

# Global Flyway Network

The shorebird  
ecological demographics &  
conservation initiative



## **RED KNOT NORTHWARD MIGRATION THROUGH BOHAI BAY, CHINA, FIELD TRIP REPORT APRIL - JUNE 2018**

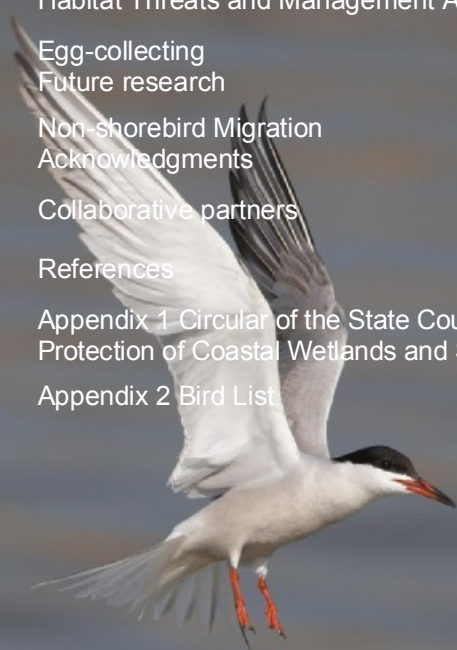
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Red Knots in the smog at Hangu Wind Farm site 15 May 2018 © Adrian Boyle

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Common Tern, 1 June 2018 © Adrian Boyle

## Summary

This year's fieldwork season commenced on 11 April 2018 and finished on 6 June 2018.

The main findings from this year's fieldwork showed that Red Knot *Calidris canutus* were once again using the Luannan Coast in numbers similar to 2014 and 2015, following the low numbers recorded during 2016 and 2017. Great Knot *Calidris tenuirostris* were also present in larger numbers than usual and the number of individually marked Great Knots observed increased markedly compared with previous years. The Luannan Coast referred to throughout this report encompasses our study sites shown in Figure 1 and the adjacent salt and aquaculture ponds.

We recorded 4,116 marked shorebirds. 4,103 from throughout the East Asian-Australasian Flyway (EAAF) and 13 from 2 sites on the east coast of India which is in the Central Asian Flyway. During the 2017 study period we recorded 2,765 (10 of those from India) (Table 1). This year, 361 birds were individually recognisable from the Global Flyway Network (GFN) colour-banding project in Northwest Australia (NWA). This is 66 more than the 295 observed in 2016 and 2017 and likely reflects the increased numbers of Red and Great Knots using the Luannan Coast in 2018. The totals were dominated by Red Knot with 313 (269 in 2017) individuals identified, Great Knot with a doubling of individuals identified to 44 (22 in 2017) and Bar-tailed Godwit *Limosa lapponica* with 4 (4 in 2017) (Table 3). These results come from 'scanning'; this is systematically searching through feeding or roosting birds using telescopes and looking specifically for flags and colour-bands on bird legs. Each marked bird is recorded and the records sent to each banding project at the end of the fieldwork season. This season, due to the water levels in the pond habitat being deeper than in all previous years, Red Knots did not feed there and subsequently spent more time on the mudflats. Resighting observations and counts are easier and more productive in terms of recording marked birds on the mudflats and this, as well as the higher numbers of Red Knot, contributed to the increased number of sightings. As in previous years, these records reflect the vital importance of the area for Red Knots from NWA and throughout the EAAF and increasingly so for Great Knots.

The importance of the vast area of commercial ponds adjacent to the inter-tidal area for shorebirds has been well documented from our work and that of Beijing Normal University (BNU) students in previous years. This year the use of ponds by shorebirds was noticeably less than in any previous year. Many species usually utilise the ponds, but all except one of the ponds that we explored had deep water in them consistently throughout the season. This deep water provides few foraging opportunities for the smaller shorebirds. This year the ponds were so deep that we even recorded lower numbers of the longer-legged and larger species such as Black-tailed Godwits *Limosa limosa* and Pied Avocet *Recurvirostra avosetta*.



Mixed shorebirds in the smog, Nanpu 26 April 2018 © Matt Slaymaker

On one of our specific count days, 16 May 2018, we counted 48,630 Red Knot our highest single total since 2013. We recorded 1,703 Asian Dowitchers *Limnodromus semipalmatus* on 13 May 2018 at the Hangu Wind Farm mudflats, very similar to the 1,754 on 8 May 2017 also recorded at Hangu. And we slightly increased our highest count of Eurasian Curlew *Numenius arquata* to 1,754 on 18 April 2018 from 1,686 on 19 April 2015.

During our fieldwork seasons in 2012, 2013 and 2014, we estimated that a minimum of 40,000 White-winged Black Terns *Chlidonias leucopterus* were using the Luannan Coast at a single point in time. Numbers have never approached that many for the last four years. Overall, there were probably only several thousand in the area on any given day during their peak staging times from mid- to late-May. Despite the difficulty of counting flying terns over the vast area of ponds there is undoubtedly many fewer of this species using the study area.

The ponds within the salt works/aquaculture areas host all the migrant shorebirds at high tide when the mudflats are inundated by the sea, making the area a critical component of the Luannan Coast. For their roosting opportunities alone the ponds, despite the low numbers of foraging birds this year, should be included in any conservation initiatives. The ponds are also an important contributing factor to the local economy and jobs (see Study Site).

A table of species recorded in internationally important numbers has been compiled from GFN and BNU studies over the previous ten northward migration seasons (2009–2018). It is an effective way to give an indication of the immense importance of the Luannan Coast Shorebird Site. In the last 5 seasons fifteen species of migratory shorebirds and one migratory tern have been recorded in internationally significant numbers (1 % Ramsar criteria). Five species have an absolute minimum of 10% of their entire EAAF population passing through the Luannan Coast site during northward migration (Table 4). Note that these are single peak counts and do not account for turnover rate. Including these, the total number of birds using the Luannan Coast during the northward migration season would be much greater.

On the Luannan Coast the direct destruction of the intertidal habitat has slowed in the last six years. The pressures on the intertidal areas appear to be less in terms of direct destruction, but are still present with the development of industrial and housing areas adjacent to and on previously reclaimed mudflats. There are building projects that are taking place in former pond habitat and mudflat areas reclaimed in recent years including a large steel works that will have a port developed on existing intertidal flats. Currently, multi-billion yuan projects are in the planning stages for development within the Luannan Coast area and the future of these critically important intertidal areas remain under threat despite the strong conservation messages made by the Chinese central government and the commencement of management actions at the Luannan Birds Nature Reserve by the Luannan County government (see Habitat Threats and Management Actions).

Global Flyway Network aims to continue conducting research activities and follow-up analysis to document the futures of four shorebird species (Bar and Black-tailed Godwit and Red and Great Knot) at their non-breeding sites in NWA and throughout the EAAF, with an emphasis on the Luannan Coast, Bohai Bay. A critical question is the interpretation of the increased use of the Luannan Coast by Red and Great Knots. Does this increase reflect a recovery of overall population size, or rather the increased reliance on this area because of changes to habitat elsewhere? Knowing this distinction is critical, but requires local and flyway-wide research efforts, including the continuation of satellite tracking of individual knots.



Whether GFN and partners will be able to achieve this depends on continued financial and logistical support. From this work we will be able to assess the effects of human induced habitat change and management through statistical analysis. GFN will continue to support conservation efforts with in-depth analyses of the data collected at Bohai Bay in conjunction with Department of Conservation-New Zealand, World Wide Fund for Nature (WWF)-China, and Wetlands International-China. Dr Tamar Lok, a postdoctoral researcher from the University of Groningen, Postdoc Dr Hong-Yan Yang at Beijing Forestry University and PhD students Ying-Chi Chan and He-Bo Peng aim to continue to analyse GFN data under the co-supervision of Professor Theunis Piersma. All work will be in close cooperation with Beijing Normal University and Fudan University.



Students busy on the mudflats at Nanpu 2 May 2018 © Matt Slaymaker

## **Introduction**

Some of the Yellow Sea mudflats are critical feeding areas for migratory shorebirds on their journeys to and from their breeding and non-breeding grounds. The areas used by migratory shorebirds are referred to as 'stop-over sites' (sites used mainly for a 'pit-stop', a rest) or 'staging sites' (sites used for more than a few days for serious refuelling). Birds spend from a few days to about six weeks at any one or a number of sites on their way north. The Luannan Coast is one such critical area and it is particularly important to Red Knot (Piersma *et al* 2016, Rogers *et al.* 2010). The ecology of the enigmatic long-distance migratory shorebird Red Knot, despite a lot of study, still leaves much to be discovered in the EAAF. It is represented in this flyway by three subspecies *piersmai*, *rogersi* and *roselaari* (the latter is not part of this study because it only breeds on Wrangel Island and migrates to the Americas). The subspecies *piersmai* and *rogersi* breed in different locations in the Siberian Arctic and share non-breeding locations in Australasia (Tomkovich 2001, Rogers *et al.* 2010).

Despite a lot of research involving Red Knot, we do not fully understand the northward and southward migration strategies of the two subspecies, and changes therein as a consequences of habitat change and loss within the EAAF. Surveys of the Yellow Sea by Mark Barter and Chinese colleagues failed to find significant numbers of the species despite extensive searching in May 2000. During northward migration in 2002 they did record 14,277 in the NW Bohai Bay region, now called the Luannan Coast (Barter *et al.* 2003). During a brief six-day visit in late April 2007 Chris Hassell (CH) from GFN counted a single flock of 10,650 Red Knot in the same region. In September 2007 Yang Hong-Yan (YHY, then a PhD student at Beijing Normal University) commenced a project on the food, foraging and staging ecology of Red Knots in the area. She had been conducting regular counts since 2003 during northward migration and her work showed that numbers of birds in the study area had increased over the years, presumably due to habitat destruction elsewhere and consequently birds moving into the study site (Yang *et al.* 2011).

It is well documented that migratory shorebirds can move from one area to another if one area becomes unsuitable. However this is of course non-sustainable if habitat destruction continues; eventually there is not enough habitat to support populations. It is equally well documented that there is negative survival consequences for birds moving to new sites (Burton *et al.* 2006). Until Local and International Governments accept that birds cannot continue to 'just move somewhere else' indefinitely the populations of migratory shorebirds passing through the Yellow Sea and therefore returning to their various non-breeding locations in the southern areas of the EAAF are in grave danger of diminishing to unsustainable levels.

It is clear from our current knowledge that the Luannan Coast is the single most important site for Red Knot on northward migration in the EAAF. The southward migration route and staging areas of Red Knot are still a relative mystery to us. Geolocator studies of male, *rogersi* Red Knot from the breeding grounds in Chukotka show that they use the northern Yellow Sea on northward migration as is already well documented but also that some *rogersi* pass through northern Bohai Bay on southward migration (Tomkovich *et al.* 2013). They don't appear to do so in large numbers though as ornithologists at the Luannan Coast have only recorded very small numbers during the southward migration period.

In conjunction with the work by YHY, studies by GFN have continued during the northward migration seasons of 2009 to this year, 2018. These fieldwork studies have concentrated on searching for individually-marked Red Knots and have been remarkably successful. In view of the many human-related threats to this area, it is the single most important staging area for two subspecies of Red Knot in the EAAF encompassing all Red Knots wintering in Australia and New Zealand, it seems of utmost importance to continue the survey work. The research effort in China builds on the research conducted in NWA funded from 2007 to 2013 by BirdLife-Netherlands. BirdLife-Netherlands and WWF-Netherlands have continued to financially support Theunis Piersma as the Chair in Global Flyway Ecology at the University of Groningen through which the analytic and data-processing work by Dr Tamar Lok was made possible. From 2015 to 2017 most costs were paid from the 2014 Spinoza Premium to Theunis Piersma from the Netherlands Organization for Scientific Research (NWO), WWF-Netherlands with additional support from Beijing Normal University. During the fieldwork season of 2018 most costs were met by Beijing Normal University through Professor Zhang Zhengwang. Here we report on what we have achieved in April - June 2018.

All the migratory birds mentioned in this report are covered by the China-Australia Migratory Bird Agreement (CAMBA). The data in this report confirm the importance of the Luannan Coast for migratory birds and the priority for both Australia and China to advance and build on their actions to protect this site for the future of migratory birds.





