

PROJECT INFORMATION

Project title:

Conserving migratory waterbirds at a critical stopover site in Lianyungang, Jiangsu province of China.

Project starting and finishing date:

March 01, 2022 – November 30, 2022.

We used the EAAFP fund to cover the southward migration period (late June – early November) in 2022.

Name of organization:

Spoon-billed Sandpiper in China (hereafter SBSinChina)

Project person in charge:

Ziyou Yang

CONTENTS OF FINAL REPORT

Overall objectives

- To monitor the number and species of waterbirds during southward migration in Lianyungang, with an emphasis on Asian Dowitcher (*Limnodromus semipalmatus*), Nordmann's Greenshank (*Tringa guttifer*) and Great Knot (*Calidris tenuirostris*)
- To monitor waterbirds' habitat-use and local movement patterns in Lianyungang by using flag resighting records, satellite tracking data receivers, and direct observations
- To monitor waterbirds' habitat threats throughout the project
- To improve public awareness of Lianyungang's migratory waterbirds

Study sites

There are over ten east flowing rivers in Lianyungang. Those rivers meet the Yellow Sea at Linhong, Qingkou, Xingzhuang, and several other major estuaries, and form vast areas of natural intertidal flats (Zhang et al. 2020). Due to differences in geology, landforms, and ocean dynamics, etc., different estuarine tidal flats in Lianyungang have very different substrates, and thus support different waterbird species. For example, northern estuaries such as Xiuzhen, Hankou, and Xingzhuang have sandy beaches, whereas middle estuaries such as Qingkou and Linhong have soft mudflats. The southernmost estuaries from Xishu to Shaoxiang have rocky shorelines.



Due to budget constraints, SBSinChina did not survey all the estuaries in this project, but focused our efforts on Linhong (34°47'30"N, 119°14'12"E), Qingkou (34°51'22"N, 119°12'30"E), and Xingzhuang (34° 53'15"N, 119° 11'E) estuarine tidal flats and their nearby high-tide roosts (Fig. 1) where Asian Dowitcher and their similar species Black-tailed Godwit (*Limosa limosa*) and Bar-tailed Godwit (*Limosa lapponica*) are most abundant.



Figure 1. Map of the survey areas at Lianyungang's Linhong, Qingkou and Xingzhuang estuaries.

The major high-tide roosts are previous aquaculture ponds near the Linhong estuary which are now scheduled for city development (Fig. 1, 5). These ponds are large and have low water level solely maintained by rainwater, thus become suitable roosting habitats for shorebirds and gulls during high tide. There also are some aquaculture ponds near the Qingkou and Xingzhuang estuarine tidal flats, but those ponds are smaller and contain high water level almost all year round.





Figure 2. Linhong estuarine tidal flat. Photo by Yongxiang HAN



Figure 3. Dense smooth cordgrass (*Spartina alterniflora*) on the Qingkou estuarine tidal flat. Photo by Yongxiang HAN





Figure 4. Xingzhuang estuarine tidal flat. Photo by Yongxiang HAN



Figure 5. Shorebird high-tide roost near the Linhong estuary. Photo by Yongxiang HAN

Methodology

This report covers the period of March to December 2022. We conducted surveys twice a month during waterbird migration periods (i.e. April – May and August – October) and once a month outside the migration periods. Due to Covid-related lockdown, survey efforts (i.e. number of surveyors,



experience of surveyors, and areas covered in each survey) in March, April, and May are much less compared to 2019 – 2021.

All surveys were planned around spring tides when waterbirds congregate in high-tide roosts or in very small areas of intertidal flats that are not inundated by seawater. In each survey, waterbird surveyors identified and count all waterbirds in high-tide roosts or on intertidal flats using spotting scope. Extra attention was paid to look for flagged individuals. Survey tracks were recorded using the Chinese navigation app 2bulu (known as 两步路 or 户外助手 in Chinese).

