WADER BREEDING SUCCESS IN THE 2017 ARCTIC SUMMER, BASED ON JUVENILE RATIOS OF BIRDS WHICH SPEND THE NON-BREEDING SEASON IN AUSTRALIA

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INTRODUCTION

The populations of waders which breed in the northern hemisphere and migrate to spend the northern hemisphere winter in south-east Australia or north-west Australia recorded their worst ever breeding season in 2017 . This is based on 40 years of annual monitoring in south-east Australia (SEA) and 20 years in north-west Australia (NWA). Furthermore, the bad news extended further with a powerful cyclone greatly reducing the planned fieldwork period in February 2018 in NWA and human errors, equipment failure and 'bad luck' impinging on our fieldwork results in SEA. 2017/18 was probably the year we 'had to have' (especially after we had been so lucky with weather conditions in most other recent years) but it was certainly a year we'd like to forget!

Similar fieldwork programmes are carried out in SEA and NWA each year to try to obtain the best estimates we can of the proportion of juveniles of each species in wader populations in Australia during the November-March period. In NWA the fieldwork is concentrated into a three-week Expedition (NWA 2018, on this occasion, running from February 12 to March 6, 2018). This was planned to give ten days cannon netting at 80 Mile Beach and six days at Roebuck Bay, Broome. A powerful cyclone, which eventually passed straight over our base at Anna Plains Station, beside 80 Mile Beach, caused us to return prematurely to Broome after only three days of fieldwork at 80 Mile Beach. We were eventually able to resume catching activities, at Broome, though greatly restricted by torrential rain making access to some locations impossible. We thus lost seven out of the ten planned catching days at 80 Mile Beach and had only six quite restricted catching days at Broome. In spite of the difficulties we were still able to obtain adequate samples of all the main species we monitor annually in NWA and all but one in SEA.

METHODS

As usual all birds used in the percentage juvenile calculations were caught by cannon netting, mainly at high tide roosts on coastal beaches. In SEA this was carried out at the usual range of locations along the central coast and bays of Victoria, plus the west coast of King Island (Tasmania) and the south-east corner of South Australia. In NWA weather disruptions restricted catching to three attempts on 80 Mile Beach (two at 51 km and one at 13km south of Anna Plains Station) and six at Roebuck Bay, Broome, mostly at the west end of Quarry Beach etc. Birds were aged using the usual criteria, based on plumage and primary moult.

RESULTS & DISCUSSION

The 2017/18 data is presented, in Tables 1-4. These are drawn up in the same format as is previous years, except that the average percentage juveniles in Tables 3 and 4 now includes the current year. In SEA some of the comparative data goes back for 40 years and in NWA comprehensive data has now been collected for the last 20 years. With the long data sets it is now more appropriate to compare

results with the long-term average percentage juvenile figures rather than with the median figures used in previous reports.

In spite of various practical difficulties, the total number of birds contributing to our assessment of the success of the 2017 Arctic breeding season was 1,802 in SEA and 1,252 in NWA. Although these are well down on the usual ballpark totals of 3-4,000 birds in each area, it is still sufficient to give a reasonable estimate of the proportion of juveniles in all except one of the species (Sanderling – SEA) monitored annually in the two regions (Tables 1 & 2). A total catch of at least 20 individuals is considered necessary to give a worthwhile estimate of the percentage of juveniles.

The past year is notable not only for its sampling difficulties but also as a year when the breeding success of most of the wader populations seems to have been the worst experienced during the course of the study. All eight species in NWA which could be assessed were recorded as having 'poor' breeding success in the 2017 Arctic breeding season. This is the first time NWA populations have been so uniformly poor in their apparent reproductive success. Only one of the main species monitored in NWA reached 10% juveniles, and that was Greater Sand Plover, with 13.2% juveniles in 2017/18 compared with a long-term average of 21.7%.

The outcome for wader populations spending the non-breeding season in SEA was almost as bad, with four out of six species having their 2017 breeding performance classed as 'poor' or 'very poor'. The stand-out exception was Sharp-tailed Sandpiper which appears to have had a very good breeding season, with 27.8% juveniles. Bar-tailed Godwit were also classed as having an average breeding season. This population of Bar-tailed Godwits (subsp. *baueri*) breeds in Alaska, whereas those in NWA (subsp. *menzbieri*) breed in Yakutia, in northern Siberia.