Sunrise over Nanpu ponds 24 May 2018 © Matt Slaymaker

## **The Study Site**

The centre of the study site is situated at 39° 03' 35"N 118° 12' 33"E. It is near Nan Pu Development City, situated on the edge of Bohai Bay, 190 km south east of Beijing, China. Figure 1 shows the five main coastal study sites and the Caofeidian New Area Industrial Park. This enormous area will have destroyed 142 km<sup>2</sup> of intertidal mudflat at its completion in 2020 (Yang *et al.* 2011). It has already covered >75% of its planned area. The mudflats of our five study sites cover 30 km in length and are 1-3 km wide (on the lowest tides).

The mudflats are separated by a man-made seawall from the Nanpu Salt Ponds complex. These are reputedly 'the largest salt works in Asia'. This area, adjacent to the mudflats, is also critical habitat for birds to forage, roost and for some species to nest but some of these areas are also being lost to industrial development. The area of ponds adjacent to the Luannan Coast is vast, stretching 10 km inland and across the entire 20 km, from south east to north west, of our study sites and therefore roosting opportunities are many and varied for migratory shorebirds and terns. The ponds are used for the production of salt (evaporation, storage and crystallization ponds), fish and shrimp for human consumption, brine-shrimp (*Artemia*) that are fed to larger species of shrimp to fatten them for harvest and sale for human consumption. Brine shrimp cysts (dormant eggs) are also collected and can be stored for long periods and hatched, on demand, to provide a convenient form of live feed for larval fish and are the most sought after of the *Artemia* products. Different salinities are more, or less, suited to the different uses.



**Figure 1.** Interpreted satellite image of Bohai Bay, China with new site Hangu.

In previous years the majority of shorebirds and terns have used the evaporation ponds for roosting and feeding. This year was markedly different with very few shorebirds making use of the ponds as they were all, bar one, too deep. For the purposes of this report all and any pond, regardless of its use, is referred to as a 'pond'. The Hangu Wind Farm site is 24 km NNE from the middle of our main study site of Nanpu. The habitat is identical, open mudflats adjacent to ponds, roads and industry (a huge power station dominates the area). The site is also used in the same way by the birds. They roost in the ponds and use them for foraging if the opportunity exists but feed predominately on the mudflats. There is almost zero fishing activity on the mudflats at Hangu as it is incredibly soft and very difficult to walk on. All our work there was done from sea walls and in the ponds. The Hangu ponds were a similar depth as in 2017 and suitable for birds to forage in.



Returning from scanning at Hangu 13 May 2018 © Matt Slaymaker



## **Marking of Shorebirds**

Shorebirds captured throughout the EAAF are marked with plain coloured leg flags, engraved leg flags (ELF), or combinations of four colour-bands and one leg flag. Each bird also has a metal band placed on it supplied by the country's relevant banding scheme. Each capture location has its own coloured flag and/or position of the flag on the birds' leg: [http://eaaflyway.net/documents/Protocol\\_birds%20marking.pdf](http://eaaflyway.net/documents/Protocol_birds%20marking.pdf)

The focus of our study is the individually colour-banded birds marked at Roebuck Bay and 80 Mile Beach, NWA, but we record every single marked bird we see during our fieldwork thereby documenting the importance of this area for various species from regions throughout the flyway.

In addition to the data collected during our studies at Luannan the GFN project is also getting 10's of 1,000's of resightings at Roebuck Bay and 80 Mile. This huge dataset, with such a high number of records of individually marked birds, is very valuable for learning about survival and movements of these shorebirds (Piersma *et al.* 2016).



NWA colour-banded Bar-tailed Godwit (4RRYB) banded at Roebuck Bay 19 October 2013. Seen all years 2014 to 2018 at Nanpu ponds. This image is from 14 April 2018  
© Matt Slaymaker

## **Fieldwork in 2018**

The fieldwork program for 2018 started on 11 April and finished on 6 June, equating to fifty-seven consecutive days of fieldwork with two to three (occasionally five) observers in the field daily. On our first fieldwork day the usual suite of species that we expect to see were present Eurasian Curlew, Grey plover *Pluvialis squatarola*, Kentish Plovers *Charadrius alexandrinus*, Dunlin *Calidris alpina* and Great Knot being the most common. On the second day, 12 April we recorded a minimum of 6,500 Great Knot using the Nanpu and Zuidong mudflats. Our highest count of Great Knot was 8,230 on 18 April. Numbers stayed fairly constant until 12–15 May when most of this species continued with their northward migration.

Red Knot were apparently later arriving than in 2016 and 2017, but were eventually recorded in greater numbers than in those years. Numbers increased from hundreds on 12 April to 4,500 on 27 April and then to 9,534 on 1 May. The count of all areas in conjunction with Beijing Normal University on 16 May showed there to be 46,830 Red Knot, our highest count since 2013. These birds were at the 'main sites' that we have come to expect big numbers of Red Knot to use. 25,250 at Nanpu, 8,110 at Beipu and 12,226 at Hangu Wind Farm. This a big increase on the biggest count from 2016 (20,000) and 2017 (17,000). It is still not clear if we were unable to locate some birds during 2016 and 2017 or they didn't arrive at Luannan and were using other sites in the Yellow Sea region. Our 'sense' was that the birds were not here (see reports from 2016 and 2017).

All the totals of each species should be considered underestimates, or absolute minimum totals, for the area due to the fact there are still areas of ponds inaccessible to us and we cannot count all sites used by shorebirds simultaneously.

On our first day we recorded 1,000's of Kentish Plover but in the following days the most was only ever a couple of hundred. This is usual as birds move north and spread out throughout the ponds to breed.

*Note; all counts throughout this document are minimum numbers*

Table 1 documents the duration of our study periods at Bohai Bay. As our understanding of the importance of the site became clear to us we started to cover the entire migration season of Red Knots. We started with a preliminary visit in 2007 leading to the complete and continuous coverage of northward migration from 2010 – 2018. No observations were made during northward migration season 2008.

**Table 1.** Days of observation, total sightings of marked birds and resightings of individually recognisable colour-banded Red-Knot from NWA at the Luannan study site 2010 - 2018.

	Days of Observation	Total Flag Sightings	Colour-banded Red Knot from NWA
2007	7	49	0
2008	0	0	0
2009	19	859	76
2010	57	3,133	106
2011	52	3,354	170
2012	53	4,496	279
2013	59	4,613	269
2014	57	5,014	345
2015	57	4,147	387
2016	56	3,554	261
2017	55	2,765	265
2018	57	4,116	313
<b>Total</b>	<b>529</b>	<b>36,100</b>	<b>2,471</b>

Total sightings of all marked birds were much higher than in 2017 (Table 1 above). The total number of resightings from NWA for all marked birds was also much higher 2,437 up from 1,596 in 2017. The total number of Red Knot colour-band resightings, 1,122, increased substantially from the 680 in 2017. The number of individually identifiable Red Knot was higher but not by the same magnitude as total resightings, an 18 % increase in individuals against 65 % increase for total resightings. These figures demonstrate we are seeing some of the same individuals repeatedly. This strengthens the dataset and also suggests that more NWA Red Knot were at the Luannan Coast this year. During 2018 Red Knots used the mudflats more consistently than in previous years and so this is where we did the vast majority of our resighting work. Red Knots only used one pond that we could find, for foraging late in the season. They did roost in the ponds as in previous years.

This was only our second year with good coverage of the Hangu Wind Farm site. The scenario was the same in that, by checking individual birds resighting history, we were able to establish that the birds using the Hangu Wind Farm site were mainly the same birds that were using the Nanpu and Beipu sites. Observations showed that individual birds did move between the two areas, within a day in some instances. The sites seem very similar in the timing of tides and the extent of mudflats available to the birds and neither site experienced any significant disturbance on the mudflats this year.

The shell-fishing activity at Nanpu stopped this year as of 1 May. The Hebei Provincial Oceanic Administration banned shell-fishing from 1 May to 1 September to minimise disturbance to the birds. This is a very welcome move and very sensible in that the fisherman will be permitted to return from 1 September when there will be less birds utilising the site. Note that it has been argued that the very intense fishing practices in the late-summer may even benefit shorebirds staging in the spring because they would increase the settlement of new recruits the subsequent spring (Yang *et al.* 2016). There is almost zero fishing activity on the mudflats at Beipu and Hangu as it is incredibly soft and is very difficult to walk on. All our work at those two sites was conducted from sea walls and in the ponds. Zuidong does have some shell-fishing activity but it is not mechanical, only people searching for shell-fish by hand. At the eastern area of Zuidong there is a popular site where people access the mudflat and collect shellfish. There can be over 200 people on the mudflat, but they stay in a relatively small area and their current use likely has little effect on the overall population of benthos available to shorebirds.

The ponds have, over the course of the last 3 years, become gradually deeper and deeper and subsequently there are fewer foraging opportunities for shorebirds. We previously spent about 25 % of our scanning efforts in ponds, but this year that was reduced to under 5 %. The birds do still use the pond walls for roosting, but observing tightly packed roosts is relatively unproductive (results in fewer colour-band observations) and accessing the ponds where the birds roost can be difficult. Due to the deep ponds, the birds were still using the mudflats to forage, even late in the season. In previous years, late in the season the birds use the mudflats less frequently and forage in the shallow ponds. During 2018, we only found one accessible pond with small numbers of foraging Red Knot. This is a pond that has been a suitable foraging site for birds including Red Knot in all previous years.

Despite this change it remains the case that both the ponds and the adjacent mudflats of the Luannan Coast are vital components of the area for shorebird conservation. The importance of the ponds can easily be augmented with proper management. Any opportunities to engage with the owners and managers of the ponds should therefore be taken to explain the importance of the ponds to migratory shorebirds. As the water flows through the ponds system there may be opportunities to retain some shallow ponds without impacting on the commercial effectiveness of the ponds.

The scanning of foraging birds from the seawall and on the mudflats occupied most of our time. Exploration of the ponds also took some time, as we were hoping to find good scanning opportunities; this did not eventuate. During the course of the season we made 4,116 sightings of individuals (Table 1, 2 and 3). All shorebirds that forage on the mudflats leave there at high tide, as the sea reaches the seawall and fly to roost in the ponds.



Mixed shorebirds in the smog, Nanpu 26 April 2018 © Matt Slaymaker



Some birds roost in close proximity to the mudflats (especially early in the season), but as with previous years, by early-May most birds flew many kilometres from the mudflats to their pond wall roost sites, some of which are difficult to scan successfully. This change in roost preference seems to happen every year. The reasons are a mystery. The roost areas we did access continued to be relatively undisturbed although migrating raptors and pond workers do cause some disturbance. The levels of disturbance do not appear to differ between roosts sites close to or distant from the mudflats. The myriad of roosting opportunities available are a positive for the shorebirds, but the foraging opportunities within the ponds have diminished almost completely over the last 3 years.

The retention of the remaining mudflats at Zuidong, Nanpu, Beipu and Hangu remains of great conservation importance. Retaining these mudflats in good ecological condition will enable the huge numbers of migrant shorebirds and terns to continue using the area as a staging site. This need has been recognised and the new Luannan Birds Reserve has been established (see Nature Reserve Status and government priorities).



Adrian heading out to scan the one pond available for birds to forage in 3 June 2018 © Jiayi Zhao

Table 2 below shows the totals of all marked migratory shorebirds recorded during our fieldwork seasons and the location they were originally marked. The birds with plain flags just indicate the original banding area and cannot be identified to an individual bird. The colour-banded birds, the engraved leg-flagged birds (ELF) and some birds with unique positioning of flags on their legs can be attributed to individual birds when close views are obtained. As the team were seeing individually marked birds that were 'new' to the area late into the fieldwork period, it is not unreasonable to assume that plain-flagged birds were also still arriving while others will have moved through the site. So, while some will undoubtedly be multiple sightings, the numbers in the table are a good reflection of the numbers of flagged birds present during the study period.

**Table 2.** Totals of resightings of marked shorebirds, of all species, by banding area, recorded during fieldwork 2010 to 2018. These records (2010–2018) represent 33 different marking areas in 13 countries and territories within the EAAF highlighting the importance of these mudflats, not only to birds from NWA, but from throughout the entire EAAF.