In autumn 2021, SBSinChina surveyors observed multiple flagged Nordmann’s Greenshanks from Schaste Bay, Russia, and at least one of them was wearing a Nano satellite tag. Therefore, in August and September 2022, SBSinChina used a Bluetooth receiver manufactured by the Druid Inc. to search for signals from satellite-tagged individual(s).

RESULTS

Threatened species on the IUCN Red List

We recorded 13 threatened waterbirds on the Lianyungang coast, including the Critically Endangered (CR) Siberian Crane (*Leucogeranus leucogeranus*), Endangered (EN) Nordmann’s Greenshank, Great Knot, Far Eastern Oystercatcher (*Haematopus ostralegus osculans*), and Black-faced Spoonbill (*Platalea minor*), as well as Vulnerable (VU) Saunders’s Gull (*Chroicocephalus saundersi*), Relict Gull (*Ichthyaetus relictus*), Red-crowned Crane (*Grus japonensis*), Hooded Crane (*Grus monocha*), Chinese Egret (*Egretta eulophotes*), Baikal Teal (*Sibirionetta formosa*), and Common Pochard (*Aythya ferina*). Only Common Pochard, which overwinters on the Lianyungang coast, is not on China’s List of Protected Animals.





Figure 6. A flock of Siberian Cranes flying over the Linhong estuarine tidal flat. Photo by Jinchi SHAO



Figure 7. Juvenile Great Knot on the Xingzhuang estuarine tidal flat. Photo by Min ZHUGE
www.birdinginchina.com





Figure 8. A relict gull resting at a high-tide roost. Photo by Min ZHUGE www.birdinginchina.com

Species exceeding 1% of their flyway population

The Ramsar Convention on Wetlands uses eight criteria to identify wetlands of international importance. Criterion 6 states that “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.” According to the Fifth Edition of the Waterbird Populations Estimates (WPE5.0), between March and December 2022, we recorded 18 species whose number exceeded 1% of their flyway population (Table 1).

Over 1% Pied Avocet (*Recurvirostra avosetta*) were recorded every month except for June and July. Similarly, more than 1% Gray Plover (*Pluvialis squatarola*) were recorded monthly except for March, June, and July. Asian Dowitcher, Bar-tailed Godwit, and Black-tailed Godwit rely heavily on the Lianyungang coast during spring and autumn migration periods. Sharp-tailed Sandpiper (*Calidris acuminata*), in contrast, is more dependent on Lianyungang in spring, but its number decreased by 63.8% compared to the same period in 2019. The number of wintering Far Eastern Oystercatcher and Ruddy Shelduck (*Tadorna tadorna*) peaked in December.

Table I. Summary of species whose number exceeded 1% of their flyway population between March and



December 2022. We used the WPE5.0 for all species except for Nordmann's Greenshank (for which we used the 1,000 – 2,000 estimates according to BirdLife International (2016)).

Species	IUCN Conservation status	Date recorded	Number	% flyway population
Nordmann's Greenshank	EN	May 14	108	6.2%~10.8%
		August 5	124	6.2%~12.4%
Saunders's Gull	VU	September 4	155	1.8%
Sharp-tailed Sandpiper	VU	May 2	4,000	2.5%
Red-crowned Crane	VU	March 24	6	1.5%
Hooded Crane	VU	November 15	40	4.0%
Eurasian Curlew	NT	March 30	1,769	1.8%
		December 11	1,180	1.2%
Asian Dowitcher	NT	April 24	700	3.0%
		May 2	7,000	30.4%
		May 15	16,888	73.4%
		July 20	650	2.8%
		August 5	10,641	46.3%
		August 17	4,777	20.8%
Curlew Sandpiper	NT	September 3	276	1.2%
		May 15	1,980	1.4%
Far Eastern Oystercatcher	NT	December 10	1,590	22.7%
Black-tailed Godwit	NT	April 24	1,500	1.1%
		May 2	3,000	2.1%
		August 5	5,896	4.2%
		August 17	2,407	1.7%
Bar-tailed Godwit	NT	April 24	6,500	4.3%
		August 17	5,380	3.6%
Dunlin	LC	April 24	13,040	1.3%
Broad-billed Sandpiper	LC	August 5	833	3.3%
Pied Avocet	LC	March 24	1,800	1.8%
		March 30	6,000	6.0%
		April 15	1,400	1.4%
		April 24	2,000	2.0%
		May 2	1,000	1.0%



