China Coastal Waterbird Census was initiated in September 2005 with the aim of understanding the distribution, migration and seasonal changes of waterbirds along the coast of mainland China through monthly-synchronized surveys. It is hoped that the results of the census can help conserving China's biodiversity and Important Bird Areas. The book is a report written based on the data collected from January 2012 to December 2019.

The CCWC is supported by the following organizations:

鸻鹬鸟类研究所 Waders Study Institute
盘锦市观鸟会 Panjin Bird Watching Society
秦皇岛市观（爱）鸟协会 Qinhuangdao Birds Protection Association
天津观鸟会 Tianjin Birdwatching Society
沧州师范专科学院生命科学系 Department of Life Science, Cangzhou Normal University
山东黄河三角洲国家级自然保护区管理局 Yellow River Delta National Nature Reserve, Shandong
青岛市观鸟协会 Qing-dao Birding Association
连云港市墟沟小学 Lianyungang Xugou Primary School
勺嘴鹬在中国 Spoon-billed Sandpiper in China
上海野鸟会 Wild Bird Society of Shanghai
中国林业科学研究院亚热带林业研究所 Research Institute of Subtropical Forestry, Chinese Academy of Forestry
溫州野鸟会 Wenzhou Bird Conservancy
福建省观鸟协会 Fujian Birdwatching Society
厦门市滨海湿地与鸟类研究中心 Xiamen Coastal Wetlands and Birds Research Center
厦门市观鸟协会 Xiamen Bird Watching Society
广东海丰鸟类省级自然保护区 Haifeng Bird Provincial Nature Reserve, Guangdong Province
深圳市观鸟协会 Shenzhen Bird Watching Society
茂名市观鸟会（筹）Maoming Bird Watching Society (In preparation)
湛江市爱鸟协会 Zhanjiang Bird Watching Society
澳门特别行政区市政署 Municipal Affairs Bureau (IAM), Macau SAR
澳门鸟会 Macau Aves Society
香港观鸟会 The Hong Kong Bird Watching Society

ISBN: 978-962-7508-26-7

中国沿海水鸟同步调查项目组
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China Coastal Waterbird Census Report

(1.2012 – 12.2019)

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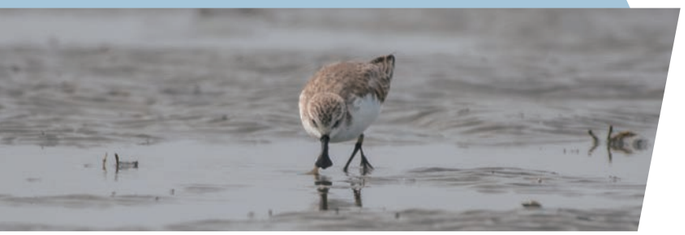
Spoon-billed Sandpiper (Photo credit: Jun Rong)



China Coastal Waterbird Census Report (1.2012 – 12.2019)

Report Writing: Chi-Yeung CHOI, Jing LI, Wen-Jie XUE

Typesetting: Mao Morning Studio

Proofreading: Chi-Yeung CHOI, Jing LI, Yat-Tung YU, Chiu LAM

Translated by Oxford Translation (HK) Ltd, Jing LI

Published by The Hong Kong Bird Watching Society
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Sponsor: Swire Trust

Surveyors at work (Photo credit: Ke Da)

Published in January 2021
ISBN: 978-962-7508-26-7

Recommended citation Choi, C.-Y., Li, J. & Xue, W.J. (2020). China Coastal Waterbird Census Report (Jan. 2012–Dec. 2019). Hong Kong: Hong Kong Bird Watching Society.

Photo credits (Front cover, back cover and inner front cover background):
Line-up of surveyors (The late Jun ZHANG)
Overhead in Shinanhe Dao (Xue-Zhong Liu)
Sunset in Beidaihe (Xue-Zhong Liu)
Panoramic view of Shinanhe Dao (Xue-Zhong Liu)

中国沿海水鸟同步调查项目组
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China Coastal Waterbird Census Report

(1.2012 – 12.2019)

Black-faced Spoonbill and Eurasian Spoonbill (Photo credit: Xiao Shan Gang)

