

**AWSG NORTH-WEST AUSTRALIA WADER & TERN EXPEDITION 2022 REPORT
FRIDAY 4TH NOVEMBER TO SUNDAY 27TH NOVEMBER 2022**

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INTRODUCTION

The aim of the Australasian Wader Studies Group (AWSG) north-west Australia (NWA) research program is to use the best science and field practices to advance the best conservation outcomes for increasingly threatened waders (shorebirds) and terns in Australia with a focus on two major shorebird areas of international significance in north-west Australia: Roebuck Bay and Eighty Mile Beach (80 Mile Beach). Together these sites are the third most important site for waders in the world. Birds migrate along the East Asian-Australasian Flyway (EAAF) – a network of stopover sites birds use to fly from their breeding grounds in the northern hemisphere to their “wintering” grounds in the southern hemisphere.

Specifically, the project aims to monitor the annual breeding success of waders breeding north of the equator in the EAAF (productivity estimates), monitor survival through mark recapture, obtain information on site faithfulness, investigate migratory pathways of waders and terns and collect biometric data to assist with the monitoring of climate change. The project in NWA is included in a larger study by Deakin University evaluating the extent, structure and determinants of AIV (avian influenza) prevalence and genetic diversity in different ecological contexts.

BACKGROUND

Eighty Mile Beach is a mega scale (220 km) linear sand-coast. The beach is 100 m wide and includes several muddy, microscale irregular embayment's. Adjoining tidal mudflats vary from 1.1 to 5 km in width (Pearson 2003). The maximum width of tidal flat was recorded at 3.8 km on low water spring tides in 1999 but probably exceeds 5 km (Minton *et al.* 2013; Rogers 2003).

The AWSG commenced a counting program at shorebird sites from Port Hedland to Roebuck Bay in 1981 that has involved annual field expeditions, including both aerial and ground counts. Since 2004,

Roebuck Bay including Bush Point and a 60km section of Eighty Mile Beach have been counted twice per annum (Minton 1982, Minton *et al.* 2013; Rogers *et al.* 2020). Twenty-three species of waders have been recorded in internationally significant numbers. An estimated 3,680,701 waders comprising over 3,038,500 migratory shorebirds using the grasslands, 549,031 migratory shorebirds using the coast and 17,293 resident shorebirds are present between Coulomb Point and the southern end of Eighty Mile Beach (Rogers *et al.* 2020). This represents around 20% of the total number of migratory waders visiting Australia each year and around 6% of the total EAAF migratory wader population. In addition, between 5,500 and 6,500 of migratory and resident terns and about 1,000 gulls (Minton *et al.* 2013, Minton *et al.* 2003) use the area.

Roebuck Bay is a tropical marine embayment with extensive, biologically diverse, intertidal mudflats. The site is internationally important for at least 20 species of migratory waders. This makes Roebuck Bay one of the most important sites for shorebird conservation in the EAAF. Eighty Mile Beach supports 19 species of shorebirds in internationally significant numbers (Rogers *et al.* 2020).

A great deal has been learned about migration routes of waders and terns that come to Australia to spend their non-breeding season (northern hemisphere winter/Austral summer) alongside resident waders and terns. However, for some of these species, crucial information on their movements is still lacking and for all of them knowledge on their population dynamics is essential to national and international conservation efforts. Data from the capture of birds enables an understanding of population changes and contributing factors – for example: recruitment, adult survival, local movements, site faithfulness to a non-breeding location, sex and age structure at non-breeding sites, potential changes in morphology because of climatic variation, as well as changes in migration patterns, departures and breeding periods. Shorebird counts are also a necessary component of this process and

the long-term study of birds in the field supports the interpretation of data collected during the *Migratory Shorebirds* count program run by the AWSG and BirdLife Australia (Rogers *et al.* 2020). These count data (e.g. summarised in Clemens *et al.* 2016) sketch a bleak picture for many of these species that are facing rapidly changing habitats along their migratory routes in East Asia, highlighting the relevance of the data to be collected in the framework of this research project.

Another threat that is facing avian migrants is the increased exposure to pollutants and Avian Influenza Virus (AIV) because of booming poultry production, particularly in East Asia. Australia is therefore exposed to AIV emergence, yet the factors that drive the dispersal, emergence and evolution of AIV are still poorly understood. Although wild water birds (including waders and terns) are known to be the major reservoir of AIV, little is known about the factors that shape viral prevalence, genetic diversity and evolution in Australia.

Non-migratory shorebird and tern species that travel widely across Australia's inland wetlands and coasts are also reported as declining. However, sufficient data for the evaluation of population trends has been available only for eastern Australia and a national assessment is lacking, including the remote north-west of Australia. These non-migratory species have generally been getting much less research attention by Australian shorebird researchers (Weston 2007).