Marked at	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total 2010-2018	Known Individuals 2018
Australia, King Island, Tasmania	3	2	4	0	1	5	2	4	1	22	0
Australia, New South Wales	0	2	0	1	0	1	0	0	0	4	0
Australia, Northern Territory	3	0	0	1	0	4	57	24	55	144	14
Australia, North West Australia (Colour Bands)	317	412	904	613	922	1221	671	680	1122	6862	361
Australia, North West Australia (Flags)	912	812	1166	1053	1222	1036	964	916	1315	9396	293
Australia, Queensland	7	7	8	27	12	4	14	3	1	83	1
Australia, South Australia	12	35	62	73	54	31	40	20	20	347	3
Australia, South West Western Australia	6	0	0	1	4	3	0	0	0	14	0
Australia, Victoria	746	644	798	985	858	507	487	290	433	5748	44
China, Bohai Bay	122	96	129	125	108	55	162	78	126	1001	15
China, Chongming Dongtan National Nature Reserve	321	447	565	552	679	510	518	342	437	4371	65
China, Jiangsu	0	0	0	0	0	0	0	1	2	3	0
China, Liaoning Liaohkou National Nature Reserve, Liaoning	1	9	0	1	1	7	1	5	0	25	0
China, Yalu Jiang National Nature Reserve	0	0	0	1	3	3	0	0	0	7	0
Hong Kong	5	23	19	44	39	20	20	6	18	194	5
India, Point Calimere, Tamil Nadu	0	0	0	0	0	0	5	5	5	15	0
India, Chilika Lake, Odisha	1	0	0	0	0	4	7	5	8	25	0
Indonesia, Java	1	0	0	0	0	0	0	0	0	1	0
Indonesia, Sumatra	12	4	5	8	7	6	2	2	0	46	0
Japan, Kyushu	0	0	0	0	0	0	2	0	0	2	0
Japan, North Coast, Hokkaido	1	7	10	5	9	5	8	2	0	47	0
Japan, North East Coast	0	0	0	0	0	4	1	0	0	5	0
Japan, Tokyo Bay	0	0	0	0	0	0	0	0	1	1	1
New Zealand, North Island	558	748	681	855	734	452	317	198	307	4850	91
New Zealand, South Island	32	20	21	35	22	17	18	5	2	172	1
Phillipines, Olango Island	0	0	0	1	1	0	0	0	0	2	0
Russia, Chukotka	1	32	43	50	62	38	44	22	22	314	7
Russia, Kamchatka	1	3	4	1	0	6	7	20	37	79	9
Russia, Sakhalin	0	4	5	48	52	44	43	33	36	265	0
Singapore	1	0	0	1	1	0	0	0	0	3	0
South Korea	0	0	0	0	8	12	5	0	5	30	0
Taiwan	4	0	2	3	2	4	1	0	1	17	0
Taiwan, Kinman Island	0	0	0	0	0	0	0	2	0	2	0
Thailand, Inner Gulf Of Thailand	31	18	34	96	153	92	125	75	113	737	2
Thailand, Ko (Island) Libong, South West Coast	35	29	36	33	60	56	33	27	49	358	0
<b>Totals</b>	<b>3133</b>	<b>3354</b>	<b>4496</b>	<b>4613</b>	<b>5014</b>	<b>4147</b>	<b>3554</b>	<b>2765</b>	<b>4116</b>	<b>35192</b>	<b>912</b>
<b>Number of Species</b>	<b>14</b>	<b>14</b>	<b>13</b>	<b>18</b>	<b>17</b>	<b>18</b>	<b>17</b>	<b>15</b>	<b>14</b>		

## **Shorebird use of the mudflats and resighting coverage**

The birds' use of the Study Site (see Fig. 1, Study Site image) has changed from our first visit in 2007 and continues to vary each year as local conditions fluctuate and effect the suitability of different areas for the birds (particularly Red Knot, our focal species and a 'specialised feeder'). We have four major mudflat study sites within the entire study area and also the ponds.

The Nanpu mudflat is the largest of the sub-sites that we study at 8 km long and 4 km wide, at the lowest tide, and it is often where most of the birds congregate. This is presumably because, at present, this site has the most abundant or accessible prey. Due to the topography of the artificial seawall, it is also the last area of mudflat to be covered on an in-coming tide and the first to become exposed on an out-going tide. Consequently, this is where we obtain the best views of birds and is where the majority of our fieldwork was conducted in 2018 as in all other years. The mechanical shellfishing operation has been stopped from 1 May to 31 August. Last year we regularly saw up to 100 people on the mudflats at the Nanpu site collecting shellfish by hand, but this year there were substantially less (usually less than 10). Reasonable levels of fishing activity in past years did not appear to concern the birds, we would watch flocks of birds feeding close to shell-fishermen. However, we cannot be sure that the increased presence of Red Knot on the Nanpu mudflats isn't somehow connected to the lower levels of fishing activity this year. Nanpu mudflats are undoubtedly the most important of the remaining mudflats in the area. There had been some dredging in 2006 for small-scale reclamation and artificial islands have been built close offshore for oil extraction, but the mudflats abutting the seawall are still excellent shorebird foraging grounds. The Nanpu mudflats is the area that has been given nature reserve status.

The mudflats at Beipu are 4.5 km long and approximately 4 km wide at the lowest tide. The flats here have undergone many changes since our first visit in 2009. During our fieldwork in 2009 and 2010 we were regularly scanning at Beipu with thousands or tens of thousands of Red Knots frequenting the site. However, soon after our fieldwork season finished in 2010, development work started and was still going on during the 2011 field season. This involved many large industrial dredging ships pumping mud out of the mudflats and over the seawall into the adjacent salt ponds, damaging two shorebird habitats in the one process. In the areas that were dredged the mud was extracted up to a depth of 15 m. This brings up anaerobic sediment and is pumped into the pond that is going to be filled. The heavy sediments settle and remain in the pond while the finer sediment and water run back out through sluice gates placed in the seawall for this purpose. As the fine black water and sediments run out back over the mudflats, they may smother it and cause the benthos to 'suffocate'. Just after this process there is a dramatic drop in shorebirds foraging at the affected site, we also saw this happen at our southern-most study site of Zuidong.

The destruction of the mudflats at Beipu ceased prior to our 2012 season due to a dispute between the development companies and the pumping companies. This situation has remained the same up to this 2018 season with no dredging or development work being done on the Beipu mudflats for six years. However, the ponds immediately inland from the mudflats at the northern end that had mud pumped into them in 2011 are now dry mud and offer no feeding or roosting opportunities for birds. Due to these activities, the Beipu mudflats have had wildly fluctuating numbers of foraging Red Knots. In 2012, 13 and 14 very small numbers were recorded there, hundreds at most in 2014. In 2015 that changed very dramatically with up to 25,000 Red Knots using Beipu. The usage in 2016 was reasonably high with up to 9,000 Red Knots on the flats. 2017 reflected the low numbers of Red Knot in the area with very low numbers of Red Knot, the biggest count being 2,230 on 15 May 2017. This year on 16 May there were



8,110 Red Knots. Scanning effectively is more difficult at Beipu than it is at Nanpu, mainly due to logistics and the shorter time the birds are close enough to read flags and colour-bands. We know from our work and resighting histories that birds use all sites and so we were likely to encounter any birds that were using Beipu at either Nanpu or Hangu. The suitability of the Beipu mudflat as a foraging site for migratory shorebirds has certainly not been consistent over the 9-year period of our full study years. Detailed studies on the benthos of the site have not been undertaken by the PhD students, as the very soft mudflats are difficult and indeed dangerous to access.

Another issue at Beipu that highlights the lack of regulation on the coast is that in 2016 a 'resort' was built on the seawall. By 2017 it had already been abandoned and some of the buildings had toppled over the edge of the seawall. This continued in 2018. The decrepit development does not seem to be a major conservation issue in comparison to the huge losses of mudflats along the Yellow Sea coast, but it illustrates the unregulated nature of the human use of this very important site.



One of the 'resort' buildings toppling on to the mud flats 21 May 2018 © Chris Hassell

This year we once again worked regularly at Zuidong, particularly early in the season when large numbers of Great Knot were using the mudflats there. The mudflats there have 'improved' since the major pumping and seawall construction in 2009–2011. Because Zuidong mudflats are covered by the tide earlier than the Nanpu mudflats, birds from Zuidong would regularly move between these two sites. Most of our scanning here is done out on the mudflats and not from the seawall. A lot of industrial development continues on the reclaimed land adjacent to the remaining Zuidong mudflats.

The North Beipu site has been worked progressively less and less over the years and this season we explored it a few times but did very little formal scanning there. The mudflats here are very soft and access is prohibited due to the Chlor-alkali liquid waste facility located there. The ponds at North Beipu that used to be good roosting and foraging habitat have had all the pond walls built up by dredging mud from within each pond. This has made the sides steep and the water deep at the base of the walls and therefore unsuitable for foraging shorebirds. The top of the walls are very rough and as the dredged mud dries out they become very cracked and unsuitable for roosting birds. The only birds using North Beipu this season in reasonable numbers were White-winged Black Terns. As with the Beipu mudflats we know from previous years that individual birds that we see at North Beipu we also record at Beipu and Nanpu mudflats in the same season.

Hangu Wind Farm site is now regarded as one of our study sites within the Luannan Coast study area. We first visited Hangu regularly in 2017 but it is evident that it is an important component of the Luannan Coast for shorebirds and we included it in our fieldwork schedules this year and will continue to do so. PhD student Zhu Bingrun (ZB) carried out fieldwork at the site regularly and provides good information to help us plan our visits there. Red Knots use the area in large numbers, but not consistently. The biggest count this year was 12,266 on 16 May. It remains an important site for Black-tailed Godwits and Asian Dowitchers, both species that like to forage in very soft sediments. ZB recorded 15,120 Black-tailed Godwit on 31 March (this is before the GFN study period starts, but we include it here in this report). Not a single Black-tailed Godwit marked in NWA has been seen amongst these large flocks. This is not surprising as these birds are not the subspecies that spend the non-breeding season in NWA. They are the subspecies that spend the non-breeding season in South China and Hong Kong and probably some of South East Asia. ZB's PhD will hopefully discover more about this. The Asian Dowitcher count of 1,703 on 13 May 2018 was very similar to the 1,754 on 8 May 2017.



A marked Curlew Sandpiper from Hong Kong roosting at Hangu ponds  
 14 May 2018 © Adrian Boyle

Table 3 shows records of individually colour-banded birds marked in NWA recorded on the Luannan Coast for the years 2010 to 2018. The 361 individuals recorded this year is our second highest total. This is 66 more than the 295 in 2016 and 2017 and likely reflects the increased numbers of Red and Great Knots using Luannan. The totals were dominated by Red Knot with 313 (269 in 2017) individuals identified, then Great Knot with a doubling of individuals identified to 44 (22 in 2017) and Bar-tailed Godwit with 4 (4 in 2017). Three of the Bar-tailed Godwit have been seen over multiple years, one for the third consecutive year, one the fifth and one the ninth. Resighting conditions on the Luannan Coast were 'better' this year and marking effort on the non-breeding grounds of NWA has been consistent over the years. The Luannan Coast is not a major staging site for Bar-tailed Godwits.

**Table 3.** Totals of individually colour-banded birds from the GFN project marked in NWA resighted on the Luannan Coast 2010 to 2018. No Black-tailed Godwits have been recorded within the Study Site.

NWA colour-banded individuals	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bar-tailed Godwit	3	2	4	3	5	6	3	4	4
Great Knot	6	20	17	12	11	30	31	22	44
Red Knot	106	170	287	272	329	387	261	269	313
	<b>115</b>	<b>192</b>	<b>308</b>	<b>287</b>	<b>345</b>	<b>423</b>	<b>295</b>	<b>295</b>	<b>361</b>

## Internationally Important Counts

During the ten years GFN have been visiting the Luannan Coast we have been conducting regular counts in conjunction with Beijing Normal University, 2010 to 2018. The importance of this site is not in any doubt. Table 4 below shows clearly the immense importance of these mudflats and ponds to shorebirds from throughout the EAAF. All counts are absolute minimum counts as the vast area can never be completely covered with our current resources and no turnover analysis is done. During this 2018 season we recorded our highest count of Eurasian Curlew and our highest Red Knot since 2013. We also had internationally significant counts of various species during the fieldwork season but none were higher than those shown in Table 4. Note that there have been higher counts of Red Knot, Curlew Sandpiper *Calidris feruginea*, Broad-billed Sandpiper *Limicola falcinellus*, Grey Plover, Nordmann's Greenshank and Sharp-tailed Sandpiper *Calidris acuminata* prior to 2014 but with the renewed EAAF Population Estimates (BirdLife Australia 2016) we have only used counts from the last 5 years to more accurately reflect the current situation at the Luannan Coast. Most migratory shorebird populations in the EAAF are declining and it is no surprise that many species have also shown declines in peak numbers on the Luannan Coast.

