WADER BREEDING SUCCESS IN THE 2013 ARCTIC SUMMER, BASED ON JUVENILE RATIOS OF BIRDS WHICH SPEND THE NON-BREEDING SEASON IN AUSTRALIA

CLIVE MINTON[1], ROZ JESSOP[2] & CHRIS HASSELL[3]

[1] *165 Dalgetty Road, Beaumaris, Victoria 3193, Australia. e-mail: mintons@ozemail.com.au*
[2] *Phillip Island Nature Park, PO Box 97, Cowes, Victoria, 3922, Australia. e-mail: rjessop@penguins.og.au*
[3] *PO Box 3089, Broome, Western Australia 6735, Australia. e-mail: turnstone@wn .com.au*

INTRODUCTION

The Victorian Wader Study Group has been collecting "percentage juvenile" data from waders in south-east Australia annually since the 1978/79 non-breeding season. Similar data has been collected by the Australasian Wader Studies Group at Broome and 80 Mile Beach in north-west Australia since 1998/99. This data is a proxy for measuring the level of annual breeding success for a range of migratory wader species which spend their non-breeding season in these areas of Australia.

The data collected each year has been published annually since 2000 in Arctic Birds and in the AWSG Bulletin (Stilt) (Minton et al 2000, Minton et al 2013 etc.). It has also been analysed regularly with results being published in scientific papers (Boyd et al 2005, Minton et al 2005, Rogers & Gosbell 2006, Rottman et al, in prep).

The principal purpose of this note is to place on permanent record the data collected in Australia during the 2013/14 non-breeding season so that this is available at any time in the future to wader researchers worldwide.

METHODS

The data has been collected, and the results presented, in the same way throughout this long-term study. Only birds caught by cannon-netting are included. Only birds caught in defined periods (see footnotes to Tables 1 & 2) are used. These periods are determined for each species in each area by using banding data to show when both adult and juvenile birds have largely completed their southward migration and when adult birds have not yet set off again on their northward migration.

Birds were aged by conventional methods involving both diagnostic body plumage (mostly wing coverts) and the wear/moult of the primary feathers. In most species the level of experience in the banding groups now enables ageing to be carried out with a high level of accuracy in most species throughout the defined periods. The greatest difficulties are encountered late in the season – in Sanderling in south-east Australia and in Terek Sandpiper and Grey-tailed Tattler in north-west Australia – when some individual birds have almost completely lost all traces of their original juvenile plumage.

The shortcomings of this method of measuring breeding success have been fully elaborated in earlier papers. It needs to be stressed that the data is a measurement of the proportion of first-year birds in the population some months after the end of the breeding season, after completion of the southward migration. The true reproductive rate, measured by the number of young at fledging, is likely to be higher. The numerical figure obtained is therefore more of an annual index of reproductive success rather than an absolute measure. Since the greatest interest is in comparing year to year breeding success variations and looking for any long-term trends in breeding success, this does not particularly matter. At the present time these measurements of percentage juveniles in banding catches are the only practical method of collecting long-term reproductive rate data on a range of migratory wader species.

Note that for the data from south-east Australia both the median (for the 35 year data set) and the average (for the last 15 years of data) are presented. In all cases the median is lower than the average, indicating that the data is not normally distributed. A small number of exceptionally high percentage

juvenile figures have occurred in most species, thus raising the average. However in most species the difference between the median and the average is not large.

Classification of the breeding success in a particular year is made by reference to the average figures for that species. The classification is only in broad terms.

RESULTS

Adequate samples were obtained in the 2013/14 non-breeding season for all the main study species in south-east Australia except the Red Knot. A total of 45 days was spent in banding fieldwork in the defined period, producing 47 samples of the seven study species (Table 1). Good coverage was also achieved in north-west Australia, except on Sanderling, with 32 catching days producing 104 samples of the 11 listed species (Table 2).

Exceptionally high percentage juvenile figures were obtained for Curlew Sandpiper (39.8%), Bar-tailed Godwit (44.7%) and Ruddy Turnstone (37.7%) in south-east Australia. These three species were classified as having had "very good" breeding success in 2013 and no species was classified lower than "average". It is likely that if a larger sample of Red Knot had been obtained then it would also have shown an unusually high level of breeding success. Small flocks of juvenile Red Knot were seen (but not caught) at a number of non-regular sites, including Werribee Sewage Farm (per D. Rogers). This predominately happens after 'good' breeding years.