Despite studies and grant programs that target threatened waders such as Hooded Plover *Thinornis rubricollis*, Beach Stone Curlew *Esacus magnirostris* and Plains Wanderer *Pedionomus torquatus* there are few studies on non-migratory waders and terns reliant on inland and coastal wetlands such as Red-necked Avocet *Recurvirostra novaehollandiae*, Red-kneed Dotterel *Erythrogonys cinctus*, Black-fronted Dotterel *Elseyornis melanops*, Banded Stilt *Cladorhynchus leucocephalus*, Australasian Pied Stilt *Himantopus leucocephalus* and Whiskered Tern *Chlidonias hybrida*. This paucity of information leaves conservation managers with no real understandings of the variety of factors limiting populations of most non-migratory waders and terns.

Broome and 80 Mile Beach are experiencing rapid growth in tourism and expansion of facilities that has increased access to remote coastlines between Port Hedland and Broome. Despite the travel restrictions between 2020 and 2022, tourism in the Broome region continued to increase and has exceeded 274,000, exceeding the predicted 250,000 visitors per year by 2036 (Kimberley Development Commission 2018; Shire of Broome LGA Visitor Factsheet 2019).

Benchmarking of human visitation was undertaken at both 80 Mile Beach and Roebuck Bay in 2011-13

prior to establishment of the marine national park (Beckley 2015). Visitation to the 80 Mile Beach area was centred around access points such as Eighty Mile Beach Caravan Park, Cape Keraudren, Eco Beach, Barn Hill, Port Smith and Bidyadanga. Except for the resident community at Bidyadanga, the areas being used coincided with locations where camp sites and/or tourist accommodation were available. The main activity was fishing - 46% of people. As increased camping sites and access become available visitation to these sites will continue to increase.

Information on both resident and migratory species is needed to assist in planning for infrastructure demand and increased access to beaches and wetlands. Threats that will accompany increased access include recreational driving on beaches and increased access to wetlands for shooting. As well as increasing tourism, economic development in the oil and gas industry is increasing annually.

Proposed developments affecting Roebuck Bay include the "Kimberley Marine Support Base" (KMSB) Pty Ltd, comprised of a floating wharf, along with associated on-shore terminal facilities (Kimberley Ports Authority 2026). Further south in the Great Sandy Desert there is the proposed Theia Energy Pty Ltd fracking, ports, and oil pipeline project for west Kimberley that could impact on underground water, inland marshlands and freshwater oceanic outflows. Theia Energy terminated the assessment for this project in 2022. In addition, the Gingerah Energy Hub for geothermal, solar and wind power is also underway (Gingerah Energy 2026). These developments will also increase the demand for accommodation, services and recreational opportunities in the area.

EXPEDITION AIMS

The specific objectives of this Expedition were to:

1. Monitoring of annual breeding success of migratory shorebirds via the percentage of juveniles in the population during the non-breeding season. Relate these to climatic conditions at the breeding grounds and data on habitat availability and quality along their migration routes using online databases.
2. Monitoring of annual breeding success of resident shorebirds and terns via the percentage of juveniles in the population during the non-breeding season. Relate these to climatic conditions of the breeding areas using online databases.
3. Obtain annual survival estimates of all key species via recapture of birds already carrying bands and maintaining a marked pool of birds using mark-recapture analyses. Study the response to environmental conditions for focus

- species including Oriental Pratincole (alternatively Oriental Plover or Pied Stilt) by satellite tracking their movements.
4. Marking birds with unique markings that can be observed and reported from throughout the flyway including across Australia and obtaining information on where marked birds are being seen allowing spatially-explicit mark-recapture analyses. Satellite tracking of focus species like Oriental Plover to allow identification of stop over sites in Australia, Asia and the flyway and breeding locations in Asia and India for on ground follow up.
 5. Obtain information on the site faithfulness and use of non-breeding sites by shorebirds and terns through the recapture of birds already carrying bands and by the collection of sightings of (colour) marked birds away from the catching/marketing area. Satellite tracking of Oriental Plover to determine which sites they use across years within Australia as numbers fluctuate widely at locations such as 80 Mile Beach. Oriental Plover and Pied Stilt also vary greatly in number and appear to react to local conditions.
 6. Obtain information on the effects of a changing climate on bird moult, morphology, and timing of migration events by taking morphometric and moult measurements and recording where and when they are being observed along the migratory flyway.
 7. Sampling captured birds (cloacal and buccal swabs for AIV prevalence; blood for prevalence of antibodies against AIV) and analysing these samples for the various serotypes (followed by full-genome sequencing if possible) and adding these data to the National Avian Influenza in Wild Birds database for phylogeographic analyses.
 8. Sampling captured birds (cloacal and buccal swabs for AIV prevalence; blood for pollution and prevalence of antibodies against AIV) and identify which species and individuals (i.e. polluted vs unpolluted) are preferential carriers and thus dispersers of the virus.

Avian Influenza and Pollutants

The project in NWA is part of a larger study by Deakin University evaluating the extent, structure and determinants of AIV prevalence and genetic diversity in different ecological contexts. In NWA this focusses on waders in tropical north-west Australia. Using AIV prevalence and genome sequence data the project aims to determine:

- what AIV serotypes, lineages, and reassortments are present and how they change through time,
- how the viruses are connected to global AIV diversity,
- whether prevalence differs between individuals (based on age, sex, condition, pollution levels) and what environmental factors (e.g. pollution) shape these differences.