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Contents

Abstract

The China Coastal Waterbird Census group conducted monthly censuses from 2012 to 2019 at 25 coastal sites in China. A total of 1,284 counts were conducted by around 480 surveyors. After integrating all the records together, these census sites could support 180 waterbird species, with at least 0.97 million waterbirds if an annual peak count was used (sum of all locations in any single round of census). On the other hand, limiting the data to boreal winter (December and February peak abundance) yielded 168 waterbird species and 0.41 million waterbirds. Among the 180 species recorded, 7 were under first class state protection, 20 under second class state protection, 4 listed as Critically Endangered on the IUCN Red List, 7 as Endangered and 13 as Vulnerable. Results from the censuses conducted in these 8 years indicated that the abundance of 26 waterbird species (sum of all locations in any single round of census) exceeded 20% of their flyway population estimate. Among these 26 species, 8 exceeded 75% of their flyway population estimate (Bean Goose Anser fabalis, Red-crowned Crane Grus japonensis, Saunders's Gull Chroicocephalus saundersi, Relict Gull Ichthyaetus relictus, Asian Dowitcher Limnodromus semipalmatus, Nordmann's Greenshank Tringa guttifer, Spoon-billed Sandpiper Calidris pygmaea and Dalmatian Pelican Pelecanus crispus), indicating the critical importance of Chinese coastal wetlands for the survival of these waterbirds.

Background

The coastline of China is over 24,000 kilometers long and many intertidal wetlands along this coast are important habitats for waterbirds in the East Asian-Australasian Flyway. Since September 2005, volunteers from various coastal sites have been carrying out the China Coastal Waterbird Census on a monthly basis with the aim to gain a better understanding on the seasonal and interannual variations of waterbird species distribution along the coast of China, so as to provide a scientific basis for making decisions related to waterbird and wetland conservation. It has been nearly 15 years since the debut of the "China Coastal Waterbird Census", during which, three relevant reports have been published, covering surveys for the periods from September 2005 to December 2007 (China Coastal Waterbird Census Group 2009), from January 2008 to December 2009 (China Coastal Waterbird Census Group 2011), and from January 2010 to December 2011 (China Coastal Waterbird Census Group 2015).

The seasonal changes of coastal waterbird populations have been described in detail in the three reports published in the past, and in brief, Chinese coastal wetlands are important stopover sites and wintering grounds for migratory waterbirds. Under the influence of seasonal changes during migration, the peak count of waterbirds generally occurs in April during northward migration season, and the waterbird population along the coast of China falls to the lowest in June when most birds arrive in the breeding grounds in the north (China Coastal Waterbird Census Group 2015). In addition, the early reports also summarized the bird species with significant abundance (exceeding 1% flyway estimate for that species) at each survey site. This report will consolidate data for the eight years from January 2012 to December 2019, update some available statistics, and analyze population trends for species of high public attention and sites with a long survey history.

Methods

Survey Method, Date & Surveyor Overview

Following the same survey method for 2005-2011, the China Coastal Waterbird Census Group conducted survey by car or on foot along routes at fixed survey sites. They used binoculars and telescopes to identify waterbirds and record their numbers, and the survey time varied for different sites depending on local conditions, with some surveys conducted during rising tide, some at high tide, and some during falling tide. Relevant details were recorded in the survey log sheets for that day.

In eastern China, coastal development and frequent human activities have led to interannual changes in bird habitats. The area of intertidal wetlands at some survey sites have shrinked gradually over the past decade or the original high tide roosts have been converted for other purposes that are no longer suitable for waterbirds, so the distribution of waterbirds in some regions may have changed overtime (Yang et al. 2011). For this reason, some of the survey areas have been adjusted while some sites are no longer surveyed. The variation in survey data resulting from these changes need to be noted in analyzing changes in waterbird population (Appendix Table 1).

The Hong Kong Bird Watching Society will announce the survey date at the beginning of each year and advise to conduct survey based on local conditions. Surveyors at each site will typically complete the survey on or 1-2 days before or after the survey date to achieve synchronization. During non-migratory seasons, the survey may be completed one week before or after the survey date according to the judgment of local coordinators. In some regions, surveyors may, according to the actual condition, conduct survey more frequently, especially on some endangered waterbirds, such as Spoon-billed Sandpiper (*Calidris pygmaea*) and Far Eastern Curlew (*Numenius madagascariensis*), etc., during the spring and autumn migration periods. Some records will be included in this report with some special notes. You may refer to Appendix A or early reports (China Coastal Waterbird Census Group 2009, 2011, 2015) for description of individual sites.