**Table 4.** Internationally Important Counts at Luannan Coast 2014 to 2018.

Species	Scientific Name	Date recorded	Number	% of EAAF Population present	EAAF Population from BirdLife Australia 2016	1% Criteria
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	08-05-17	1,754	<b>12.5</b>	14,000	140
Black-tailed Godwit	<i>Limosa limosa</i>	02-04-17	17,100	<b>10.7</b>	160,000	1,600
Broad-billed Sandpiper	<i>Limicola falcinellus</i>	27-05-15	2,460	<b>8.2</b>	30,000	300
Curlew Sandpiper	<i>Calidris feruginea</i>	04-05-14	24,500	<b>27.2</b>	90,000	900
Dunlin	<i>Calidris alpina</i>	07-05-17	40,000	<b>1.6</b>	2,500,000*#	25,000
Eurasian Curlew	<i>Numenius arquata</i>	18-04-18	1,754	<b>1.7</b>	100,000"	1,000
Great Knot	<i>Calidris tenuirostris</i>	04-05-15	10,270	<b>2.4</b>	425,000	4,250
Grey Plover	<i>Pluvialis squatarola</i>	19-04-15	2,867	<b>3.6</b>	80,000	800
Marsh Sandpiper	<i>Tringa stagnatilis</i>	27-04-16	8,785	<b>6.8</b>	130,000	1,300
Nordmann's Greenshank	<i>Tringa nebularia</i>	16-05-16	7	<b>1.4</b>	400-600"	5
Pied Avocet	<i>Recurvirostra avosetta</i>	27-04-16	951	<b>0.95</b>	100,000*	100
Red Knot	<i>Calidris canutus</i>	16-05-18	48,630	<b>43.8</b>	110,000	1,100
Red-necked Stint	<i>Calidris ruficollis</i>	08-05-16	4,747	<b>1</b>	475,000	4,750
Sanderling	<i>Calidris alba</i>	29-05-16	4,321	<b>12.3</b>	35,000	350
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	04-05-14	4,000	<b>4.7</b>	85,000	850
Spoon-billed Sandpiper	<i>Eurynorhynchus pygmeus</i>	25-05-16	1	<b>0.3</b>	140-480*	3
Spotted Redshank	<i>Tringa erythropus</i>	15-05-16	592	<b>2.6</b>	25,000*	250
White-winged Black Tern	<i>Chlidonias leucopterus</i>	14-05-14	40000e	<b>4 to 40</b>	100,000-1,000,000*	1,000

e Estimate \* Wetlands International (2016). "Waterbird Population Estimates 5" # Uncertainty of distribution of all subspecies in EAAF.

The column 1% Ramsar criteria refers to Criterion 6 of the Ramsar Convention: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.



## **Red Knot *Calidris canutus* and the presence of *rogersi* and *piersmai* subspecies**



Red Knots roosting at Nanpu ponds 29 April 2018 © Adrian Boyle

The main focus of our studies on the Luannan Coast are Red Knots. We get fabulous data each year on the individually marked birds from the GFN project.

The *rogersi* birds, predominately from SE Australia and New Zealand non-breeding grounds, generally arrive first and leave for their eastern Siberian breeding grounds earlier than the *piersmai* birds. The latter, predominately from NW Australia non-breeding grounds, breed in more northerly latitudes on the New Siberian Islands.

In relation to Red Knot marked in Roebuck Bay and 80 Mile Beach (NWA), for both the total number of resightings and the individuals that those sightings represent, it needs to be taken in to account that approximately 20% of Red Knots marked in NWA may be the *rogersi* subspecies. These *rogersi* birds may or may not move to New Zealand after marking in NWA and then use New Zealand as their permanent non-breeding area. From New Zealand they may migrate to Bohai under different schedules than *rogersi* that have NWA as their non-breeding location. Interestingly both *rogersi* and *piersmai* depart NWA at the same time (late April) despite the difference in breeding locations (Verhoeven *et al.* 2016).

In our experience it appeared that birds which arrive at Luannan early in the season, before 1 May, are predominately *rogersi* and stay for up to a month. Birds that arrive late in the season, mid-May onwards, are predominately *piersmai* are only here for a short time, in some cases, a week or less. However, the general trend of the subspecies arrival periods had changed, most noticeably during 2016 and 2017 (see Report 2017). The pattern of arrival this year was intermediate between what we had come to see as the 'normal' timing between 2010 and 2105 and the earlier arrival of *piersmai* during 2016 and especially 2017. This effect could have been produced by the much larger numbers of *piersmai* present at the site this year.

To evaluate the proportions of the two subspecies we conduct random scans of flocks and assign a subspecies to each bird. Red Knot were assigned to the *rogersi* or *piersmai* sub-species on the basis of plumage characteristics. The majority of the two subspecies of Red Knot using the EAAF can be distinguished, when in fresh, full or near-full breeding plumage by the colour and pattern of that breeding plumage (Hassell *et al.* 2011). This is particularly noticeable when the two subspecies are side by side as is usually the case in our study site.

A 'typical' *piersmai* AP 4 © Adrian BoyleA 'typical' *rogersi* AP 3 © Adrian Boyle

To obtain the data for the graphs below we conduct regular, random scans of Red Knots flocks, assigning each individual bird to a subspecies. The number of flocks and birds scanned is very similar over the years.

Table 5.

Year	Number of Scans	Number of Red Knots assessed
2015	225	39,925
2016	221	38,364
2017	218	38,866
2018	231	39,164

% rogersi V piersmai 12/04/2018 to 05/06/2018

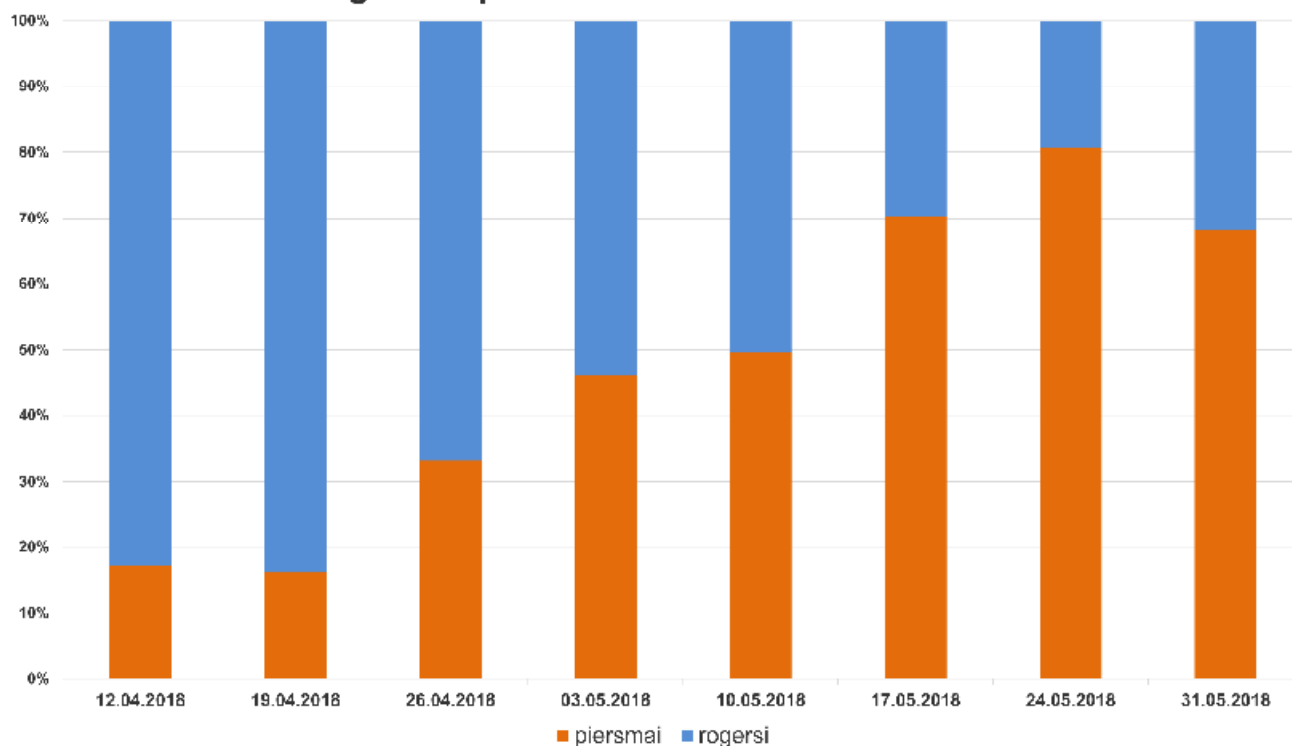


Figure 2. % rogersi V piersmai over time. 2018.

Note that the number of birds sampled for the final week was very low, n = 647.

## Red Knots numbers

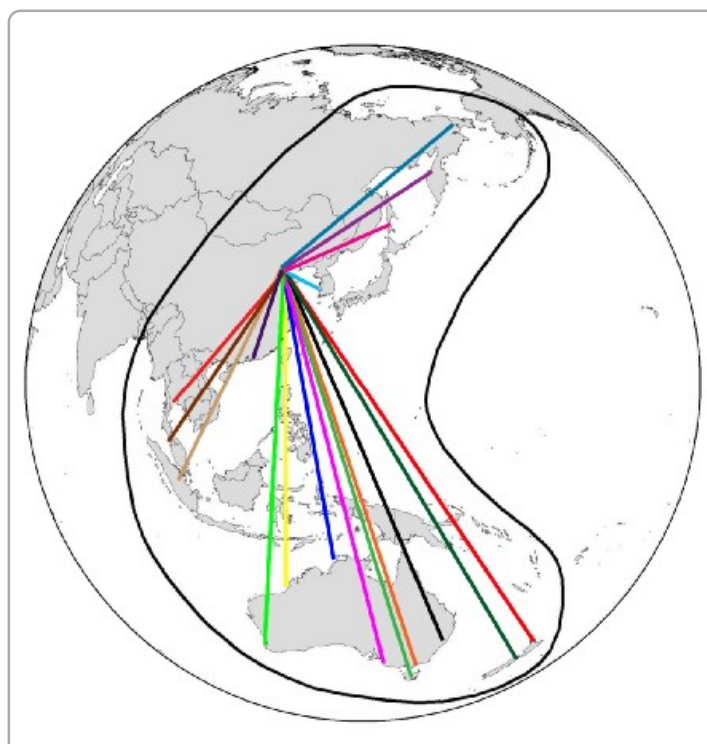
The peak count of Red knot this year was 46,830 on 16 May a huge increase on the 2017 highest count of 14,577 on 15 May, which was our lowest count since full surveys started in 2010. The highest in 2016 was 20,000 on 4 May, the highest count in 2015 was 30,746 on 29 May.

In 2018, Red Knot were a little later arriving than in 2016 and 2017, but were observed in much greater numbers than in those years. Numbers increased from 'hundreds' on 12 April to 4,500 on 27 April and then increased to 9,534 on 1 May and then up to the 16 May peak. These birds were at the 'main sites' that we expect big numbers of Red Knot to use. 25,250 at Nanpu, 8,110 at Beipu and 12,226 at Hangu Wind Farm. It is still not entirely clear if we were unable to locate some birds during 2016 and 2017, or that they didn't arrive at Luannan and were using other sites in the Yellow Sea region. Our 'sense' and our searching strongly suggest that the birds were not present (see reports from 2016 and 2017).

The first wave of northward migrating Red Knots from the Luannan coast starts around mid-May when the *rogersi* subspecies start to leave. There is a second wave of mass migration of Red Knots towards the breeding grounds that commences in very late May and numbers drop off quickly and on our last day of fieldwork, in all years, there are just hundreds to a few thousand Red Knots remaining (Table 6).

**Table 6.**

Count Date	29.05.2015	29.05.2016	30.05.2017	30.05.2018
Red Knot	19,000	5,480	12,800	11,278
Count Date	05.06.2015	05.06.2016	05.06.2017	05.06.2018
Red Knot	6,230	1,910	880	934



**Figure 3.** Between 2009 and 2018 we have recorded Red Knot from 17 different banding locations throughout the EAAF. The map above is a representation of some of these sites.