Species	IUCN Conservation status	Date recorded	Number	% flyway population
		May 13	1,691	1.7%
		August 4	1,968	2.0%
		August 17	3,670	3.7%
		September 4	8,038	8.0%
		September 24	9,800	9.8%
		October 22	5,000	5.0%
		November 16	3,700	3.7%
		December 11	4,000	4.0%
Gray Plover	LC	April 15	2,500	2.5%
		April 24	4,000	4.0%
		May 13	2,445	2.4%
		August 17	1,000	1.0%
		September 24	1,840	1.8%
		October 22	2,900	2.9%
		November 16	1,290	1.3%
		December 11	1,500	1.5%
Kentish Plover	LC	September 4	990	1.3%
Dalmatian Pelican	NT	October 6	6	6.0%
Common Shelduck	LC	December 11	3,000	2.5%

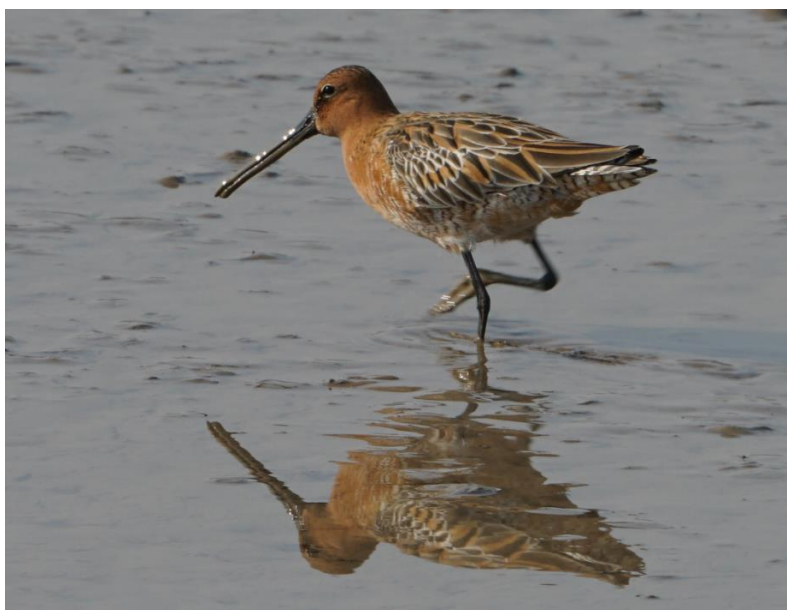


Figure 9. An Asian Dowitcher in beautiful breeding plumage. Photo by Chuangbin CHEN





Figure 10. Asian Dowitchers, Nordmann's Greenshanks, and other waterbirds roosting at a high-tide roost near the Linhong estuary. Photo by Ziyu YANG



Figure 11. Oriental Stork (front) and Dalmatian Pelican (back) foraging in an aquaculture pond near the Linhong estuary. Photo by Yongxiang HAN

Asian Dowitcher

Among all the waterbirds recorded, Asian Dowitcher relies most heavily on the coastal wetlands in



Lianyungang, and it is the focal species of our project. On May 15, 2022, 16,888 Asian Dowitchers were recorded at Lianyungang’s Linhong and Qingkou estuaries, which constitutes nearly 73.4% of the species’ estimated global population. When we compare this number with the survey results from 2019 to 2021, we noticed a considerable decline of about 37.9%. We think this is likely because SBSinChina staff were all locked down at home in May, survey efforts were not as much as in previous years.