These scientific aims translate into the practical aim of catching and sampling waders and terns and notably long-distance migratory waders, which are considered the second most-important AIV-reservoir in Australia and globally. Sampling involved taking cloacal and buccal swabs for AIV prevalence and taking blood samples for prevalence of antibodies against AIV and pollutants. The pollutant data will allow linking species-specific pollutant levels to population dynamic parameters (i.e. recruitment or juvenile percentages, survival from banding data analysis, count data).

MAIN ACHIEVEMENTS

Catching

We drove to Anna Plains on the day after the team arrived in Broome, eight cannon net catches and one mist-netting session were made. Catches were made on all days suitable for cannon netting. The first day after arrival was used to observe leg flags and species distribution along the beach. Oriental Plovers were caught by mist-netting at “Brolga” dam on the plains. In contrast to 2021, raptors such as Black Kites *Milvus migrans* were not so prevalent hunting along the dunes which contributed to the success of catch days.

The first day back at Roebuck Bay was used for flag sighting and deciding on the best catching sites. Good catches were made on two of the five catching days. The average catch size was just over 70 birds. Disturbance by birds of prey such as Black Kites and Brahminy Kites *Haliastur indus* was a problem as in previous years and cost us promising opportunities twice at Wader Beach. In addition, the emergence of a dingo from the mangroves as birds started to roost on Minton Straight sent all the migratory waders over to the saltmarsh and a catch of seven Australian Pied Oystercatcher was made. Captured waders had to be released at alternate sites to those where the catch occurred to reduce predation opportunities for raptors. This procedure will be adopted for future catching in Broome. Overall, the Expedition caught a total of 1,242 birds, of which 1,241 were waders (18 species) and one tern (Tables 1 and 2). The total number of birds caught in 2022 was comparable to previous years (Table 3). Seven birds carrying bands put on elsewhere were caught during the Expedition, six Great Knot and one Bar-tailed Godwit (Appendix 1). All were from China.

A team of between two and four persons observed flags each catch day, resighting 546 flagged or

colour banded birds (Table 4). This included birds originally banded in NWA (448), China (25, including: 20 from Chongming; 2 from Rudong, Jiangsu; 1 from Dongtai, Jiangsu; and 1 from Mai Po), Kamchatka, Russia (3), Taiwan (3), Northern Territory, Australia (1) and Victoria, Australia (1)

(Appendix 2). It has not been possible to obtain information on birds banded in Kamchatka, Russia to date. A summary of banded or flagged birds that moved between 80 Mile Beach and Roebuck Bay is shown in Table 5.

Table 1. NWA 2022 Expedition catch totals.

Catches	Location	Sub-site	New	Retrap	Total
Waders					
7/11/2022	80 Mile Beach	22km south of Anna Plains	128	9	137
8/11/2022	80 Mile Beach	34km south of Anna Plains	58	2	60
9/11/2022	80 Mile Beach	42km south of Anna Plains	197	5	202
10/11/2022	80 Mile Beach	40.3km south of Anna Plains	33	1	34
11/11/2022	80 Mile Beach	39km south of Anna Plains	164	10	174
12/11/2022	80 Mile Beach	28km south of Anna Plains	146	8	154
13/11/2022	80 Mile Beach	24km south of Anna Plains	69	0	69
14/11/2022	80 Mile Beach	20km south of Anna Plains	48	1	49
16/11/2022	Anna Plains	Brolga Dam	2	0	2
Sub-total			845	36	881
Terns			1	0	1
Total Anna Plains			846	36	882
20/11/2022	Broome	Quarry Beach	25	4	29
21/11/2022	Broome	Minton Strait	7	1	8
22/11/2022	Broome	Wader Beach	0	0	0
23/11/2022	Broome	Eagles Roost	201	122	323
24/11/2022	Broome	Wader Beach	0	0	0
Sub-total			233	127	360
Terns			0	0	0
Total Broome			233	127	360
Total waders			1078	163	1241
Total terns			1	0	1

Table 2. Number of new birds captured and retraps during NWA 2022 by species.

Common name	Scientific name	New	Retrap	Total
Bar-tailed Godwit	<i>Limosa lapponica</i>	70	7	77
Black-tailed Godwit	<i>Limosa limosa</i>	14	0	14
Broad-billed Sandpiper	<i>Calidris falcinellus</i>	4	0	4
Common Greenshank	<i>Tringa nebularia</i>	2	0	2
Curlew Sandpiper	<i>Calidris ferruginea</i>	24	0	24
Great Knot	<i>Calidris tenuirostris</i>	274	123	397
Greater Sand Plover	<i>Charadrius leschenaultii</i>	241	12	253
Grey Plover	<i>Pluvialis squatarola</i>	6	0	6
Grey-tailed Tattler	<i>Tringa brevipes</i>	107	4	111
Siberian Sand Plover	<i>Charadrius mongolus</i>	4	0	4
Oriental Plover	<i>Charadrius veredus</i>	3	0	3
Australian Pied Oystercatcher	<i>Haematopus longirostris</i>	7	1	8
Red Knot	<i>Calidris canutus</i>	44	3	47
Red-capped Plover	<i>Charadrius ruficapillus</i>	23	0	23
Red-necked Stint	<i>Calidris ruficollis</i>	102	3	105
Ruddy Turnstone	<i>Arenaria interpres</i>	22	3	25
Sanderling	<i>Calidris alba</i>	6	0	6
Terek Sandpiper	<i>Xenus cinereus</i>	125	7	132
Total waders		1078	163	1241
Gull-billed Tern	<i>Gelochelidon nilotica affinis</i>	1	0	1
Total terns		1	0	1
Grand total		1079	163	1242

Table 3. Comparison of catches between years (including terns).

