laying or early incubation with the parent birds continuing to incubate. However, while confirming that incubation of reduced clutches does occur, our observations suggest that this happens with far less frequency than the incidence of plovers laying small (one or two eggs), but complete clutches.

From the sample of 560 complete clutches, nine (1.61%) contained one egg, 44 (7.86%) contained two eggs, 505 (90.18%) contained three eggs, and two (0.36%) contained four eggs. No nest containing five eggs was observed, although a clutch of this size has been recorded once by R. Pierce (in Higgins & Davies 1996). Bearing in mind the difference in sample sizes, our findings tend to agree with those of Bomford (1988) in that approximately 90% of nests contained a final clutch of three eggs and only very small numbers of nests contained either one, two or four eggs.

Past experience with Double-banded Plover nesting (Crossland & Sanders 1997); suggested that smaller clutches tended to be more common later in the season, perhaps because these were final re-nests after one or more previous failures, or possibly because these were cases of double-brooding. We decided to test this by pooling our two seasons' data, then splitting this data into two sets - nests with first egg-laying dates before 15 November (n= 431) and nests with first egg-laying dates after that date (n=129). First egg-laying dates were calculated back from laying dates of subsequent eggs, from hatching dates and/or from when adults were first observed showing strong nesting behaviour. The date of 15 November was chosen because it marked the beginning of the final month of an egg-laying period which generally lasts from early September to mid December (pers. obs.).

Our results confirmed that smaller clutches were more prevalent late in the season. One and two-egg clutches (combined) comprised 23.26% of clutches laid after 15 November, while comprising only 5.34% of clutches laid before that date. Conversely, three-egg clutches comprised 76.74% of clutches laid after 15 November, while comprising 94.20% of clutches laid earlier (Table 1). Four egg clutches were only recorded before 15 November (Table 1).

Inter-seasonal nest-site fidelity

By *inter-seasonal nest-site fidelity* we mean birds using the exact same nest scrape in at least two consecutive breeding seasons. This differs from the terms *nesting site fidelity* (Pierce 1989), *breeding-site fidelity* (Thompson & Hale 1989; Dowding & Chamberlin 1991; Johnson & Waters 2008) and *site tenacity* (Gratto *et al.* 1985; Flynn *et al.* 1999) in that these other terms refer to faithfulness to a breeding territory and not necessarily to the re-use of a former nest scrape. Faithfulness to a breeding territory is known to be high amongst many shorebirds (Cramp & Simmons 1983, Pierce 1989, Dowding & Chamberlin 1991). Re-use of a former nest scrape is generally uncommon, but has been observed for seven New Zealand charadriiformes (Crossland 2000).

In the 1997-98 breeding season we monitored 262 Double-banded Plover nests. Of these, some 218 former nest scrapes were located again and monitored throughout the subsequent (1998-99) breeding season. As all nest scrapes had been marked by a small stone cairn, most were easily relocated the following year. By the end of the 1998-99 breeding season, 22 of these relocated previous season's nest scrapes (=10.1%) had been re-used as active nests.

Intra-seasonal nest-site fidelity

By intra-seasonal nest-site fidelity we mean a pair laying a repeat clutch in a nest scrape that has already been used at least once within the same breeding season. Pierce (1989) noted this once during a ten year study of Double-banded Plover nesting on the Cass River Delta, 21.5 km north of the nearest of our study rivers (Tekapo River). We noted it nine times during our study. In the 1997/98 breeding season this happened twice in a sample of 262 nests (= 0.76%). In the 1998/99 breeding season it happened seven times from a sample of 339 nests (= 2.06%). Thus we had a mean average of 1.5% over the full sample of 601 nests.

Multi-seasonal nest-site fidelity

Soper (1963) recorded a Double-banded Plover pair using the same nest scrape in three consecutive seasons on the Shotover River, Central Otago. On the Ahuriri River we recorded one nest scrape that was used four times in three consecutive breeding seasons - once in 1996/97 (Crossland & Sanders 1997), twice in 1997/98 and once in 1998/99 (this study). The clutch survived to hatching in each of the four

Table 1: Comparison of clutch size before and after 15 November

Period	1 egg	2 eggs	3eggs	4 eggs	Total Nests
< 15 Nov	5 (1.16%)	18 (4.18%)	406 (94.20%)	2 (0.46%)	431
>15 Nov	4 (3.10%)	26 (20.16%)	99 (76.74%)	0 (0.0%)	129
Total	**9 (1.61%)**	**44 (7.86%)**	**505 (90.18%)**	**2 (0.36%)**	**560**

nesting attempts.

DISCUSSION

Clutch size

This study confirms Bomford's (1988) findings that approximately 90% of Double-banded Plover clutches comprise three eggs and clutch size generally ranges from one to four eggs. This is similar to most other Charadrius plovers in Australasia (Higgins & Davies 1996). We also found that smaller clutch sizes tended to be more prevalent later in the season. We speculate that this may be due to re-nesting and/or double-brooding, with females probably less physiologically able to lay three or four-egg clutches toward the end of the breeding season.

Nest-site fidelity

Our finding that 10.1% of Double-banded Plover nest scrapes were re-used in the following season is comparable to a study of New Zealand Shore Plover (*Thinornis novaeseelandiae*) where 15% of nests were re-used (Davis (1994). An interesting point of difference however is that whereas Shore Plover nest on a small, relatively stable rocky shoreline environment and are entirely sedentary, the Double-banded Plovers on our study rivers nest in highly dynamic riverbed environments and are strongly migratory, completely leaving the breeding grounds for 5-7 months of the year (Pierce 1999). In another study of migratory plovers (Flynn et al. 1999), only 1 case of inter-seasonal nest re-use was detected from a sizeable population of Semi-palmated Plover (*Charadrius semipalmatus*).

Other migratory shorebirds are known to re-use former nest scrapes. For example, Stilt Sandpipers (*Micropalama himantopus*) sometimes re-use scrapes preserved in frozen ground over winter and Mountain Plover (*Charadrius montanus*) exhibit fidelity to nest sites used the previous year (Graul 1975). Richards (1988) suggests that this behaviour "allows an earlier start to the breeding cycle by more experienced pairs" .

Gratto *et al.* (1985), Thompson & Hale (1989), Ryabitsev & Alekseeva (1998) and Flynn *et al.* (1999) studying Semipalmated Sandpiper (*Calidris pusilla*), Common Redshank (*Tringa totanus*), Grey Plover (*Pluvialis squatarola)* and Semipalmated Plover respectively, all found that breeding-site fidelity in these shorebirds was positively correlated with a successful nesting attempt in the previous season. This is something we sought to investigate for Double-banded Plover.

Because most of the Double-banded Plover pairs nesting in the 1997-98 and 1998-99 seasons were not banded we were unable to follow known pairs and confirm whether or not it was the original pair or new birds that re-used a scrape. However, we were able to look at the history of the individual nests. From our sample of 22 nest scrapes used in both seasons, some 16 had known nesting outcomes in the first season. Of these, 14 (87.5%) first-season nesting attempts were successful, while only two (12.5%) failed.

Analysis of intra-seasonal re-use found a similarly strong relationship between a successful first nesting attempt and re-use of the nest scrape. From the nine intra-seasonal re-nests in our study, the first outcomes of six are known - all (100%) hatched successfully on the initial nesting attempt.

Is inter-seasonal nest-site fidelity likely to be higher on rivers with controlled flows compared to those with unmodified flows?

If males were to gain benefits from re-using a previously successful nest scrape (such as greater success in winning and retaining a mate, or a competitive advantage over rival males through occupation of a proven high value territory, or an earlier start to the breeding cycle) then strong motives for re-use of nests would likely exist.

Given the geological instability of braided riverbeds with unmodified flows (Hughey 1998, Maloney *et al.* 1999), there is a relatively high likelihood that used nests would disappear from one breeding season to the next. For example, nest scrapes could be lost to channel erosion; scoured away by elevated flows; covered in new depositions of sediment; buried under flood debris; or smothered by the growth of vegetation. It would seem unlikely therefore that birds would have the same nest scrape available to them from one season to another - except perhaps for a very small proportion of nests located on the most stable terraces at riverbed margins. However, on rivers with flows controlled by hydro-electric dams the normal fluctuations in water level are minimised and long periods (sometimes several years) may pass between major dam spills. This can result in riverbed nesting habitat remaining stable and morphologically unaltered over multiple breeding seasons. Consequently, many old nest scrapes are likely to remain intact and be potentially available for re-use.

We made a tentative investigation of this by comparing data for a riverbed site with unmodified flows; another with stable controlled flows; and three riverbed sites with controlled flows but where sizeable dam spills occurred during the study period (Table 2).

We found a marginally higher incidence of nest re-use on the site with stable controlled flows. On this site (Ohau River) 7.25% of monitored nesting attempts in the 1998-99 breeding season involved re-use of a nest scrape from the previous season (table 2). This compared to nest re-use incidences of 6.45% for the study site with unmodified flows (Ahuriri River) and 1.96- 6.45% for the 3 sites where dam spilling occurred (Tekapo River sites 1,2 & 6). We encourage future research into this question as findings may have useful implications for the management of rivers controlled by hydro-electric schemes, particularly in relation to the timing and volume of dam spills.

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Table 2: Comparison of nest re-use on five study sites with different flow type histories: 1998-99 breeding season

study site	**Ahuriri 5**	**Tekapo 1**	**Tekapo 2**	**Tekapo 6**	**Ohau 4**
flow type	**unmodified**	**dam spill**	**dam spill**	**dam spill**	**no dam spill**
renests	2	2	1	2	5
total nests 1998-99	31	31	51	52	
% re-use	**6.45%**	**6.45%**	**1.96%**	**3.84%**	**7.25%**

(Note: The two other study sites were excluded from this analysis because they were located on lake deltas and were as much affected by fluctuations in lake levels as they were by river flows)

Sarah Gibbs, Don Hadden, Richard Heyward, Rachel Keedwell, Grant Norbury, Mandy Ridley, Tony Ryder, Mark Sanders and Emily Sanchez) We would like to thank Drs Phil Battley and Grant Norbury for reviewing and offering suggestions for improving earlier drafts of this manuscript. And special thanks to our project manager, Grant Norbury for permission to publish the data presented in this paper and the opportunity to work on such an interesting bird in such a fantastic landscape!

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RECORD OF SPOTTED REDSHANK *TRINGA ERYHTROPUS* IN SUMATRA (INDONESIA) AFTER 19 YEARS

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Spotted Redshank *Tringa erythropus* is scarce visitor to Sumatra, Indonesia. The only two previous known records from Sumatra are between September 1988 and March 1989. An observation of approximately three Spotted Redshanks in Galas River, Sembilang National Park on 31 October 2008 is thus the third and most recent record of this species in Sumatra after a break of 19 years (from 1989 to 2008).

INTRODUCTION

Sumatra is the westernmost and second largest island in Indonesia. Wetlands are well distributed in Sumatra, particularly on the east coast of the island. Wetland sites in Sumatra are important for waders. Numerous sites around the coastline of Sumatra support upwards of 30 migratory waders. Eastern Sumatra supports wader populations comparable or greater than those found on the west coast of Peninsular Malaysia (Li *et al.* 2006). Surveyed sites known to support 10,000 birds or more include Bagan Percut and Pantai Sejara-Tanjung Tiram in North Sumatra Province; Tanjung Datuk and Tanjung Bakung in Riau Province; Tanjung Datuk and Tanjung Bakung in Riau Province; Tanjung Jabung in Jambi Province and the Banyuasin Peninsular, Musi Delta and Lumpur Bay in South Sumatra (Crossland *et al.* 2006).

There are 37 species of migratory wader recorded in Sumatra (Crossland *et al.* 2006). From all that species, Spotted Redshank *Tringa erythropus* is scarce visitor to Sumatra. This paper outlines details of a recent report of Spotted Redshank on 31 October 2008 in Sumatra (Indonesia), after previously known record between September 1988 and March 1989 by Verheugt *et al.* (1990).

SURVEY SITE

Telok Galas river geographically lies at 01^0 59'59 7" S and $104^0$48'29 8" E. This river is part of Banyuasin Peninsular, South Sumatra, Indonesia (Figure 1). Administratively, the area located in Banyuasin II Sub-district and Sungsang District, South Sumatra Province. Now, the area is part of Sembilang National Park, a new National Park in Indonesia. The habitat is an intertidal mudflats and mud-banks are extensive, during low spring tides, they locally extend out to two kilometers from the coast. The substrate is extremely soft and access is consequently difficult. However, they provide excellent feeding grounds for many large waterbirds and waders.

SPOTTED REDSHANK RECORD

At 09.00 hrs on 31 October 2008, we observed three rather elegant shorebirds with longish and relatively long, slender bill has a red base to the bill and conspicuously bright orange-legs (Figure 2). The bird is slightly larger (taller) than Redshank *Tringa totanus* (Figure 3), differs in shape in longer and slightly droop-tipped bill and longer neck (Figure 4). The birds look smaller when standing or feeding than the accompanying Black-tailed Godwit *Limosa limosa* and Bar-tailed Godwit *Limosa lapponica* (Figure 5). After consultation with some field guides, the characters were consistent with adult non-breeding Spotted Redshank *Tringa erythropus* as outlined in the description of van Gills & Wiersma 1996; Hayman *et al.* 1986; Mackinnon *et al.* 1998; Robson 2005 and Sonobe & Usui 1993.

DISCUSSION

Spotted Redshank *Tringa erythropus* breed in North Scandinavia and Northwest Russia across North Siberia to Chukotsky Peninsula. Birds winter from West Europe through the Mediterranean to Equatorial Africa, and East through Persian Gulf and India to Southeast Asia, Southeast China and Taiwan (van Gills & Wiersma 1996). The bird is winter visitor In Southeast Asia and vagrant to South Thailand (Robson 2005).

Crossland *et al.* (2006) stated that Spotted Redshank are a scarce visitor to Sumatra. In Sumatra, the bird has only been recorded two times in Lebak (a floodplain habitat in South Sumatra) where eight birds were recorded at Lebak Pampangan on 9 October 1988 and three at Lebak Teluk Tomang on 31 March 1989 (Verheugt *et al.* 1993).

There are no recent reports for Spotted Redshank in Sumatra (Holmes 1996, Crossland *et al.* 2006). This record of approximately three birds in Galas River (Sembilang National Park) is only the third record for this species in Sumatra and also for Indonesia (Sukmantoro *et al.* 2008). The record is also a recent record after 19 years for Indonesia.

Unlike of Lebak Pampangan and Lebak Teluk Tomang which are freshwater habitats, Galas River is an intertidal mudflat along the coast. This new locality is new habitat for Spotted Redshank in Sumatra. Hayman *et al.* (1986) stated that when not breeding, Spotted Redshank prefers freshwater lakeshores or blackish lagoons, but also occurs on sheltered muddy coast.

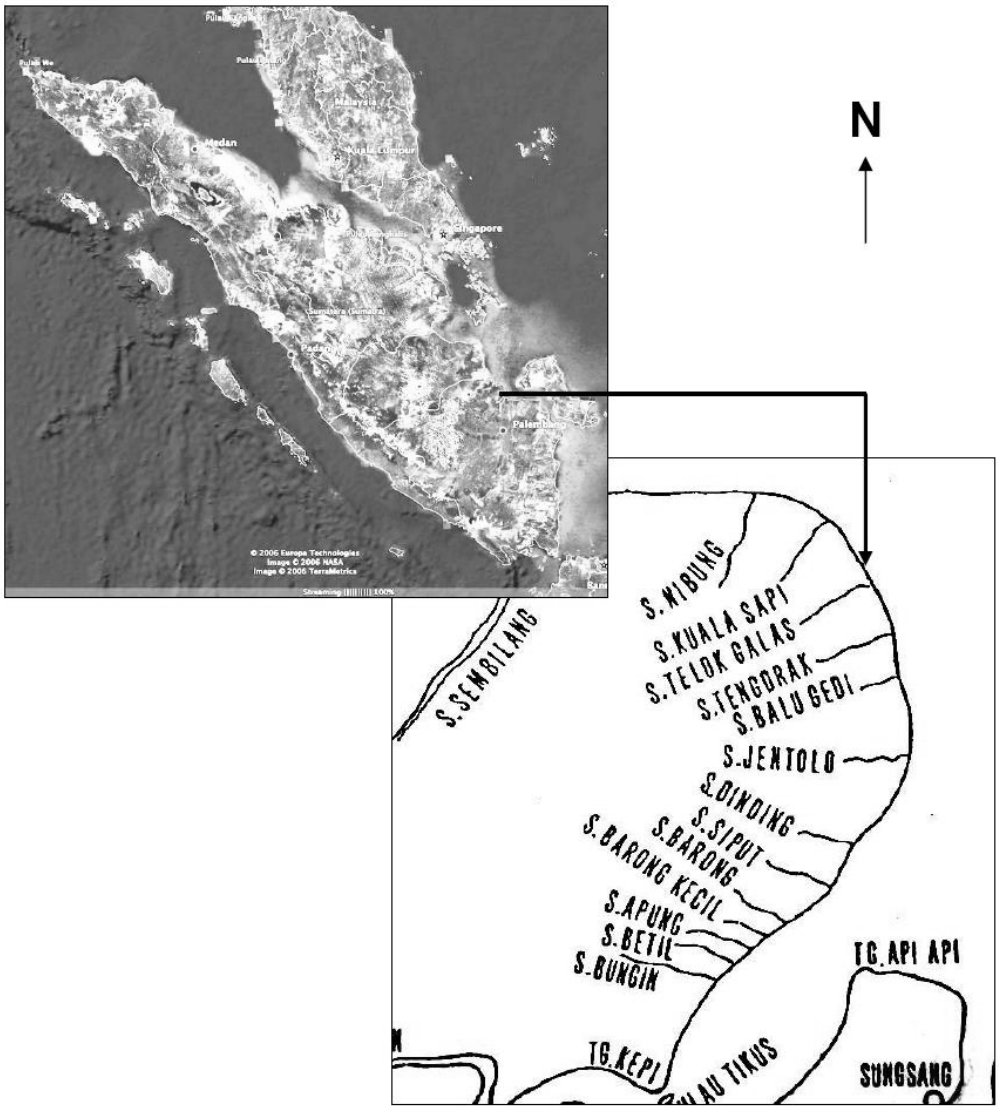

Figure 1. Map of Galas river

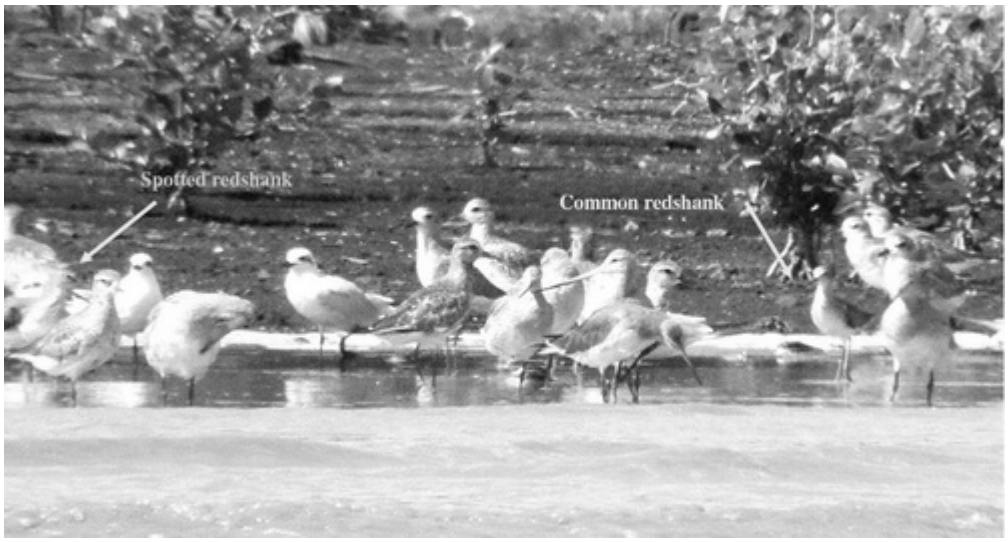

Figure 2. The Spotted Redshank is a rather elegant shorebird with longish and relatively long, slender bill has a red base to the bill and conspicuously bright orange-legs