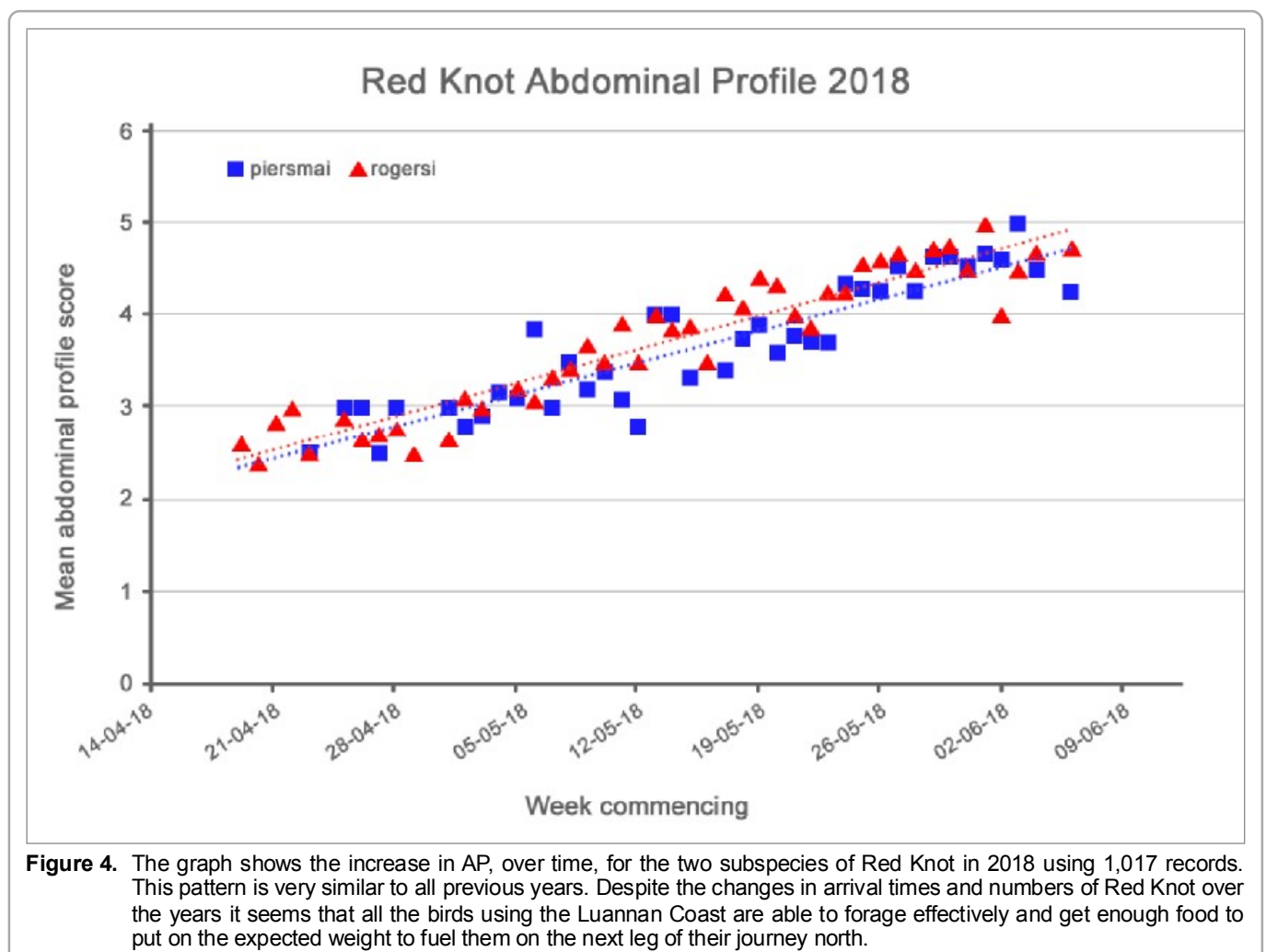


## Abdominal Profiles

As we are not catching Red Knots at Luannan, there is an absence of body mass data, however it is possible to score the abdominal profile (AP) of birds visually in the field from telescope observations (Wiersma & Piersma 1995). This is a suitable alternative way to assess the fat stores and weight gain of birds. We record abdominal profile on all flagged and colour-banded Red Knot when we get a suitable view. A side-on view of the bird is needed for an accurate assessment. A factor the observer has to take into account is if the bird is 'fluffed-up' due to cold weather. This can mislead the observer into thinking the bird is 'fatter' than it really is. This can certainly be a problem, but the experienced observers of GFN are aware of this and so all observers are scoring under the same criteria. The scores range from AP 1-thin to AP 5-obese. A bird scored as 1 looks unhealthy and a bird scored at 5 is very fat.

It would seem that both subspecies and most individuals are arriving at our Luannan Coast study site in good body condition, whilst no birds are arriving in very poor condition (AP 1). This likely means that they are staging somewhere between their Australian and New Zealand non-breeding sites and the Luannan Coast. Colour-band and flag resightings show this and it is further supported from geolocator tracks and satellite data confirming birds stop at many sites south of Luannan including Hong Kong, Taiwan, southern China and north east Borneo (GFN, AWSG unpublished data). This northward migration strategy is, however, one piece of the Red Knot life-cycle question that we are still attempting to answer more fully.

During the 2018 fieldwork season, 1,017 Red Knot were assessed for both subspecies and abdominal profile during one sighting. The results were very similar to those of previous years' (Figure 4).



## **Additional species of interest**

The following section reports on some additional species at Luannan of particular interest, these include vulnerable, endangered and critically endangered species that GFN take the opportunity to record and report on. Black-tailed Godwit does not fall in to one of those categories but is the subject of much interest due to the likelihood of a new subspecies being described soon and GFN's close cooperation with BNU student Zhu Bingrun. Sanderling appears to have a stable but not large population in the EAAF but the occasional very large counts of this species lead us to record and report on it in our annual reports.

## **Great Knot *Calidris tenuirostris***

The Great Knot is classified as endangered by International Union for Conservation of Nature (IUCN 2016) <http://www.iucnredlist.org/details/22693359/0> and as critically endangered by the Australian Government <http://www.environment.gov.au/biodiversity/threatened/species/pubs/862-conservation-advice-05052016.pdf>.

During the 2018 fieldwork a high count of 8,230 Great Knots was recorded, which is higher than the 6,000 of 2017 but a little lower than the 10,000 of 2016 and 10,270 of 2015. Those two years were our highest counts during the nine years of complete survey periods. The numbers of individually marked Great Knot (Table 4) has fluctuated with the counts. But this year we got an excellent set of resightings (44), well above the high-count years of 2015 and 2016. Possibly Great Knot were moving through the site and we were seeing new birds as a result of this turnover. The Great Knots come from the roost ponds on to the mudflats in front of the seawall at Nanpu where we usually start our scanning activities. They don't forage much in this area but move off to Zuidong as the tide recedes there. Zuidong seemed to be good for foraging and we saw Great Knot finding and ingesting suitable sized bivalves and they were gaining weight, as assessed from our abdominal profile records.



Great Knot flock in the Nanpu ponds swirl over Adrian © Matt Slaymaker



## **Black-tailed Godwit *Limosa limosa***

Black-tailed Godwit use the Luannan coast in internationally significant numbers (Table 4). They are not a focus of the GFN studies at Luannan despite them being one of the 4 study species in Roebuck Bay. This is because the subspecies that visits Luannan is not from the Australian non-breeding population. However, the Black-tailed Godwits using the study site are studied as they are the focus of a PhD being carried out by Zhu Bingrun from BNU/University of Groningen.

The taxonomy of Black-tailed godwits in the EAAF is not clearly understood. GFN researchers noted a difference in morphology of the Black-tailed Godwits they see at the Luannan Coast compared to the ones they see regularly in NWA. The NWA birds are smaller and have brighter breeding plumage, on average. During fieldwork over ten years at Luannan, GFN have never recorded a marked bird from NWA. It is possible there is a new subspecies of Black-tailed Godwit to be described in the EAAF. Zhu's PhD study and associated genetic work with his colleagues at the University of Groningen in the Netherlands will hopefully unravel this mystery. It is hoped that, in the next couple of years, BNU and GFN will be able to attach satellite transmitters to the birds in NWA to further add information to this study. We know from the work of Dmitry Dorofeev of the All-Russian Research Institute for Environmental Protection and a PhD student at Moscow State University that many Black-tailed Godwits from the NWA population pass through the west coast of Kamchatka during July and August on their southward migration. And indeed some may breed in that area. Where the majority of the NWA population breed is currently not well understood and the proposed tracking project, using modern satellite technology, is another step towards understanding the Black-tailed Godwits of the EAAF.

Black-tailed Godwits have always favoured the pond habitat over the coastal mudflats at Luannan. This year Zhu did not record a number as big as the 17,100 from 2017. That count was greater than any we have recorded in previous years and represented 10.7% of the current EAAF population. 2018's highest count was 15,120 on 31 March this count represents 9.5% of the entire estimated EAAF population and this will obviously be a much higher percentage of this subspecies' population. As with other counts within the study site, these totals represent a single peak count and do not account for turnover as birds pass through the area. Luannan is evidently a critically important staging site for Black-tailed Godwits.



Part of the Black-tailed Godwit flock 31 March 2018 © Zhu Bingrun



## **Sanderling *Calidris alba***

This season the biggest count of Sanderling was 1,262. This is much lower than the 4,000 individuals of 2016 and 2017. Sanderling are not an easy species to monitor at Luannan, as they can come over from the roosting ponds well after the tide has receded and can land a kilometre or more from the seawall and spread out over a wide area. Our largest counts of Sanderling are usually made when we are ourselves well out on the mudflats; however, our time spent in this area varies annually depending on the location of our key target species. Due to the depth of the water, it is unlikely that thousands of Sanderling were feeding in any of the ponds, so maybe, like we assume with the Red Knots in previous years, they have used alternative sites in the Yellow Sea and, like the Red Knots, will return to use Luannan in the coming years as conditions and feeding opportunities change at different sites.

## **Spoon-billed Sandpiper *Calidris pygmaea***

The Spoon-billed Sandpiper is critically endangered (IUCN 2016)

<http://www.iucnredlist.org/details/22693452/0>

with vigorous conservation programs under way to try and save this species from extinction. With possibly fewer than 200 breeding pairs left in the wild it was exciting to find a single bird on the Nanpu mudflats on 20 May. This is GFN's sixth record over the ten years we have been surveying this site. All have been in late May or early June; however, this was our earliest record. None of the individuals we have recorded have been banded or flagged from the well-studied population in Meinypil'gyno, Chukotka, Russia.



Record shot of Spoon-billed Sandpiper 20 May 2018  
© Matt Slaymaker

## **Nordmann's Greenshank *Tringa guttifer***

Nordmann's Greenshank is an endangered shorebird (IUCN 2016) <http://www.iucnredlist.org/details/summary/22693225/0> with a continuing decline in its population. Nordmann's Greenshanks were recorded on 26 days between 17 April and 16 May 2018. The sightings were of them feeding on the mudflats at Nanpu and roosting in the adjacent ponds. We counted a minimum of 6 on any one day. This is 4 less than we recorded in 2012 a minimum of 10 individuals. Although occurring in low numbers, this is an easy species to locate at Luannan due to its predictable habits and distinctive behaviour, so this change likely reflects a real decrease in the number of birds present. Then, on 1 and 5 June, after no records for 15 days, we recorded single individuals of this species. Both were in non-breeding plumage and were probably young birds and different to the others recorded earlier in the season, which had breeding plumage.



Nordmann's Greenshank roosting in the Nanpu Ponds  
29 April 2018 © Adrian Boyle

### **Black-faced Spoonbill *Platalea minor***

Black-faced Spoonbill is a rare wading bird endemic to the EAAF and classified as endangered (IUCN 2015).

We did not record any this year. We have only 2 records of this species since 2010. The first record was a 2<sup>nd</sup> calendar year bird seen on 19 May 2013 and an adult bird last year 2017.

### **Chinese Egret *Egretta eulophotes***

Chinese Egret is a vulnerable species with a small, decreasing population with a maximum of 4,100 adults (Wetlands International 2016). We did not record Chinese Egret in 2018 we had 4 records of this species in 2015.

### **Breeding shorebirds and terns**

In addition to the migratory shorebirds and terns passing through the Luannan Coast there are 9 species we have recorded breeding within the study site. Pied Avocet *Recurvirostra avosetta* is the most common species we record and are the focus of Dr Weipan Lei's postdoctoral study. Lei is one of three students studying shorebirds and terns from Professor Zhang Zhengwang's department, College of Life Sciences at Beijing Normal University. The Avocets breed on the bare banks of ponds, on open areas of dry mud in unused or recently reclaimed ponds and on small islands within the ponds. Black-winged Stilt *Himantopus himantopus* and Kentish Plover *Charadrius alexandrinus* breed in the same locations as Pied Avocet in good numbers. Little Ringed Plover *Charadrius dubius* was observed giving distraction displays although no eggs or chicks were seen.

Common Redshank *Tringa totanus* was not confirmed breeding this year but birds were present in suitable habitats and was very likely breeding occurred, as it has in previous years.