The waterbird census work initiated by the China Coastal Waterbird Census Group in 2005 is basically conducted on a voluntary basis, and professional teams are gradually forming in some regions. Moreover, the China Coastal Waterbird Census Group has established long-term extensive project partnership with universities and conservation foundations and published papers in peer-reviewed journals. At present, surveyors participating in the synchronized surveys are mostly volunteers, and in some regions, professionals take charge of and implement the project. This kind of citizen science project primarily initiated, organized and promoted by the private sector has become one of the most important forms of environmental protection and monitoring in China and globally (Ma et al. 2013).

Survey Sites

From January 2012 to December 2019, 26 survey groups conducted synchronized surveys at 25 survey sites; in particular, surveys at Guangdong Shenzhen Bay/Hong Kong Deep Bay were conducted by two different teams in Shenzhen and Hong Kong within the Bay Area, respectively, but the surveys were conducted on a synchronized basis through coordination to minimize the chance of double-counting. Therefore, the data concerning Shenzhen Bay/Hong Kong Deep Bay could be combined and analyzed together from 2012 onwards (Figure 1). In addition, data for some years/months are not available for individual survey sites due to inadequate staffing, limited resources or being included very recently.

Analysis of Waterbird Population Changes

Using the log-linear model (Poisson regression) (van Strien et al. 2004), we estimated the relationship of bird abundance with the survey sites and years and calculated the total slope and its 5% confidence interval to determine the changes in each bird species or population between 2012 and 2019. Relevant calculation will be made using the rtrim v2.1.1 toolkit in R software.