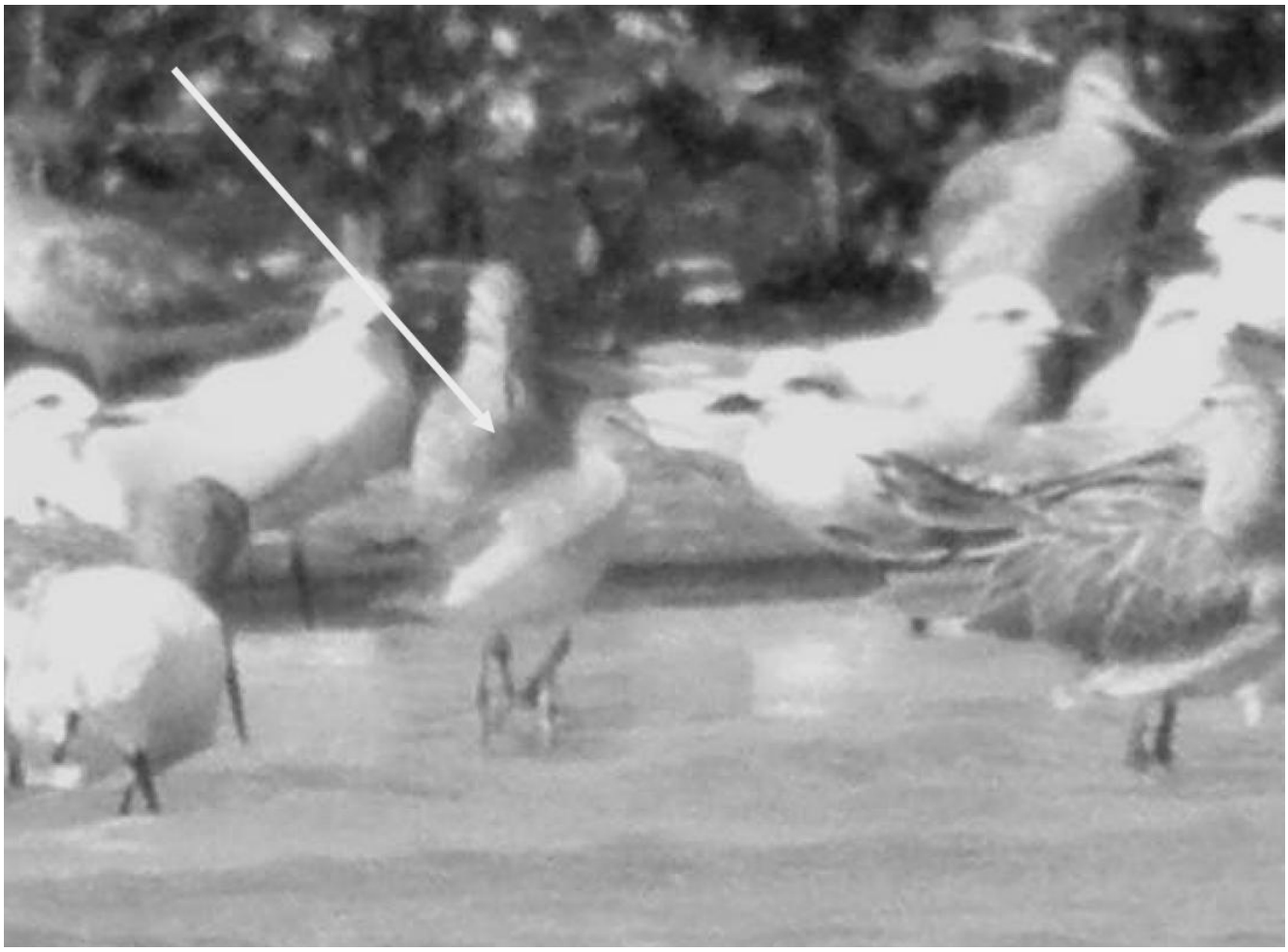

Figure 3. The Spotted Redshank look taller than Common Redshank *Tringa totanus*.

Figure 4. The Spotted Redshank has slightly droop-tipped bill.

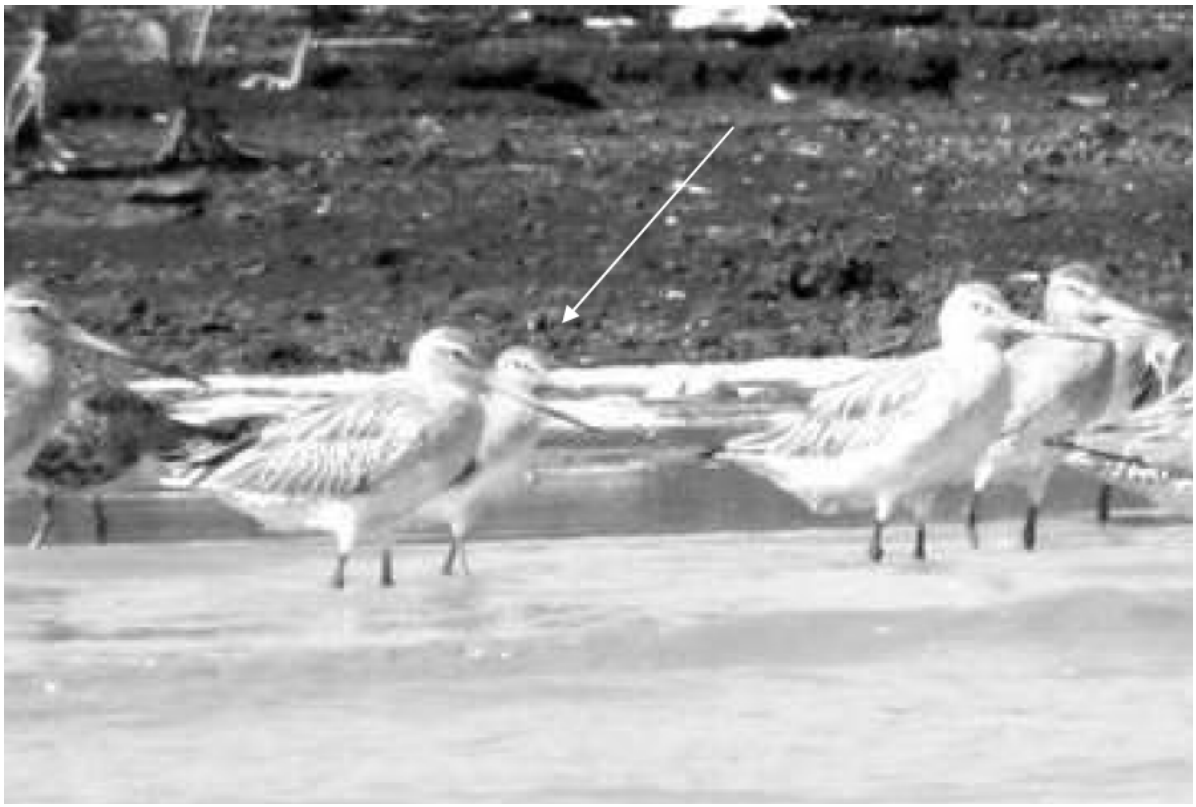

Figure 5. The Spotted Redshank look significantly smaller when standing or feeding beside Godwits.

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WADERS IN YALGORUP NATIONAL PARK, WESTERN AUSTRALIA

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This article gives an overview of the wader populations that frequent the northern lakes of Yalgorup National Park in Western Australia and the seasonal fluctuations that take place at these lakes. These findings are based on regular surveys conducted from 2001 to 2009.

INTRODUCTION

The lakes of Yalgorup National Park form part of the Peel-Yalgorup wetland system which are recognised as wetlands of international importance under the Ramsar Covention. The lakes covered in this article can be found in Yalgorup National Park which is located to the south of Mandurah. They comprise of Boundary Lake, Duck Pond, Swan Pond and the north east and eastern side of Lake Clifton. Teal Lake also known as Linda's Lagoon is included. Teal Lake is on private land and adjacent to the reserve (Figure 1).

The soils of Yalgorup National Park are largely made up of calcareous material derived from sea shells and other marine organisms. The coastal dune system consists of a series of ridges that run parallel to the coast and extend 1-2 kilometres inland. The lakes that characterise the park lie in the depression between the coastal barrier dunes. Reflecting this structure, the ten lakes form three distinctive lines parallel to the coast. Lake Preston is extremely elongated and lies closest to the coast. The lakes behind the next ridge are far more broken, comprising (from north to south): Swan Pond, Duck Pond, Boundary Lake, Teal Lake, Lake Pollard, Martins Tank, Lake Yalgorup, Lake Hayward and Newnham Lake. Lake Clifton is the furthest from the coast and the nearest to the Old Coast Road. It too is extremely elongated (Figure 1).

Hydrology

The Yalgorup lakes are principally supplied by fresh groundwater and precipitation but are saline due to high evaporation rates. The salinity levels of the lakes is much higher in autumn than in spring. The salinity regime varies between the different lakes. Lake Clifton for example has very extensive areas of groundwater seepage, which result in pronounced horizontal salinity gradients. It is the least saline of all the lakes within the Park. Similar vegetation surrounds the lakes. Around hyper saline lakes, there is a narrow belt of samphire, behind which clumps of *Juncus kraussii* and *Gahnia trifida* occur. Hypo saline lakes have a dense belt of *Melaleuca cuticularis* and *M. rhaphiophylla* or *Acacia cyclops*.

The lakes are generally situated near Tuart (*Eucalyptus gomphocephala*) and Jarrah (*E. marginata*) forest with an understorey of peppermint. The immediate surroundings of the lakes are made up of thickets of saltwater paperbarks (*Melaleuca cuticularis*) that in places extend to the water's edge. The foreshore of the lakes varies in width, depending on rainfall and the season of the year.

The fluctuations in water levels in the lakes in Yalgorup National Park generally follow a cyclical pattern. In winter the lakes are full of water due to rainfall, surface run off and the inflow of groundwater. The water levels, at their peak, flood well into the fringing paperbark trees and little suitable wader habitat remains. Teal Lake is the shallowest lake and has the least saline water. Teal Lake fills up first followed by Swan Pond and Duck Pond. Boundary Lake is the last to flood and will often retain suitable wader habitat even in winter. During the months of spring water levels gradually drop and small stretches of beach become exposed which are quickly occupied by pairs of Hooded Plover establishing

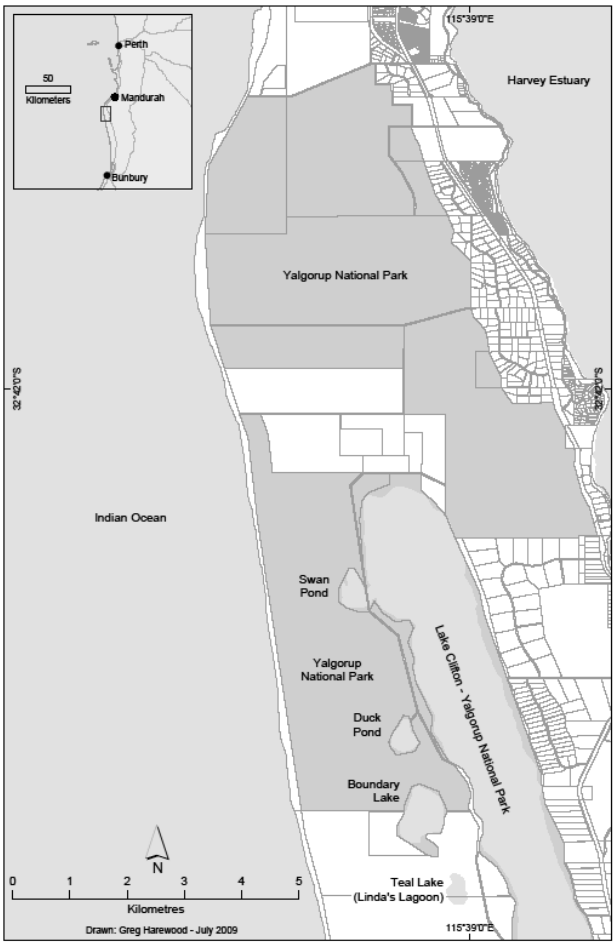

Figure 1. Location of Yalgorup National Park, Western Australia.

their territories. At this stage Swan Pond still forms part of the whole Lake Clifton system and shares a common surface area. As water levels drop it becomes a separate lake entity.

Over summer the water levels continue to recede and more shoreline becomes exposed. Small lakes such as Duck Pond fall dry with the exception of some small seepage pools found at the base of fringing reed beds. These are fed by the underground drainage system. Swan Pond and Teal Lake (Linda's Lagoon) dry out during the months January to March. Teal Lake retains some small seepage pools along the reed beds and is less saline than any of the other lakes. Boundary Lake maintains water throughout summer although levels can drop by at least 50%-60%. Swan Pond, Boundary Lake and Duck Pond produce crystalline salt sheets as they dry out.

Variations to this cycle occur when heavy summer rains raise the lakes water levels or during prolonged droughts which may extend the period of dried out lakes.

METHODS

Wader counts commenced in 2001.These were initially done on an irregular basis till 2005. A large suite of information was collected during this early period. Monthly surveys covering the northern lakes in Yalgorup National Park commenced in 2005 and are still ongoing. A total of 91 surveys were conducted between 2005 and 2009. Kate Robinson regularly surveyed the eastern shore line of Lake Clifton. She carried out 48 surveys from January 2008 to April 2009. A set circuit was followed when the northern lakes were surveyed. The surveys commenced at Duck Pond then to Boundary Lake, Teal Lake, Swan Point, Swan Pond and finally proceeding to the north eastern side of Lake Clifton. Notes were kept on water levels.

RESULTS

The counts from 2005-2009 are shown in Table 1. The maximum numbers of waders sighted at individual lakes are shown in Table 2. In total 11 migratory wader species and eight endemic wader species were observed.

On 2 January 2007 a Fairy Tern, *Sterna nereis* colony was found at Swan Point and at least 10 nests containing eggs were recorded. Further on 20 February 2009 one Fairy Tern nest with two eggs was located at Swan Point.

Two Inland Dotterel, *Charadrius australis* were seen on 31 August 2007 in the north eastern section of Lake Clifton. There was another sighting of two Inland Dotterel at Boundary Lake on 22 August 2001 (Rule 2001).

A large mixed flock of 115 migratory waders was observed at Duck Pond on 15 May 2008 which comprised of Great Knot, Bar-tailed Godwit, Common Greenshank, Grey Plover and Sharp-tailed Sandpiper.

Species accounts

Bar-tailed Godwit, *Limosa lapponica*

A rare visitor that has been seen at Boundary Lake and Duck Pond. Records are from April and May 2008 and the highest count was 21 Bar-tailed Godwit. These birds may have originated from the Peel-Harvey Estuary (Mandurah). Two birds were sighted at Lake Clifton (north) in May 1999.

Common Greenshank, *Tringa Nebularia*

The Common Greenshank has been observed in every month of the year. The highest numbers were recorded over the summer months with 25 on 21 January 2009 at Boundary Lake. Most oserved as single birds but also found in small flocks. Large numbers have been found along the east shore of Lake Clifton (north) with 24 recorded there in December 1997 and 25 in December 1998. (Russell 2000). Fluctuations of the Common Greenshank populations at the northern lakes are shown as maximum monthly counts in Table 3.

Red-necked Stint, *Calidris ruficollis*

Red-necked Stint were observed in every month of the year. The highest counts were made from October to March when up to a thousand birds could be seen. Winter sightings produced much lower numbers, up to a maximum of 100 birds. Boundary Lake and Swan Pond have both recorded up to a thousand birds. Swan Pond consistently had higher numbers of Red-necked Stint than the other sites. Red-necked Stint were rarely seen on Duck Pond and occasionally on Teal Lake. Fluctuations of the Red-necked Stint populations at the northern lakes are shown as maximum monthly counts in Table 4.

Black-winged Stilt, *Himantopus himatopus*

Present in small numbers at the northern lakes. Highest count is 50 Black-winged Stilts. Most frequently observed at Lake Clifton and Boundary Lake. Absent during August, September and October.

Grey Plover, *Pluvialis squatarola*

Grey Plover have become more common in recent years and are mainly seen between March and July though still in small numbers. Maximum count was 24 Grey Plover on 2 May 2008. Most often observed at Boundary Lake.

Red-capped Plover, *Charadrius ruficapillus*

The presence of Red-capped Plover at the lakes is closely linked to the availability of suitable habitat when beach areas are exposed. Red-capped Plover have been recorded breeding at Boundary Lake and Swan Pond. Red-capped Plover is the most common endemic wader. Agonistic behaviour between Red-capped Plover and Hooded Plover was regularly observed as they both inhabit similar beach habitat. Fluctuations of the Red-capped Plover population at the northern lakes are shown as maximum monthly counts in Table 5.

Hooded Plover, *Thinornis rubricollis*

Hooded Plover hang on to their territory as long as possible even as water levels flood the foreshore. Hooded Plover will seek out adjacent samphire flats or rocky outcrops to remain near their territories. When the lakes flood completely the Hooded Plover leave the northern lakes and seek refuge elsewhere in Yalgorup National Park. As spring approaches

Table 1. Survey results from Yalgorup's northern lakes from March 2005 to July 2009

Year	2005	2005	2005	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2007	2007	2007	2007	2007
	10-Mar	13-May	24-May	5-Jan	17-Jan	2-May	19-May	1-Jun	16-Jun	7-Jul	19-Jul	13-Sep	1-Nov	15-Nov	13-Dec	2-Jan	30-Jan	10-Mar	21-Mar	4-Apr
Bar-tailed Godwit																				
Common Greenshank	1	1			22								1	1		2	3			1
Marsh Sandpiper						1														
Grey-tailed Tattler																				
Great Knot																				
Red-necked Stint	360		10				50	100	33	10	56	100	21	1424	30	140	120	50	5	120
Sharp-tailed Sandpiper																				
Curlew Sandpiper																				
Pied Oystercatcher																				
Black-winged Stilt	20	13															6	18		
Banded Stilt	40			5																
Red-necked Avocet	40	9		95																200
Grey Plover	12					4					14								6	
Red-capped Plover	60	12	11		20	2	58	30	29	10	28		25	120	84	20	32	70	5	30
Black-fronted Dotterel																				
Lesser Sand Plover														2	6					
Greater Sand Plover	1																			
Hooded Plover	7	6	2	11	13	9	11	9	11	12	14	7	7	7	6	14	10	6	6	14
Inland Dotterel																				
P=Present																				
Total	**541**	**41**	**23**	**111**	**55**	**16**	**119**	**139**	**73**	**32**	**112**	**107**	**54**	**1554**	**126**	**176**	**171**	**144**	**22**	**365**

Year	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008
	21-Apr	18-May	30-May	11-Jun	6-Jul	15-Aug	31-Aug	20-Sep	30-Oct	16-Nov	1-Feb	22-Feb	23-Feb	14-Mar	2-Apr	14-Apr	2-May	15-May	30-May	7-Jul
Bar-tailed Godwit																1	17	15	21	
Common Greenshank	1		2	7	1	1		2	1		12			1	5	3	9	9		
Marsh Sandpiper																				
Grey-tailed Tattler																				1
Great Knot																		6		
Red-necked Stint	40			48			250		600		189			90	85	50	73	40	20	9
Sharp-tailed Sandpiper																	P			
Curlew Sandpiper									17					1	3				2	9
Pied Oystercatcher																		1		
Black-winged Stilt	5		6	4	4	11					30			4	1		1	26	19	3
Banded Stilt					215						20				1					
Red-necked Avocet					50	1					93				3	11	142	85	70	
Grey Plover			10	4	2									7	12	12	24	6	7	
Red-capped Plover	1	12	6	81	40	10	50	4	106		80			50	65	52	22	31	11	28
Black-fronted Dotterel																	1			
Lesser Sand Plover															1					
Greater Sand Plover																				
Hooded Plover	4	12	5	9	2	6	3	5	11	16	7	8	49	8	19	16	10		4	7
Inland Dotterel							2													
P=Present																				
Total	51	24	29	153	314	29	305	11	735	16	431	8	49	161	195	145	299	219	154	57

Year	2008	2008	2008	2008	2008	2008	2008	2009	2009	2009	2009	2009	2009	2009	2009	2009
	22-Jul	29-Aug	30-Sep	10-Nov	22-Nov	15-Dec	29-Dec	21-Jan	7-Feb	20-Feb	10-Mar	21-Mar	30-Apr	19-May	10-Jun	22-Jul
Bar-tailed Godwit																
Common Greenshank					13	6	5	30	15	16	1	1		2		
Marsh Sandpiper																
Grey-tailed Tattler					2											
Great Knot																
Red-necked Stint				15	154	26	250	19		490	195	120	130	6	38	6
Sharp-tailed Sandpiper																
Curlew Sandpiper																
Pied Oystercatcher																
Black-winged Stilt														8	5	1
Banded Stilt																
Red-necked Avocet						57	12								51	
Grey Plover											9	1	2	3		
Red-capped Plover				19	37	99	15	47	24	22	20	60	107	67	4	6
Black-fronted Dotterel																
Lesser Sand Plover										1						
Greater Sand Plover									1							
Hooded Plover	4		4	11	4	9	9	4	9	18	10	12	4	13	0	2
Inland Dotterel																
P=Present																
Total	**4**	**0**	**4**	**45**	**210**	**197**	**291**	**100**	**49**	**547**	**235**	**194**	**243**	**99**	**98**	**15**

Table 2. Highest wader counts for individual lakes - March 2005 to July 2009.