Common Tern *Sterna hirundo* breed in scattered colonies numbering from a few pairs to a few hundred pairs. The subspecies *longipennis* is the most common subspecies to breed in our study area but we have recorded and photographed birds with black-tipped red bills of the subspecies *minussensis*. Paul Holt (a Beijing-based ornithologist) informs us that "*minussensis* is regular on the Hebei coast (and in Beijing) and often outnumbers *longipennis*. They breed in both areas too, occasionally even pairing with *longipennis*".

Gull-billed Tern *Gelochelidon nilotica* (of the subspecies *affinis*) is another tern species breeding on small islands within the ponds. They are much less numerous than Common Terns but still probably number up to 100's of pairs in the pond complex. Little Terns *Sterna albigula* breed in small numbers in the same habitat as the Pied Avocet. Whiskered Terns *Chlidonias hybridus* breed in reed beds inland from the ponds, but are included in this report as they forage over the salt ponds and inter-tidal mudflats. Wu Fuxing is continuing with his PhD studies on the breeding terns using the ponds complex.



Whiskered Tern 1 June 2018 © Adrian Boyle

## **White-winged Black Tern *Chlidonais leucopterus***

The White-winged Black tern does not breed at Luannan, but the species does pass through in large numbers. We have never made an accurate count of this species due to the logistical difficulties of counting within the extensive pond complex used by this species. Our best estimate was from mid-May 2014 when we estimated some 40,000 to be present. The population estimate for this species in the flyway is vague, but 40,000 would constitute anything from 4 to 40% of the EAAF population. It seems that from 2015 to 2018 were far fewer White-winged Black Terns in the study area, but it should be noted that it is impossible to cover all the ponds at any one time. However, as there has been an apparent decline noted for four years in a row it may mean that migrant terns are under similar pressures as migrant shorebirds.



White-winged Black Tern, 1 June 2018 © Adrian Boyle

## **Nature Reserve Status and government priorities**

The data presented here, in previous GFN reports and the growing list of scientific papers from institutions, most notably GFN and BNU, documenting the shorebirds and benthos of the Luannan Coast led to a 5 year Memorandum of Understanding being signed between the Paulson Institute, World Wide Fund for Nature (WWF), Hebei Provincial Forestry Department and Hebei Luannan County Government on 15 June 2017.

The Luannan Birds Nature Reserve has now been established and is managed by the Luannan County Government. There was some action at the site, demonstrating that small steps towards conservation management are being made. A large billboard proclaiming the site at Nanpu a Nature Reserve was erected. More effectively, workers were clearing the dead *Spartina* at the site, in conjunction with an initiative from WWF. This, along with a temporary ban on shell-fishing from 1 May to 1 September 2018 proclaimed by the Hebei Provincial Oceanic Administration, are all positive signs. This period covers the peak time of the bird's use of the area. GFN are very pleased and believe these are good signs of the seriousness with which the authorities view the impact of past destruction and unregulated fishing on the mudflats and the animals that use them.





The Luannan Birds Nature Reserve 30 May 2018 © Adrian Boyle

In addition to this some strong words have been emanating from the Chinese government in regards to the destruction of inter-tidal mudflats. In January 2018 China's State Oceanic Administration (SOA) stated that *"the agency will only approve coastal wetland development that is important for public welfare or national defence. Unauthorized projects will be stopped, and illegal structures torn down. The administration will nationalize already reclaimed wetlands that have not yet been built on"* and *"Using reclaimed land for commercial real estate development is prohibited and all reclamation activities in the Bohai Sea area will be banned,"* and *"Reclaimed land that has remain deserted for a long time will be confiscated."* Then in March 2018 a major government reorganisation saw environment and biodiversity elevated to be considered as government priorities and management of all protected areas were brought under one ministry. It is hoped that this will streamline any decisions and actions in relation to all conservation related laws, not just those relating to migratory shorebirds and inter-tidal mudflats. However, it should be noted that in one of these statements, the government committed to *"nationalise reclaimed land with no structures built on it, and will halt reclamation projects that have yet to be opened and are against national policies."*

Even more recently, in July 2018, further strong statements were released via a *Circular of the State Council on Strengthening the Protection of Coastal Wetlands and Strictly Controlling the Reclamation* see Appendix 1 for the full text.

Despite this undoubtedly positive news, there are still continuing pressures on the inter-tidal area and are detailed elsewhere in this and previous reports (see steel works and port development in next section).

Further focus was brought to this stretch of coast by visits from Hank and Wendy Paulson who spent a morning birding on the seawall and surrounding area. The Paulson Institute (<http://www.paulsoninstitute.org/>) has been influential in helping to attain Nature Reserve status for Nanpu mudflats and the birds behaved impeccably for their visit.





Red Knot impress the Paulsons 5 May 2018 © Kath Leung

### **Human use of the mudflats**

The most striking change this year was the ban on mechanical shell-fishing as mentioned previously. The Hebei Provincial Oceanic Administration banned shell-fishing from 1 May to 1 September 2018, to minimise disturbance to the shorebirds. The fisherman will be welcomed back from 1 September when there will be less birds utilising the site. The very intense fishing practices in the late-summer may even benefit shorebirds staging in the spring (Hong-Yan Yang *et al* 2016). We hope that the local communities will still be able to make good incomes from their fishing activity outside the dates of the ban. A new species we hadn't seen being farmed before at Luannan was jellyfish. They were being grown in one of the small ponds adjacent to the Nanpu/Beipu creek and then collected and taken to be grown in indoor facilities until the correct size for sale to restaurants.



Jelly fish harvest Nanpu 28 May 2018 © Chris Hassell

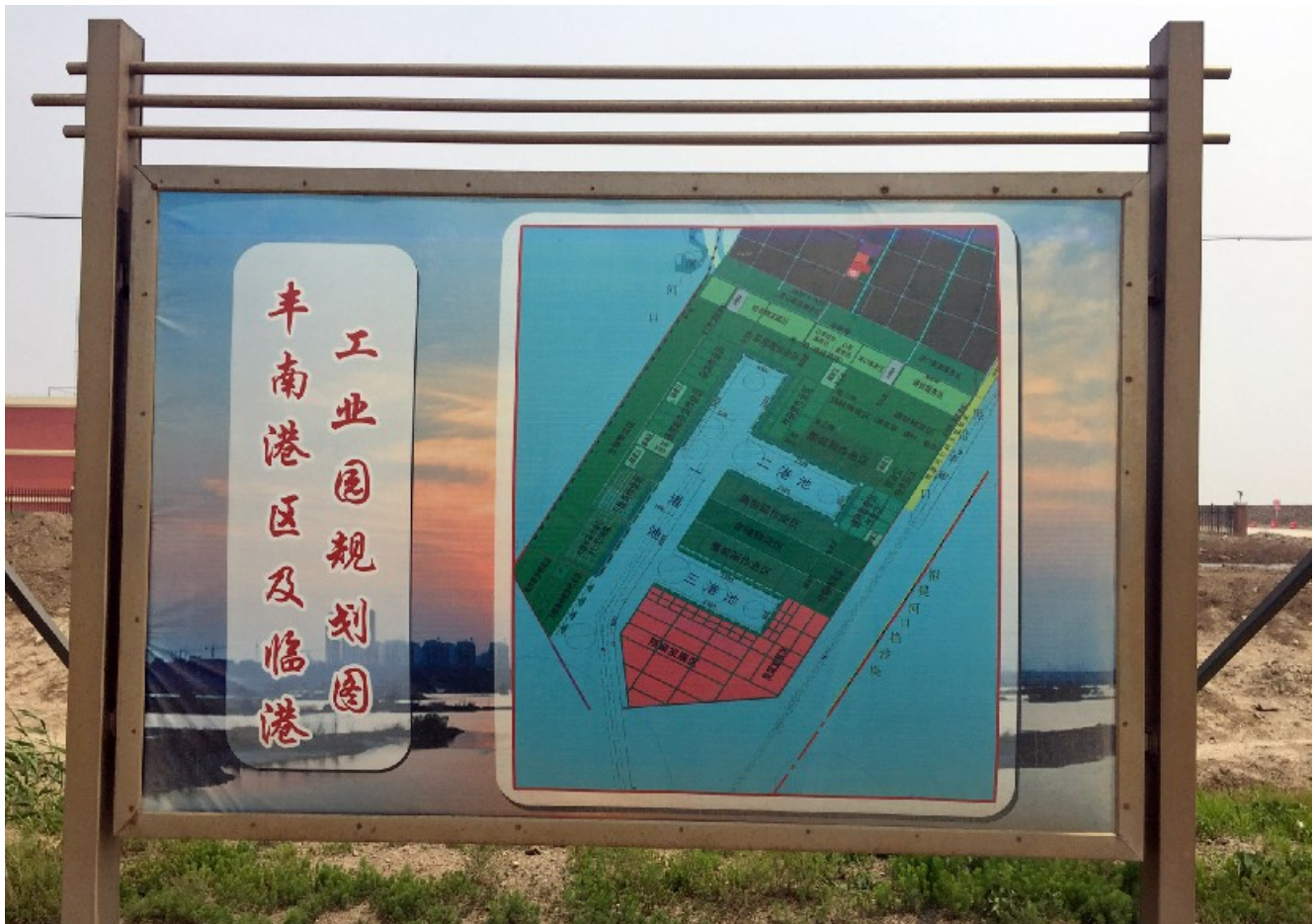


## **Habitat Threats and Management Actions**

Despite the positive news related above, many huge projects are already underway and there is no explanation of what 'national policies' are. As is the case in all and any nation in the world, the economy will usually take precedence over the environment. One such massive industrial project is happening right now in one of our less frequented study sites between Beipu and Hangu Wind Farm. This is an area we have seldom visited due to the difficulty of access to the mudflats and limited opportunities for scanning. Over the years, we have done some exploration of the ponds (now reclaimed) in that area but we know little about shorebird use of the adjacent mudflats. A classic case of losing something before it is even documented what ecological value it has.

The area is now called the "Hebei Fengnan By-port Economic Zone". The new zone is going to host 5 steel companies, each moved from their current locations within or near urban areas. This will undoubtedly bring an economic upturn to the area with additional jobs and investment. The project started in August 2017 and is scheduled to be complete by July 2021. The total investment will be around the equivalent of A\$4 billion.

We drove past the construction site during our fieldwork season and it is a sight to behold, with all construction seemingly going on at once, throughout the 3.7 km long, 1 km wide site. The land on which the steel works is being built was reclaimed many years ago and used as aquaculture ponds, before being filled in for this project. In addition to the steelworks, a port will be developed. This will, from our understanding of the 'information boards' at the site, cover some 54 square km of mudflats and shallow sea and become an imposing feature of the coast. Another large chunk of mudflat set to disappear!



The official sign for the port development 26 May 2018 © Adrian Boyle



The Luannan Coast is very important for oil production and China National Offshore Oil Corporation (CNOOC) operate there and have done so for many years. Generally, this industry does not cause too much of a conservation threat to the migratory bird populations. There is the loss of some habitat for drill rigs and infrastructure, but much of the exploration and infrastructure is offshore and away from the mudflats.

However, some serious risks are associated with large scale oil production. An oil spill would be very serious for the Luannan coast mudflats, the associated benthos and birds. If that oil spill were to coincide with the spring migration season, the effects on migratory populations could be catastrophic. If an accident were to occur outside of peak bird use of the area it would still be a very serious as the benthos would be affected and diminish the areas biodiversity, suitability for shorebirds and shellfish harvest for local fisher-people. It would be ideal if one of our Chinese collaborative partners could have a meeting with CNOOC to start a dialogue regarding the shared use of the area for on-going profitable oil production and keeping the area safe for foraging migratory shorebirds. These two objectives can be met with good will from both sides.



The Spartina being cleared and clear of last year's dead vegetation 20 and 30 May 2018 © Adrian Boyle

Another threat to the mudflat foraging area is the establishment of areas of Smooth Cordgrass *Spartina alterniflora* on the mudflats adjacent to the seawall at Zuidong and Nanpu. The patches have increased markedly since they first established. This is a highly invasive, non-native species and has caused huge problems in other important shorebird sites in the Yellow Sea, most notably at Chongming Dongtan National Nature Reserve where a multi-million dollar project is underway to mitigate the problem. It was very pleasing to see late in the season that the issue was starting to be addressed the dead Spartina was being cleared. Last year's tall vegetation dies back and then covers the new growth and prevents spraying for control to be efficient. With the dead material removed any spraying should have much more impact.