Consistent with their transiting patterns in the past three years, the number of Asian Dowitcher peaked in early August and then halved in mid-August. In early September, their number quickly dropped to below 300, and no Asian Dowitcher was observed in October (Fig. 12). On August 5, we recorded 10,641 Asian Dowitchers at Linhong and Qingkou estuaries, which makes up approximately 46.3% of the species’ estimated global population. This is a 42.8% increase compared to 2021.

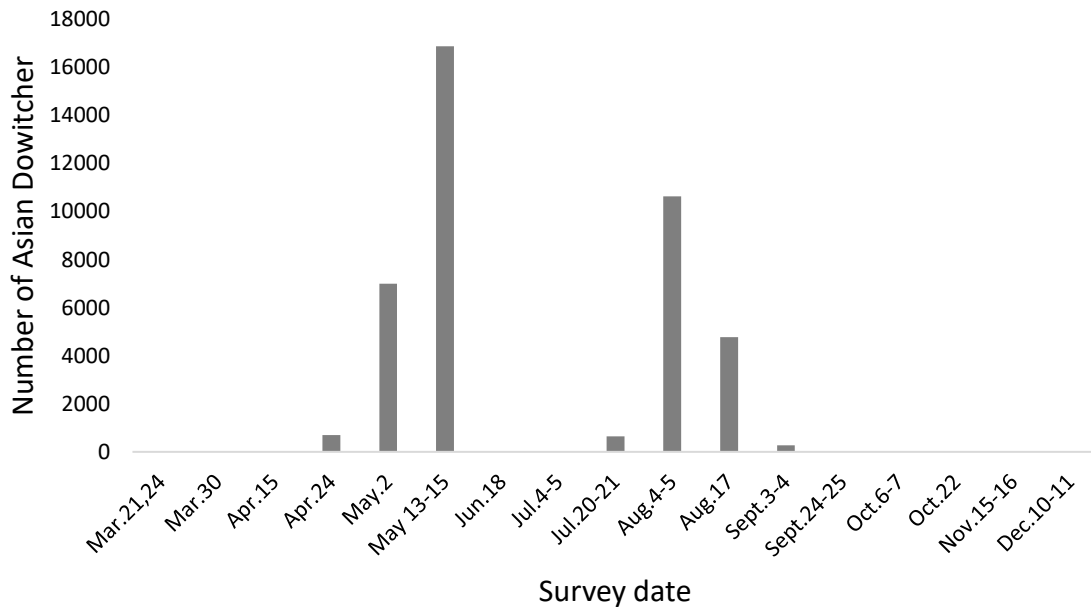


Figure 12. The number of Asian Dowitchers at Lianyungang’s Linhong, Qingkou, and Xingzhuang estuarine tidal flats between March 16-December 15, 2022.

Throughout the project, SBSinChina recorded multiple flagged Asian Dowitchers. For example, W6 is the first Asian Dowitcher marked at Mai Po Nature Reserve, Hong Kong. It was born in 2020 and flagged while passing through the nature reserve on September 20, 2020. Our observation of this individual on August 4, 2022 near Qingkou estuary is its very first resighting record. Moreover, we recorded Yellow 1A which was flagged at Roebuck Bay, Northwest Australia on August 13, 2017. Yellow



1A was previously observed by SBSinChina surveyors in Lianyungang in May 2020, meaning that it may pass through Lianyungang during both northward and southward migration periods.

Nordmann's Greenshank

Nordmann's Greenshank is another focal species of the project. Our survey results show that Nordmann's Greenshank relies heavily on the Lianyungang coast during both northward and southward migrations. In spring, its number peaked in mid-May, making up roughly 5.4-10.8% of the estimated global population. In autumn, we recorded its maximum number in early August, which constitutes 6.2-12.4% of its global population (Fig. 13).