Location	Duck Pond	Swan Pond	Boundary Lake	Teal Lake	Lake Clifton
Bar-tailed Godwit	15		14	9	2
Common Greenshank	9	4	25	12	3
Marsh Sandpiper			1		
Grey-tailed Tattler					2
Great Knot	6				
Red-necked Stint	50	1000	1000	100	600
Sharp-tailed Sandpiper	present				
Curlew Sandpiper				3	17
Pied Oystercatcher			1		
Black-winged Stilt	6	30	40	43	55
Banded Stilt	250	210	110	200	12
Red-necked Avocet	100	415	35		400
Grey Plover	8	2	11	14	1
Red-capped Plover	18	3	50	40	100
Black-fronted Dotterel	1				
Lesser Sand Plover			1		6
Greater Sand Plover			1		1
Hooded Plover	20	15	57	6	71
Inland Dotterel			2		2
Total	**483**	**1679**	**1348**	**427**	**1272**

Table 3. Common Greenshank - highest monthly counts at Yalgorup's northern lakes Janaury 2001 to July 2009.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jan			3	3		22	3		30
Feb		2						12	16
Mar			1		1			1	1
Apr				1	1		1	5	
May				1	1		2	9	2
Jun	3		3				7		
Jul							1		
Aug							1		
Sep							2		
Oct							1		
Nov		3		1		1		13	
Dec	1		10	1				6	

Table 4. Red-necked Stint – Highest monthly counts Yalgorup's northern lakes January 2006 to July 2009.

Year	2003	2004	2005	2006	2007	2008	2009
Jan	450	100	350	200	140		19
Feb	500	300	100	50		189	490
Mar	10	100	150		50	90	195
Apr	50	10	400		120	50	130
May	50	50	50	50		73	6
Jun				100	48		38
Jul		8		56		9	6
Aug				24	250		
Sep							
Oct				20	600		
Nov		10		1424		154	
Dec	1000	100	100	30		250	

Table 5. Red-capped Plover - Highest monthly Yalgorup's northern lakes, January 2005 to July 2009.

Year	2005	2006	2007	2008	2009
Jan		20	32		47
Feb				80	50
Mar	60		70	50	60
Apr			30	65	107
May	12	58	12	31	67
Jun		30	81		4
Jul		28	40	28	6
Aug			50		
Sep			4		
Oct			106		
Nov		120		37	
Dec		84		99	

and water levels recede Hooded Plover soon turn up on small stretches of beach that become exposed and stake out their territory. It is then a matter of time till the beaches dry out and sufficient foraging sites become available before the Hooded Plover start breeding.

Hooded Plover have been recorded breeding at Teal Lake (Linda's Lagoon), Swan Pond, Duck Pond, Boundary Lake and Lake Clifton (east side). Breeding records between 2000-2009 show that Hooded Plover bred at the following lakes: Swan Pond: August 2006 (runners), February 2008 (runners), Duck Pond: March 2002 (runners), February 2003 (runners), February 2004 (runners), December 2004 (runners), December 2005 (eggs), May 2006 (runners), March 2007 (runners), Boundary Lake: December 2001 (runners), March 2004 (runners), March 2005 (runners), September 2006 (runners), Teal Lake (Linda's Lagoon): February 2001 (runners), December 2004 (eggs), March 2009 (runners), Lake Clifton (East): April 2008 (runners), April 2009 (runners), Lake Clifton (West): August 2004 (runners). The "value" of various lakes to Hooded Plover is shown in Table 6.

The west side of Lake Clifton opposite the old lime kilns is one of the few locations in summer where Hooded Plover congregate in large numbers. This is an isolated location. On 28 March 2007 (64) Hooded Plover were seen here, on 29 March 2008 (71) and on the 2 April 2009 (52). Flocking of Hooded Plover was recorded at Boundary Lake in 2001 and 2002.

Variations in the Hooded Plover population at the northern lakes are shown as maximum monthly counts in Table 7.

DISCUSSION

In designating the Peel-Yalgorup wetland system as a wetland of international significance we commit to certain obligations. These include monitoring the site to ensure it retains its 'ecological character'. Three indicator species were selected for this purpose e.g. Red-necked Stint, Sharp-tailed Sandpiper and Hooded Plover. Data obtained monitoring their populations over a five year period will be used to evaluate the ecological character of the site against the limits of acceptable change. (Hale 2008)

Although this report only covers a small geographical section of the overall Ramsar site the detailed data makes an important contribution. There is an influx of migratory waders over summer at the northern lakes. The most common are the Red-necked Stint and Common Greenshank. Black-winged Stilt *Himantopus himatopus* , Red-necked Avocet, *Recurvirostra novaehollandiae* and Banded Stilt, *Cladorhynchus leucocephalus* numbers also increase at this time of the year. Numbers are fewer in comparison with other lakes in the park where larger numbers have been recorded. The largest flocks of Red-necked Avocet (400) were sighted in the middle part of Lake Clifton.

The Hooded Plover population is residential. Hooded Plover congregate in large flocks over summer. These mainly occur around the middle lakes in particular Martins Tank, the northern section of Lake Preston and the western shore of Lake Clifton. Some migration of Hooded Plover to the Wagin Lake system has been documented. (Singor, 2009). Hooded Plover banding has taken place at Yalgorup National Park since 2002. Some of the findings are:

Table 6. The value of wetland areas in Yalgorup National Park for the Hooded Plover.

Location	Reason	Conservation value
NORTHERN LAKES		
Swan Pond	Breeding site	High value
Duck Pond	Breeding site	Very high value
Boundary Lake	Breeding site. Summer congregation site.	High value
Teal Lake (Linda's Lagoon)	Breeding site	High value, outside reserve
Lake Clifton	Breeding site, Summer congregation site.	High value

High value = supports breeding but not each year.
Very high value = supports breeding most years by one or multiple pairs.

Table 7. Hooded Plover - highest monthly counts at Yalgorup's northern lake January 2005 to July 2009.

Year	2005	2006	2007	2008	2009
Jan	10	13	14	2	4
Feb	15	16	21	56	18
Mar	7		64	71	35
Apr	27	10	14	19	52
May	17	11	12	11	13
Jun	1	11	9	3	
Jul	11	14	2	7	2
Aug	9		6		
Sep		7	5	4	
Oct	2		11		
Nov		7	16	11	
Dec	11	6		9	

- Once the young birds are able to fly, they leave the parent birds and move away from the breeding area, joining up with mixed flocks of adults and other immatures. The breeding adults tend to stay close to the breeding areas.
- Some birds are very faithful to breeding/home territories, generally being recorded there through most of the year, depending on water levels.
- Apart from the inland sightings, none of the banded birds have been recorded more than about 20 km from where they were banded.

In winter as the water levels rise in the Peel-Harvey Estuary and at Lake McLarty suitable wader habitat becomes harder to find. It is at this time of the year that some waders divert to the lakes in Yalgorup National Park. The northern lakes support small numbers of overwintering migratory waders.

Comparison between northern and middle lakes

There is a considerable amount of data available on the wader populations that frequent the middle lakes of Yalgorup National Park. (Russell 2000). This information covers Lake Pollard, Martins Tank, Lake Yalgorup, Lake Hayward, Lake Newnham, Lake Preston north and Lake Clifton over the years 1994 to 1999.

A comparison of the records from the middle and northern lake shows that the distribution of waders is not uniform throughout Yalgorup National Park. There are however a number of similarities between both sites. The records of Black-winged Stilt and Common Greenshank follow a similar monthly pattern with closely matching numbers. Red-necked Stint and Banded Stilt numbers are much higher at the middle lakes extending into the thousands. Similar to the northern lakes, migratory waders were seen at the middle lakes over the winter months. These were Bar-tailed Godwit, Common Greenshank, Common Sandpiper, Red-necked Stint and Grey Plover. Red-capped Plover were present all year round at both sites though in much higher numbers at the middle lakes over summer.

Lake Preston (southern part):

Lake Preston stretches from the township of Preston Beach, in the middle of the Park, to Myalup located at the southern end of Yalgorup National Park. The south west corner of Lake Preston provided some of the highest wader counts for the Park. Tony France has intensively surveyed Lake Preston for many years and provided the following insight. "Large flocks of Banded Stilt and Black-winged Stilt congregate in the southern basin of Lake Preston. Banded Stilt seem to arrive en masse, first in the northern part of Lake Preston and then gradually make their way to the southern half of Lake Preston by January. Black-winged Stilt on the other hand sometimes arrive in small numbers from late October onwards but more usually from mid to late December. Black-winged Stilt seem inclined to string themselves in small flocks (< 6) along the shoreline. The large rafts of Banded Stilts sighted contained some Black-winged Stilt and Red-necked Avocet. The largest wader congregations are found at the south west pocket of Lake Preston where the birds remain for some time. In February 2005 in excess of 10.000 Banded Stilt and 3000 Red-necked Stint were seen".

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INFLUX OF WADERS AND WATERBIRDS AT AMBERLEY SWAMP - A NEW ZEALAND EPHEMERAL WETLAND

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INTRODUCTION AND STUDY AREA

Unlike Australia where ephemeral wetlands are an ubiquitous feature of the landscape, exerting a profound influence on the distribution and ecology of many waterbird species (Kingsford & Norman 2002), New Zealand has few such wetlands and resident waterbird populations are far less irruptive.

In settled districts of New Zealand most wetland habitats other than permanent water bodies were drained and cleared for agriculture during the 19th and 20th centuries, often with the assistance of government subsidies. Ephemeral wetlands of a size sufficient to attract large numbers of waterbirds are now very few, particularly in the drier eastern parts of both main islands.

The Canterbury Plains on the eastern side of the South Island have a relatively dry climate with an average annual rainfall of 450 - 700 mm. Away from a narrow band of permanent coastal wetlands and the braided river systems that bisect the plains, naturally occurring wetlands are very scarce (Potts 1882; Speight *et al.* 1927). Most original wetlands were drained between the 1860s and 1960s - their indigenous vegetation removed and in the most part replaced by exotic pasture or invaded by exotic willow woodland (*Salix* sp.).

Amberley Swamp (43°07'S, 172°43'E),

Amberley Swamp, located west of State Highway One, 2 km NNW of Amberley township, is one of the few remaining ephemeral wetland basins on the Canterbury Plains. The site is a former freshwater swamp that was drained for farming but remains prone to temporary flooding after prolonged rainfall. The portion of the original site that still floods occupies an area of 80-100 ha, measuring 1.4 km west to east and a variable 500-700m north to south. The site lies approximately 6m below the level of surrounding land is artificially drained through an outlet ditch (Dock Creek Diversion) cut deeply through higher ground on the southern side. The entire site is privately owned and managed for cattle grazing.

Stanton Road bisects Amberley Swamp from north to south and was constructed on a raised causeway. The sector to the east (about 70% of the site) has been largely converted to pasture but contains several small stands of rushes along creeks and several small pockets of willows. The western sector (30%), although grazed by livestock, still retains a high percentage of rush (*Juncus* sp.) and sedge (*Carex* sp.) cover. Under normal (dry) conditions Amberley Swamp supports low numbers of wetland/grassland birds, comprising mainly Masked Lapwing, Paradise Shelduck, Mallard, Purple Swamphen and Swamp Harrier. When the site floods, the eastern sector is covered in extensive sheets of shallow water, while the western sector converts into wet rushland.

Normal annual rainfall for the Amberley area is approximately 490mm. During 2008 almost double this amount (809mm) was recorded, including two major fall events on 29-30 July (c.150 mm) and 26 August (c.120 mm). These exceptional episodes of heavy rain, just four weeks apart, were each considered 1-in-50 year events. They caused extensive flooding over much of the north-east South Island and resulted in the complete inundation of Amberley Swamp. The site was flooded up to a depth of 1 m and a damaged flood gate on Dock Creek Diversion meant that drainage remained impeded for some time (Christchurch Press 2 October 2008). Extensive surface water ponding prevailed on the site for a full six months - from late July 2008 (mid winter) to late January 2009 (mid summer). The site was finally dewatered during January and February 2009.

METHODS

I first became aware that Amberley Swamp was extensively flooded and held a large influx of waterbirds on 22 October 2008. The area was viewed when passing by car and only an estimate of easily identifiable species congregating in the eastern sector was obtained. The opportunity to return and undertake a full bird survey arose on 23 December 2008. Two subsequent surveys were made on 11 January and 2 March 2009. All water birds were counted on these visits and habitat condition recorded.

RESULTS

On the initial visit on 22 October 2008, the site was >90% covered in water and held congregations of waders, waterfowl and gulls.

The first full survey of waders and waterbirds was made on 23 December 2008 when the eastern sector comprised >70% shallow ponding and <30% exposed muddy substrates. A total of 732 birds of 18 species were counted (table 1), including four native waders - South Island Pied Oystercatcher, Pied Stilt, Masked Lapwing and Double-banded Plover.

Nine waterbird species were recorded breeding on site - Black Swan, Paradise Shelduck, Mallard, Australasian Shoveler Grey Teal, New Zealand Scaup, Purple Swamphen, Masked Lapwing and Pied Stilt.

By 11 January 2009 a large volume of surface water had drained or evaporated, leaving a habitat mix of <30% ponding, <50% wet mud and >20% dry mud. 1771 water

Table 1. Counts of waders and water birds at Amberley Swamp, North Canterbury 2008-2009

Species	**22-Oct**	**23-Dec**	**11-Jan**	**2-Mar**
South Island Pied Oystercatcher *Haematopus finschi*	?	16	-	-
Pied Stilt *Himantopus himantopus leucocephalus*	100+	125	78	2
Masked Lapwing *Vanellus miles*	?	31	74	33
Double-banded Plover *Charadrius bicinctus bicinctus*	?	9	67	2
total waders	**100+**	**181**	**219**	**37**
Great Cormorant *Phalacrocorax carbo*	?	-	1	-
Little Pied Cormorant *P. melanoleucos brevirostris*	?	1	-	-
White-faced Heron *Egretta novaehollandiae*	?	2	-	-
Black Swan *Cygnus atratus*	50+	20	6	4
Canada Goose *Branta canadensis*	?	4	-	-
Paradise Shelduck T*adorna variegata*	300+	124	34	53
Mallard/Black Duck *Anas platyrhynchosA. /superciliosa*	?	71	590	21
Grey Teal *Anas gracilis*	500+	268	870	-
Australasian Shoveler *Anas rhynchotis variegata*	?	29	40	-
New Zealand Scaup *Aythya novaeseelandiae*	?	1	-	-
Purple Swamphen *Porphyrio porphyrio melanotus*	?	21	10	43
Swamp Harrier *Circus approximans*	?	1	1	6
Kelp Gull *Larus dominicanus*	50+	2	-	-
Black-billed Gull *Larus bulleri*	100+	7	-	-
total other water birds	**1000+**	**551**	**1552**	**127**
Total all species	**1100+**	**732+**	**1771+**	**164+**

birds were counted, including 219 waders and large numbers of dabbling ducks.

By the final visit on 2 March 2009 the wetland had largely dried out and new pasture sown by the landowner had begun to sprout. The habitat mix in the eastern sector was <5% ponding, <15% wet mud, <30 dry mud and >50% new grass sprouting on dry mud. Waterbird numbers had sharply reduced with just 164 birds of 8 species recorded, including a residual collection of waders.

DISCUSSION

Ephemeral wetlands are a class of habitat that have received little critical attention from New Zealand ornithologists. Aside from a short paper by Harrison (1975) on a site c.12 km south-east of Amberley Swamp, no other accounts of birdlife using ephemeral wetlands in the Canterbury Region appear to have been published in recent decades. One has to go back to Potts (1882) for detailed accounts of the birdlife attracted to such habitats.

The influx of waterbirds to Amberley Swamp demonstrates the importance, albeit temporary, of ephemeral wetlands in dry, eastern South Island farming landscapes. Flooding of ephemeral wetlands in late winter and spring can provide breeding habitat for opportunistic species, while flooding during the summer months can provide post-breeding flocking and moulting sites, as well as provide transit points for over-flying domestic migrants. Ephemeral wetlands in the Canterbury Region are scarce and generally hold water for only 1-6 weeks following heavy rainfall events. The extent of surface water (>80 ha) and duration (>6 months) of the 2008-9 flooding event at Amberley Swamp was exceptional.

Most of the species observed at Amberley Swamp do not occur in any abundance in the general vicinity and obviously flew there from further afield. The nearest wetland sites with waterbird populations of sufficient size to function as possible source areas are Ashley-Saltwater Creek Estuary (15 km SSE), Woodend Lagoon (22 km SSE), Southbrook Oxidation Ponds (24 km SSW) and St Annes Lagoon (58 km NE).

Of the nine waterbird species recorded breeding, six (Pied Stilt, Masked Lapwing, Purple Swamphen, Black Swan, Australasian Shoveler and Grey Teal) are species that have colonised New Zealand from Australia at some time from 70 to 1000 years before present. It is an interesting observation that while most endemic New Zealand waterbirds tend to breed in spring and early summer (September through February), the breeding activity of some the Australian colonists seems to be triggered more by the presence of suitable “wet” environmental conditions than by the onset of spring. Most of the Australian colonists recorded with young at Amberley Swamp commence breeding in winter. For example; Masked Lapwing and Grey Teal start nesting in June, while Black Swan, Purple Swamphen and Pied Stilt all nest from July onwards (Heather & Robertson 1996, Marchant & Higgins 1990). The flooding of Amberley Swamp in July and August 2008 was perfect timing to draw in these Australian colonists for breeding. The continuation of favourable habitat conditions (shallow ponding and muddy substrates) through the spring and summer months subsequently attracted spring-nesting New Zealand endemics and post-breeding flocking by waterbirds from a wide catchment.