While GFN are conducting our work on the Luannan coast, we always try to engage the local fisher-people and pond workers. Despite the language barrier we lend them our binoculars to look through and show them the birds in our telescopes. BNU have had some information brochures printed in Chinese developed by their students and we hand those out to many people who approach us to ask what we are doing. A big bonus is that our driver Mr Liu and his son Xiao Liu are both genuinely interested in the migratory birds and in our studies and they chat to various people who we encounter during our work and from what we can tell give a very enthusiastic story!



Xiao Liu on practical duties 18 May 2018  
© Adrian Boyle

## **Egg-collecting**

Every year of our study we have seen egg-collecting. In 2016 we witnessed it on the most serious scale in our 9 years. Thankfully in 2017 and this year egg-collecting pressure had returned to more 'normal' levels and we only saw local pond workers taking a few eggs from easily accessible nests, mostly Pied Avocet. This could well be down to the efforts of the local conservation group Tangshan Wildlife Protection Society, Caofeidian Youth Volunteer Organization who in 2016 came to the Salt Ponds to erect signs saying egg-collecting was illegal in a move organised by Mr Tian Zhiwei and a CCTV News story was produced and shown on television.

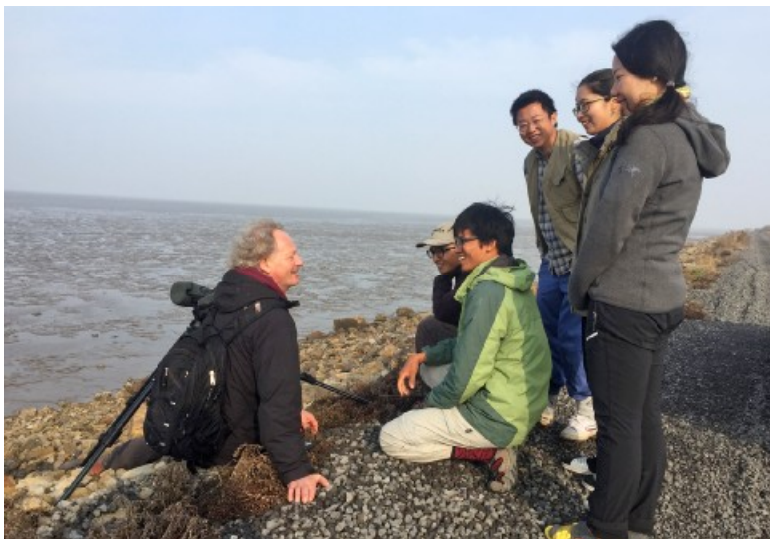


Kentish Plover nest 4 June 2018 © Matt Slaymaker

## **Future Research**

GFN strives to continue to document the fates of four shorebird species at their non-breeding sites in NWA by applying individual colour-band combinations and conducting intensive resighting scans for the marked birds. A comprehensive database of sightings from the marking sites in NWA and throughout the flyway is being maintained. With the work in Bohai Bay and sightings from other shorebird colleagues throughout the flyway we will be able to assess the effects of human-induced habitat change on survival rates of the populations.

GFN will continue conservation efforts at Bohai Bay in conjunction with WWF- China, Wetlands International – China, Department of Conservation – New Zealand and any Provincial and local government agencies that we can engage with Ying-Chi Chan, a PhD student of Theunis Piersma, is currently researching migration of Bar-tailed Godwits, Great Knots and Red Knots along the EAAF, using mark-resighting data presented in this report, and other methods such as satellite telemetry and benthic sampling. He-Bo Peng is in the 3<sup>rd</sup> year of his PhD at NIOZ/University of Groningen with Theunis Piersma as a supervisor. He is studying the benthic resources for migrant shorebirds along the entire Yellow Sea coast of China and does field work on the Luannan Coast. There is a proposal for GFN and BNU to collaborate on a satellite tracking study of the population of Black-tailed Godwits that spend the non-



Theunis Piersma chatting to the field team of PhD student He-Bo Peng, when he should be scanning! 4 May 2018 © Matt Slaymaker

breeding season in NWA. This will be a component of Zhu Bingrun's PhD. Dr Tamar Lok is overseeing sophisticated demographic analyses on the GFN data, although she has now obtained her own funding to focus on the developmental ecology of spoonbill migration. All this work is made possible under the Chair in Global Flyway Ecology at the University of Groningen, with support from WWF-Netherlands, WWF-China and BirdLife-Netherlands, with the in-kind support of the NIOZ Royal Netherlands Institute for Sea Research and in close cooperation with Beijing Normal University.



## **Non-shorebird Migration**

Although the migratory shorebirds were the focus of our work, we had a number of keen ornithologists present and, whenever there was an opportunity, we were looking for anything with wings. The passerine migration through the area is marked by high species diversity despite the paucity of any wooded habitat. Appendix 2 has a complete list of all the 248 birds seen during the fieldwork period.



White-bellied Redstart *Luscinia phaenicuroides* 23 April 2017 © Adrian Boyle

## **Acknowledgements**

Financial support for this season's fieldwork came from the 2014 Spinoza Premium (a.k.a. the Dutch Nobel prize) awarded to Theunis Piersma by the Netherlands Organization for Scientific Research (NWO) and by funding from WWF-Netherlands, Beijing Normal University.

A huge thank you to Zhu Bingrun (BNU/University of Groningen), Weipan Lei (BNU) and Tong Mu (Princeton University) for their friendship and constant help during our fieldwork. We thank Mr Lui (senior) and Mr Lui (junior) they are the perfect drivers for the project, constantly thoughtful and helpful. We only speak a tiny bit of each other's language, but we genuinely enjoy their company. Thanks to Mo Xunqiang from Tianjin Normal University and Liu Jin from BNU for help during the count days that GFN and BNU share.

Thank you to Andreas Kim for formatting and presentation of the report. Thank you to Liz Rosenberg for editing the report. Thank you to Jin Xin for figure 4 and various excel assistance. Thank you to Emilia Lai for assistance with Figure 2.



Thank you to all the shorebird enthusiasts throughout the EAAF who send in sightings of marked birds. Thank you to the NWA expedition teams and the Australasian Wader Studies Group. Thank you to the fabulous group of volunteers from the Broome community who assist with the capture of the birds. GFN acknowledges the Yawuru People via the offices of Nyamba Buru Yawuru Limited for permission to catch birds to be marked for this project on the shores of Roebuck Bay, traditional lands of the Yawuru people. GFN acknowledges 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.

Our major funders over the years have been BirdLife Netherlands (2007-2012) WWF Netherlands (2010-2014, 2016) and Spinoza Premium of Netherlands Organisation for Scientific Research to Theunis Piersma (2014-2016). We also receive financial and much logistical support during fieldwork from Beijing Normal University principally from Professor Zhang Zhengwang, and his PhD students.



Mr Liu 16 May 2017 © Chris Hassell

More information on the GFN colour-banding project can be found at [www.globalflywaynetwork.com.au/](http://www.globalflywaynetwork.com.au/)  
For a view of the global reach of GFN, see [www.teampiersma.org](http://www.teampiersma.org).

Contact Chris: [turnstone@wn.com.au](mailto:turnstone@wn.com.au)

### **Collaborative partners**

- ❖ Australasian Wader Studies Group (AWSG)
- ❖ Beijing Normal University, China
- ❖ University of Groningen, Netherlands
- ❖ NIOZ Netherlands Institute for Sea Research
- ❖ Broome Bird Observatory
- ❖ Broome Community Volunteers
- ❖ WWF-China
- ❖ WWF-Netherlands
- ❖ Fudan University, China

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## **Appendix 1**

### **Circular of the State Council on Strengthening the Protection of Coastal Wetlands and Strictly Controlling the Reclamation**

<https://app.www.gov.cn/govdata/gov/201807/25/427280/article.html>

2018-07-25

### **Circular of the State Council on Strengthening the Protection of Coastal Wetlands and Strictly Controlling the Reclamation**

**[2018] No. 24**

The people's governments of all provinces, autonomous regions and municipalities directly under the Central Government, ministries and commissions under the State Council, and their respective agencies:

Coastal wetlands (including beaches, estuaries, shallow seas, mangroves, coral reefs, etc.) are important habitat breeding sites for birds and migration stations for birds. They are precious wetland resources with important ecological functions. In recent years, China's coastal wetland protection work has achieved certain results. However, due to the long-term large-scale reclamation activities, the coastal wetlands have been greatly reduced, and the natural coastline has been sharply reduced, causing damage to marine and terrestrial ecosystems. In order to effectively improve the protection level of coastal wetlands and strictly control the activities surrounding reclamation, the notice is as follows.

#### **I. The overall requirements**

(1) Significant significance. Further strengthening the protection of coastal wetlands and strictly controlling the activities of reclamation will help to strictly observe the red line of marine ecological protection, improve the marine ecological environment, enhance the level of biodiversity, and safeguard the national ecological security; it will help deepen the reform of natural resource asset management system and mechanism innovation. Promote the overall planning and comprehensive management of land and sea, build a new pattern of land and space development and protection, and promote the implementation of the strategy of strengthening the country by the sea; help establish the concept of protection priority, realize the harmonious coexistence between man and nature, build a marine ecological environment governance system, and promote the construction of ecological civilization.

(2) Guiding ideology. Thoroughly implement Xi Jinping's new era of socialism with Chinese characteristics, thoroughly implement the spirit of the 19th and 19th Central Committees of the Party, and firmly establish the concept of green mountains and green mountains, and strictly implement the decision-making arrangements of the Party Central Committee and the State Council. Adhere to ecological priority and green development, adhere to the most stringent ecological environmental protection system, effectively transform the working ideas of "to the sea", coordinate the development and protection of land and sea space, and achieve strict protection, effective restoration and intensive use of marine resources. Contribute to strengthening ecological environment protection and building beautiful China.



## **II. Strict control of new land reclamation**

(3) Strictly control new projects. We will improve the control of the total amount of reclamation and cancel the annual plan indicators for the reclamation area. In addition to the major national strategic projects, we will stop the approval of new reclamation projects. The newly added reclamation project should simultaneously strengthen the ecological protection and repair, and repair it while constructing, to minimize the reduction of ecosystem service functions. The reclamation projects that have not been approved or defrauded for approval shall be investigated and dealt with seriously by the relevant departments, and the original state of the sea shall be ordered to be severely punished according to law.

(4) Strict approval procedures. The major national strategic projects determined by the Party Central Committee, the State Council, and the Central Military Commission involve reclamation. The National Development and Reform Commission and the Ministry of Natural Resources shall, in accordance with the principles of strict control, ecological priority, and economic intensive, work with relevant departments to propose site selection and reclamation. Audit opinions on scale and ecological impact shall be submitted to the State Council for approval according to procedures.

In order to implement the decision-making arrangements of the Party Central Committee, the State Council, and the Central Military Commission, the provincial people's government proposes a reclamation project with national strategic significance. The provincial people's government shall report to the National Development and Reform Commission and the Ministry of Natural Resources; the National Development and Reform Commission and the Nature. The Ministry of Resources will conduct demonstrations with relevant departments, issue audit opinions on the necessity of reclamation, reclamation scale, and ecological impact, and report to the State Council for approval according to procedures. In principle, the reclamation projects involving the ecologically vulnerable and self-purifying sea areas such as Liaodong Bay, Bohai Bay, Laizhou Bay and Jiaozhou Bay will not be accepted.

## **III. Speed up the processing of the legacy of the reclamation history**

(5) Conduct comprehensive investigations on the status quo and formulate treatment plans. The Ministry of Natural Resources and the National Development and Reform Commission and other relevant departments should make full use of satellite remote sensing and other technical means to complete the national survey on the status of reclamation by the end of 2018, master the planning basis, approval status, sea use, sea area, and utilization status. Wait, find out the illegal and illegal land reclamation and the surrounding area, and report it to the relevant provincial people's government. In accordance with the principle of "ecological priority, economical intensive, classified policy, active and stable", the relevant provincial people's government, in conjunction with the special inspection of the reclamation carried out in 2017, determines the list of issues left over from the reclamation history and formulates the enclosing before the end of 2019. The plan for the disposal of historical issues in the sea proposes annual disposal targets and strictly limits the projects used for real estate development, low-level redundant construction of tourism and recreation projects and pollution of marine ecological environment. In principle, applications for new reclamation projects proposed by provinces (autonomous regions and municipalities directly under the central government) that have not completed the processing of historical issues will not be accepted.