Year	New captures	Retraps	Total
2017	2286	292	2578
2018	1073	194	1267
2019	2025	133	2158
2020	1950	240	2190
2022	1079	163	1242

Table 4. Number of birds observed with engraved flags (AWSG) or colour bands (Global Flyways network GFN project) during NWA 2022. Some birds had lost part of their colour bands and could not be identified to individual. Number of incompletely read flags in parentheses.

Common name	Species type	AWSG plain yellow	AWSG engraved	GFN
Australian Pied Oystercatcher	Resident	-	5	NA
Bar-tailed Godwit	Arctic migrant	1	85	26(+9)
Black-tailed Godwit	Sub-Arctic migrant	-	7	6(+7)
Pied Stilt	Migrant (Asia)	2	7	NA
Broad-billed Sandpiper	Arctic migrant	-	2	NA
Curlew Sandpiper	Arctic migrant	-	53	NA
Far Eastern Curlew	Sub-Arctic migrant	-	1	NA
Great Knot	Arctic migrant	4	178 (+1)	14(+5)
Greater Sand Plover	Non-Arctic migrant	6	30 (+2)	
Grey Plover	Arctic migrant	-	1	
Grey-tailed Tattler	Non-Arctic migrant	1	19	
Siberian Sand Plover	Non-Arctic migrant		2	
Red Knot	Arctic migrant	1	18	4(+1)
Red-necked Stint	Arctic migrant	5	-	
Ruddy Turnstone	Arctic migrant		1	
Terek Sandpiper	Non-Arctic migrant		13	

Table 5. Movements of retrapped or engraved flagged birds between Broome and 80 Mile Beach, banding or last sighting location and capture location/sighting location in 2022.

Common name	Species type	Number observed or re-caught	80 Mile to Broome	Broome to 80 Mile
Bar-tailed Godwit	Arctic migrant	87	0	2
Black-tailed Godwit	Arctic migrant	7	0	0
Pied Stilt	Migrant (Asia)	7	0	0
Broad-billed Sandpiper	Arctic migrant	1	0	0
Curlew Sandpiper	Arctic migrant	51	0	0
Great Knot	Arctic migrant	136	2	1
Grey Plover	Arctic migrant	1	0	0
Grey-tailed Tattler	Arctic migrant	19	0	1
Red Knot	Arctic migrant	14	1	0
Ruddy Turnstone	Arctic migrant	1	0	0
Greater Sand Plover	Non-Arctic migrant	27	0	1
Terek Sandpiper	Non-Arctic migrant	10	1	0

Count on 80 Mile Beach

An estimate of birds in each 10km segment of 80 Mile Beach between 0 and 40km south of the entrance at Anna Plains Station to the beach was made to determine the three most abundant species in each 10km to aid catch site selection (Table 6). Note total numbers are estimates only and should not be regarded as definitive. Thirty-six flag sightings were also made (see Appendix 2 for interstate and overseas sightings).

Old birds

It is always interesting to see the old ages reached by some of the retraps (Appendix 3). The greatest number of days between catching and recapture was 8204 days or 22.5 years for a Greater Sand Plover living on 80 Mile Beach, minimum age 23 as banded in its first year. For Great Knot 7973 days or 24+ years old; Grey-tailed Tattler 7673 days or 23+ years old. There were 20 birds retrapped that were more than 10 years old (Appendix 3).

Proportion of juveniles

The project aimed to capture between 100 and 220 birds of each target species to estimate the relative breeding success of these species in the 2022 northern hemisphere breeding season (juvenile fraction error range of 0.1-0.15 from Rogers & Standen 2019). The long term average is calculated from the years that sample size exceeds 100, so is variable (Table 8). Adequate samples of five of the eleven target species were captured (see Table 7). Few juveniles were captured suggesting that the Arctic breeding season for 2022 was poor both for birds that breed above the Arctic circle and those that breed further south (Table 8). Note that in small samples such as Curlew Sandpiper more juveniles may be caught, and thus the number of juveniles in the catch is not a reliable indication of breeding success. However, in SE Australia the percentage of

juvenile Curlew Sandpipers in catches was 41.7%, well above the long-term average of 16.9% for this location (Victorian Wader Study Group data).

Although factors affecting shorebirds breeding in the Arctic and Sub-Arctic are complex, in general colder breeding species appear to be moving north, while warmer breeding species are moving into the areas north of their historic distribution (Anderson *et al.* 2022). For species that breed on the New Siberian Islands above the Arctic circle such as Red-necked Stint there is no further north to go and monitoring the percentage of juveniles over time gives an indication of the effects of climate change on their survival into the future.

