WADER BREEDING SUCCESS IN THE 2014 ARCTIC SUMMER, BASED ON JUVENILE RATIOS OF BIRDS WHICH SPEND THE NON-BREEDING SEASON IN AUSTRALIA

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INTRODUCTION

Each year since 2000 the Australasian Wader Studies Group and Victorian Wader Study Group have put together for publication the results they have obtained in the preceding wader non-breeding season on the proportion of juvenile birds in cannon-net catches in Australia. This creates a permanent record of such data for future analysis by researchers worldwide.

This short paper gives the results for the 2014/15 austral summer, collected in north-west Australia (AWSG) and in south-east Australia (VWSG), thus giving an index for the breeding productivity during the 2014 Northern Hemisphere summer of a range of wader populations.

The "percentage juvenile" data for earlier years has been published in the Proceedings of the Australian Shorebirds Conference held in Canberra in December 2003 (Minton et al 2005). More recent results have been published each year in Arctic Birds, commencing with Minton et al 2000. These results have also been published annually in the AWSG journal Stilt, with the most recent paper being Minton et al 2014.

During the past year a paper analysing all the Australian data, and comparing it with data from Western Europe and elsewhere, has also been published (Aharon-Rotman et al 2015).

METHODS

All birds used in this analysis were again caught by a standard method (cannon-netting at high-tide roosts) in the period when wader populations are most stable i.e. when all of the adults and all of the juvenile birds have reached their non-breeding areas. In north-west Australia this is 1 November to mid-March and in south-eastern Australia it is 15 November to 25 March. However, in south-eastern Australia there are some exceptions to the time period. No Sharp-tailed Sandpiper and Curlew Sandpiper catches after 28 February were used. This is because adults of these two species set off on northward migration within Australia from as early as the beginning of March. Conversely some Ruddy Turnstone samples up until the second week of April, and the occasional Sanderling catch up to late April, have been incorporated into the data because our studies (mainly using geolocators) have shown that adults do not depart on northward migration from their non-breeding areas until after such dates.

The tables of data are presented in the usual format. Note that in Table 1 the *median* percentage juvenile figure has been used for assessing the 2014 breeding success of wader populations which come to south-east Australia. It was felt that, given the long data series available (up to 36 years), use of the median would minimise distortions associated with the occasional extreme breeding season (good or bad).

However in Table 3, for comparison, the *average* percentage juvenile figure is quoted. For north-western Australia, in Tables 2 and 4, only the average percentage juvenile figure is used, because up to the present time, the data series from there is much shorter (only going back to 1998/99, compared with 1978/79 for the data from south-eastern Australia). It may be that in the future, now that there is more data, we should also use the median figure for NWA wader population breeding success assessments.

In most species the ageing of juvenile birds for much of the first year is relatively straightforward, especially during the monitoring period, because significant juvenile plumage (particularly wing

coverts) is retained. The extent of wear and sun bleaching/fading of the tips of primaries were also useful aids in distinguishing juvenile birds from adults. The pattern and timing of moult in the primaries themselves could also be a useful indicator. Many juveniles/first year birds carry out a moult of some (or all) of their primaries but this commences much later than the adults and often only involves part of the wing (normally the outermost primaries).

The species most difficult to age correctly, particularly in the second half of the sampling period, were Sharp-tailed Sandpiper and Terek Sandpiper. This is because most of the distinctive juvenile plumage of these species is shed in the earlier part of the non-breeding season and the wing moult of primaries by some juvenile birds can start as early as the beginning of November.

RESULTS

The number of adult and juvenile birds of each species caught during the 2014/15 sampling period are given in Table 1 (south-eastern Australia) and Table 2 (north-west Australia). The number of catches of each species which were used to produce the figures for each region are also given to indicate the spread of sampling or, in some cases, the limited number of samples obtained. In calculating the median percentage juvenile figure for south-east Australia the number of years of data which have contributed to this figure is indicated.

The results for the 2014/15 monitoring season have been added to those of other years since 1998/99 in Tables 3 and 4, with new averages for this period being calculated.

DISCUSSION

The Northern Hemisphere 2014 breeding season was much less favourable than that of 2013 for wader populations which visit south-east Australia. In only one species, the Ruddy Turnstone, was breeding success assessed as ‘good’. Most outcomes were average and that of Curlew Sandpiper was rated as ‘poor’. In the previous year the outcome of the 2013 breeding season for these SEA wader populations was generally ‘good’, or even ‘very good’.

A similar reduced breeding success in 2014 compared with 2013 was also noticeable in wader populations in north-west Australia. Again, only Ruddy Turnstone was assessed as being ‘good’. In three species their breeding performance was assessed as ‘poor’, with Great Knot and Bar-tailed Godwit outcomes being particularly bad.

The quite marked levels of year-to-year variations in breeding success in the Arctic are illustrated in Tables 3 and 4. It is interesting that these 16-year data series do not seem to show any marked trend, upwards or downwards, in breeding success over the years.

The recent analysis of all the AWSG and VWSG percentage juvenile data (Aharon-Rotman et al 2015) also showed that there is currently no sign of a strong three-yearly cycle (good, bad, medium) in our breeding success data such as was originally present in western European/South African populations of the Curlew Sandpiper (Summers & Underhill 1987). This analysis suggests that any semblance of a three-year cycle in our the East Asian Australasian Flyway, such as is slightly apparent in Red-necked Stint and Curlew Sandpiper figures from the 1980s, is no longer present. Furthermore the recent analysis showed that even in Western European/African populations of Curlew Sandpiper the strong three-year cycle is no longer apparent. This corresponds with the reported breakdown of a similar cycle in Lemmings (Ims et al 2008). This has been attributed to the effects of climate change in Arctic regions.