Only Ruddy Turnstone, with a juvenile percentage of 30.8%, was classified as "very good" in north-west Australia. Two species – Great Knot and Red Knot – were classified as "very poor" (5.0% and 7.9% juveniles) and it is likely that Broad-billed Sandpiper would have fallen in this category if the sample size had been large enough to be significant. The best performance amongst the other species monitored was by Bar-tailed Godwit (17.0%) and this was the only one of these species which had a classification above "average".

DISCUSSION

After the abysmal 2012 breeding success of most of the migratory wader species which spend the non-breeding season in south-east Australia (Table 3) it was particularly welcome that all species had a much improved performance in 2013, with half the species being classed as "very good". In Curlew Sandpiper, Bar-tailed Godwit and Ruddy Turnstone the 2013/14 percentage juvenile figure had only been exceeded twice in the 35 years of this study. Curlew Sandpipers achieved an incredible 45.3% juveniles in 1991/92. In the same year – well known worldwide for its incredible productivity – the Ruddy Turnstones produced 80.3% juveniles. High figures in Bar-tailed Godwits occurred in 1981/82 (60.5%) and 2007/08 (36%). These are a far cry from the single figure numbers obtained in three species in 2012/13 and also in 2011/12.

The 2013 breeding outcomes for migratory wader species in north-west Australia were also generally an improvement on the previous year (Table 4), but overall they were not as good as the results from south-east Australia. It was interesting that Ruddy Turnstone breeding success was of the same unusually high level in both areas suggesting that conditions were suitable for their breeding in 2013 across a wide area of their arctic breeding habitat. Red-necked Stint outcomes were also similar in the two areas (17.3% juveniles in south-east Australia and 19.4% in north-west Australia).

It is of particular concern that both Red Knot and Great Knot in north-west Australia again had a low percentage of juveniles, with both species now having had similar low percentage juvenile figures for each of the last three years (Table 4). It is tempting to wonder whether the extensive losses of habitat at their major stopover sites in the Yellow Sea, used especially on northward migration to the breeding grounds, are now having an effect on the subsequent breeding success when birds reach the arctic.

CONCLUSION

As the length of the data sets on the percentage of the juveniles in wader populations in the non-breeding areas in south-east and north-west Australia continues to grow this study becomes progressively more valuable. Some earlier analyses did not indicate any noticeable change over time in the breeding success of various species during the earlier years of the study. But with the rate of loss of intertidal habitat in the Yellow Sea having grown enormously in the last 10 years, and with the overall losses encountered now reaching 50% over the last 30 years, this data set will become even more valuable in the future in assessing whether one of the consequences of these changes is a reduced breeding success in some wader species. Annually monitoring wader populations in south-east Australia and north-west Australia will therefore be continued as a high priority for the foreseeable future by the VWSG & AWSG.

ACKNOWLEDGEMENTS

The dedication of VWSG and AWSG fieldwork teams, and their efforts and perseverance in sometimes extremely adverse weather conditions, is fundamental to the success achieved in obtaining adequate samples of all the main study species each year. Everyone is greatly thanked for their efforts and their considerable input of time (and cost).

Many land owners kindly granted access through their land to shorelines where we catch birds. Anna Plains Station and Broome Bird Observatory in north-west Australia, and Rosemary Davidson at Yanakie in south-east Australia, also very kindly provided accommodation for fieldwork teams based there. The wildlife authorities in Victoria, South Australia, Tasmania and Western Australia kindly provided the necessary permits, with some financial support also from the WA Parks Department. The Australian Bird Banding Scheme is thanked for providing banding permits and bands.

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Table 1. Percentage of juvenile/first year waders in cannon-net catches in south-east Australia in 2013/14

Species	No. of catches		Total caught	Juv./ 1st year		Long term median* % juvenile (years)	Assessment of 2013 breeding success
	Large (>50)	Small (<50)		No.	%		
Red-necked Stint *Calidris ruficollis*	8	6	2185	379	**17.3**	14.8 (35)	Average
Curlew Sandpiper *C. ferruginea*	3	2	251	100	**39.8**	9.6 (34)	Very good
Bar-tailed Godwit *Limosa lapponica*	2	1	152	68	**44.7**	18.5 (24)	Very good
Red Knot *C. canutus*	0	2	19	18	**(94.7)**	58.0 (18)	(Very good?)
Ruddy Turnstone *Arenaria interpres*	0	18	475	179	**37.7**	9.3 (23)	Very good
Sanderling *C. alba*	2	1	157	33	**21.0**	10.0 (22)	Good
Sharp-tailed Sandpiper *C. acuminata*	2	0	126	24	**19.0**	11.5 (32)	Average

All birds cannon-netted in period 2 November to 25 March except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only and some Ruddy Turnstone and Sanderling to early April.