Among the shorebirds captures, 826 had their full biometrics recorded. All birds had their moult recorded. Information for target species is given in Table 9.

Table 6. Most abundant waders in each 10km section of 80 Mile Beach between Anna Plains entrance and 40km south.

Km south of Anna Plains entrance	0-10	10-20	20-30	30-40
Total number of shorebirds and terns	8926	38,890	27,810	40,000
Top 3 species	Common Greenshank Great Knot Red Knot	Great Knot Greater Sand Plover Bar-tailed Godwit	Greater Sand Plover Great Knot Bar-tailed Godwit	Great Knot Greater Sand Plover Bar-tailed Godwit
Interesting observations	Little Curlew 48 Oriental Plover 900 Curlew Sandpiper >1000 Broad-billed Sandpiper 1 Brolga 9	Turtle; Only saw Little Curlew - 30 and Oriental Pratincole on return.	Orange geolocator on Great Knot	Black/White flagged Bar-tailed Godwit Broad-billed Sandpiper 1

Table 7. Outcome of sampling against target species during NWA 2022.

Common name	Scientific name	Species type	Adequate sample obtained?
Bar-tailed Godwit	<i>Limosa lapponica</i>	Arctic migrant	No
Curlew Sandpiper	<i>Calidris ferruginea</i>	Arctic migrant	No
Great Knot	<i>Calidris tenuirostris</i>	Arctic migrant	Yes
Red Knot	<i>Calidris canutus</i>	Arctic migrant	No
Red-necked Stint	<i>Calidris ruficollis</i>	Arctic migrant	Yes
Ruddy Turnstone	<i>Arenaria interpres</i>	Arctic migrant	No
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	Arctic migrant	No
White-winged Black Tern	<i>Chlidonias leucopterus</i>	Asian migrant	No
Greater Sand Plover	<i>Charadrius leschenaultii</i>	Non-Arctic migrant	Yes
Grey-tailed Tattler	<i>Tringa brevipes</i>	Non-Arctic migrant	Yes
Terek Sandpiper	<i>Xenus cinereus</i>	Non-Arctic migrant	Yes

Table 8. Percentage of juveniles (first year birds) in the 2022 wader catch. Figures represent the number of birds aged in the field. All birds cannot netted in period 1 November to mid-March.

Species	No. of catches		Total caught	Juveniles		Long-term average % juvenile (no. years)	Assessment of 2022 breeding success
	Large (>=50)	Small (<50)		No.	%*		
Great Knot	1	10	438	15	3.5	9.6 (24)	Low
Bar-tailed Godwit	0	7	102	2	2.0	9.5 (24)	Low
Red-necked Stint	0	8	105	12	11.4	17.9 (27)	Below average
Red Knot	0	4	48	2	(4.1)	14.9 (22)	-
Curlew Sandpiper	1	5	48	11	(4.2)	17.0 (22)	-
Non-arctic northern migrants							
Greater Sand Plover	0	9	264	25	9.5	20.6 (26)	Poor
Terek Sandpiper	0	6	127	6	4.7	13.0 (23)	Below average
Grey-tailed Tattler	2	5	195	60	31.0	18.8 (23)	Very good

*Percentages in brackets are only indicative as sample size below 100 birds.

Table 9. Number of birds for which full biometrics were recorded during NWA 2022.

Common name	Species type	Total
Bar-tailed Godwit	Arctic migrant	71
Black-tailed Godwit	Arctic migrant	14
Broad-billed Sandpiper	Non-Arctic migrant	4
Common Greenshank	Arctic migrant	2
Curlew Sandpiper	Arctic migrant	24
Great Knot	Arctic migrant	129
Greater Sand Plover	Non-Arctic migrant	210
Grey Plover	Arctic migrant	6
Grey-tailed Tattler	Non-Arctic migrant	111
Siberian Sand Plover	Non-Arctic migrant	4
Oriental Plover	Non-Arctic migrant	1
Red Knot	Arctic migrant	45
Red-necked Stint	Arctic migrant	105
Ruddy Turnstone	Arctic migrant	25
Sanderling	Arctic migrant	6
Terek Sandpiper	Non-Arctic migrant	122

Avian Influenza and pollutants

A total of 406 birds were sampled for avian influenza and pollutant studies (Table 10). Results of this work have been published in Wille and Klaassen (2023).

Satellite tracking of Oriental Pratincole

No suitable opportunities to catch Oriental Pratincole occurred during the field work expedition in November 2022. A field trip to Anna Plains

Table 10. Number of birds sampled for avian influenza and pollutant studies during NWA 2022.