CONCLUSION

Overall therefore the 2014 Arctic summer seems to have been an average, or below average, breeding season for most of the wader populations which spend the non-breeding season in Australia. Fortunately it was not as bad as some past years have been (especially the disastrous 1992 breeding season).

Annual monitoring of the proportion of juveniles in wader populations in Australia will be continued in the future. At present it is the only method of obtaining a measure of breeding outcomes on a long-term basis on a wide range of wader species. Note, however, that this is not a true breeding productivity index as the population of young birds is not measured until, on average, some six months after fledging will have taken place (and *after* the first migration).

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Table 1. Percentage of juvenile (first year) waders in cannon-net catches in south-east Australia 2014 / 2015.

Species	**No. of catches**		**Total caught**	**Juveniles**		**Long term median * % juvenile (years)**	**Assessment of 2014 breeding success**
	Large (>50)	**Small (<50)**		**No.**	**%**		
Red-necked Stint *Calidris ruficollis*	8	10	3494	647	**18.5**	15.3 (36)	Average
Curlew Sandpiper *C. ferruginea*	1	7	490	25	**5.1**	10.0 (35)	Poor
Bar-tailed Godwit *Limosa lapponica*	1	0	103	15	**14.6**	19.5 (25)	Below average
Red Knot *C. canutus*	0	2	11	11	**(100)**	58.0 (18)	(Very good?)
Ruddy Turnstone *Arenaria interpres*	0	21	485	81	**16.7**	10.0 (24)	Good
Sanderling *C. alba*	1	4	146	20	**13.7**	10.1 (23)	Average
Sharp-tailed Sandpiper *C. acuminata*	2	5	289	45	**15.6**	13.3 (33)	Average

All birds cannon-netted in the period 2th November to 25th March except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only and some Ruddy Turnstone and Sanderling to early April and one Sanderling catch in late April (2015).

*Does not include the 2014/2015 figures.

Table 2. Percentage of juvenile (first year) waders in cannon-net catches in north-west Australia in 2014 / 2015.

Species	No. of catches		Total caught	Juveniles		Assessment of 2014 breeding success
	Large (>50)	Small (<50)		No.	%	
Great Knot *Calidris tenuirostris*	4	7	629	41	6.5	Poor
Bar-tailed Godwit *Limosa lapponica*	1	9	199	11	5.5	Poor
Red-necked Stint *C. ruficollis*	1	7	203	21	10.3	Poor
Red Knot *C. canutus*	0	8	75	10	17.2	Below Average
Curlew Sandpiper *C. ferruginea*	1	7	92	17	18.5	Average
Ruddy Turnstone *Arenaria interpres*	0	5	40	11	27.5	Good
Sanderling *C. alba*	0	5	16	2	-	-
Non-arctic northern migrants						
Greater Sand Plover *Charadrius leschenaultii*	2	10	381	76	19.9	Average
Terek Sandpiper *Xenus cinereus*	0	6	81	10	12.3	Average
Grey-tailed Tattler *Heteroscelus brevipes*	1	10	153	29	19.0	Average
Oriental Plover *C. veredus*	1	6	104	15	14.4	Average (?)

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

Table 3. Percentage of juvenile birds in wader catches in south-east Australia 1998 / 1999 to 2014 / 2015.

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**	**14/15**	***Average (16yrs)***
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	38	17	*14.6*
Red-necked Stint *Calidris ruficollis*	32	23	13	35	13	23	10	7.4	14	10	15	12	20	16	22	17	19	*17.4*
Curlew Sandpiper *C. ferruginea*	4.1	20	6.8	27	15	15	22	27	4.9	33	10	27	(-)	4	3.3	40	5.1	*17.3*
Sharp-tailed Sandpiper *C. acuminata*	11	10	16	7.9	20	39	42	27	12	20	3.6	32	(-)	5	18	19	16	*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	14	*15.1*
Red Knot *C. canutus*	(2.8)	38	52	69	(92)	(86)	29	73	58	(75)	(-)	(-)	78	68	(-)	(95)	(100)	*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	45	15	*24.5*

All birds cannon-netted between 15th November and 25th March, except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only and some Ruddy Turnstone and Sanderling to early April and one Sanderling catch in late April (2015). Averages (for previous 16 years) exclude figures in brackets (small samples) and exclude 2014 / 2015 figures

Table 4. Percentage of first year birds in wader catches in north-west Australia 1998 / 1999 to 2014 / 2015

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**	**14/15**	**Average (16yrs)**
Red-necked Stint *Calidris ruficollis*	26	46	15	17	41	10	13	20	21	20	10	17	18	24	15	19	10	*20.7*
Curlew Sandpiper *C. ferruginea*	9.3	22	11	19	15	7.4	21	37	11	29	10	35	24	1	1.9	23	18	*17.4*
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	6	*11.8*
Red Knot *C. canutus*	3.3	14	9.6	5.4	32	3.2	(12)	57	11	23	12	52	16	8	1.5	8	13	*17.0*
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	5	*10.8*
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	20	*23.5*
Terek Sandpiper *Xenus cinereus*	12	(0)	8.5	12	11	19	14	13	11	13	15	19	25	5	12	15	12	*13.7*
Grey-tailed Tattler *Heteroscelus brevipes*	26	(44)	17	17	9.0	14	11	15	28	25	38	24	31	20	18	16	19	*20.7*

All birds cannon netted in the period 1 November to mid-March. Averages (for previous 16 years) exclude figures in brackets (small samples) and exclude 2014 / 2015 figures.