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REPORT OF THE FIRST SHOREBIRD SURVEY AT MUNDOK, NORTH KOREA BY MIRANDA NATURALISTS' TRUST AND KOREAN NATURAL ENVIRONMENT CONSERVATION FUND. 26–29 APRIL 2009

A MIRANDA NATURALISTS' TRUST - KOREAN NATURAL ENVIRONMENT CONSERVATION FUND PROJECT

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INTRODUCTION

The first joint shorebird survey undertaken in the Democratic Peoples Republic of Korea (DPRK) or North Korea by the Miranda Naturalists' Trust of New Zealand (MNT) and the Korean Natural Environment Conservation Fund was conducted at the Mundok Migratory Birds Wetland Reserve (referred to throughout as Mundok) between 26–29 April 2009. Little shorebird data is available for North Korea, which is a concern for people involved with shorebird research in the East-Asian Australasian Flyway. Almost annually since 2004 teams from the MNT along with local staff have conducted shorebirds surveys at Yalu Jiang National Nature Reserve in China on the border with North Korea and shorebirds have been observed roosting across the Yalu River in North Korea. This led the MNT to investigate possible ways of visiting and undertaking surveys in North Korea. In 2007, following an approach from the MNT, the New Zealand Minister of Foreign Affairs, during an official visit to the country, raised the issue of such surveys with the relevant North Korean authorities. The agreement for a survey to take place came early in 2008. While it was not possible to complete travel arrangements in time for the 2008 northward migration, it was agreed that in late April 2009 a joint venture survey could be undertaken at Mundok.

A total of 6,345 shorebirds of 22 species were counted at the three sites within the reserve. Three shorebird species, Bar-tailed Godwit, Eurasian Curlew and Far-eastern Curlew occurred in internationally important numbers, more than 1% of their respective populations. The 82 Saunders's Gull seen represent 0.5% of the estimated population. At least 50 individual shorebirds from seven banding regions of the flyway were identified by their coloured leg bands and flags.

SURVEY SITES

The Mundok Migratory Birds Wetland Reserve is situated approximately 39° 30' N – 125° 22' E, on the coast of the Yellow Sea and some 80km north of Pyongyang, where the Chong Chon and Taenyong rivers form an estuary approximately 7km across at the mouth. The Reserve is on the southern side of the estuary.

Three areas within the reserve were counted Dong Rim-ri, So Ho-ri and Ryong Rim-ri, (Figure 1). These are about 6km apart along the coast but considerably further by road. Each site has quite different types of habitat, although the mud at each site appeared to be very soft particularly along the main river channels of Dong Rim-ri and So Ho-ri. There was no indication that significant numbers of shorebirds roosted at any other sites within the reserve.

Dong Rim-ri - 39°33'00"N 125°24'30"E

This site has steep sided mudflats bordered by reed beds and an offshore island mostly covered in reeds, unsuitable for roosting shorebirds. The site was not seen at low tide but on the spring tide when it was surveyed, the mudflats were covered several hours before high tide and any birds in the area were forced to leave. A few shorebirds were seen flying further up the river to an unknown destination.

So Ho-ri - 39°30'20"N 125°22'50"E

So Ho-ri faces northwest and has a shoreline bordered by rice paddies, which were predominantly in a ploughed state and were suitable for roosting shorebirds. There is an offshore mudflat island approximately 4km long by 1km wide at a distance of 1km across a river channel. The island has small scattered reed beds along its length. Suitable mud remains exposed for roosting shorebirds on all but the highest spring tides. During the biggest spring tide, encountered on 28 April the entire island was underwater, forcing all birds to roost in rice paddies where they were difficult to see. Inland are a series of lakes and wetland depressions where small numbers of shorebirds were also seen.

Ryong Rim-ri - 39°25'48"N 125°20'57"E

This important shorebird roost site is situated at the mouth of a small river, which has a deep channel and wide flat sides between two stop banks. These flats are partly covered in reedy vegetation. Birds use the river flats to sub-roost and probably only move inland if the flats are covered by the rising tide, as happened on both survey dates. The birds then appear to favour a small area of shallow saltwork ponds, some of which were dry. It is expected that this is a regular roost site.

SURVEY METHODS

Counts were carried out between 26–29 April 2009 with Ryong Rim-ri counted twice on 27 and 29 April.

Spring high tides at Mundok completely cover the mudflats, forcing shorebirds to roost inland for several hours. During the survey the tides ranged between 7.5 and 7.7m. The mudflats are very expansive and on neap tides birds are probably able to remain on the mudflats at some distance

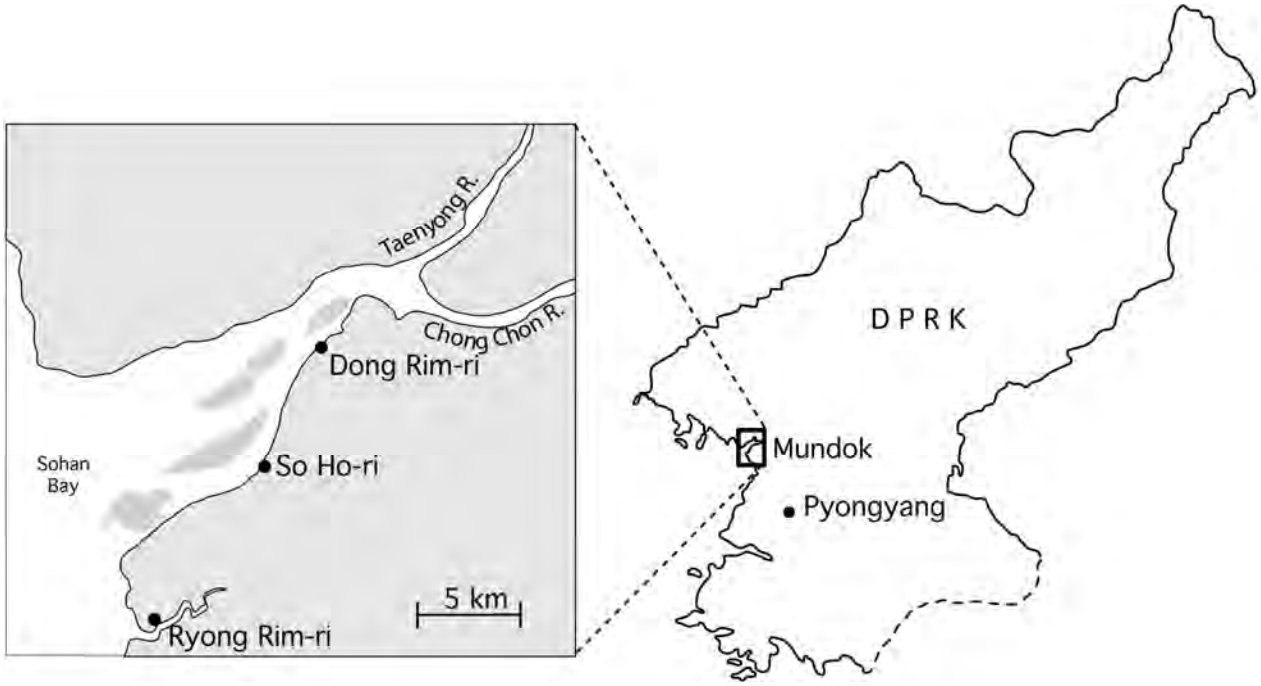

Figure 1. Map of DPRK and Mundok location

from the seawall, which would make counting difficult. Following methodology used at Yalu Jiang, counting started at least two hours before high tide as birds arrived from the mudflats to roost. Counting continued until shortly after high tide when most birds appeared to have settled and movements had ceased.

Counts appeared to be reasonably complete and accurate and observations indicated that birds were relatively site faithful during the survey period. The birds at So Ho-ri were counted on the offshore mudflat island at a distance of 1.5–3km but the air was clear and the light favourable, allowing the birds to be seen reasonably well with telescopes from the roof of the management centre situated on top of a hill. A few small shorebirds may have been overlooked and identifying some of the more distant curlews to species level was difficult except when they flew.

Incidental counts of other waterbirds were conducted where possible, although they were not the primary focus; their numbers are included in Table 5.

RESULTS

Table 1 summarises the species and totals for the count period when 6,345 birds of 22 species were counted. Three shorebirds species occurred in internationally important numbers. Bar-tailed Godwit, Eurasian Curlew and Far-eastern Curlew. The higher numbers only from the Ryong Rim-ri counts are included in the totals.

Species Reaching the 1% Ramsar Criterion at Mundok

Bar-tailed Godwit
The *baueri* sub-species accounted for most of the Bar-tailed Godwit seen during the survey with much smaller numbers of the *menzbieri* sub-species present. This should change in early May, as *menzbieri* are known to migrate northward slightly later (McCaffery & Gill 2001). Therefore, this count represents more than 1% of the estimated 155,000 *baueri* population (Bamford 2008).

Far-eastern Curlew
The count on 26 and 27 April represents approximately 2.5% of the estimated 38,000 world population (Bamford 2008). A count of 1,890 has been recorded at Mundok in the past (Barter 2002).

Eurasian Curlew
The count on 26 and 27 April represents approximately 1.5% of the estimated 40,000 flyway population (Bamford 2008).

Other Key Shorebird Species

Dunlin
Almost 1,300 at So Ho-ri and 200 at Ryong Rim-ri indicate that Mundok is a good site for this wide-ranging species.

Great Knot
The soft deep mud at Mundok may not be suitable for small bivalves that are Great Knot's main food (Higgins & Davies 1996), therefore, the small number and the lack of Red Knots which have a similar diet probably indicates that their food source is not abundant at Mundok.

Kentish Plover
Very small numbers, mostly in pairs, which are probably birds that breed in the area.

Terek Sandpiper
A significant count of 133 at Ryong Rim-ri, which included one bird banded at Chongming Dao near Shanghai in China.

Pacific Golden Plover
Although only one was found on the mudflats, about 40 were seen in ploughed rice paddies 2km inland from Ryong Rim-

Table 1. Total shorebird count for the Mundok Reserve 26-29 April 2009
(*numbers in () for Ryong Rim-ri are not included in species totals)*

Species	DATE >	26.Apr.09	27.Apr.09	28.Apr.09	29.Apr.09
		7.6m	7.7m	7.7m	7.5m
	TIDE >	10:10	10:50	11:30	12:20
	SITE >		Ryong Rim-	Dong	Ryong Rim-
	TOTAL	So Ho-ri	ri	Rim-ri	ri
Black-tailed Godwit *Limosa limosa*	3	-	-	-	3
Bar-tailed Godwit *Limosa lapponica*	2,400	200	2,000	-	2,200
Whimbrel *Numenius phaeopus*	49	6	(25)	13	30
Eurasian Curlew *Numenius arquata*	630	580	50	-	(30)
Far-Eastern Curlew *Numenius madagascariensis*	950	200	750	-	110
Spotted Redshank *Tringa erythropus*	25	-	(15)	-	25
Common Redshank *Tringa totanus*	24	8	11	5	(8)
Common Greenshank *Tringa nebularia*	11	3	(3)	3	5
Wood Sandpiper *Tringa glareola*	21	-	(1)	-	21
Terek Sandpiper *Xenus cinereus*	149	-	133	16	(120)
Common Sandpiper *Actitis hypoleucos*	3	-	3	-	(1)
Great Knot *Calidris tenuirostris*	172	-	(25)	-	172
Sanderling *Calidris alba*	2	-	2	-	-
Red-necked Stint *Calidris ruficollis*	12	-	12	-	(2)
Temminck's Stint *Calidris temminckii*	6	-	6	-	-
Sharp-tailed Sandpiper *Calidris acuminata*	9	-	9	-	(2)
Dunlin *Calidris alpina*	1,584	1,290	(200)	4	290
Black-winged Stilt *Himantopus himantopus*	14	11	-	-	3
Grey Plover *Pluvialis squatarola*	196	55	140	1	(80)
Pacific Golden Plover *Pluvialis fulva*	40	-	-	-	40
Kentish Plover *Charadrius alexandrinus*	11	1	10	-	(2)
Lesser Sand Plover *Charadrius mongolus*	33	-	(6)	11	22
Totals	6,345	2,354	3,401	53	3,166

ri (included in Ryong Rim-ri total). This species can be quite elusive and would be easily overlooked if they were feeding and roosting in ploughed rice paddies.

Flag and Colour Band Sightings

Flags and colour bands were seen on birds at Ryong Rim-ri. While it was difficult to determine exactly how many banded birds were present, approximately 50 individual birds over the two days were identified, although it was not always possible to obtain complete colour combinations.

Marked birds of five species from seven regions of the flyway, South and North Islands New Zealand, Victoria, Southeast Queensland and North-western Australia, Chongming Dao, China and Barrow in Alaska were seen.

Tony Habraken, David Lawrie, Adrian Riegen Kim Kwang Pil, Pak Ung, Choi Chul Nam and Ri Kum Bok recorded flags and colour bands. Apologies for anyone's name left off this list.

Summary of Confirmed Banded Birds seen at Ryong Rim-ri

Tables 2–4 show only the confirmed marked birds seen. Partial colour band combinations and partially read engraved flags have been omitted.

Saunders's Gull

The 82 Saunders's Gulls counted on 26 and 29 April represents 0.5% of the estimated 14,400 population (Cao 2008), of this threatened species.

DISCUSSION

A species of particular interest was Red Knot, a species for which the staging sites in East Asia were largely unknown before 2009. Reasonable numbers have been recorded in the Bohai Sea but not enough it appeared, to account for the estimated flyway population of 220,000 (Bamford 2008). In May 2009 large numbers were found at sites in the Bohai Sea. (Chris Hassell pers comm.).

No Red Knots were seen at Mundok in April 2009, this could well be due to lack of suitable food. Yalu Jiang, which is only 110 km away, is also a poor site for this species with only two counts in eight years reaching more than 100 birds.

Several species, in particular, Grey Plover, Lesser Sand Plover, Spotted Redshank and Whimbrel may be present in larger numbers later in May, as these three species are certainly more numerous later in the migration season at Yalu Jiang.

One of the workers in the Ryong Rim-ri salt ponds indicated that in 2008 perhaps three times as many shorebirds were using the ponds. Whether this was in April or May is unclear but is worth further investigation.

Although there is a large rural based human population close to and in the reserve and people are actively gathering a variety of foods from the coastal areas, the shorebirds seem to be left alone. North Korean security issues restrict the number of people allowed on the mudflats and surrounding areas. The fact researchers were able to approach to within 50m of the roosting birds was a strong indication they are left undisturbed. There was no sign of active coastal

Table 2. Summary of engraved flags seen at Ryong Rim-ri 27–29 April 2009

ENGRAVED FLAGS - BAR-TAILED GODWIT							
Flag Colour	Code	Banding Site	Banding Date	Age	Date Last Seen	Where Last Seen	Distance
White	ARW	Miranda, New Zealand	29.11.08	3+	-	-	9,893 km
White	BSC	Miranda, New Zealand	29.01.09	3+	01.03.09	Miranda, NZ	9,893 km
White	APU	Miranda, New Zealand	29.11.08	3+	29.03.09	Miranda, NZ	9,893 km
Yellow	HP	Broome, NW Australia	13.02.04	?	27.08.06	Broome, NW Australia	6,355 km
Green	DL	Brisbane, QLD, Australia	21.03.08	2+	29.03.09	Brisbane, QLD, Australia	7,941 km
ENGRAVED FLAGS - GREAT KNOT							
Yellow	EKU	Broome, NW Australia	14.09.08	2	-	-	6,355 km

Table 3. Summary of colour-banded birds seen at Ryong Rim-ri 27–29 April 2009

COLOUR BANDED BAR-TAILED GODWITS from NEW ZEALAND						
Colour Bands	Banding Site	Banding Date	Age	Date Last Seen	Where Last Seen	Distance
5YBRY	Totara Ave, Golden Bay, SI	03.02.07	3+	13.02.09	Totara Ave, Golden Bay, SI	10,072 km
1BYBR	Warrington, Otago, SI	28.02.06	3+	05.02.09	Aramoana, Otago, NI	10,445 km
1BBWB	Awarua, Southland, SI	26.10.04	3+	08.01.09	Awarua Bay, Southland, SI	10,431 km
4YRRB	Foxton, Manawatu, NI	18.02.07	3+	31.03.09	Foxton, Manawatu, NI	10,180 km
1YBRB	Pakawau, Golden Bay, SI	04.12.05	2?	13.02.09	Farewell Spit, S Island SI	10,072 km
2WWYR	Miranda, Firth of Thames, NI	10.10.04	3?	17.09.05	Avon-Heathcote Est, Canterbury NI	8,893 km
COLOUR BANDED DUNLIN from ALASKA, U.S.A						
G flag /YL	Barrow, Alaska	June 2003 or 2004			June 2007or 2008 at Barrow	5,475 km

Table 4. Summary of flagged birds seen at Ryong Rim-ri 27–29 April 2009

FLAGS ONLY			
Species	Flag colours	Qty	Banding Region
Bar-tailed Godwit	White/Green	1	Nelson, South Island, NEW ZEALAND
Bar-tailed Godwit	White	7	Miranda, North Island, NEW ZEALAND
Bar-tailed Godwit	Orange	5	Victoria, AUSTRALIA
Bar-tailed Godwit	Green	3	Southeast Queensland, AUSTRALIA
Bar-tailed Godwit	Yellow	5	Broome Northwest AUSTRALIA
Bar-tailed Godwit	White/Black	1	Chongming Dao, Shanghai, CHINA
Bar-tailed Godwit	Black/White	3	Chongming Dao, Shanghai, CHINA
Great Knot	Yellow	4	Broome Northwest AUSTRALIA
Great Knot	Black/White	1	Chongming Dao, Shanghai, CHINA
Terek Sandpiper	Black/White	1	Chongming Dao, Shanghai, CHINA
Dunlin	Black/White	1	Chongming Dao, Shanghai, CHINA
Grey Plover	Black/White	1	Chongming Dao, Shanghai, CHINA

development so the shorebird habitat appears to be secure, at least for the time being.

FURTHER SURVEYS

Mundok is an important staging site on the East Asian-Australasian Flyway for the *baueri* sub-species of Bar-tailed Godwit and both curlew species and is probably the final staging site for these birds before they depart for the breeding grounds.

With important shorebird refuelling sites being lost to development around the Yellow Sea, Mundok will become increasingly important for shorebirds in the future and surveying this and other suitable sites nearby on a regular basis would be extremely valuable.

ACKNOWLEDGEMENTS

The former New Zealand Foreign Affairs Minister Rt Hon Winston Peters raised the subject of a joint shorebird survey during his official visit to North Korea in November 2007. Without this initial request the survey would not have taken place and we are very grateful to the Minister. This survey would also not have been possible without the considerable help of the DPRK/NZ Friendship Society, in particular Mrs Ji Yon Ok in North Korea. Don Borrie and Peter Wilson in New Zealand also assisted greatly with the initial planning. The Korean Natural Environment Conservation Fund arranged all internal travel and other logistical support. In particular we wish to acknowledge the help of Sin Hyok Chol vice-director of Mundok County, Land and Environment Department. Special thanks also to Choe Il Chol, Manager of the Mundok Reserve and his staff. We also

wish to thank Kim Kwang Pil and Pak Ung, two scientists who helped with the survey. Their extensive knowledge of natural sciences was very valuable. We must also acknowledge the considerable logistical and financial support of the New Zealand Ministry of Foreign Affairs and Trade. The Department of Conservation and the Lottery Minister's Discretionary Fund also assisted with funding. A final thank you to Gillian Vaughan and Keith Woodley for their valuable assistance with this paper.