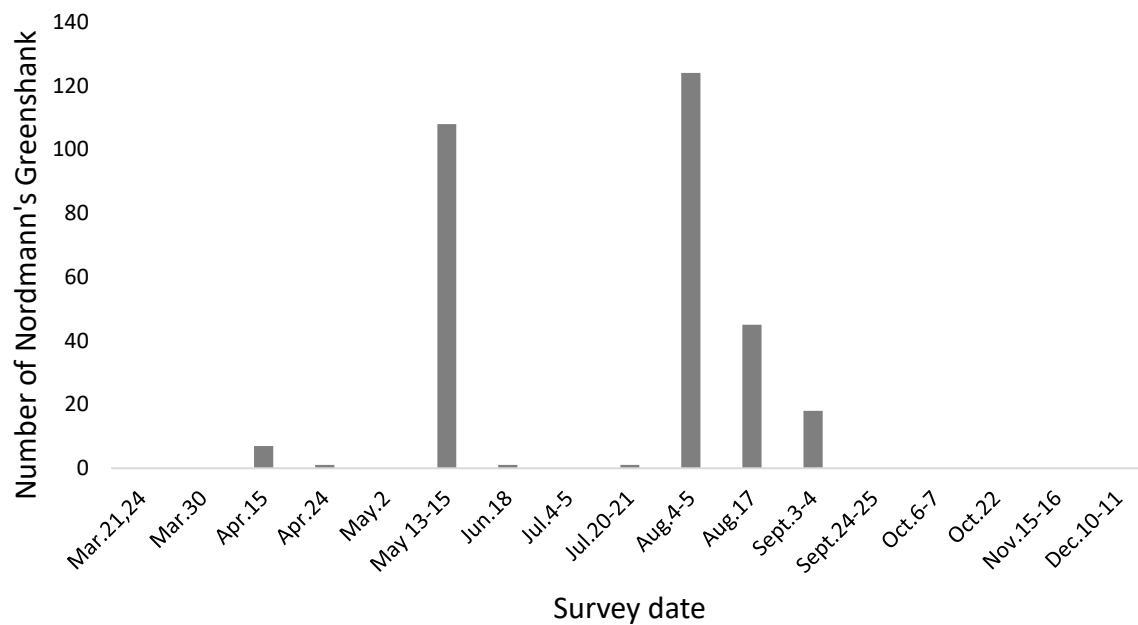


Figure 13. The number of Nordmann's Greenshank at Lianyungang's Linhong, Qingkou, and Xingzhuang estuarine tidal flats between March 16-December 15, 2022.

Due to technical problems, we did not receive signals from the satellite-tagged individuals from Russia. Nevertheless, we did observe one marked Nordmann's Greenshank from the Russian breeding ground (Fig. 15). This individual had a red flag on its left tibia, and red and white (color most likely faded) rings on its right tibia. We confirmed with Philipp Maleko from the University of Florida, that the individual is most likely to be Red P1. Red P1 was flagged at the Schaste Bay of Russia in 2019 and lost the Nano satellite tag on its back.





Figure 14. Surveyors tried to receive signals from the satellite-tagged Nordmann's Greenshanks by setting up a Bluetooth hub manufactured by the Druid Inc. Photo by Ziyou YANG



Figure 15. Red P1 roosting near the Linhong estuary. Photo by Wenjie XUE

Great Knot

Unlike Asian Dowitcher, Great Knot prefers harder intertidal flats with sandier substrate, so sandy beaches in northern Lianyungang (e.g. Xiuzhen, Mutao, Hankou, Longwang, and Xingzhuang estuarine



tidal flats) are more suitable to them. Since our project mainly focuses on Asian Dowitcher, we allocated resources (i.e. budget, surveyors) to estuaries where Asian Dowitcher is most abundant, and only visited the northern sandy beaches if situation permitted. Therefore, our counts of Great Knot may be largely underestimated (Fig. 16). On August 20 in his spare time, SBSinChina’s senior surveyor Lin ZHANG recorded 4,000 Great Knots at Hankou estuarine tidal flat, which constitutes roughly 1.4% of the species’ flyway population.