* Does not include the 2013/2014 figures

Table 2. Percentage of juvenile/first year waders in cannon-net catches in north-west Australia in 2013/14

Species	No. of catches		Total caught	Juv/1st year		Assessment of 2013 breeding success
	Large (>50)	Small (<50)		No.	%	
Great Knot *Calidris tenuirostris*	8	3	1049	53	5.0	Very poor
Bar-tailed Godwit *Limosa lapponica*	2	7	224	38	17.0	Good
Red-necked Stint *C. ruficollis*	4	7	676	131	19.4	Average
Red Knot *C. canutus*	3	10	392	31	7.9	Very poor
Curlew Sandpiper *C. ferruginea*	1	14	281	66	23.5	Average (Good?)
Ruddy Turnstone *Arenaria interpres*	1	7	133	41	30.8	Very Good
Sanderling *C. alba*	0	4	5	1	–	–
Non-arctic northern migrants						
Greater Sand Plover *Charadrius leschenaultii*	4	9	843	181	21.5	Average
Terek Sandpiper *Xenus cinereus*	1	9	139	21	15.1	Average
Grey-tailed Tattler *Heteroscelus brevipes*	2	8	314	51	16.2	Average
Broad-billed Sandpiper *Limicola falcinellus*	0	4	29	2	(7.4)	(Very poor)

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

Table 3. Percentage of first year birds in wader catches in south-east Australia 1998/1999 to 2013/14

Species	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	*Average (15yrs)*
Ruddy Turnstone *Arenaria interpres*	6.2	29	10	9.3	17	6.7	12	28	1.3	19	0.7	19	26	10	2.4	37.7	*13.1*
Red-necked Stint *Calidris ruficollis*	32	23	13	35	13	23	10	7.4	14	10	15	12	20	16	22	17.3	*17.4*
Curlew Sandpiper *C. ferruginea*	4.1	20	6.8	27	15	15	22	27	4.9	33	10	27	(–)	4	3.3	39.8	*15.7*
Sharp-tailed Sandpiper *C. acuminata*	11	10	16	7.9	20	39	42	27	12	20	3.6	32	(–)	5	18	19.0	*18.7*
Sanderling *C. alba*	10	13	2.9	10	43	2.7	16	62	0.5	14	2.9	19	21	2	2.8	21.0	*14.7*
Red Knot *C. canutus*	(2.8)	38	52	69	(92)	(86)	29	73	58	(75)	(–)	(–)	78	68	(–)	(94.7)	*58.1*
Bar-tailed Godwit *Limosa lapponica*	41	19	3.6	1.4	16	2.3	38	40	26	56	29	31	10	18	19	44.7	*23.2*

All birds cannon-netted between 15 November and 25 March, except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only and some Ruddy Turnstone and Sanderling to early April. Averages (for previous 15 years) exclude figures in brackets (small samples) and exclude 2013/14 figures

Table 4. Percentage of first year birds in wader catches in north-west Australia 1998/1999 to 2013/14

Species	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**Average (15yrs)**
Red-necked Stint *Calidris ruficollis*	26	46	15	17	41	10	13	20	21	20	10	17	18	24	15	19.4	*20.8*
Curlew Sandpiper *C. ferruginea*	9.3	22	11	19	15	7.4	21	37	11	29	10	35	24	1	1.9	23.5	*17.0*
Great Knot *C. tenuirostris*	2.4	4.8	18	5.2	17	16	3.2	12	9.2	12	6	41	24	6	6.6	5.0	*12.2*
Red Knot *C. canutus*	3.3	14	9.6	5.4	32	3.2	(12)	57	11	23	12	52	16	8	1.5	7.9	*17.7*
Bar-tailed Godwit *Limosa lapponica*	2.0	10	4.8	15	13	9.0	6.7	11	8.5	8	4	28	21	8	7.6	17.0	*10.4*
Non-arctic northern migrants																	
Greater Sand Plover *Charadrius leschenaultii*	25	33	22	13	32	24	21	9.5	21	27	27	35	17	19	28	21.5	*23.6*
Terek Sandpiper *Xenus cinereus*	12	(0)	8.5	12	11	19	14	13	11	13	15	19	25	5	12	15.1	*13.6*
Grey-tailed Tattler *Heteroscelus brevipes*	26	(44)	17	17	9.0	14	11	15	28	25	38	24	31	20	18	16.2	*21.0*

All birds cannon netted in the period 1 November to mid-March. Averages (for previous 15 years) exclude figures in brackets (small samples) and exclude 2013/14 figures.