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Table 5: Opportunistic waterbird counts at Mundok
(numbers in () are not in the species totals as they may be duplicates)

Waterbirds Species	Sites Totals	So Ho-ri	Ryong Rim-ri	Dong Rim-ri	Ryong Rim-ri	Ryong Inlanc
		26.Apr.09	27.Apr.09	28.Apr.09	29.Apr.09	27.A
Common Shelduck *Tadorna tadorna*	81	75	2	4	-	
Mallard *Anas platyrhynchos*	22	-	2	20	-	
Spot billed Duck *Anas zonorhyncha*	76	32	8	34	(4)	
Pintail *Anas acuta*	2	-	-	2	-	
Garganey *Anas querquedula*	12	-	4	6	-	
Common Teal *Anas crecca*	20	-	10	4	-	
Common Pochard *Aythya ferina*	5	-	1	4	-	
Little Grebe Tacybaptus *ruficollis*	18	-	6	-	(4)	
Great Crested Grebe *Podiceps cristatus*	2	-	-	-	-	
Black-crowned Night Heron *Nycticorax nycticorax*	20	-	-	-	-	
Grey Heron *Ardea cinerea*	7	1	(1)	-	5	
Great Egret *Casmerodius albus*	7	3	3	1	(3)	
Little Egret *Egretta gazetta*	1	-	-	-	-	
Coot *Fulica atra*	15	-	-	-	-	
Black-tailed Gull *Larus crassirostris*	4	-	(2)	-	4	
Vega Gull *Larus vegae*	31	-	31	-	-	
Black-headed Gull *Chroicocephalus brunnicephalus*	16	12	4	-	-	
Saunders's Gull *Saundersilarus saundersi*	82	3	-	-	79	
Caspian Tern *Hydroprogne caspia*	1	1	-	-	-	
Kingfisher *Alcedo atthis*	9	-	5	-	(2)	
Jack Snipe *Lymnocryptes minimus* *The identification of these snipes is being reviewed*	3	-	-	-	-	
Totals	**434**	**127**	**79**	**75**	**101**	

MIGRATORY WADERS AND AVIAN INFLUENZA – A REASON FOR CONCERN?

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With the world on a World Health Organization Phase 6 Pandemic Alert, the flu has very much been in the headlines. Questions arise as to where this new strain came from, how long it will last and how serious the consequences will be. Links between avian flu and migratory waders are well-documented but could they be responsible for introducing deadly strains of the flu virus into Australia? Evidence presented in the scientific literature suggests that the chances of this happening are low.

The flu is caused by *Influenza A virus* (FLUAV), a virus that infects many bird species (both wild and domesticated), humans, pigs, horses, dogs, cats, seals, ferrets, minks, rodents and even whales (Fauquet *et al.* 2005). All of the genetic material of FLUAV is found on eight segments of RNA, which are wrapped up in a very small, roughly spherical particle composed of protein, carbohydrate and lipid. To replicate, FLUAV must be able to move in and out of cells and critical to these processes are two, spike-shaped glycoproteins on the surface of the virus particle called hemagglutinin and neuraminidase (abbreviated to HA and NA), which mediate binding of the virus particle to a cell surface receptor, fusion of cell and virus membranes and finally release of newly formed virus particles from the infected cell. In defense, the animal produces neutralizing antibodies against HA and NA, which fight the infection but also impose strong selection pressures on the virus, driving rapid evolution. To date, 16 sub-types of hemagglutinin (H1-H16) and nine sub-types of N (N1-N9) are known, which make 144 possible combinations (Fouchier *et al.* 2005). FLUAV is classified into different subtypes according to the particular combination of HA and NA (e.g. H1N1 for the current Mexican flu) and subtypes are further divided into strains according to pathogenicity.

The scientific consensus is that FLUAV originated in birds and specifically in the Anseriformes (ducks, geese and swans) and Charadriiformes (gulls, terns and waders); all virus subtypes and most combinations of HA and NA are present in birds but the range in mammals is much narrower (Olsen *et al.* 2006; Webster *et al.* 2007). Cross-species transmission is rare and when it does occur, is mostly transitory (Webster *et al.* 2007). There are subtle differences in the chemical structure of the cell receptors in the upper respiratory tract of birds and humans, which normally prevent avian strains of FLUAV from establishing in humans (Kuiken *et al.* 2006; Shinya *et al.* 2006; Suzuki 2005). However, minor changes at specific sites in the hemagglutinin gene can lead to a switch in receptor-binding specificity from avian to human-type receptors (Tumpey *et al.* 2007; Yamada *et al.* 2006). Change in host, whether it be from a wild bird to poultry or to a mammalian host, is typically followed by a period of rapid evolution associated with host adaptation, giving rise to new strains (Webster *et al.* 2007). Pigs have both mammalian and avian-type cell receptors and act as melting pots for the virus as when co-infected with human and avian strains, the RNA segments can reassort and new strains created with bits of genetic information from each parent strain (Brown *et al.* 1998; Castrucci *et al.* 1993). It is through this reassortment process that the Asian and Hong Kong pandemic strains of the flu of 1957 (H2N2 subtype) and 1968 (H3N2 subtype) arose(Lindstrom *et al.* 2004). It therefore comes as no surprise that China is considered the epicentre of many new flu strains, given the huge number of people, pigs and ducks living in close proximity to each other.

Low pathogenic avian influenza (LPAI) is endemic in wild bird populations on all continents, including Antarctica, and poses little threat to humans. Over eons, LPAI has co-evolved with its bird host to a point where it no longer causes serious disease nor reaches a high incidence in the population other than in immunologically naïve juveniles: selection pressure acts against virus strains that severely debilitate or kill the host as viruses cannot survive outside their host for very long periods of time. A long-term surveillance program at Delaware Bay on the east coast of North America suggests that LPAI cycles between waders and ducks (Krauss *et al.* 2004; Olsen *et al.* 2006; Webster *et al.* 2007). In spring, northward-migrating waders and particularly Ruddy Turnstone are the major reservoir of LPAI whereas in autumn, it is the duck population. The virus replicates and is shed from cells lining the intestinal tract, providing a transmission pathway between species through faecal contamination of the water. However, for reasons that are still unclear, the epidemiology of LPAI in Eurasia, Africa and on the west coast of America (including Alaska) is very different and the virus appears able to perpetuate in ducks alone. The incidence of LPAI in waders in these regions is very low (Fouchier *et al.* 2003; Gaidet *et al.* 2007; Hlinak *et al.* 2006; Iverson *et al.* 2008; Munster *et al.* 2007; Winker *et al.* 2008).

LPAI from wild bird populations has moved into poultry (chickens, turkey, quail and guinea fowl) and over time, adapted to these new host species. H5 and H7 sub-types of LPAI in poultry have been known to abruptly change pathogenicity and become highly pathogenic (high pathogenic avian influenza, HPAI), a change linked to yet another mutation in the HA, which allows the virus to infect cell types beyond those lining the respiratory and intestinal tracts such as the brain (Kuiken *et al.* 2006). Until about a decade ago, HPAI had never been detected in wild bird populations and also not known to infect humans. However, Asian lineage HPAI subtype H5N1 broke all the rules. HPAI H5N1 was first detected in domestic geese in southern China in 1996 and is now widely distributed in poultry in South-East Asia (Shortridge *et al.* 1998). At the time of writing this

article, 429 cases of HPAI H5N1 infection in humans had been reported to the World Health Organization, of which 262 (61%) had resulted in death. This compares with a mortality rate of 0.7% for the Mexican lineage H1N1 strain. Thankfully, sustained transmission of HPAI H5N1 in the human population has not occurred and therefore this virus has not reached pandemic proportions. However, there is a risk that H5N1 could reassort with human strains of the virus or acquire the necessary mutations to allow efficient transmission between humans.

For the first six years of the outbreak, spread of HPAI H5N1 was linked with the movement of poultry, poultry products or contaminated equipment. However, in April 2005, HPAI H5N1 killed thousands of waterbirds and gulls at Lake Qinghai, China, including an estimated 10% of the global population of Bar-headed Goose (Chen *et al.* 2005; Olsen *et al.* 2006). Lake Qinghai is a protected nature reserve far away from any poultry farm. By December 2005, HPAI H5N1 had reached Europe, where it was primarily detected in dead waterbirds and only sporadically in poultry (Globig *et al.* 2009). The dead waterbirds were likely to have been sentinels for the arrival of the virus rather than being responsible for its spread. However, there is strong suspicion that some species of wild duck acted as vectors. When experimental inoculated with HPAI H5N1, Mallard Duck frequently show few signs of disease yet are able to shed the virus from their gastrointestinal tract and trachea and transmit it to other individuals (Keawcharoen *et al.* 2008; Sturm-Ramirez *et al.* 2005). In Thailand and Vietnam, the incidence of H5N1 in poultry is correlated with the density of free-roaming domestic ducks, which are released into the rice paddies each day to feed, where they can potentially interact with wild ducks (Gilbert *et al.* 2006; Gilbert *et al.* 2008; Tiensin *et al.* 2009). Earlier this year, the Food and Agriculture Organization of the United Nations initiated a satellite-tracking project to better understand the migrations of wild ducks residing in Hong Kong and investigate their role in the epidemiology of avian influenza (FAO Press Release, 30 January 2009). There have been no confirmed cases of HPAI of any subtype in waders, although an H5N1 subtype virus of undetermined pathogenicity was detected in a Green Sandpiper from Chany Lake, western Siberia, close to where there had been an outbreak of HPAI H5N1 in domestic poultry (Brown *et al.* 2005).

To this day, HPAI H5N1 has not been detected in Australia, which in a way, is surprising considering that the virus is endemic in Indonesia and reported from the province of West Papua on the island of New Guinea (McCallum *et al.* 2008). Several theories have been proposed to explain the absence of HPAI H5N1 in Australia, including lack of regular migrations of ducks and geese between Australia and the southern parts of Indonesia and New Guinea, the low population density of humans and therefore poultry in northern Australia, the significant decline in major waterbird breeding events in recent years (virus transmission is more likely in dense, mixed species flocks) and enhanced biosecurity precautions by the poultry industry and state and federal governments (McCallum *et al.* 2008). Given that in the same period, HPAI H5N1 has spread to Europe and Africa, it would seem that there are strong natural barriers preventing the introduction of HPAI H5N1 into Australia. However, this is not a reason for complacency and more research is required to better understand movement patterns of ducks, geese and other waterbirds between Australia and its northern neighbours (McCallum *et al.* 2008). Furthermore, virtually nothing is known about the tolerance of Australian waterbird species to HPAI H5N1 and therefore their potential to act as either vectors or reservoirs of the virus.

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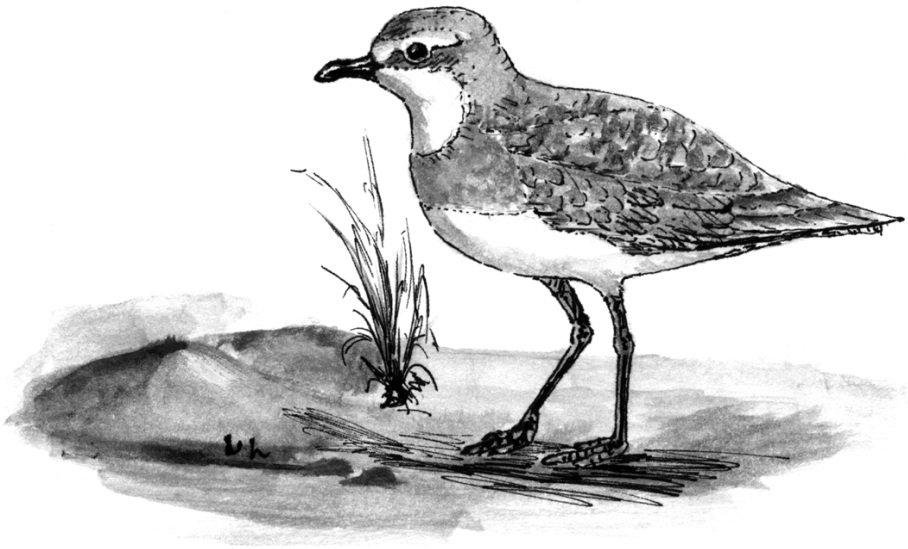

FURTHER RECORDS OF AUSTRALIAN PAINTED SNIPE *ROSTRATULA AUSTRALIS* IN THE LAKE EYRE BASIN, QUEENSLAND, WITH EVIDENCE OF BREEDING

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INTRODUCTION

Field surveys in the past two decades have shown that the Australian Painted Snipe *Rostratula australis* occurs more widely and frequently in the remote arid and tropical regions of Australia than was previously thought (eg. Hassell & Rogers 2002, Jaensch 2003a,b). However, records remain sparse relative to the vast wetland systems of these regions. The wetlands are mostly temporary, some seasonal but many available only erratically, so advance planning of surveys is difficult. The species is well camouflaged, secretive in behaviour and in the north and arid interior inhabits swamps that are remote from observers and uncomfortable to explore. Each additional record of Australian Painted Snipe from arid and tropical regions of Australia is therefore of considerable interest in the context of improving our understanding of the ecology of this threatened species at the whole-of-population scale. The present article reports two records, one each from the Diamantina and Georgina River catchments, within the Lake Eyre Basin of inland Australia.

RECORDS

Diamantina catchment

On 14 March 2007, RJ saw an Australian Painted Snipe at an un-named wetland in the middle part of the Diamantina River catchment in the Channel Country, south-western Queensland. The sighting was in the far SE margins of the wetland near (about 200 metres west of) coordinates -25.3407, 140.9713.

The wetland, marked as 'land subject to inundation' on the Betoota 1:250,000 topographic map, is 11 km SE of Lake Teeta and 46 km NNW of Old Betoota Hotel. It is part of a cluster of swamps at the terminus of a small internal drainage basin (7500 hectares) between low stony hills and an extensive dunefield. The junction of Farrars Creek and the Diamantina River lies to the west at the edge of the dunefield. The swamp covers 500 ha and is dominated by shrubland of lignum *Muehlenbeckia florulenta* and has sparse cover of coolibah *Eucalyptus coolabah* and belalie *Acacia stenophylla* low trees.

Being in the arid zone and not river-fed, the swamp presumably is dry most of the time but inundated often enough to support the wetland-dependent lignum. Heavy rainfall occurred in the area in January 2007 and apparently filled the swamp. Maps of rainfall for the month indicate at least 100 mm at the site and across most of the Channel Country whereas mean rainfall for January in this region is between 25 and 45 mm. At Bedourie, 185 km to the north-west, 296 mm fell in January 2007, mainly in one rain event, this being the highest monthly total on record (77 years; www.bom.gov.au). This type of rain event produces considerable runoff from bare, hard stony catchments in this region and can easily fill swamps such as the one described here.

Judging by its dark hood and partly chestnut neck, the painted snipe was an adult female. It was flushed in the early afternoon by RJ wading through the swamp. Rising from a gilgai mound, it flew just five metres, then when pressed again by RJ and another observer (Vanessa Bailey), it flew another 20 metres (less than one metre above water) and was lost to sight.

The mound was an islet 3x1 metres in dimension but probably was under water when the swamp filled in January. It was within an extensive area of gilgai mounds in soft grey clay, about 100 metres from the drying edge of the swamp; open water was still up to 1.5 metres deep in the hollows and channels between mounds. Most mounds had one or more small lignum shrubs (to 0.5 m high, with many green leaves) over dense lush sward of nardoo *Marsilea* sp. and some sedges (*Cyperus difformis*, *Schoenoplectus dissacanthus* and *Eleocharis pallens*) on the mound edges. Bigger islets with taller lignum and some canegrass *Eragrostis australasica* were visible farther inside the swamp. Water was turbid (milky), as is typical in these wetlands, and supported some green algae.

A nest scrape was discovered on the islet, about 30 centimetres above present water level. Situated in the partial shade of a small lignum shrub, the scrape was lined with fine, partly-dry green stems of grass, sedge and nardoo and a few twigs. A partly decomposed feather of a painted snipe, with a large cream spot – hence most likely a primary wing feather of a male or juvenile, otherwise perhaps a tail feather of undeterminable gender – was inside the nest lining. All evidence therefore indicated that this was a recently-used nest of an Australian Painted Snipe.

Georgina catchment

On 30 April 2009, RJ saw an Australian Painted Snipe at an un-named wetland in the headwater catchment of the Georgina River in the eastern Barkly Tableland, north-western Queensland. The sighting was in the far SW margins of the wetland at coordinates -20.5261, 138.4855.

The wetland, marked as 'swamp' on the Mount Isa 1:250,000 topographic map, is 108 km WNW of Mount Isa, 77 km SSE of Camooweal and 121 km NNE of Urandangi. It seems to be the terminus of an internal drainage basin of about 50,000 hectares, surrounded by low hills including the Pilpah Range, though there may be overflow connection to Mingera Creek to the south. Whereas most of the basin is un-timbered, some southern margins support low open woodland of coolibah *Eucalyptus* sp. and northern parts support sparse low shrubland in the interior and margins. The remains of sparse to dense, tall tussock grassland,

probably *Bothriochloa* sp. and/or *Eulalia* sp., and tall semi-woody forbs were evident in the margins of the swamp.

Exceptional rainfall occurred in this area in summer 2009. Totals for Mount Isa, Camooweal and Urandangi for January-February (717, 766 and 383 mm) were 3-4 times above mean totals for those months. Consequently the un-named swamp filled to probably 5000 hectares or more and though drying back it still held over 3000 hectares on 30 April.

The painted snipe was flushed at 1600 hours from near the emerged dry stub of a tussock at the base of a stunted coolibah in shallow water, as RJ was wading through a broad area of similar habitat in search of nesting shorebirds. It was identified by its upperwing plumage as a male, but its age could not be determined. Flying just above water for only 30 m, it then crouched in shallow water among other stubs until flushed a second time by RJ and a second observer (Guy Dutson) to a more distant hiding place.

The bird was in an extensive area of short dead stubs of tussock grass (remnant stems less than 20cm tall), each stub providing a miniature islet of 100-300 square centimetres with just enough cover to partly conceal the snipe. Density of stubs was about 1-2 stubs per square metre. There was no green ground-level vegetation at the site, due to prolonged and deep inundation until the more recent drying-back. Water in this area was still around 0.3 metres deep, sometimes 0.5 metres, and turbid (milky). Dry land was less than 100 metres away, including gravelly but near-flat rises. Soil at the site was a mix of clay and gravel.

The islets offered potential nest sites though no nests were found despite intensive searching; this site and adjacent areas (10 ha in total) of similar habitat were searched for this species and/or nests by two experienced observers for about one hour. Reasons against the painted snipe having an active nest at this time were: (1) the area might soon have dried back to patches of water or dried out totally (though similar habitat might then have emerged from deeper water lakeward of the site); (2) nesting may have already occurred a month or more earlier as the wetland started to recede; and (3) there was no green ground cover (if that is important – in RJ's experience, nests usually have some green cover).

CONCLUSIONS

In regard to the Diamantina nest, the freshness of the lining – lining of a much older nest would have been washed away when the swamp filled – and firmly shaped scrape (indicative of an incubating bird) confirmed that it had been used by painted snipe in recent months. The date on which the eggs were laid probably was less than eight weeks earlier (mid January or later), based on rainfall events. Incubation is recorded as less than three weeks with young leaving the nest soon after hatching (Marchant & Higgins 1993), so, conceivably, laying could have been as late as mid February (once the mound-top emerged as the water dried down) with the semi-independent young leaving the nest in early March. Presence of the feather of a (probable) male bird in the nest lining is consistent with the view (Marchant & Higgins 1993) that the male normally does the incubation.

This breeding record is at least the third from the arid-zone Diamantina wetlands in Queensland: previous records were in November, after local rain (Duncan-Kemp 1934), and January, after river flooding (Jaensch 2003a). In fact, it is almost certain that the first record was from the same wetland, named by Duncan-Kemp as "the six-mile swamp" in reference to a local homestead. Duncan-Kemp does not explicitly state that painted snipe was found nesting in this swamp but this can be inferred: in the chapter on a visit to this swamp – where many birds were nesting – the author mentions Painted Snipe as a bird that was seen in the swamp (though it had not been seen in the district before) and separately indicates admiration for "the deep creamy, black-splotched clutch of the Painted Snipe".

Although breeding was not detected at the upper Georgina site, on the basis of habitat it seems possible that breeding had occurred or could yet occur there in autumn 2009.

Extensive swamp habitat suitable for Australian Painted Snipe in the Queensland part of the Lake Eyre Basin is mainly available in summer-autumn in years of good local rainfall and/or substantial river floods caused by monsoon activity. Such floods occur there at least every 2-3 years on average, but not every year. Hence the species potentially could occur there in many years but it is not a resident. It now seems clear that its breeding in the Basin is not accidental and, given the difficulty of finding the bird and its nests, breeding possibly occurs more often than the few records indicate.