During northward migration period, Great Knot is one of the earliest arrivers to Lianyungang. Its number peaked in late March, which is much earlier than that of Asian Dowitcher and Nordmann’s Greenshank (in mid-May). During southward migration, in contrast, the maximum number of Great Knot occurred later (on August 20 in 2019, 2020, and 2022).

Since 1980s, an expedition team has been banding ‘wintering’ waterbirds at Roebuck Bay and 80-mile Beach in Northwest Australia. As both sites are important wintering ground for Great Knot, a good number of Great Knots have been marked with yellow flags. In addition, Shanghai Chongming Dongtan National Nature Reserve as an important stopover site for Great Knot (Ma et al. 2013) has also banded considerable number of Great Knots in the past decade. Throughout this project, SBSinChina observed many marked Great Knots from Northwest Australia and Shanghai Chongming Dongtan (mostly in the northern estuaries such as Hankou and Xingzhuang; Table II). All resighting records have been submitted to their corresponding banding agency through Ms. Katherine LEUNG.

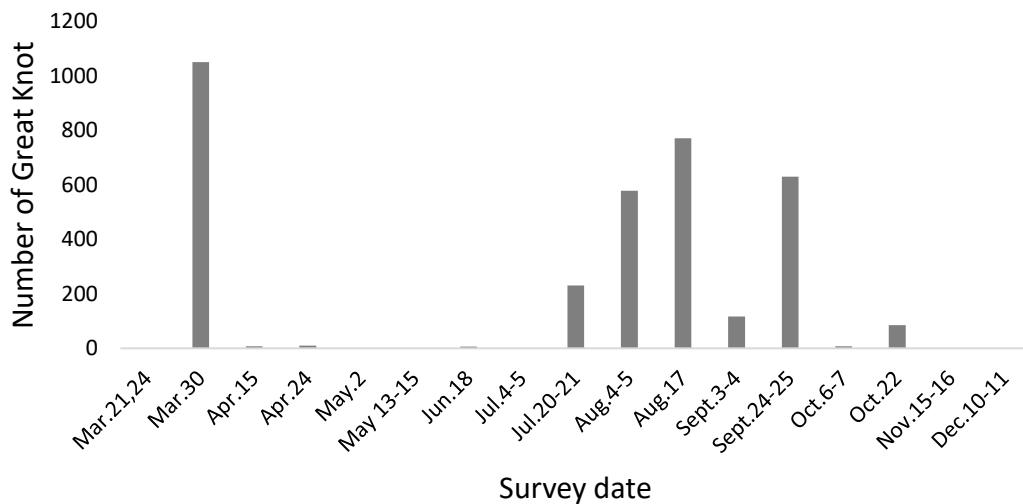


Figure 16. The number of Great Knot at Lianyungang’s Linhong, Qingkou, and Xingzhuang estuarine tidal flats between March 16-December 15, 2022.



Table II. Summary of marked Great Knots on the Lianyungang coast. Since most SBSinChina staff were locked down at home during northward migration, nearly all resighting records were made during southward migration.