Common name	Scientific name	Species type	Number
Bar-tailed Godwit	<i>Limosa lapponica</i>	Arctic migrant	72
Black-tailed Godwit	<i>Limosa limosa</i>	Arctic migrant	14
Curlew Sandpiper	<i>Calidris ferruginea</i>	Arctic migrant	24
Great Knot	<i>Calidris tenuirostris</i>	Arctic migrant	71
Greater Sand Plover	<i>Charadrius leschenaultii</i>	Non-Arctic migrant	50
Grey-tailed Tattler	<i>Tringa brevipes</i>	Non-Arctic migrant	50
Siberian Sand Plover	<i>Charadrius mongolus</i>	Non-Arctic migrant	4
Red Knot	<i>Calidris canutus</i>	Arctic migrant	45
Red-necked Stint	<i>Calidris ruficollis</i>	Arctic migrant	102
Ruddy Turnstone	<i>Arenaria interpres</i>	Arctic migrant	25
Sanderling	<i>Calidris alba</i>	Arctic migrant	3
Terek Sandpiper	<i>Xenus cinereus</i>	Non-Arctic migrant	50

Station was made 10-13 February 2023 to Anna Plains Station. One bird was caught on the 14th February but was below the weight threshold for deployment of a transmitter. Although there were around 80,000 Oriental Pratincole present, the majority were moving further south at high altitude and not roosting in suitable places to catch. No other

opportunities for catching occurred. Transmitters will be reported for use in 2023/24.

OTHER MATTERS

Participants

A total of 28 AWSG volunteers took part in the Expedition over the 24-day period. Details of origins are: 24 Australia (3 NSW, 1 Queensland, 1 SA, 6 Vic, 13 WA), 2 United Kingdom, 1 New Zealand, 1 Finland. In addition, two personnel from University of Canberra's EcoDNA group came to Broome to test equipment, and two personnel from NAQS (Northern Australia Quarantine Strategy) attended in Broome. Local rangers and DBCA staff participated at 80 Mile Beach and Roebuck Bay, Broome.

The team worked well together and had a high proportion of repeat visitors. Expeditioners are thanked for taking initiative and 'stepping up' in Clive's absence to make the expedition a great success.

The AWSG was assisted by regular involvement of elders and Department of Biodiversity Conservation and Attractions (Western Australia) rangers from the Karajarri, Ngarla & Nyangumarta, (Yamatji Marlpa) traditional owner corporations.

Talks

A programme of evening talks presented by Expedition members took place. Thanks to all those who prepared and gave talks.

Training

The value of the training aspect of the expedition should not be underestimated. The conditions in NWA are extreme and provide a valuable training opportunity for many who rarely experience extremes of temperature while banding. Trainees included ten training for an A Class basic capture method licence and one for an A Class cannon-net licence. In addition, rangers and elders from the Karajarri, Nyangumarta (Yamatji Marlpa), attended catches at 80 Mile Beach. Rangers from DBCA Ngarla and Nyangumarta attended catches in Broome.

Itinerary

This year the Expedition followed the planned itinerary. Many thanks to Helen and Graeme Macarthur and Grace Maglio for assisting with organising the expedition and lending personal equipment for the expeditions use.

Finances

The Expedition costs in 2022 were similar to the previous years. A professional caterer was engaged

to look after the food procurement and cooking for the Expedition.

Next Expedition

The next Expedition to NWA (NWA 2024) will take place in early 2024. A tidal series suitable for visiting both Roebuck Bay and 80 Mile Beach in the one field trip is not available in late 2023. The format will be the same as in 2022 and will accommodate further satellite tracking study of Oriental Pratincole and more effort flag sighting at 80 Mile Beach.

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- Ethics Permit granted by Department of Biodiversity Conservation and Attractions Western Australia to cover field work activities.
- A Fauna Taking (Scientific or other purposes) Licence under Regulation 25 of the Biodiversity Conservation Regulations from the WA Department of Biodiversity, Conservation and Attractions.
- An authorisation to take or disturb threatened species under Section 40 of the Biodiversity Conservation Act 2016 from the WA Department of Biodiversity, Conservation and Attractions.

- All participants were licenced with the Australian Bird and Bat Banding Scheme.
- Consultation with the Stoate family of Anna Plains Station for access and hosting the Expedition.
- Consultation with the Yawuru People via the offices of Nyamba Buru Yawuru Limited for permission to catch birds on the shores of Roebuck Bay, traditional lands of the Yawuru people.
- Consultation with the Karajarri and Nyangumarta people for permission to catch birds to be marked for this project on the shores of 80 Mile Beach, traditional lands of the Karajarri and Nyangumarta people.

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APPENDICIES

Appendix 1. Overseas controls (birds caught with overseas bands) during NWA 2022.