Deliberate searches for Australian Painted Snipe and its nests in the Basin have been few but at times a substantial effort has been invested. For example, in April 2009, RJ searched intensively for a total of 10 hours for waterbird nests in floodplain swamp at six sites in the middle Georgina and Diamantina floodplains of the Queensland Channel Country, in habitat that was at least broadly suitable for Australian Painted Snipe, but none were found (Reid *et al.* 2009). A similar effort in these floodplain swamps in 2001 yielded only one breeding record (Jaensch 2003a). It may be concluded that we are scarcely any closer to knowing if the species is naturally rare (small population size), has declined to low population size due to habitat loss (elsewhere in Australia), and/or is just very difficult to find.

Despite the discomfort of heat, humidity and insects, it seems that further survey effort targeting Australian Painted Snipe in remote regions of Australia such as the Channel Country, is needed to help clarify the conservation status of the species. A key question to address is whether or not the periodically extensive wetland habitat of Australia's savannah and arid zones is sufficient to support the species, either in conjunction (seasonally) with wetlands of south-eastern Australia or (if south-eastern wetlands continue to decline) as a stand-alone refuge.

With so few birds and nests found in the Lake Eyre Basin it is difficult to pinpoint any major threats to the species there. Land use throughout the Basin's floodplains is principally pastoral grazing of cattle but high conservation values persist under the present grazing regimes. The greatest potential threat to Australian Painted Snipe and its habitat in floodplain wetlands is the reduction or loss of flooding through potential future regulation or harvest of the Basin's presently free-flowing rivers (Jaensch 2009). Over

the past decade, these rivers have continued to flood and provide shorebird habitat whereas river regulation, water harvest and drought have ensured that much shorebird habitat of the Murray-Darling Basin has rarely been inundated.

Temporary wetlands of inland Australia also offer breeding habitat for other shorebirds, notably Black-winged Stilt *Himantopus himantopus* and Red-kneed Dotterel *Erythrogonys cinctus*. Though no nests of other shorebirds were found at the two sites described above, it is possible that stilts and dotterels were nesting. Indeed, at the swamp west of Mount Isa in April 2009 at least 200 stilts and 100 dotterels were present, nest sites were plentiful and breeding was suspected. Conservation of breeding habitat for any one of these species will generally benefit a suite of shorebird species.

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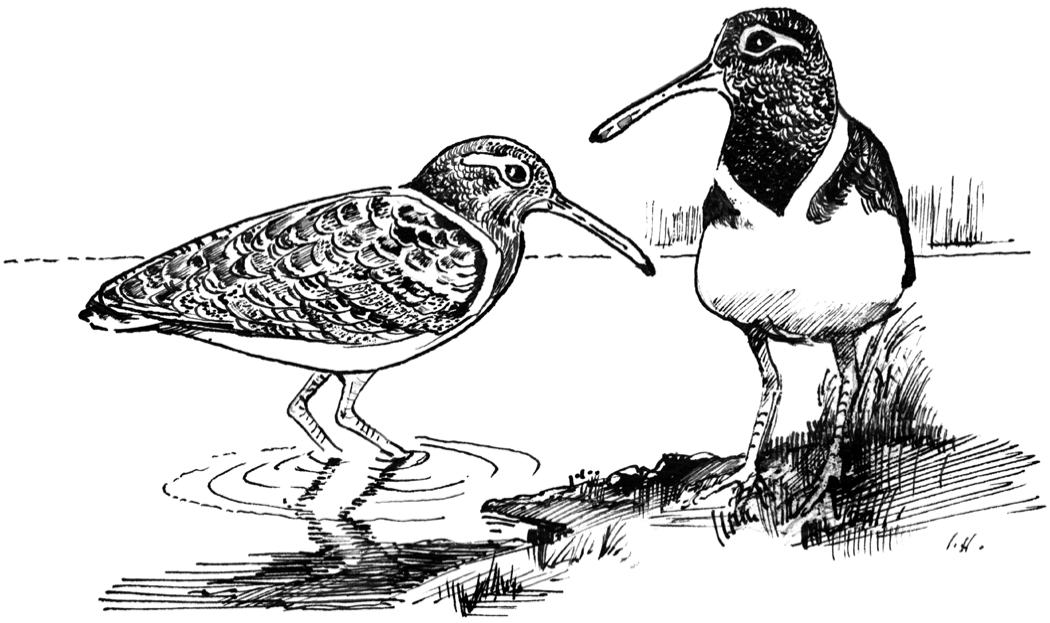

SIGHTINGS OF BLACK-TAILED GODWITS *LIMOSA LIMOSA* ON PARRY LAGOON NATURE RESERVE, WYNDHAM, WA.

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Black-tailed Godwits *Limosa limosa* are widely assumed to scatter through inland wetlands when in Australia, but details of where they might be found in the Kimberley region of Western Australia are sparse (Higgins *et al*. 2001). This report documents sightings of substantial numbers of Black-tailed Godwits in Parry Lagoon Nature Reserve near Wyndham in April 2009.

Parry Lagoon Nature Reserve was created in 1971. 141,453 hectares of the Ord River Floodplain, including the Reserve, were listed as a Wetland of International Importance under the Ramsar Convention in 1990 due, in part, to the large numbers of waterbirds using the floodplain in the wet season (DCLM 1998, Dept of Environment 2009).

The Reserve stretches from the main Wyndham-Kununurra highway north to the mouth of the Ord River. The southern part of the reserve is dominated by an alluvial floodplain fed by Parry Creek. This floodplain is inundated to varying degrees during the wet season. When the rain ceases, except for a few permanent and semi-permanent waterholes associated with incised channels and claypans, the plain quickly dries out. The Ramsar information sheet produced by DCLM (1998) notes the importance of the Reserve to Marsh Sandpiper *Tringa stagnatilis* and Wood Sandpiper *T. glareola* , to Little Curlew *Numenius minutus* and Oriental Pratincole *Glareola maldivarum*; it makes no mention of Black-tailed Godwit.

In most wet seasons vast areas of the plain are flooded, creating wonderful waterbird habitats, but almost completely restricting access to those without wings. Perhaps this explains the paucity of published research detailing wet season counts of birds using the floodplain. In February 2009 I walked along the flooded access track to Telegraph Hill overlooking the floodplain and, from there, could see water stretching as far as the Ord River, a distance I know, from driving in the dry season, to be over 25km.

As Table 1 (Bureau of Meteorology 2009) shows, in the 2008-2009 wet season heavy rains fell early in the season, but little or no rain fell in March and April 2009. This resulted in the southern margins of the plain being accessible to vehicles earlier in the year than usual.

I first accessed the south-west corner of the floodplain on 15th April 2009. From the edge of the flooded area I could see at least 500 Black-tailed Godwits and many Sharp-tailed Sandpipers *Calidris acuminata*, mixed with a huge flock of Glossy Ibis *Plegadis falcinellus* and Black-winged Stilt *Himantopus himantopus*. Most of the godwits were standing in water up to their bellies, so there was little chance of sighting leg flags. A huge amount of water was still available for birds on the flooded plains, so an accurate count of shorebirds present could only have been made from the air.

I returned to the floodplain the next day, 16th April. In the small section that I could overview I counted 980 Black-tailed Godwits and at least 20,000 Sharp-tailed Sandpipers. There were also some, though not nearly so many, Red-necked Stint *Calidris ruficollis*, Common Greenshank *T. nebularia* and Marsh Sandpiper. Similar to the previous day, the godwits were standing in water up to their bellies in a long, quite closely-spaced line, seeming to prefer the area at the edge of or in low density stands of sedges to open water. Most of the birds were feeding. Again, no leg flags were sighted on the godwits or sandpipers.

The next afternoon, 17th April, the situation was different. No waders in the immediate vicinity of the places I could access, although still many Black-winged Stilt, Glossy Ibis and Pied Heron *Egretta picata* feeding in the water. However, in the far distance, the air was 'smoking' with whirling flocks - too far for me to identify or photograph successfully, and far too many for me to count. There were definitely many thousands, rather than hundreds of birds, very probably waders.

The next time I had the opportunity to visit the plains, on April 28th, there were no waders visible far or near, although similar numbers of stilt and ibis to previous visits remained. I stayed for over an hour looking for distant flocks in the air, but none were visible. I therefore concluded that, despite huge areas of potential food sources still being available, the waders had migrated onwards.

The interesting questions are where the Black-tailed Godwits and Sharp-tailed Sandpipers come from. Hassell *et al*.(2005) estimated a population of around 20,000 Sharp-tailed Sandpipers on Lake Argyle, a large permanent lake about 100km away. One possibility is that birds there might chose to leave the site when water levels are rising, or as new productive feeding sites become available on Parry floodplain. Alternatively, they could be birds from southern Australia. Apparently Victorian Sharp-tailed Sandpipers left unusually early in 2009, with only 9 left in the entire Werribee Treatment Plant on 27th March (Danny Rogers, pers comm). However, despite considerable time spent scanning sandpiper flocks on 16th April, no orange leg flags were sighted.

Table 1: Wyndham rainfall figures 2008-9 Wet Season

	Nov 2008	**Dec 2008**	**Jan 2009**	**Feb 2009**	**Mar 2009**	**April 2009**
Monthly rainfall in mm	45.8	676.6	298.2	412.8	45.4	0

The movement patterns of the Black-tailed Godwits are even more obscure. Do they move in from somewhere along the coast, or are they spread out over inland Australia in those periods when they definitely are not at Parry Lagoon? Was the stop at Parry Lagoon their last fuelling stop on their migratory journey to the Yellow Sea? In the absence of leg flags, I can offer no insights to this conundrum.

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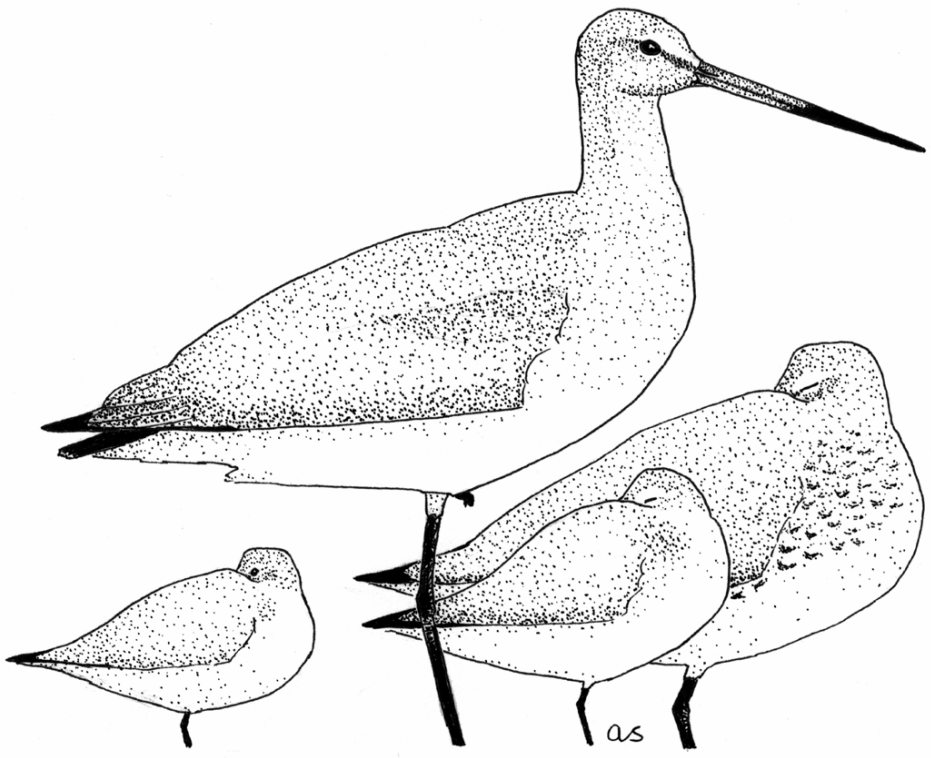

REPORT ON POPULATION MONITORING COUNTS WINTER 2008 AND SUMMER 2008-09

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Shorebird populations continued to decline according to reports released this year from northwest Western Australia, Queensland, and the Coorong. Similarly reports of habitat loss throughout the flyway have continued, and a recent review by Birds Australia found evidence that 21 shorebird species have decreased in at least one area in Australia. As shorebird numbers and available shorebird habitat continue to decline, it is critical that we are able to increase the confidence with which we can report national and local population changes. In this past year significant steps were made toward meeting the objectives of the Shorebirds 2020 Program which will build on the data collected for the last 29 years. Without these data trends in shorebird populations in Australia would be poorly understood and the importance of many areas for shorebirds would never have been recognised.

The expansion of the program this year exceeded our expectations. Incredibly, in the summer of 2008-09 between 500 to 1000 volunteers conducted shorebird counts at 155 known shorebird areas, with additional less methodical counts done at another 225 areas. The largest expansion of areas surveyed occurred in South Australia, where population monitoring counts were organised at 44 shorebird areas, and many additional opportunistic counts were submitted. The expansion of counts in Western Australia was similarly impressive with organised counts in 28 shorebird areas. Many of these areas are comparatively larger than those in much of the country, and require large teams to complete. The number of areas being surveyed in New South Wales and Queensland continued to grow this year, and impressively many of these areas have volunteers or organisations conducting monthly counts. The counts in Tasmania continued and there was a large increase in the amount of historic data processed. The areas around Darwin in the Northern Territory continue to be surveyed regularly with an increase in the frequency of counts in many count areas. In Victoria, the number of areas counted also grew, and the frequency of counts grew markedly in the Melbourne region. Data reported here include counts from 155 shorebird areas collected during the winter 2008 and summer 2009.

There are a few slight changes to the way in which shorebird count data were reported in Stilt this year. We have continued to report the maximum number of individuals for each species counted in either summer or winter. However, maximum summer counts this year were taken from December through February, with counts from November or March reported only when no other summer counts were available. Winter still included the months of May to July.

Data also continued to be reported by shorebird area. The boundary of each of these areas is meant to include all the areas where a group of shorebirds may be found in the peak summer or winter months, but as we learn more from shorebird experts throughout the country, these boundaries will continue to be refined. Analysis of the data in some areas suggests that improved identification of shorebird areas will reduce annual count variation.

Last year analysis revealed that statistically significant declines in shorebird populations (50% over 5 years for some species) could be obtained if around 149 areas were monitored around the country (Haslem et al. 2008). Additional analysis done this year based on this past summers data suggests that continued monitoring at 113 areas would yield sufficient statistical power (80%) to detect "national" trends of: 25-52% change in five years for 19 shorebird species and 50-80% change for seven species in ten years (Clemens et al. 2009).

For site-based population trends we have found that the best way to determine population trends for more species would be to reduce the annual count variation at each shorebird area. We are still learning how best to do this. Fortunately, the repeat counts done this summer, and in previous years give us some data to investigate. A quick look at the repeated counts done over the summer of 2008 suggests that repeated counts would reduce annual count variation if we take a maximum count over multiple counts. The degree of reduction in variation appears to be dependent on local site characteristics, and the way shorebirds use each area. It is likely that areas with high count variation would benefit most from more surveys.

This was a remarkable year in terms of survey coverage throughout the country, but considerably more work is needed in order to ensure that enough trained observers are available to participate in the counts. In some areas the expanded count coverage simply fell on the same observers. If this project is going to be sustainable in the long term, new counters will need to be added rather than simply increasing the work load of existing counters. Along with recruiting enough counters, the largest challenge for the program is to ensure that data within each shorebird area will be collected consistently from now on. The data will only be useful for population monitoring if the same areas are counted by similarly skilled personnel, in the same way, under the same conditions, covering the same area on each count. While some areas would benefit from changes to the area covered or counting method, it is important that the method for counting each year become as fixed as possible, so any changes to how an area is surveyed need to either be made this year or not at all.

For more detailed information on the work we've been doing, for maps of the areas we need counted, data sheets, and ID or counting training information please visit the revised website www.shorebirds.org.au

What the data is telling us:

In the short term the data is telling a great deal about the distribution and abundance of shorebirds throughout Australia, and in some cases the changes that have occurred over time are obvious.

The most obvious example of changes in Australian shorebird distributions have been the declining abundance of shorebirds at non-coastal wetlands in southern Australia in the last 20 years. After nearly 10 years of drought, many wetlands have dried out, while others are becoming degraded due to a lack of freshwater inflows. It is, therefore, not surprising that shorebirds are less abundant in the non-coastal wetlands of Australia (Nebel et al. 2008). However, this summer's remarkable count coverage allowed us to further quantify those changes. Twenty-nine non-coastal shorebird areas were identified in southern Australia that had been counted in the 1980's and again this past summer (Figure 1). This past summer's count marked the first in many years that most of these areas had been surveyed. In the 1980's the number of surveys varied between sites, so the average maximum summer count from 1980-89 was used for comparison. The results of this simple comparison suggest that in southern Australia, shorebird numbers at non-coastal wetlands have decreased by nearly 80% (Table 1), and declines by species have ranged from 50% to 99%. The only exception to this was the Pacific Golden Plover, which may have been recorded in higher numbers in wetlands adjacent to the coast this past summer because coverage was better, and there was less water around so there was less potential habitat to search for what can be an elusive species. The Coorong data (not included in these comparisons) is showing similarly large declines in many migratory shorebird species. The Coorong data was not included here because there is much better data and discussion available elsewhere (Brookes et al. 2009, Gosbell 2005).

For the areas where changes have not been as drastic, it will take up to five years to generate enough data to report national shorebird trends with confidence. In the meantime there are many things that can be reported that will add to the evidence regarding how shorebird populations are tracking. First, in areas where standardised counts are happening, simply reporting on the changes in the numbers seen each year will allow some understanding of how much shorebird populations are being affected by things like habitat destruction in the flyway. The recent count of the whole of 80-mile beach in northwest Australia provides an excellent example of the power in simply reporting changes in two complete annual counts (Rogers et al. 2009). Second, continuing to report trends from the individual shorebird areas where historic data is available will build on the evidence of population changes and several areas have data sets that are now ready for additional analysis. As this process continues a more completely vetted set of data from each shorebird area will become available. Where data at individual sites has been collected in the same way for long periods more rigorous reporting has been possible, and there are encouraging signs from new analytical techniques (Fuller et al. 2009, Rogers et al. 2009). While we work to make more conclusive data available, these steps will help increase our understanding of shorebird population trends in Australia.

The number of areas visited this last summer, and the amount of data generated will provide a useful foundation for years to come. The increasingly spatial explicit data will be especially useful for planners, and those looking to do habitat analysis in order to further explore what is driving

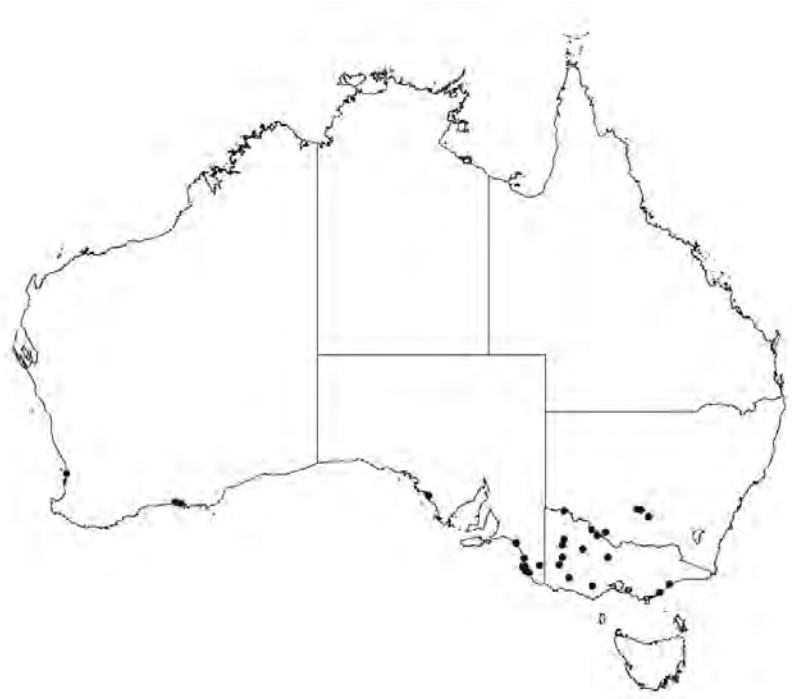

Figure 1. Location of 29 non-coastal wetlands where shorebird counts were compared between the 1980's and the summer of 2008-2009.