Flag	Date	Details about individual
Yellow elf 5ZT	July 21	Marked at Roebuck Bay in July 2019; first overseas record.
Black over green clipped plain flags	July 21	Marked on the Libong Island of Thailand
Black over white elf CL4	August 05	Marked at Chongming Dongtan Nature Reserve on April 08, 2020 as adult.
Black over white elf P83	August 05	Marked at Chongming Dongtan Nature Reserve on March 30, 2016 as a second-calendar year bird.
Green elf AJN	August 05	Marked in Queensland, Australia in September 2012; first resighting record.
Black over yellow elf YA	August 05	Marked in Kamchatka, Russia
Yellow elf XSA	August 05	Marked at Roebuck Bay in July 2013; recorded at Bohai Bay for multiple times during northward migration. This is the first resighting record during southward migration.
Yellow elf 6AE	August 05	Marked near 80 Mile Beach in November 2019; first overseas record.
Green over blue elf 00L	August 06	Marked at Tiaozini, Yancheng on September 29, 2019
Yellow elf UCD	August 06	Marked at Roebuck Bay on March 06, 2011; resighted in Kamchatka in 2012, 2016, and 2019.
Black over yellow elf YA	August 20	Marked in Kamchatka, Russia
Black over yellow elf AZZ	August 20	Marked in Kamchatka, Russia
Black over white elf Y31	August 20	Marked at Chongming Dongtan Nature Reserve on March 30, 2018 as adult.
Black over white elf J08	August 20	Marked at Chongming Dongtan Nature Reserve on March 28, 2015 as adult.
Black over white elf U16	August 20	Marked at Chongming Dongtan Nature Reserve on March 27, 2017 as adult.
Black over white elf C89	August 20	Marked at Chongming Dongtan Nature Reserve on April 06, 2017 as adult.
Yellow elf ZTD	August 20	Marked at Roebuck Bay on February 22, 2014 as a second-calendar year bird.
Yellow elf 2EW	August 20	Marked at Roebuck Bay on February 20, 2016; resighted in Kamchatka in July 2016 and July 2019.
Yellow elf 1TC	August 20	Marked at Roebuck Bay on September 13, 2015 as a second-year bird.
Yellow elf YHU	August 20	Marked at Roebuck Bay on November 03, 2013; resighted in Lianyungang in August 2020.



Flag	Date	Details about individual
Yellow elf JCY	August 20	Marked at Roebuck Bay on November 25, 2008 as adult.
Yellow elf 6JX	August 20	Marked at Roebuck Bay on October 20, 2019 as adult.
Yellow elf XEZ	August 20	Marked at Roebuck Bay on November 04, 2012 as adult.
Yellow elf UXA	August 20	Marked at Roebuck Bay on March 11, 2011 as subadult; resighted in Kamchatka in 2016, 2017, and 2019.
Yellow elf 2YZ	August 20	Marked at Roebuck Bay on February 25, 2016 as adult.
Black over yellow elf D1	August 22	Marked in Kamchatka, Russia
Black over yellow elf AYX	August 22	Marked in Kamchatka, Russia
Black over yellow elf GB	August 22	Marked in Kamchatka, Russia
Black over yellow elf K9	August 22	Marked in Kamchatka, Russia. Black flag missing
Black over yellow elf L6	August 22	Marked in Kamchatka, Russia. Black flag missing
Yellow elf 3HH	August 22	Marked at Roebuck Bay on November 19, 2009 as adult.
Yellow elf YUX	August 22	Marked at Roebuck Bay on November 06, 2013 as adult.
Yellow elf 4LH	August 22	Marked at Roebuck Bay on March 01, 2018 as adult.
Yellow elf WNN	August 22	Marked at Roebuck Bay on March 06, 2012 as adult; resighted in Bohai Bay during northward migration in 2014 and 2015.
Yellow elf 5AT	August 22	Marked at Roebuck Bay on March 01, 2018 as adult; resighted in Lianyungang in August 2020.
Yellow elf 2NV	August 22	Marked at Roebuck Bay on February 20, 2016 as adult.



Figure 17. Yellow 6AE foraging on the Hankou estuarine tidal flat on August 5, 2022. Photo by Ziyou YANG



Discussion

Results from this project show that coastal wetlands of Lianyungang support a large number of waterbirds almost all year round. From March to December 2022, SBSinChina recorded 13 threatened species on the IUCN Red List, as well as 18 species whose number exceeded 1% of their flyway population. The single-day count of three waterbird species (i.e. Asian Dowitcher, Nordmann's Greenshank, and Far Eastern Oystercatcher) in particular, exceeded 10% of their estimated global population. Moreover, we recorded many flagged individuals from multiple protected areas along the flyway (e.g. Roebuck Bay, Mai Po Nature Reserve, Chongming Dongtan National Nature Reserve). All the above-mentioned results suggest that Lianyungang is a critically important stopover and wintering site for waterbirds on the EAAF. Protecting its coastal wetlands is necessary to ensure conservation of EAAF waterbirds.