Species	Country of origin	Band number	Age at capture	Recapture Date	Recapture location	Flags	Banding details
Great Knot	Chongming Island, China	F127026	2	7/11/2022	80 Mile Beach (-19.3761 121.3081)	Black/white (plain flags)	Chongming Island, 28/03/2012 as adult
Bar-tailed Godwit	Chongming Island, China	G134513	2	11/11/2022	80 Mile Beach (-19.201606 121.20268)	Black/white engraved (J6)	Chongming Island, 13/048/2016 as adult
Great Knot	Chongming Island, China	F132413	2	23/11/2022	Roebuck Bay - Eagles Roost -17.972965 122.302507)	Black/white engraved Y00	Chongming Island, 12/07/2017 as adult
Great Knot	Chongming Island, China	F130619	2	23/11/2022	Roebuck Bay - Eagles Roost -17.972965 122.302507)	Black/white (plain flags)	Chongming Island, incorrect band no.
Great Knot	Chongming Island, China	F127144	2	23/11/2022	Roebuck Bay - Eagles Roost -17.972965 122.302507)	Black/white (plain flags)	Chongming Island, 01/04/2012 as adult
Great Knot	Bohai Bay, China	E144080	2	23/11/2022	Roebuck Bay - Eagles Roost -17.972965 122.302507)	Blue (engraved E26)/yellow (plain)	Bohai Bay: Banded on 5-May-2016 at Nanpu mudflat (39.049, 118.229), female, seen Broome 04/2020.
Great Knot	Chongming Island, China	F134785	2	23/11/2022	Roebuck Bay - Eagles Roost -17.972965 122.302507)	Black/white engraved AYT	Chongming Island, 04/04/2019

Appendix 2. Number and identity of birds observed with overseas engraved flags (note it has not been possible to date to obtain information on birds banded in Russia).

Species	Origin	Sighting Date	Sighting Location	Latitude	Longitude	As Seen	Band no.	Banding date	Age at banding
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white A69	F131167	2014/4/13	Adult
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white 70	F132182	2016.3.30	2
Red Knot	China, Chongming	6/11/2022	80 Mile Beach 39.9km	-19.4796	121.1941	Most likely Black over white, X85	F132398	2017.4.12A	
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white E51	F132507	2014.4.6	Adult
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white E72	F132531	2014.4.6	Adult
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white P62	F132799	2015.3.29	Adult
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white P19	F133174	2016.3.30	2
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white U83	F133486	2017.4.1	

Species	Origin	Sighting Date	Sighting Location	Latitude	Longitude	As Seen	Band no.	Banding date	Age at banding
Great Knot	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white AY7	F134785	2019/4/4	Adult
Bar-tailed Godwit	China, Chongming	19/11/2022	BBO Beach	-17.9774	122.4453	Black over white A04	G134903	2020/4/13	Adult
Bar-tailed Godwit	China, Chongming	6/11/2022	80 Mile Beach 39.4km	-19.4664	121.3511	Most likely Black over white, A32	G135109	2021/4/14	Adult
Bar-tailed Godwit	China, Chongming	27/11/2022	Wader Beach	-17.9772	122.3329	Black over white (plain)	Plain		
Bar-tailed Godwit	China, Chongming	20/11/2022	BBO Beach	-17.9774	122.4453	Most likely Black over white	Plain		
Bar-tailed Godwit	China, Chongming	26/11/2022	BBO Beach	-17.9774	122.4453	White over black plain, Old (prior to 2006)	Plain		
Bar-tailed Godwit	China, Rudong, Jiangsu	26/11/2022	BBO Beach	-17.9774	122.4453	green flag over blue flag	Plain		
Bar-tailed Godwit	China, Rudong, Jiangsu	26/11/2022	BBO Beach	-17.9774	122.4453	green flag over blue flag	Plain		
Bar-tailed Godwit	China, Chongming	6/11/2022	80 Mile Beach 17.5km	-19.3249	121.3457	Black over white (plain)	Plain		
Bar-tailed Godwit	China, Chongming	6/11/2022	80 Mile Beach 38.8km	-19.4743	121.2002	Black over white (plain)	Plain		
Bar-tailed Godwit	Australia, Victoria	6/11/2022	80 Mile Beach 40.6km S	-19.4855	121.1854	Orange (plain)	Plain		
Bar-tailed Godwit	China, Dongtai, Jiangsu	6/11/2022	80 Mile Beach 40.6km S	-19.4855	121.1854	Green/Blue left tibia; Metal right tibia	Plain		
Black-tailed Godwit	Russia, Kamchatka	27/11/2022	Wader Beach	-17.9772	122.3329	Black over yellow engraved Y4	No data		
Curlew Sandpiper	Australia, Victoria, Yallock Creek	27/11/2022	Wader Beach	-17.9772	122.3329	Orange engraved flag KUP	428653	5/03/2022	Adult
Curlew Sandpiper	China, Hong Kong, Mai Po	27/11/2022	Wader Beach	-17.9772	122.3329	White over yellow, RR	No data	14/04/2022	Adult
Great Knot	China, Bohai Bay	25/11/2022	Campsite	-17.9741	122.3094	Blue over Yellow EC6	No data		
Great Knot	Australia, Northern Territory, Lee Point, Buffalo Creek	27/11/2022	Wader Beach	-17.9772	122.3329	Yellow over Blue E6	6326874	14/10/2015	Adult
Great Knot	China, Chongming	20/11/2022	BBO Beach	-17.9774	122.4453	Black over yellow engraved LAM	No data		
Great Knot	Russia, Kamchatka	22/11/2022	BBO Beach	-17.9774	122.4453	Black over yellow engraved ABL	No data		