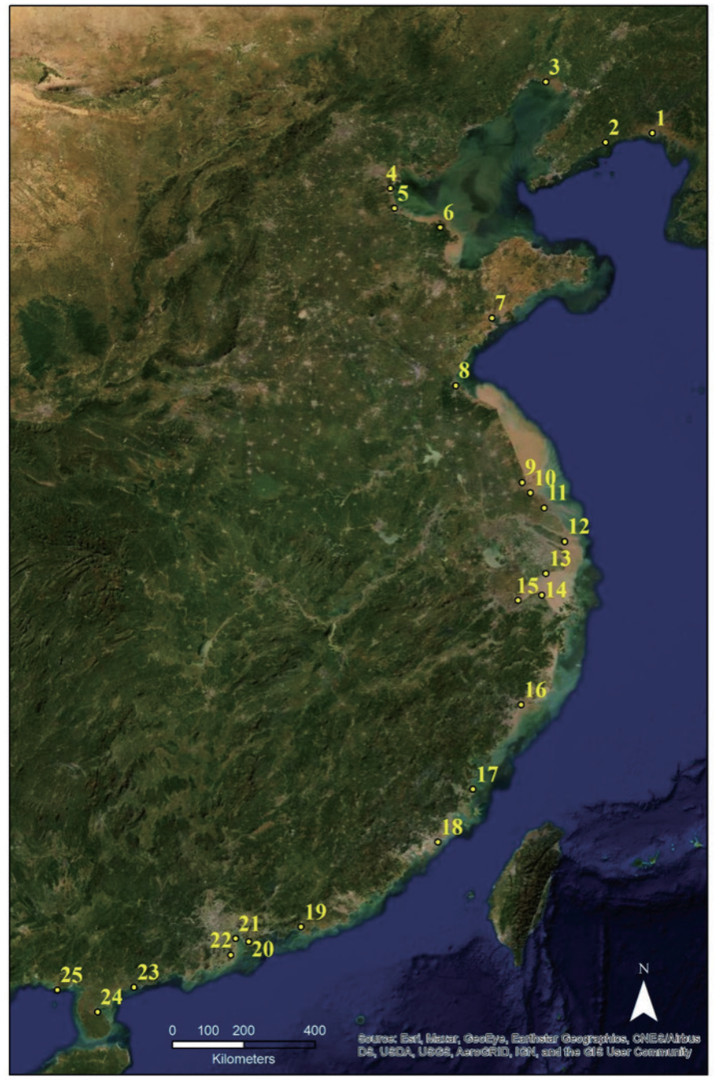

Figure 1. The survey locations between 2012 and 2019

1. 辽宁丹东 Liaoning Dandong
2. 辽宁庄河 Liaoning Zhuanghe
3. 辽宁盘锦 Liaoning Panjin
4. 天津 Tianjin
5. 山东东营 Shandong Dongying
6. 河北沧州 Hebei Cangzhou
7. 山东胶州湾 Shandong Jiaozhou Bay
8. 江苏连云港 Jiangsu Lianyungang
9. 江苏条子泥 Jiangsu Tiaozini
10. 江苏洋口 Jiangsu Yangkou
11. 江苏东凌 Jiangsu Dongling
12. 上海 Shanghai
13. 杭州湾北部 Hangzhou Bay North
14. 浙江杭州湾 Zhejiang Hangzhou Bay
15. 浙江绍兴 Zhejiang Shaoxing
16. 浙江温州湾 Zhejiang Wenzhou Bay
17. 福建闽江口 Fujian Minjiang Estuary
18. 福建泉州湾 Fujiang Quanzhou Bay
19. 广东海丰 Guangdong Haifeng
20. 广东深圳湾 / 香港后海湾 Guangdong Shenzhen Bay/Hong Kong Deep Bay
21. 广东南沙 Guangdong Nansha
22. 澳门 Macau
23. 广东茂名 Guangdong Maoming
24. 广东湛江 Guangdong Zhanjiang
25. 广西北海 Guangxi Beihai

Results & Discussion

Surveyors' Effort

From January 2012 to December 2019, about 480 surveyors were involved in 1,268 surveys at 25 survey sites; in particular, surveys at Guangdong Shenzhen Bay/Hong Kong Deep Bay, and Fujian Quanzhou Bay and Minjiang Estuary were conducted most frequently, nearly every month during that period, with a survey frequency of 99-100%, followed by Jiangsu Lianyungang, Shandong Dongying and Liaoning Dandong, with a survey frequency of over 88% (Appendix Table 2).

Site Analysis

The largest abundance recorded for each bird species in all rounds of surveys at each site was used to reflect the waterbird population at each survey site, and currently, the sites support more than 100,000 waterbirds include Shandong Dongying, Liaoning Dandong, Liaoning Panjin, Tianjin, Jiangsu Lianyungang, Tiaozini and Dongling, and Guangdong Shenzhen Bay/Hong Kong Deep Bay. In addition, the sites with the highest waterbird species richness are Shandong Dongying, Jiangsu Tiaozini, Jiangsu Lianyungang, Guangdong Shenzhen Bay/Hong Kong Deep Bay and Liaoning Dandong, and the sites topping other sites in respect of the number of waterbird species exceeding 1% flyway estimate are Shandong Dongying (47 species), Liaoning Dandong (31 species), Liaoning Panjin (31 species), Jiangsu Lianyungang (30 species) and Tianjin (27 species), respectively. These results clearly indicate that coastal wetlands by Yellow Sea and Bohai Sea of China are critical for conservation of waterbirds in the flyway (Table 1).

In terms of shorebird abundance, the sites with the highest shorebird abundance are Liaoning Dandong, Jiangsu Lianyungang, Liaoning Panjin, Shandong Dongying and Jiangsu Tiaozini. Each of the former three places has a shorebird abundance of over 100,000. Liaoning Dandong even records a shorebird abundance of nearly 200,000. The sites with the highest shorebird species richness are Guangdong Shenzhen Bay/Hong Kong Deep Bay, Shandong Dongying, Jiangsu Dongling and Jiangsu Yangkou. The sites topping other sites in respect of the number of shorebird species exceeding 1% flyway estimate are Jiangsu Lianyungang (22 species), Jiangsu Dongling (19 species), Jiangsu Tiaozini (18 species), Liaoning Panjin (18 species) and Shandong Dongying (18 species). Therefore, the coastal wetlands in Yellow Sea and Bohai Sea region, especially Jiangsu, are critical for conservation of shorebirds in the flyway.

In terms of ducks and geese, the sites with the highest abundance ducks and geese are Shandong Dongying, Tianjin, Liaoning Panjin, Liaoning Dandong and Guangdong Shenzhen Bay/Hong Kong Deep Bay. The sites with the highest species richness of ducks and geese are Shandong Dongying, Jiangsu Tiaozini, Liaoning Dandong, Jiangsu Lianyungang and Tianjin, and the sites topping other sites in respect of the number of duck and geese species exceeding 1% flyway estimate are Shandong Dongying (16 species), Tianjin (11 species), Liaoning Dandong (8 species), Hebei Cangzhou (5 species) and Zhejiang Wenzhou Bay (5 species). Therefore, the sites critical for duck and geese are slightly different from those for shorebirds, but Shandong Dongying and Liaoning Dandong are critical for both waterbird groups.

Table 1. The key waterbird community features from 25 surveyed sites between 2012 and 2019. The highest abundance was the sum of the highest count of each waterbird species per location.