In NWA Great Knot seem to be having a particularly bad run of breeding seasons, with 6.6% juveniles only being bettered once in the last seven breeding seasons. Even Greater Sand Plovers, which used to reliably have 20-30% juveniles in their populations during the non-breeding season, have now had three successive poor breeding outcomes, with percentage juveniles only 10-13%. In NWA Terek Sandpipers and Grey-tailed Tattlers also seem to be having a bad period, with three successive poor breeding years.

Overall, it appears that SEA and NWA have had more than their fair share of poor breeding results in recent years. In SEA it now means that in two of the last three breeding seasons there have been very poor breeding outcomes. This is certainly not what is needed considering that the wader populations in the East Asian-Australasian Flyway are also suffering a severe impact from the reduced food supplies on migration. This is due to the huge losses of feeding habitat in the Yellow Sea caused by extensive land reclamation over the last 30 years.

LONG-TERM TRENDS

In spite of these poor breeding outcomes in recent years there is an apparent long-term trend of increased average percentage juveniles in the wader populations which visit SEA (Table 5). With up to 40 years of data now available on the seven species monitored annually in SEA all but one had a higher percentage of juveniles in the last 20 years (1998/99 to 2017/18) compared with the first 20 years (1978/79 to 197/98). Even the exception – Ruddy Turnstone – showed the same pattern if one outlier (80% juveniles in 1991/92) is omitted from the calculations. Fuller examination of the data incorporating statistical tests and plotting trend lines will be carried out.

If these preliminary results are genuine, it will be a particularly interesting finding. There are several possible explanations. One is that it is an effect of climate change – the small and slow amelioration of the climate on the breeding grounds, apparent in an increase in July temperatures, has increased egg hatching success and/or chick survival rates. Another possible explanation is that the lower populations now present in most wader species are leading to a higher quality of environment for present populations on the breeding grounds (and maybe also at migration stopovers or in the non-breeding areas). Birds are therefore breeding, migrating and/or surviving more successfully than formerly – the

process of ‘natural regulation of animal numbers’ or density dependence. It would be encouraging if we could demonstrate that such processes are now coming into play in the markedly changing wader environment.

CONCLUSION

With the 2017 Arctic breeding season being apparently the most unsuccessful since our detailed recording of the percentage juveniles in Australian wader populations began (40 year ago in SEA and 20 years ago in NWA) it is to be hoped that the 2018 breeding season brings a marked turn-around in fortunes. The critical events will mostly take place in the Arctic in June and July 2018, but we will have to wait until the bulk of the wader populations have reached Australia in November/December 2018 before we will really start to have an idea of 2018 breeding outcomes. Let us hope that there is a marked improvement to celebrate. Let us also hope for more conducive catching conditions in the next non-breeding season in Australia!

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Arctic Birds website: http://www.arcticbirds.net/doc.html

Table 1. Percentage of juvenile (first year) waders in cannon-net catches in south-east Australia 2017/2018.

Species	**No. of catches**		**Total caught**	**Juveniles**		**Long-term average* % juvenile (years)**	**Assessment of 2017 breeding success**
	Large (>50)	**Small (<50)**		**No.**	**%**		
Red-necked Stint *Calidris ruficollis*	4	6	946	36	**3.8**	15.1 (40)	Very Poor
Curlew Sandpiper *C. ferruginea*	2	5	259	14	**5.4**	14.6 (38)	Poor
Bar-tailed Godwit *Limosa lapponica*	0	1	49	10	**20.4**	21.6 (29)	Average
Red Knot *C. canutus*	0	2	21	7	**33.3**	54.4 (20)	Poor
Ruddy Turnstone *Arenaria interpres*	1	18	345	24	**7.0**	15.9 (28)	Poor
Sanderling *C. alba*	0	1	6	1	**-**	14.5 (26)	-
Sharp-tailed Sandpiper *C. acuminata*	1	2	176	49	**27.8**	15.9 (34)	Very Good

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) .

*Includes the 2017/2018 figures.

Table 2. Percentage of juvenile (first year) waders in cannon-net catches in north-west Australia 2017/2018.