Species	Origin	Sighting Date	Sighting Location	Latitude	Longitude	As Seen	Band no.	Banding date	Age at banding
Great Knot	Russia, Kamchatka	22/11/2022	BBO Beach	-17.9774	122.4453	Black over yellow engraved AFK	No data		
Great Knot	Russia, Kamchatka	26/11/2022	Wader spit	-17.9796	122.3366	Black over yellow engraved AFK	No data		
Great Knot	China, Chongming	6/11/2022	80 Mile Beach 39.4km	-19.4664	121.3511	Black over white (plain)	Plain		
Greater Sandplover	China, Chongming	26/11/2022	BBO Beach	-17.9774	122.4453	Black over white (plain)	Plain		
Greater Sandplover	Taiwan	6/11/2022	80 Mile Beach 17.5km	-19.3249	121.3457	Black flag over yellow engraved flag BF	No data		
Greater Sandplover	China, Chongming	13/11/2022	80 Mile Beach 24km	-17.9796	122.3366	Black over white (plain)	Plain		
Greater Sandplover	Taiwan	13/11/2022	80 Mile Beach 24km	19.3695	122.3089	White over blue (plain)	Plain		
Grey-tailed Tattler	Taiwan	27/11/2022	BBO Beach	-17.9774	122.4453	White over engraved blue 96	No data		

Appendix 3. Retraps of waders after more than 10 years or estimated at being at least 10 years old.

Species	Band	Date banded	Banding location	Age at banding	Retrap date	Retrap location	Interval (yrs)	Min. age at retrap
Greater Sand Plover	05200519	22/05/2000	80 Mile Beach	1	7/11/2022	Shores of 80 Mile Beach 24km S	22.5	23
Great Knot	06248881	9/01/2001	Shores of 80 Mile Beach	2	8/11/2022	Shores of 80 Mile Beach 36km S	21.8	24+
Grey-tailed Tattler	06275166	4/11/2001	Shores of 80 Mile Beach	2	7/11/2022	Shores of 80 Mile Beach 24km S	21	23+
Greater Sand Plover	05282450	14/02/2002	Shores of 80 Mile Beach	1	8/11/2022	Shores of 80 Mile Beach 36km S	20.8	21
Great Knot	06289491	11/11/2007	Beaches Crab Ck Rd Roebuck Bay Broome	2	9/11/2022	Shores of 80 Mile Beach 36km S	15	17+
Greater Sand Plover	05254122	17/11/2008	Shores of 80 Mile Beach	2	11/11/2022	Shores of 80 Mile Beach 39km S	14	16+
Pied Oystercatcher	10121519	20/02/2011	Beaches Crab Ck Rd Roebuck Bay Broome QUARRY	2	21/11/2022	Beaches Crab Ck Rd Roebuck Bay Broome (Minton's)	11.8	14
Greater Sand Plover	05265473	23/02/2011	Shores of 80 Mile Beach	2	14/11/2022	Shores of 80 Mile Beach 20km S	11.7	14+
Great Knot	06312155	1/03/2011	Shores of 80 Mile Beach	2+	7/11/2022	Shores of 80 Mile Beach 24km S	11.7	13+
Great Knot	06315028	26/02/2012	Shores of 80 Mile Beach	2+	7/11/2022	Shores of 80 Mile Beach 24km S	10.7	13+

Species	Band	Date banded	Banding location	Age at banding	Retrap date	Retrap location	Interval (yrs)	Min. age at retrap
Great Knot	06314921	28/02/2012	Shores of 80 Mile Beach	2+	7/11/2022	Shores of 80 Mile Beach 24km S	10.7	13+
Red-necked Stint	03678191	1/03/2013	Shores of 80 Mile Beach	2+	10/11/2022	Shores of 80 Mile Beach 43km S	9.7	12+
Red-necked Stint	03678385	3/03/2013	Shores of 80 Mile Beach	2+	12/11/2022	Shores of 80 Mile Beach 24km S	9.7	12+
Grey-tailed Tattler	06319304	2/03/2013	Shores of 80 Mile Beach	2+	9/11/2022	Shores of 80 Mile Beach 36km S	9.7	11+
Great Knot	06319004	2/03/2013	Shores of 80 Mile Beach	2+	7/11/2022	Shores of 80 Mile Beach 24km S	9.7	12+
Ruddy Turnstone	05274302	20/02/2014	Beaches Crab Ck Rd Roebuck Bay Broome	2+	20/11/2022	Beaches Crab Ck Rd Roebuck Bay Broome (Quarry)	8.8	11+
Greater Sand Plover	05274100	2/03/2014	Shores of 80 Mile Beach	2+	7/11/2022	Shores of 80 Mile Beach 24km S	8.7	14+
Bar-tailed Godwit	07268156	25/02/2015	Shores of 80 Mile Beach	3+	7/11/2022	Shores of 80 Mile Beach 24km S	7.7	10+
Greater Sand Plover	05276244	9/02/2016	Shores of 80 Mile Beach	2+	7/11/2022	Shores of 80 Mile Beach 24km S	6.8	11+
Great Knot	06325256	13/02/2016	Shores of 80 Mile Beach	3+	7/11/2022	Shores of 80 Mile Beach 24km S	6.7	10+