地点 **Location**	调查次数 **Number of survey**	最大数量 **Highest abundance**	鸟种数 **Number of species**	极危种种数 **CR species**	濒危种种数 **EN species**	易危种种数 **VU species**	超过迁飞区 **1%** 的鸟种数 **Species exceeded 1% flyway estimate**
山东东营 Shandong Dongying	84	318,800	138	2	5	12	47
辽宁丹东 Liaoning Dandong	84	286,119	114	1	7	8	31
辽宁盘锦 Liaoning Panjin	58	245,951	112	1	5	8	31
江苏连云港 Jiangsu Lianyungang	90	200,173	119	1	6	6	30
天津 Tianjin	75	203,626	108	2	3	7	27
江苏条子泥 Jiangsu Tiaozini	45	150,403	124	2	5	6	24
江苏东凌 Jiangsu Dongling	68	112,841	109	2	4	5	22
浙江温州湾 Zhejiang Wenzhou Bay	11	75,651	99	2	5	5	19
广东深圳湾 / 香港后海湾 Guangdong Shenzhen Bay/Hong Kong Deep Bay	96	107,168	117	3	5	4	17
河北沧州 Hebei Cangzhou	12	50,575	88	1	3	4	16
江苏洋口 Jiangsu Yangkou	50	49,919	111	1	5	4	16
浙江杭州湾 Zhejiang Hangzhou Bay	11	70,967	76	1	4	2	15
山东胶州湾 Shandong Jiaozhou Bay	12	46,913	80	2	3	4	14
福建泉州湾 Fujian Quanzhou Bay	96	48,316	94	0	3	3	13
福建闽江口 Fujian Minjiang Estuary	95	34,132	108	2	5	6	11
广东海丰 Guangdong Haifeng	54	26,222	74	0	2	1	4
上海 Shanghai	24	24,632	103	0	3	5	4
广东湛江 Guangdong Zhanjiang	52	8,564	62	2	3	1	3
辽宁庄河 Liaoning Zhuanghe	1	7,779	19	0	0	2	3
浙江绍兴 Zhejiang Shaoxing	7	74,678	47	0	2	1	2
广东南沙 Guangdong Nansha	45	13,332	56	1	1	1	2
广西北海 Guangxi Beihai	15	6,294	70	1	1	2	2
上海杭州湾北部 Hangzhou Bay north	24	7,596	92	0	5	3	1
澳门 Macau	75	7,445	66	0	4	1	1
广东茂名 Guangdong Maoming	12	2,886	46	0	2	0	1

How many waterbirds are these survey sites supporting?

To answer the question, we summed up the abundance of each bird species in all the sites during each round of survey in each year and then took the highest count in all the rounds of survey for each bird species. Based on such a conservative estimate (sum of abundance in all sites during each round rather than the highest abundance in each site), we avoided double counting and took into account the summering, wintering and transiting species. From 2012 to 2019, these survey sites were home to 180 species of about 970,000 waterbirds, of which the bird species with the largest population were Great Knot (*Calidris tenuirostris*), Common Coot (*Fulica atra*), Dunlin (*Calidris alpina*), Bar-tailed Godwit (*Limosa lapponica*) and Common Shelduck (*Tadorna tadorna*) (Table 2), and the waterbird groups with the highest abundance were shorebird and duck and geese (accounting for 51% and 24% of the total waterbird abundance, respectively).

During winter (December to February), these survey sites were home to 168 species of about 410,000 waterbirds, of which the bird species with the highest abundance were Dunlin, Common Coot, Northern Shoveler (*Spatula clypeata*), Common Black-headed Gull (*Chroicocephalus ridibundus*) and Bean Goose (*Anser fabalis*) and the waterbird group with the highest abundance was duck and geese and shorebird (accounting for 39% and 30% of the total waterbird abundance, respectively).

Table 2. The 20 most abundant waterbird species (the largest sum from all locations of any census round) recorded between 2012 and 2019.