However, coastal wetlands of Lianyungang are still largely unprotected and face many threats, the most imminent being the Blue Bay project at Linhong estuarine tidal flat. Blue Bay is a self-proclaimed 'ecological restoration' project which plans to convert 1,500 ha natural intertidal flats into sandy beaches and deep-water recreational areas. In our waterbird surveys in January, March, and July, SBSinChina recorded Endangered Nordmann's Greenshank, Endangered Far Eastern Curlew, and Near Threatened Asian Dowitchers many times (Fig. 18). Once the project is completed, it will destroy nearly 1/3 of Asian Dowitcher's foraging habitats in Lianyungang and have devastating impacts on the species (Yang et al. 2021).



Figure 18. In August 2021, SBSinChina observed 223 Asian Dowitchers foraging in the Blue Bay construction area. Photo by Peng HUANG



Although the peak number of Asian Dowitcher dropped drastically compared to 2019 – 2021, its number increased during southward migration. We think the decrease in spring is most likely due to lack of survey efforts and does not reveal real changes in population. Nevertheless, one notable difference in 2022 is that 90% of Asian Dowitchers were recorded at Linhong rather than Qingkou estuary. We think this is due to the rapid expansion of smooth cordgrass at Qingkou estuary taking over precious foraging ground and roosting habitats of shorebirds (Fig. 19).



Figure 19. Aerial view of smooth cordgrass on the Qingkou estuarine tidal flat of Lianyungang. Photo by Peng HUANG

Based on the survey results in 2022, SBSinChina has the following recommendations:

- 1) Continue to survey waterbirds on the Lianyungang coast (including Linhong, Qingkou, and Xingzhuang estuaries covered in this project, as well as northern estuaries such as Hankou and Xiuzhen). Closely monitor waterbird population trend and habitat threat and take immediate actions to tackle threats.
- 2) Currently the Blue Bay project is forced to be suspended by the central government. Whether this project will resume depends on results of the environmental public interest litigation, as well as attitudes of high-level authorities. SBSinChina will continue to work with the plaintiffs to provide supplementary pieces of evidence for the litigation.
- 3) Now that the Chinese government is determined to contain the proliferation of smooth cordgrass by 2025 (Xinhua, 2023), take this opportunity to work with local authorities such as



the Lianyungang Forestry Station (i.e. 连云港林业技术指导站) to manage the smooth cordgrass at Qingkou estuarine tidal flat and restore the natural intertidal flat.

Reference

Ma, Z., Hua, N., Peng, H., Choi, C., Battley, P. F., Zhou, Q., ... & Tang, C. (2013). Differentiating between stopover and staging sites: functions of the southern and northern Yellow Sea for long-distance migratory shorebirds. *Journal of Avian Biology*, 44(5), 504-512.

Xinhua. (2023) China aims to contain proliferation of invasive plant by 2025. *The State Council Information Office of the People's Republic of China*, http://english.scio.gov.cn/pressroom/2023-02/17/content_85111546.htm.

Yang, Z., Li, J., Han, Y., Hassell, C. J., Leung, K., Melville, D. S., Yu, Y., Zhang, Z., & Choi, C. (2021) Coastal wetlands in Lianyungang, Jiangsu Province, China: probably the most important site globally for the Asian Dowitcher (*Limnodromus semipalmatus*). *Avian Research*, 12(38).

Zhang, S., Gao, S., Li, N., Wang, Z. (2020) Community structure and diversity of wintering waterbirds in four estuary wetlands of Lianyungang city, Jiangsu province. *Journal of Ecology and Rural Environment*, 36(5):560-566. [In Chinese]