Table 1. Comparison of counts in the 1980's with those recorded in the summer of 2008-2009 at 29 inland wetlands for selected species.

	Average max annual summer count 1980's, averaged across 29 areas			Summer 2008-2009 count		
Species	Mean per area (N=29)	SE	Total	Mean per area (n=29)	SE	Total
Black-fronted Dotterel	6.0	2.0	171	1.4	1.0	41
Black-winged Stilt	153.9	69.6	4379	29.3	13.5	850
Common Greenshank	15.5	4.0	416	2.8	1.2	82
Curlew Sandpiper	107.1	43.0	3107	0.2	0.2	5
Marsh Sandpiper	8.5	2.9	245	0.6	0.4	16
Masked Lapwing	101.1	37.2	2930	24.3	6.9	706
Pacific Golden Plover	0.2	0.2	7	5.8	4.0	169
Red-capped Plover	136.4	29.1	3955	73.0	31.3	2116
Red-kneed Dotterel	15.0	4.4	418	1.8	0.9	53
Red-necked Avocet	94.3	26.1	2733	12.7	7.6	367
Red-necked Stint	457.1	156.2	13256	267.6	124.4	7759
Sharp-tailed Sandpiper	396.5	124.0	11417	28.1	20.4	814
TOTAL all shorebirds	2373.4	563.3	68595	487.6	164.8	14140

population changes.

The need to determine what precisely is happening to shorebird populations is growing. Given the large population declines being reported in shorebirds and the increasing threats to shorebird habitat it is critical that we build on the evidence of what is happening so that improved knowledge can guide management and conservation of shorebird habitat (Gosbell and Clemens 2006, Oldland et al. 2009).

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WINTER 2008	NSW (listed from north to south)														NT	Qld						
Species	Tweeds Estuary	Brunswick River estuary	Richmond River estuary	Clarence River	Hastings River	Manning River Estuary	Port Stephens	Hunter Estuary	Lake MacQuarie entrance	Tuggerah Lakes	Parramatta River	Botany Bay	Lake Illawarra	Shoalhaven Estuary	North Darwin	Moreton Bay	Great Sandy Straight	Gladstone	Kinka Beach	Mackay	Bowen	Lake Moondarra
Asian Dowitcher																						
Australian Pratincole																						
Banded Lapwing																						
Banded Stilt																						
Bar-tailed Godwit	29	2	45	166	35	32	354	461	19	8	30	173	11	128		2751	**N**		14	**N**	**N**	
Beach Stone-curlew			1			3											**O**		13	**O**	**O**	
Black-fronted Dotterel		7						23		6	31					5	**T**		18	**T**	**T**	1
Black-tailed Godwit								33						1								
Black-winged Stilt	281	4	2	25				894		5	173	12	31		7	419	**C**		179	**C**	**C**	3
Broad-billed Sandpiper																1	**O**			**O**	**O**	
Bush Stone-curlew																	**U**			**U**	**U**	
Common Greenshank								18								172	**N**		41	**N**	**N**	
Common Sandpiper																3	**T**			**T**	**T**	
Curlew Sandpiper			4			1										61	**E**			**E**	**E**	
Double-banded Plover		3	47	46	16	121				3		15		114		179	**D**		2	**D**	**D**	
Eastern Curlew	4		17	52	5	2	52	184				112	2	23	3	947		1	20			
Great Knot			1	15											40	211						
Greater Sandplover															191	2						
Grey Plover																10						
Grey-tailed Tattler	2		11				1	5				5			52	388			136			
Hooded Plover																						
Latham's Snipe																1			1			
Lesser Sandplover																970		22	10			
Little Curlew																			2			
Long-toed Stint																						
Marsh Sandpiper																10			36			
Masked Lapwing	2	17		5	6	6	23	140	12	10	37	7	11	4	21	22			30			3
Oriental Plover																						
Oriental Pratincole																						
Pacific Golden Plover								2								138			39			
Pectoral Sandpiper																1			3			
Pied Oystercatcher	2	6	4	15		13	154	6	6			73	24	16	1	159		2	4			
Red Knot																49			2			
Red-capped Plover		4	11	7	4	30		91		10		2	22	39	26	113		6	251			
Red-kneed Dotterel											1					3			6			
Red-necked Avocet	5					3		2000			5								113			
Red-necked Stint			9			55						13	5	2	5	578			403			
Ruddy Turnstone			6									6			19	7		5				
Ruff																						
Sanderling			2												17							
Sharp-tailed Sandpiper																225			72			
Sooty Oystercatcher			8				14	9		2		10	1			3		2				
Terek Sandpiper			2				11	1							2	28			7			
Wandering Tattler																						
Whimbrel			1	9	1		10	37				4		5	9	374		12	27			
Wood Sandpiper																			2			
Unidentified small wader																9						
Unidentified medium wader																						
Unidentified large wader																						
TOTAL	325	33	171	340	51	222	619	3229	32	44	212	383	107	205	393	7839	--	50	1431	--	--	7
No. of species	7	7	16	9	6	10	8	15	3	7	6	12	8	9	13	30	--	7	25	--	--	3

WINTER 2008			SA		SA			Tas (from Hobart region north)												Vic (fro	
Species	Townsville	Cairns area	Port MacDonnell	Carpenter Rocks	Gulf of St Vincent	Sleaford Bay (EYRE)	Gunyah Beach (EYRE)	Derwent	Marion Bay	Moulting Lagoon	Scamander	Maurouard Beach	Georges Bay	Cape Portland	George Town Reserve	Kelso, Tamar Estuary	Narantapu National Park	Moorland Point	Robbins Passage	Corner Inlet	Anderson Inlet
Asian Dowitcher																					
Australian Pratincole																					
Banded Lapwing								1						4		10		9			
Banded Stilt					2000																
Bar-tailed Godwit	N	257						45		24	1		21			8			24	787	1
Beach Stone-curlew	O	3																			
Black-fronted Dotterel	T	2						2					3	4							
Black-tailed Godwit		60																			
Black-winged Stilt	C				100																
Broad-billed Sandpiper	O	12																			
Bush Stone-curlew	U	4																			
Common Greenshank	N	5			37			2							3						
Common Sandpiper	T	4																			
Curlew Sandpiper	E	50	2	1	8														19	5	
Double-banded Plover	D		105		3		3	43	62		3		18	82	28	47	420	41	660	691	50
Eastern Curlew		48						1		3									3	18	15
Great Knot		260																		10	
Greater Sandplover		85																			
Grey Plover					6		9													1	
Grey-tailed Tattler		48																			
Hooded Plover						37	26		1			28	11	41			3		58	3	
Latham's Snipe		30																			
Lesser Sandplover		121																			
Little Curlew																					
Long-toed Stint																					
Marsh Sandpiper		2																			
Masked Lapwing		8	5	7	10			70		27	9		85	15	117	24	20	65	14	9	28
Oriental Plover																					
Oriental Pratincole																					
Pacific Golden Plover		20																			
Pectoral Sandpiper																					
Pied Oystercatcher		6	2	10	4	3	55	642	228	229	3	26	141	57	25	46	190	3	594	744	5
Red Knot		2																		80	
Red-capped Plover		4	55	2	100	19	91	135	34	34	16	14	11	71	6	31	160	2	100	26	20
Red-kneed Dotterel					6																
Red-necked Avocet					300																
Red-necked Stint		1000	8		250		20	70		1				40		7	14		109	595	
Ruddy Turnstone		4		8	12		4							6				18	58		
Ruff																					
Sanderling							562														
Sharp-tailed Sandpiper		40																			
Sooty Oystercatcher		6	3	8		42	17	90	18	3		6	11	46	5	13	2	3	238	325	
Terek Sandpiper		15																			
Wandering Tattler																					
Whimbrel		200			2															3	1
Wood Sandpiper																					
Unidentified small wader																					30
Unidentified medium wader																					
Unidentified large wader																					
TOTAL		2296	180	36	2838	101	610	966	309	321	15	60	290	366	167	186	649	141	1764	3297	138
No. of species		27	7	6	14	4	9	11	5	7	5	4	8	10	6	8	7	7	11	14	8

WINTER 2008	n east to west)						Vic (from east to west)									WA					
Species	Western Port Bay	East Port Phillip	Laverton/Altona	Werribee / Avalon	Begola	Belmont Common	Black Rocks / Breamlea	Lake Lorne	Point Richards	Moolap Saltworks	Swan Bay & Mud Islands	Lake Connewarre area	Port Fairy	Fitzroy River Mouth	Discovery Bay to Glenelg	90 Mile Beach	Roebuck Bay	Bush Point (Roebuck Bay)	Shark Bay	Swan River & Rottnest Is.	Swan Coastal Plain Lakes
Asian Dowitcher																	6	6			
Australian Pratincole																					
Banded Lapwing																				14	
Banded Stilt			51							33										1504	
Bar-tailed Godwit	98										117					3992	518	4114	267		
Beach Stone-curlew																					
Black-fronted Dotterel		282		151			1	1				20							4		
Black-tailed Godwit																	126	2			
Black-winged Stilt		177	75	217						8	5	235	54				814		78	2	
Broad-billed Sandpiper																	13				
Bush Stone-curlew																					
Common Greenshank	5	1	2	2						1	15	2				257	51	41	13		
Common Sandpiper																			2		
Curlew Sandpiper	13		1	481							5	95				1136	1889	122			
Double-banded Plover	597	11	128	296			53			65	90	237	105	164	109						
Eastern Curlew	24										49					109	11	66	48		
Great Knot																4151	1399	5448	3		
Greater Sandplover																1694	293	2871	20		
Grey Plover											14					250	1	160	18	1	
Grey-tailed Tattler											4					1759	300	382	8		
Hooded Plover							3				10		61	86	44						
Latham's Snipe																					
Lesser Sandplover																322	17	155			
Little Curlew																					
Long-toed Stint																					
Marsh Sandpiper																					
Masked Lapwing	102	66	5	111	2	2		13	12	51	131	85	32	23							
Oriental Plover																					
Oriental Pratincole																					
Pacific Golden Plover			1													1					
Pectoral Sandpiper																					
Pied Oystercatcher	233			35						19	26	6	23	40	93	21	48	156		4	
Red Knot	36										47	33		1		686	460	515			
Red-capped Plover	89	18	42	240			24		5	37	68	105	169	26	35	7038	340	5430	38	42	45
Red-kneed Dotterel		2		17								1							4		
Red-necked Avocet		47	58	49						105							145		1		
Red-necked Stint	209	11	46	648			1				81	136	21			3628	1149	770	3		
Ruddy Turnstone	5										7		23	2		20	179	113			
Ruff																					
Sanderling														99	13	230					
Sharp-tailed Sandpiper											143										
Sooty Oystercatcher	1			4							1		5	10			12				
Terek Sandpiper																164	51	86	2		
Wandering Tattler																					
Whimbrel																87	477	165	28		
Wood Sandpiper																					
Unidentified small wader			1																		
Unidentified medium wader																				2	
Unidentified large wader																					
TOTAL	1412	461	410	2251	2	2	82	14	17	319	621	955	493	451	181	25545	7740	20602	398	1569	45
No. of species	12	9	11	12	1	1	5	2	2	8	17	11	9	9	5	18	22	18	16	7	1

WINTER 2008

Species	Peel & Yalgorup Lakes	Nuytsland Nature Reserve	**ALL shorebird areas**
Asian Dowitcher			12
Australian Pratincole			
Banded Lapwing			38
Banded Stilt	456		4044
Bar-tailed Godwit	4		14536
Beach Stone-curlew			20
Black-fronted Dotterel			561
Black-tailed Godwit			222
Black-winged Stilt	323		4123
Broad-billed Sandpiper			26
Bush Stone-curlew			4
Common Greenshank	4		672
Common Sandpiper			9
Curlew Sandpiper	9		3902
Double-banded Plover			4657
Eastern Curlew			1819
Great Knot			11538
Greater Sandplover			5156
Grey Plover			470
Grey-tailed Tattler	1		3102
Hooded Plover	24		436
Latham's Snipe			32
Lesser Sandplover			1617
Little Curlew			2
Long-toed Stint			
Marsh Sandpiper			48
Masked Lapwing			1504
Oriental Plover			
Oriental Pratincole			
Pacific Golden Plover			201
Pectoral Sandpiper			4
Pied Oystercatcher	10	40	4252
Red Knot			1911
Red-capped Plover	89	64	15491
Red-kneed Dotterel			40
Red-necked Avocet	6		2837
Red-necked Stint	31	94	10012
Ruddy Turnstone		1	503
Ruff			
Sanderling			923
Sharp-tailed Sandpiper			480
Sooty Oystercatcher		6	924
Terek Sandpiper			369
Wandering Tattler			
Whimbrel	2		1454
Wood Sandpiper			2
Unidentified small wader			40
Unidentified medium wader			2
Unidentified large wader			
TOTAL	949	167	97995
No. of species	12	5	42

SUMMER 2009	NSW (listed from north to south)																					NT	
Species	Tweeds Estuary	Brunswick River estuary	Richmond River estuary	The Broadwater	Clarence River	Barren Box Swamp	Hastings River	Manning River / Farquhar	Dubbo Sewage Ponds	Port Stephens	Hunter Estuary	Lake Macquarie Entrance	Parkes Sewage Farm	Tuggerah Lakes	Parramatta River	Botany Bay	Nericon Swamp	Fivebough Swamp	Lake Illawarra	Shoalhaven Estuary	Tullakool Saltworks	Ulladulla	North Darwin	Darwin Harbour
Asian Dowitcher																							
Australian Pratincole																							
Banded Lapwing																							
Banded Stilt													3121					4					
Bar-tailed Godwit	105	20	200		540		131	295		641	936	84		114	290	480			7	448			433	
Beach Stone-curlew							2	2															2	1
Black-fronted Dotterel		6		1		7			4		3		10	3	7									
Black-tailed Godwit					40					6	165			5									878	
Black-winged Stilt	48	27	10	31		10			20		68		338	32	132	2				7	250			
Broad-billed Sandpiper																								
Bush Stone-curlew	2																							
Common Greenshank		1	4	4	6	7				13	119		10	35		5				6	2		3	1
Common Sandpiper		1											1			1							4	10
Curlew Sandpiper			16					1			185			70	11	1				1			1	
Double-banded Plover							2	4						1						6				
Eastern Curlew	42	6	52		15		40	47		551	328	6				129				124			34	24
Great Knot			22		120			2			2					1							3376	
Greater Sandplover			16																				1001	5
Grey Plover								1					3			1							30	26
Grey-tailed Tattler	8	13	91		36		6	1		18	19	2		8		51				11			33	2
Hooded Plover																								
Latham's Snipe		10									11		1	5	3									
Lesser Sandplover								2		1													52	
Little Curlew																								
Long-toed Stint																								
Marsh Sandpiper				1							47							20		1	9			
Masked Lapwing	3	22	2	24	8	25	5	26	14	29	114	3		77	92	7		37	6	54	2	16	7	8
Oriental Plover																								
Oriental Pratincole																								
Pacific Golden Plover		22	186		12			84		28	169		2	16	2	23				144			27	16
Pectoral Sandpiper																								
Pied Oystercatcher	2	12	4		18		6	19		134	11	14	139	6		48				23		2	12	
Red Knot											15			1		2							500	
Red-capped Plover		5	3		2	25		76		37	6		380	10		7		2	21	94	100		24	
Red-kneed Dotterel						2					37				1			14		1	7			
Red-necked Avocet	9					1					2702				61									
Red-necked Stint			80		2			150		41		15		169		165			14	72	300		131	
Ruddy Turnstone		1	21		3					2			2	34		23							58	
Ruff																								
Sanderling			9					73					60										112	
Sharp-tailed Sandpiper		6			162	3		12					222	72	99	4		200		6	70			
Sooty Oystercatcher	2	1	5		7					13	10		4	18		7				1			1	
Terek Sandpiper		1	13		7						3			1									9	1
Wandering Tattler		1														1								
Whimbrel	20	2	26		69		35	2		40	1	1				71				5			68	84
Wood Sandpiper													3											
Unidentified small wader																				3			200	
Unidentified medium wader																							200	
Unidentified large wader																								
Max summer TOTAL	241	147	726	61	1047	51	201	625	38	1554	4381	109	4296	637	659	916	0	220	48	654	740	18	5508	136
No. of species	10	18	18	5	16	8	8	17	3	14	21	7	15	19	10	20	0	6	4	17	8	2	23	11
Years of summer Data	18	8	24	3	24	4	13	7	9	13	23	6	11	18	29	29	5	10	27	29	5	2	23	6

SUMMER 2009	Qld (from south to north)												SA (from east to west)										
Species	Moreton Bay	Great Sandy Straight	Mackay	Gladstone	Bowen	Burdekin River Delta	Charon Point	Bar Plain Beach - Broad Sound	Haughton River	Townsville	Bushland Beach	Cairns area	Port MacDonnell	Carpenter Rocks	Bool Lagoon	Canunda National Park	Rivoli Bay	Beachport	Lake George	Legoes Swamp	Lake St Clair	Lake Eliza	Lake Robe
Asian Dowitcher																							
Australian Pratincole																							
Banded Lapwing																							
Banded Stilt																							
Bar-tailed Godwit	9380	**N**	8	**N**	**N**	147	70	43	86	120	100	213											
Beach Stone-curlew		**O**	6	**O**	**O**							2											
Black-fronted Dotterel	1	**T**		**T**	**T**																		
Black-tailed Godwit	473					12						11											
Black-winged Stilt	468	**C**		**C**	**C**																		
Broad-billed Sandpiper	1	**O**		**O**	**O**																		
Bush Stone-curlew		**U**		**U**	**U**																		
Common Greenshank	167	**N**		**N**	**N**				6			16							25				
Common Sandpiper		**T**		**T**	**T**	1																	
Curlew Sandpiper	1548	**E**		**E**	**E**							101		2								5	
Double-banded Plover		**D**		**D**	**D**											1	1						
Eastern Curlew	1436		192			7	25	13	9	7	18	21		1									
Great Knot	727					5310	2300	340	1100	4000	2004	569											
Greater Sandplover	289					12			21			73											
Grey Plover	32					6			14	5													
Grey-tailed Tattler	991					126			18	18		72											
Hooded Plover														2		15		6	2				
Latham's Snipe	4																						
Lesser Sandplover	1069					40	60	240	32			37											
Little Curlew																							
Long-toed Stint																							
Marsh Sandpiper	21																						
Masked Lapwing	78											41	32	30			10	2	26		23	49	16
Oriental Plover																							
Oriental Pratincole																							
Pacific Golden Plover	515									24				1		23					78	90	
Pectoral Sandpiper																							
Pied Oystercatcher	341					7	2	2		2	20	7	19	17		8	3	16					
Red Knot	21					350	11		22			5											
Red-capped Plover	201					80	5	5					56	11		43	21	1	93		33	259	25
Red-kneed Dotterel																							
Red-necked Avocet																			1				
Red-necked Stint	4380					350		110				171	502	481		50	65		1081		13	692	
Ruddy Turnstone	28												27	148		23	71	37					
Ruff																							
Sanderling						2										261		50					
Sharp-tailed Sandpiper	1868											7	30	60								50	
Sooty Oystercatcher														4				3					
Terek Sandpiper	8					5			6			26											
Wandering Tattler																							
Whimbrel	1139		3			26	4		24	50		14											
Wood Sandpiper																							
Unidentified small wader	17																		8				
Unidentified medium wader													120										
Unidentified large wader																							
Max summer TOTAL	25203	--	209	--	--	6481	2477	753	1338	4226	2142	1368	786	757	0	424	171	115	1236	0	147	1145	41
No. of species	25	--	4	--	--	16	8	7	11	8	4	17	6	11	0	8	6	7	6	0	4	6	2
Years of summer Data	29	22	22	11	20	1	1	1	1	16	7	26	28	28	7	6	7	1	16	2	9	11	9