(6) Properly dispose of legal compliance and reclamation projects. The provincial people's government shall be responsible for organizing the relevant local people's governments to supervise and guide the sea

area users in accordance with the progress of the reclamation project. In the case of reclamation, in principle, intensive use should be intensively carried out to carry out the necessary ecological restoration; the reclamation should be completed before the end of 2017 and the reclamation has not been completed, and the reclamation area should be controlled to the maximum extent and the necessary ecological restoration should be carried out.

(7) Disposal of illegal and reclamation projects in accordance with the law. The provincial people's government is responsible for serious investigation and punishment according to laws and regulations, and organizes relevant local people's governments to carry out ecological assessments. According to the violation of laws and regulations, the status quo of the reclamation and the impact on the marine ecological environment, the sea body is instructed to do a good job in the disposal and ecological damage compensation and ecological restoration shall be dismantled for the serious destruction of the marine ecological environment. If there is no significant impact on the marine ecological environment, the area of the reclamation shall be controlled to the maximum extent and rectified within the prescribed time limit. In case of illegal construction of military construction projects, the relevant departments of the Central Military Commission and the relevant local people's governments shall strictly deal with them according to law.

#### **IV. Strengthen marine ecological protection and restoration**

(8) Strictly observe the red line of ecological protection. Implement the most stringent protection and supervision of the red line of marine ecological protection that has been demarcated, comprehensively clean up the reclamation project of illegally occupying the red line area, ensure that the red line area of marine ecological protection does not decrease, the standard of natural coastline retention of the mainland does not decrease, and the island is now. The length of the sandy shoreline is not shortened.

(9) Strengthening the protection of coastal wetlands. We will comprehensively strengthen the management of various types of natural protected areas in the coastal areas, and select and establish a number of marine nature reserves, marine special protection areas and wetland parks. The important coastal wetlands and important species habitats to be protected, such as Tianjin Dagang Wetland, Hebei Huanghua Wetland, Jiangsu Rudong Wetland, Fujian Dongshan Wetland, and Guangdong Dapeng Bay Wetland, are included in the scope of protection.

(10) Strengthening remediation and repair. Formulate technical specifications for appraisal, assessment, compensation and restoration of coastal wetlands. Adhere to natural restoration and supplemented by artificial restoration, increase financial support, and actively promote major ecological restoration projects such as "Blue Bay", "South Red and North Willow" and "Ecological Island Reef", and support the retreat to the sea. Rehabilitate the beach, return farmland to the wet, and so on, and gradually repair the damaged coastal wetlands.

#### **V. Establish a long-term mechanism**

(11) Improve the investigation and monitoring system. Unified wetland technical standards, combined with the third national land survey, conduct site-by-site surveys of national wetlands, including coastal wetlands, and accurately evaluate and analyze wetland protection, utilization, tenure, ecological status and functions, and establish the dynamic monitoring system will further strengthen the monitoring of the reclamation and timely grasp the dynamic changes of coastal wetlands and natural shorelines.

(12) Strict use control. Adhere to the coordination of land and sea, integrate coastal wetland protection into national land space planning, strengthen the control of land and space use, improve environmental access thresholds, and strictly limit the implementation of reclamation in sea areas with ecologically sensitive and weak self-purification capabilities. The policy elimination and restriction projects are arranged in the coastal wetlands to realize the overall protection, system restoration and comprehensive management of the lakes and lakes in the landscape.

(13) Strengthen supervision and inspection of reclamation. The Ministry of Natural Resources shall include the speeding up of the remaining issues of the reclamation history into the key issues of the inspection, supervise the implementation of local rectification, increase the accountability of the inspectors, and compact the main responsibility of the local government. We must do a good job in the rectification of the problems discovered by the special inspectors in the first round of reclamation, and supervise and rectify the accounts to ensure that rectification is in place and accountability is in place. In the second half of 2018, the special inspection of the reclamation will be launched to "review" to ensure that the state's strict control of the reclamation policy is implemented, and that the illegal and illegal activities of reclamation will be resolutely curbed and severely cracked down.

## **VI. Strengthen organizational guarantee**

(14) Defining departmental responsibilities. Relevant departments of the State Council should raise awareness of the importance of coastal wetland protection, strengthen the awareness of surrounding reclamation, clarify the division of labor, implement responsibilities, strengthen communication, and form a joint force of management. The Ministry of Natural Resources should earnestly shoulder the responsibility of protecting and repairing and rationally utilizing marine resources. It will work with relevant departments such as the National Development and Reform Commission to establish a coordination mechanism for ministries and provinces, coordinate all aspects of strength, increase protection and control, and ensure that targets and tasks are completed.

(15) Implement local responsibilities. The coastal provinces (autonomous regions and municipalities directly under the Central Government) are the main body responsible for strengthening the protection of coastal wetlands and strictly controlling the reclamation. The main person in charge of the government is the first responsible person in the administrative region. It is necessary to strengthen organizational leadership, formulate implementation plans, and refine the decomposition targets. The task is to classify and dispose of the legacy of the reclamation in accordance with the law and increase the restoration of marine ecological protection.

(16) Promote public participation. It is necessary to timely publicize and report relevant policy measures and achievements in various forms, strengthen public opinion guidance and supervision, respond to public concerns in a timely manner, raise public awareness of coastal wetlands, promote public participation and joint protection, and create a good social environment.

State Council

July 14, 2018

(This item is released publicly)



## Appendix 2

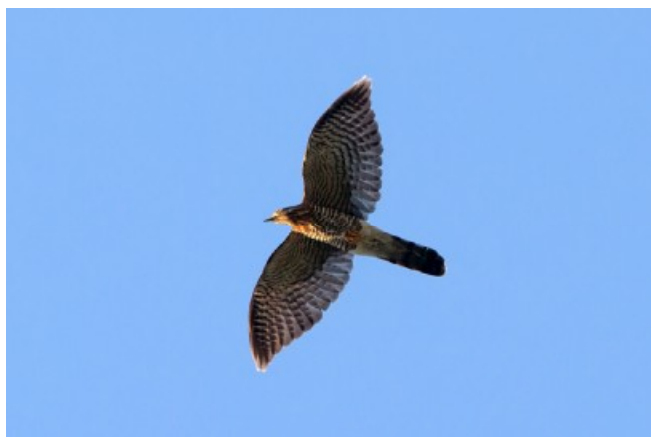
### Bird List

The full list of the 248 species recorded April 11 to June 6 2018

Bar-headed Goose	Black-crowned Night Heron	Dunlin
Greater White-fronted Goose	Eurasian Spoonbill	Little Stint
Tundra Bean Goose	Grey faced Buzzard	Long-billed Dowitcher
Ruddy Shelduck	Eastern Marsh Harrier	Asian Dowitcher
Common Shelduck	Pied Harrier	Common Snipe
Mandarin Duck	Chinese Sparrowhawk	Terek Sandpiper
Baikal Teal	Eurasian Sparrowhawk	Red-necked Phalarope
Garganey	Black Kite	Common Sandpiper
Northern Shoveler	Eastern Buzzard	Green Sandpiper
Gadwall	Eurasian Moorhen	Grey-tailed Tattler
Falcated Duck	Common Coot	Spotted Redshank
Eurasian Wigeon	Black-winged Stilt	Common Greenshank
Eastern Spot-billed Duck	Pied Avocet	Nordmann's Greenshank
Mallard	Eurasian Oystercatcher	Marsh Sandpiper
Northern Pintail	Grey Plover	Wood Sandpiper
Green-winged Teal	Pacific Golden Plover	Common Redshank
Common Pochard	Grey-headed Lapwing	Yellow-legged Buttonquail
Ferruginous Duck	Lesser Sand-plover	Oriental Pratincole
Tufted Duck	Greater Sand-plover	Black legged Kittiwake
Common Goldeneye	Kentish Plover	Saunders's Gull
Smew	Little Ringed Plover	Black-headed Gull
Common Merganser	Little Curlew	Little Gull
Red-breasted Merganser	Whimbrel	Relict Gull
Japanese Quail	Eastern Curlew	Pallas's Gull
Ring-necked Pheasant	Eurasian Curlew	Black-tailed Gull
Little Grebe	Black-tailed Godwit	Mew (Common) Gull
Great-crested Grebe	Bar-tailed Godwit	Herring Gull
Eared Grebe	Ruddy Turnstone	Herring Gull (mongolus)
Oriental Stork	Great Knot	Herring Gull (Vega)
Great Cormorant	Red Knot	Lesser Black-backed Gull Heuglins
Great Bittern	Ruff	Glaucous Gull
Yellow Bittern	Broad-billed Sandpiper	Little Tern
Grey Heron	Sharp-tailed Sandpiper	Gull-billed Tern
Purple Heron	Curlew Sandpiper	Caspian Tern
Great Egret	Temminck's Stint	White-winged Black Tern
Little Egret	Long-toed Stint	Whiskered Tern
Cattle Egret	Spoon-billed Sandpiper	Common Tern
Chinese Pond Heron	Red-necked Stint	Rock Dove (Feral Pigeon)
Striated Heron	Sanderling	Oriental Turtle Dove



Bull-headed Shrike © Matt Slaymaker



Large Hawk-cuckoo © Adrian Boyle

Eurasian Collared Dove	Collared Finchbill	Daurian Redstart
Red Collared Dove	Goldcrest	White-bellied Redstart
Spotted Dove	Asian Stubtail	White-throated Rock Thrush
Asian Koel	Manchurian Bush Warbler	Blue Rock-thrush
Large Hawk Cuckoo	Dusky Warbler	Siberian Stonechat (Stejneger's)
Lesser Cuckoo	Radde's Warbler	Siberian Thrush
Indian Cuckoo	Pallas's Leaf Warbler	White's Thrush
Common Cuckoo	Yellow-browed Warbler	Grey-backed Thrush
Oriental Cuckoo	Hume's Warbler	Grey-sided Thrush
Northern Boobook Owl	Arctic Warbler	Eyebrowed Thrush
Grey Nightjar	Kamchatka Leaf Warbler	Dusky Thrush
Common Swift	Two-barred Warbler	Naumann's Thrush
Pacific Swift	Pale-legged Leaf Warbler	Chinese Thrush
Hoopoe	Eastern Crowned Leaf Warbler	Purple-backed Starling
Common Kingfisher	Claudia's Leaf warbler	Red-billed Starling
Black-capped Kingfisher	Sulphur-bellied Warbler	White-cheeked Starling
Dollarbird	*Seicercus Warbler Sp	Crested Myna
Eurasian Wryneck	Thick-billed Warbler	Forest Wagtail
Rufous-bellied Woodpecker	Black-browed Reed Warbler	Eastern Yellow Wagtail
Great-spotted Woodpecker	Blunt-winged Warbler	Citrine Wagtail
Eurasian Kestrel	Oriental Reed Warbler	Grey Wagtail
Amur Falcon	Gray's Grasshopper Warbler	White Wagtail
Eurasian Hobby	Pallas's Grasshopper Warbler	Richard's Pipit
Peregrine Falcon	Lanceolated Warbler	Blyth's Pipit
Ashy Minivet	Baikal Bush Warbler	Olive-backed Pipit
Swinhoe's Minivet	Zitting Cisticola	Pechora Pipit
Tiger Shrike	Reed Parrotbill	Red-throated Pipit
Brown Shrike	Vinous-throated Parrotbill	American Pipit
Bull-headed Shrike	Chestnut-flanked White-eye	Tristram's Bunting
Black-naped Oriole	Japanese White-eye	Chestnut-eared Bunting
Black Drongo	Grey-streaked Flycatcher	Yellow-browed Bunting
Hair-crested Drongo	Dark-sided Flycatcher	Little Bunting
Azure winged Magpie	Asian Brown Flycatcher	Yellow-throated Bunting
Eurasian Magpie	Fujian Niltava	Yellow-breasted Bunting
Daurian Jackdaw	Blue-and-white Flycatcher	Chestnut Bunting
Carrion Crow	Rufous-tailed Robin	Black-faced Bunting
Asian Short-toed Lark	Siberian Blue Robin	Pallas's Bunting
Bank Swallow	Bluethroat	Brambling
Barn Swallow	Siberian Rubythroat	Common Rosefinch
Red-rumped Swallow	Red-flanked Blue-tail	Eurasian Siskin
Coal Tit	Korean Flycatcher	Hawfinch
Yellow-bellied Tit	Green-backed Flycatcher	Yellow-billed Grosbeak
Chinese Penduline Tit	Mugimaki Flycatcher	Eurasian Tree Sparrow
Light-vented Bulbul	Taiga Flycatcher	



Grey Nightjar © Matt Slaymaker



Red-rumped Swallow © Adrian Boyle



Shorebird ecological  
demographics and conservation

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