Species	No. of catches		Total caught	Juveniles		Long-term average* % juvenile (years)	Assessment of 2017 breeding success
	Large (>50)	Small (<50)		No.	%		
Great Knot *Calidris tenuirostris*	4	3	661	16	2.6	10.7 (20)	Poor
Bar-tailed Godwit *Limosa lapponica*	2	2	133	4	3.0	10.4 (20)	Poor
Red-necked Stint *C. ruficollis*	0	3	73	5	8.1	18.8 (20)	Poor
Red Knot *C. canutus*	0	4	74	4	5.4	15.8 (19)	Poor
Curlew Sandpiper *C. ferruginea*	1	2	62	5	8.1	17.4 (20)	Poor
Ruddy Turnstone *Arenaria interpres*	0	3	8	1	(12.5)	-	-
Non-arctic northern migrants							
Greater Sand Plover *Charadrius leschenaultii*	1	5	174	23	13.2	21.7 (20)	Poor
Terek Sandpiper *Xenus cinereus*	0	3	26	1	3.8	12.5 (19)	Poor
Grey-tailed Tattler *Heteroscelus brevipes*	0	4	41	3	7.3	18.9 (19)	Poor

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

*Includes the 2017/18 figures

Table 3. Percentage of juvenile (first year) birds in wader catches in south-east Australia 1998/1999 to 2017/2018.

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**	**15/16**	**16/17**	**17/18**	***Average (last 20yrs)***
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	2.3	28.6	7.0	*14.5*
Red-necked Stint *Calidris ruficollis*	32	23	13	35	13	23	10	7.4	14	10	15	12	20	16	22	17	19	6.0	31.3	3.8	*17.0*
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	1.9	47.6	5.4	*16.8*
Sharp-tailed Sandpiper *C. acuminata*	11	10	16	7.9	20	39	42	27	12	20	3.6	32	(-)	5	18	19	16	8.9	(-)	27.8	*18.6*
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	6.8	17.5	(-)	*15.1*
Red Knot *C. canutus*	(2.8)	38	52	69	(92)	(86)	29	73	58	(75)	(-)	(-)	78	68	(-)	(95)	(100)	(100)	90.3	33.3	*58.8*
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	26.7	12.5	20.4	*23.5*

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 20 years) exclude figures in brackets (small samples) and include 2017/2018 figures

Table 4. Percentage of juvenile (first year) birds in wader catches in north-west Australia 1998/1999 to 2017/2018

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**	**15/16**	**16/17**	**17/18**	**Average (last 20yrs)**
Red-necked Stint *Calidris ruficollis*	26	46	15	17	41	10	13	20	21	20	10	17	18	24	15	19	10	11.1	17.2	6.8	*18.8*
Curlew Sandpiper *C. ferruginea*	9.3	22	11	19	15	7.4	21	37	11	29	10	35	24	1	1.9	23	18	0.7	40.3	8.1	*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	5.7	9.0	2.6	*10.7*
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	2.7	21.6	5.4	*15.8*
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	10.3	11.0	3.0	*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	20	10.5	12.4	13.2	*21.7*
Terek Sandpiper *Xenus cinereus*	12	(0)	8.5	12	11	19	14	13	11	13	15	19	25	5	12	15	12	9.2	5.8	3.8	*12.5*
Grey-tailed Tattler *Heteroscelus brevipes*	26	(44)	17	17	9.0	14	11	15	28	25	38	24	31	20	18	16	19	8.9	14.5	7.3	*18.9*

All birds cannon-netted in the period 1 November to mid-March. Averages exclude figures in brackets (small samples) but include 2017/2018 figures.

Table 5. Percentage of juvenile (first year) birds in wader catches in south-east Australia in period 1978/79 to 2017/18

Species	**% juvenile 78/79 to 97/98 (years)**	**% juvenile 98/99 to 17/18 (years)**	**Long-term average % juvenile (years)**
Red-necked Stint *Calidris ruficollis*	13.2 (20)	17.0 (20)	15.1 (40)
Curlew Sandpiper *C. ferruginea*	12.4 (19)	16.8 (19)	14.6 (38)
Sharp-tailed Sandpiper *C. acuminata*	12.8 (16)	18.6 (18)	15.9 (34)
Ruddy Turnstone *Arenaria interpres*	19.4* (8)	14.5 (20)	15.9 (34)
Sanderling *C. alba*	13.1 (7)	15.1 (19)	14.5 (26)
Bar-tailed Godwit *Limosa lapponica*	17.7 (9)	23.4 (20)	21.6 (29)
Red Knot *C. canutus*	50.0 (10)	58.8 (10)	54.4(20)

Averages include 2017/18 figures

*10.7 if one exceptional figure of 80 is omitted