SUMMER 2009 **SA (from east to west)**

Species	Lake Hawdon	Fox and Pub Lakes	Guichen Bay	Boatswain Point	Wright Bay	Nadzab Lagoon	Coorong	Kangaroo Island	Gulf of St Vincent	Pine Point (Yorke)	Black Point	Stansbury / Oyster Point	Coobowie Inlet	Troubridge Island / Shoal	Goldsmith Beach to Wattle Pt	Port Victoria	Munderoo Bay to Tickera Bay	Port Pirie Coast	Winninowie CP	Telowie Beach	Port Augusta Saltfields	Franklin Harbour	Stearford Bay
Asian Dowitcher																							
Australian Pratincole																							
Banded Lapwing									90											15			
Banded Stilt							170024		3252									39			4500		
Bar-tailed Godwit							58	16	533							50		156				2	
Beach Stone-curlew																							
Black-fronted Dotterel		3																					
Black-tailed Godwit									3														
Black-winged Stilt	1						341	58	358												4		
Broad-billed Sandpiper																							
Bush Stone-curlew																							
Common Greenshank	11	2					382	30	525	18	18	11	1	2	8	20		1		25		11	
Common Sandpiper								2	4													1	
Curlew Sandpiper							41	82	473	4	2	29		47		14		96	91				
Double-banded Plover			3				1		9		1					1							
Eastern Curlew							47	3	29									15	3	2		2	
Great Knot								43	207					7		43		4					
Greater Sandplover									8		1							4					
Grey Plover								92	237					9	3	46		65				59	
Grey-tailed Tattler									4														
Hooded Plover							30	21	5		5												26
Latham's Snipe		17																					
Lesser Sandplover									8							1							
Little Curlew																							
Long-toed Stint																							
Marsh Sandpiper							1		15		15												
Masked Lapwing	84	3					402	234	142		2					2				3		8	
Oriental Plover																							
Oriental Pratincole																							
Pacific Golden Plover							24		2		1				2			1					
Pectoral Sandpiper									1														
Pied Oystercatcher			2				343	280	125		1		2	9	8	18		24	26	48		19	3
Red Knot								23	2682					48		749		775					
Red-capped Plover	37	4	34					112	3112	150	650		7	3	50	460	11	370	770	384	54		16
Red-kneed Dotterel		22					4		121														
Red-necked Avocet							186		696														
Red-necked Stint		160	18				3355	424	7757	310	830	163	45	500	457	630	28	800	1021	800	58	236	152
Ruddy Turnstone			7	50				112	84		21			57	44	40		62					
Ruff																							
Sanderling							87											1					101
Sharp-tailed Sandpiper		200					3009	18	1749			5		5		56		18	1			81	
Sooty Oystercatcher			3				11	87	166	2	6	18		11	3				8			2	21
Terek Sandpiper									2														
Wandering Tattler																							
Whimbrel								2	26														
Wood Sandpiper							1		2														
Unidentified small wader							313		200														
Unidentified medium wader									160							451							
Unidentified large wader																							
Max summer TOTAL	133	407	67	50	0	0	178356	1122	22787	484	1534	226	55	698	554	2107	39	1976	1920	1277	4616	421	297
No. of species	4	8	6	1	0	0	19	18	32	5	13	5	4	11	8	14	2	16	7	7	4	10	6
Years of summer Data	9	7	3	2	4	4	14	6	26	3	5	29	1	4	3	6	7	2	2	1	3	4	4

SUMMER 2009	**SA (from east to west)**														**Tas (from Hobart region nortl**							
Species	Gunyah Beach	Sensation Beach	Kellidie Bay	Horse Peninsula	Long Nose	Lake Newland	Venus Bay	Baird Bay	Sceale Bay	Streaky Bay	Eyre Island	St Peter Island	Murat Bay	Tourville Bay	Derwent	Marion Bay	Lake Dulverton	Moulting Lagoon	Scamander	Maurouard Beach	Georges Bay	Policemans Point
Asian Dowitcher																						
Australian Pratincole																						
Banded Lapwing						2	3															
Banded Stilt						304			1100			35		7								
Bar-tailed Godwit								5	1	44	101	571		72	85	7		12		1	22	
Beach Stone-curlew																						
Black-fronted Dotterel																					2	
Black-tailed Godwit											2	6										
Black-winged Stilt						5																
Broad-billed Sandpiper																						
Bush Stone-curlew																						
Common Greenshank			10		4		17	113	27	46	64	135	139	190	17			22			6	
Common Sandpiper												2										
Curlew Sandpiper					5			70	114	50		645	35	26	19							
Double-banded Plover																			1	2	6	23
Eastern Curlew												15	2	5	30			9			30	
Great Knot					22			144	1	90	350	274		269								
Greater Sandplover								6				1		4								
Grey Plover				1	40	5	66	360	5	263	99	112	70	141								
Grey-tailed Tattler												4		1								
Hooded Plover	16					6	3		6			5		7		11			5	35	2	4
Latham's Snipe																						
Lesser Sandplover					3	6		1	1													
Little Curlew																						
Long-toed Stint																						
Marsh Sandpiper									3													
Masked Lapwing			10			72	22	4		21		61	18		67		21	84			62	3
Oriental Plover																						
Oriental Pratincole																						
Pacific Golden Plover										9		5			30							
Pectoral Sandpiper																						
Pied Oystercatcher	56		18	43	84	25	155	47	5	96	186	258	88	225	520	114		206	16	7	264	26
Red Knot					27			78		70	280	497		553	2							
Red-capped Plover	15		65	5	28	90	17	119	79	167		128			42	19		29	30	7	36	14
Red-kneed Dotterel																						
Red-necked Avocet						142			34													
Red-necked Stint			40	2	251	444	272	788	721	1137	478	951	635	1429	971	600			140		660	52
Ruddy Turnstone					14			35	222	25	56	101	23	63						23		31
Ruff																						
Sanderling		245	60		224	304		2	451		9			7								170
Sharp-tailed Sandpiper					133		32	133	160	82		136	196	773								
Sooty Oystercatcher	32	3	1	31	33	16	83	71	4	32	61	129	119	98	10	3		1		5	2	1
Terek Sandpiper												1										
Wandering Tattler																						
Whimbrel									1													
Wood Sandpiper																						
Unidentified small wader				1	58	37	4	15														
Unidentified medium wader				1	30	11		65			10											
Unidentified large wader				2		3					51											
Max summer TOTAL	119	248	204	86	956	1472	674	2056	2935	2132	1747	4072	1325	3870	1793	754	21	363	155	78	1056	321
No. of species	4	2	7	5	13	13		16	18	14	11	22	10	17	11	6	1	7	5	7	11	9
Years of summer Data	9	1	3	5	6	5	4	9	10	13	2	2	3	4	37	28	3	21	5	7	9	3

SUMMER 2009	)		Tas (from Hobart region north)							Vic (from east to west)												
Species	Great Musselroe Bay	Cape Portland	Lades Beach	George Town Reserve	Kelso, Tamar Estuary	Narantapu National Park	Moorland Point	Robbins Passage	King Island	Mallacoota	Lake Reeve	Jack Smith Lake	Corner Inlet	Shallow Inlet	Anderson Inlet	Western Port Bay	East Port Phillip	Laverton/Altona	Werribee / Avalon	St. Leonards Salt Lake	Swan Bay & Mud Islands
Asian Dowitcher																					
Australian Pratincole																					
Banded Lapwing		20			5																
Banded Stilt																					
Bar-tailed Godwit		8		24				350	1	33			10070	58		402					449
Beach Stone-curlew																					
Black-fronted Dotterel									1								13		27		
Black-tailed Godwit														5					6		10
Black-winged Stilt														3			207	42	294		29
Broad-billed Sandpiper																					
Bush Stone-curlew																					
Common Greenshank	15								3				77	95	146	67	2	9	18		56
Common Sandpiper																	3		1		
Curlew Sandpiper		112		1	15			72	22				295	417	40	1415	1	774	1103		430
Double-banded Plover		2			1			4	20			2	6	2		4			49		4
Eastern Curlew				23		15		89		2			857	219	154	675			1		42
Great Knot								2					5	42							18
Greater Sandplover													4								
Grey Plover								65					250								52
Grey-tailed Tattler								5						2		39					23
Hooded Plover		3	2		2	1		49	34				7		2						6
Latham's Snipe									1								57				
Lesser Sandplover								1					10			3					1
Little Curlew																					
Long-toed Stint																					
Marsh Sandpiper									1					19				19	1		
Masked Lapwing	6	45	3	21	200	4	15	311	311	5	16	30	5	57	29	170	222	28	245	15	64
Oriental Plover																					
Oriental Pratincole																					
Pacific Golden Plover		98	8				4	93	12					204		13		22	5		21
Pectoral Sandpiper																			4		
Pied Oystercatcher	56	56	48	28	89	63	2	663	44	13			1037	4	5	357		15	57	2	14
Red Knot								819					110	4		7					20
Red-capped Plover	4	57	11		69	12	6	56	48			55	20	35	6	97	13	25	103	10	407
Red-kneed Dotterel																	23		13		
Red-necked Avocet																3		55	175		
Red-necked Stint	180	1070	44	25	420	115		10975	1217		2212	37	15489	3024	2128	5477	11	2068	7900		2850
Ruddy Turnstone		28		11	14		120	1355	459				30			18		1			34
Ruff																					
Sanderling								5	35				150	270							
Sharp-tailed Sandpiper		4	21					57	2				25	91	200	275	1503	304	2884		361
Sooty Oystercatcher	11	29	3	4	19			332	57	3			549	35	1						2
Terek Sandpiper																					
Wandering Tattler																					
Whimbrel				4				1					8	2		19					
Wood Sandpiper																					
Unidentified small wader															4						
Unidentified medium wader																					
Unidentified large wader																					
Max summer TOTAL	272	1454	140	141	827	210	147	15304	2268	56	2228	124	29004	4588	2616	8719	1049	3362	12886	27	4197
No. of species	6	13	8	9	10	6	5	20	17	5	2	4	20	20	10	17	11	12	18	3	21
Years of summer Data	2	35	17	30	13	14	5	23	4	7	13	7	29	10	15	29	29	28	29	29	29

SUMMER 2009	**Vic (from east to west)**																				**WA (from n. to**		
Species	Point Richards	Lake Lorne	Begola	Lake Connewarre area	Moolap Saltworks	Black Rocks / Breamlea	Belmont Common	Bendigo Sewage Farm	Kerang Lakes	Lake Corangamite area	Swan Hill	Lake Bulloke	Port Fairy	Hamilton	Fitzroy River Mouth	Douglas area (Wimmera)	Lake Wyn Wyn area	Lake Hindmarsh	Lake Albacutya	Mildura	Discovery Bay to Glenelg R.	Dampier Peninsula	Broome	Roebuck Bay
Asian Dowitcher																								
Australian Pratincole																								
Banded Lapwing											149													
Banded Stilt																								
Bar-tailed Godwit				6																	1		52	9879
Beach Stone-curlew																								
Black-fronted Dotterel	14	9	6	7	8		15	29												7		2		
Black-tailed Godwit				4																				685
Black-winged Stilt	1	5		400	245		11	26		40	58		91	4						260	1		23	381
Broad-billed Sandpiper																								131
Bush Stone-curlew																								
Common Greenshank			2	154	67	1					5		19	1	2						9	5	5	560
Common Sandpiper																						9	17	26
Curlew Sandpiper				833	211																	1	15	1403
Double-banded Plover				8									20		3									
Eastern Curlew				1																			5	638
Great Knot																						1	211	21342
Greater Sandplover																						179	1244	4513
Grey Plover																						24	31	254
Grey-tailed Tattler																						102	8	2765
Hooded Plover						6							63		46						3			
Latham's Snipe		13	15	5	3		31						25		5									
Lesser Sandplover																						2	73	34
Little Curlew																							727	1229
Long-toed Stint																								
Marsh Sandpiper				79	62						7												2	
Masked Lapwing	47	13	2	120	97	23	6			168	43		202	56						54	18		44	
Oriental Plover																							14	1373
Oriental Pratincole																								81
Pacific Golden Plover													2		1							21	14	39
Pectoral Sandpiper				1																				
Pied Oystercatcher				12	20								40		13						105	7	29	36
Red Knot				3																		27		3171
Red-capped Plover	17			229	107	30		15		472	32		327		39					82	12	50	109	1682
Red-kneed Dotterel				48				19						10						14	2			
Red-necked Avocet					1					15	108									173				39
Red-necked Stint	53			5033	1028	410		5		2791	63		1984		223					130		83	302	4384
Ruddy Turnstone													45									39	157	287
Ruff																								
Sanderling													320		2						283	23	251	
Sharp-tailed Sandpiper	7			2995	491					592	12		246	15	65					64	14	5	3	263
Sooty Oystercatcher					1								3									33	6	33
Terek Sandpiper																							2	726
Wandering Tattler																								
Whimbrel																						34	25	1188
Wood Sandpiper																								
Unidentified small wader				250																				
Unidentified medium wader				500																				
Unidentified large wader																								
Max summer TOTAL	139	34	25	10688	2341	470	63	94	0	4059	477	0	3387	86	399	0	0	0	0	611	448	647	3369	51371
No. of species	6	4	4	18	13	5	4	5	0	6	9	0	14	5	10	0	0	0	0	8	10	19	25	27
Years of summer Data	29	28	29	29	29	29	29	14	11	12	9	5	11	8	8	13	9	9	5	9	8	1	1	20

SUMMER 2009 **s.)** **WA (from north to south)**

Species	Roebuck Plains Lakes	Bush Point (Roebuck Bay)	Cape Gordon to Cape Villaret	Coast north of 80 Mile	80 Mile Beach	Shark Bay	Hutt Lagoon	Swan River & Rottnest Island	Woodman Point	Garden Island	Swan Coastal Plain Lakes	Peel & Yalgorup Lakes	Vasse-Wonnerup Estuary	Broadwater (Busselton)	Wagin Lake	Wilson Inlet	Albany	Stokes Inlet	Barker Inlet (WA)	Harry Davies Farm	Lake Gore	Lake Banja-Benjenup
Asian Dowitcher		3			2																	
Australian Pratincole	35				1																	
Banded Lapwing								12		7												
Banded Stilt							60	10			4	15	3		1080						32	70
Bar-tailed Godwit		19103	10	842	51719	3056		6				13					14					
Beach Stone-curlew																						
Black-fronted Dotterel	21					113	2				3		2	12								
Black-tailed Godwit		1			52							6										
Black-winged Stilt	252	2			10	126	46	78			1500	2027	800			78					5	4
Broad-billed Sandpiper		1			35																	
Bush Stone-curlew																						
Common Greenshank	9	3		6	2534	316	5	22	2		23	95	83		1	176	58				6	
Common Sandpiper	2	3	2	8	6	21	9	1			1	8					7				1	
Curlew Sandpiper	1	27			3292	89	35	30				135	1		30		1					50
Double-banded Plover																						
Eastern Curlew		196		22	423	167						11					1					
Great Knot		9489		415	128653	1099	3	7	4			10				2	119					
Greater Sandplover		5258	5	928	22885	529			2			1					24					
Grey Plover	14	260		74	1146	64	3	24	8			21					65					
Grey-tailed Tattler		196	30	113	7950	577		1	2			5					10					
Hooded Plover												102							52	9		
Latham's Snipe																						
Lesser Sandplover		124	2	7	7	30		2	1								4					
Little Curlew	330	37			784																	
Long-toed Stint	35					8					2	5										
Marsh Sandpiper	177				127	1	2					3	1									
Masked Lapwing	3																					
Oriental Plover	14	5364			17452																	
Oriental Pratincole	180	20960			1100																	
Pacific Golden Plover	1	33		1	73	3		2			2						21					
Pectoral Sandpiper	1										1					1						
Pied Oystercatcher		365		78	809	287	11	84		2		8				21	164					
Red Knot		27			23123	312						14					1					
Red-capped Plover	24	1480	5	543	6752	624	139	162	44	12	1603	163	200	69	55	98	23			39		23
Red-kneed Dotterel	3					21					1											
Red-necked Avocet						1	1	13	4		29	356	25			4					6	
Red-necked Stint	21	1905	25	458	28443	4227	89	1225	2		132	6191	802	207	195	368	535		17	78		127
Ruddy Turnstone		189		237	2433	164	11	55	16								2					
Ruff	2						1															
Sanderling		1129		208	3605	43	6	64	10	1											33	
Sharp-tailed Sandpiper	430			1	205	330	18	1			4	2507	21		87	16	56		14	14		4
Sooty Oystercatcher			4	1	25	4				2						3	1					
Terek Sandpiper		199		4	4628	19		2									1					
Wandering Tattler																						
Whimbrel		379		96	363	155	1					5					5					
Wood Sandpiper	138	267				24	2															
Unidentified small wader						120										5						
Unidentified medium wader						138		5									8					
Unidentified large wader						150																
Max summer TOTAL	1693	67000	83	4042	308637	12621	284	1640	82	24	1961	11675	1938	288	1448	765	1105	0	83	140	71	278
No. of species	21	27	8	19	30	28	19	20	11	5	13	22	10	3	6	10	20	0	3	4	6	6
Years of summer Data	1	6	3	1	16	5	4	24	8	6	15	10	8	3	1	26	24	3	1	1	4	2

SUMMER 2009 **WA**

Species	Helm's Lake	Warden Lakes (Esperance)	Lake Bannitup	Nuytsland Nature Reserve	**ALL shorebird areas**
Asian Dowitcher					5
Australian Pratincole					36
Banded Lapwing					303
Banded Stilt		200	2		183862
Bar-tailed Godwit					112723
Beach Stone-curlew					15
Black-fronted Dotterel		2			340
Black-tailed Godwit					2370
Black-winged Stilt					9259
Broad-billed Sandpiper					168
Bush Stone-curlew					2
Common Greenshank				4	6946
Common Sandpiper		1			153
Curlew Sandpiper			8		14644
Double-banded Plover					187
Eastern Curlew					6860
Great Knot					182749
Greater Sandplover				1	37014
Grey Plover					4146
Grey-tailed Tattler					13361
Hooded Plover	39	6			644
Latham's Snipe					206
Lesser Sandplover					1854
Little Curlew					3107
Long-toed Stint					50
Marsh Sandpiper					634
Masked Lapwing		7			4918
Oriental Plover					24217
Oriental Pratincole					22321
Pacific Golden Plover					2229
Pectoral Sandpiper					9
Pied Oystercatcher				21	8906
Red Knot					34349
Red-capped Plover	73	18	27	45	25197
Red-kneed Dotterel					363
Red-necked Avocet				2	4842
Red-necked Stint	130	10	2000	42	155309
Ruddy Turnstone					7253
Ruff					3
Sanderling					8666
Sharp-tailed Sandpiper			11	2	23878
Sooty Oystercatcher				11	2321
Terek Sandpiper					5664
Wandering Tattler					2
Whimbrel					3998
Wood Sandpiper					437
Unidentified small wader					1235
Unidentified medium wader					1699
Unidentified large wader					206
Max summer TOTAL	242	220	2048	116	904406
No. of species	3	7	5	8	46
Years of summer Data	2	5	2	27	

Please note:

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Vignettes:
Andrew Silcocks, p1, p44
Annie Rogers, p9, p14, p31
Nan Lepinath, p39
Ian Hance, p42

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

Stilt 56 – October 2009
Table of Contents