学名 Scientific name	英文名 Common name	中文名 Chinese name	最大数量 Highest count
Calidris tenuirostris	Great Knot	大滨鹬	93137
Fulica atra	Common Coot	骨顶鸡	73248
Calidris alpina	Dunlin	黑腹滨鹬	72005
Limosa lapponica	Bar-tailed Godwit	斑尾塍鹬	63573
Tadorna tadorna	Common Shelduck	翘鼻麻鸭	42924
Charadrius alexandrinus	Kentish Plover	环颈鸻	31203
Recurvirostra avosetta	Pied Avocet	反嘴鹬	26216
Anas poecilorhyncha	Spot-billed Duck	斑嘴鸭	25838
Aythya fuligula	Tufted Duck	凤头潜鸭	24422
Limosa limosa	Black-tailed Godwit	黑尾塍鹬	23713
Calidris ruficollis	Red-necked Stint	红颈滨鹬	22656
Limnodromus semipalmatus	Asian Dowitcher	半蹼鹬	22469
Pluvialis squatarola	Grey Plover	灰斑鸻	21036
Aythya ferina	Common Pochard	红头潜鸭	20002
Chroicocephalus ridibundus	Common Black-headed Gull	红嘴鸥	19167
Anser fabalis	Bean Goose	豆雁	19092
Calidris acuminata	Sharp-tailed Sandpiper	尖尾滨鹬	17767
Numenius arquata	Eurasian Curlew	白腰杓鹬	15526
Chroicocephalus saundersi	Saunders's Gull	黑嘴鸥	15067
Gallinula chloropus	Common Moorhen	黑水鸡	15044

How important are these survey sites to waterbirds from a flyway's perspective?

In the recorded 180 waterbird species, 7 species are national first-class protected animals and 20 species are national second-class protected animals in mainland China. Moreover, 4 species are described as Critically Endangered, 7 species are described as Endangered, 13 species are described as Vulnerable and 15 species are described as Near Threatened in the IUCN Red List.

At present, there is an estimate for flyway population of an entire species for more than half of waterbird species in the East Asian-Australasian Flyway. The higher the percentage of total flyway population recorded in a place or region, the more important the place or region is to waterbirds. According to our analysis, there are 26 waterbird species whose population (sum of abundance in each single round) exceeded 20% of their flyway estimate during the survey, indicating that the coastal wetlands in China are of great importance to the 26 waterbird species. The 26 waterbird species include 6 species of crane and stork (Red-crowned Crane *Grus japonensis*, Siberian Crane *Leucogeranus leucogeranus*, Common Crane *Grus grus*, Oriental Stork *Ciconia boyciana*, White-naped Crane *Antigone vipio* and Hooded Crane *Grus monacha*), 4 species of duck and geese (Bean Goose, Dalmatian Pelican *Pelecanus crispus*, Common Shelduck and Mute Swan *Cygnus olor*), 1 species of egret and heron (Black-faced Spoonbill *Platalea minor*), 3 species of gull and tern (Saunders's Gull *Chroicocephalus saundersi*, Relict Gull *Ichthyaetus relictus* and Chinese Crested Tern *Thalasseus bernsteini*) and 12 species of shorebird (Nordmann's Greenshank *Tringa guttifer*, Spoon-billed Sandpiper *Calidris pygmaea*, Eurasian Oystercatcher *Haematopus ostralegus*, Asian Dowitcher *Limnodromus semipalmatus*, Lesser Sand Plover *Charadrius mongolus*, Bar-tailed Godwit, Kentish Plover *Charadrius alexandrinus*, Great Knot, Pied Avocet *Recurvirostra avosetta*, Broad-billed Sandpiper *Calidris falcinellus*, Eastern Curlew and Grey Plover *Pluvialis squatarola*) (Table 3). Besides, there are 8 species whose population exceeded 75% of their flyway estimate, including Bean Goose, Red-crowned Crane, Saunders's Gull, Relict Gull, Asian Dowitcher, Nordmann's Greenshank, Spoon-billed Sandpiper and Dalmatian Pelican. In other words, the coastal wetlands in China, especially these survey sites, are critical for the survival of the 26 waterbird species. Nearly the entire species of the Endangered Nordmann's Greenshank across the world regularly stop in Jiangsu Tiaozini during their southward migration, and nearly all the Near Threatened Asian Dowitcher stop in Lianyungang during their northward migration. The wetland conservation and management in these two regions will determine whether the two waterbird species will face extinction. (Yang et al. 2019; Yang et al. 2020).

Using Ramsar's 1% of the flyway population as the criterion for wetlands of international importance, the population of 71 waterbird species exceeded 1% of their flyway population at least once in at least one survey site (25 survey sites in total) during 2012-2019, including 27 threatened or near threatened species (Appendix Table 3).

Table 3. Species with an abundant that exceeded 20% of its flyway population (the largest sum of any survey round) during our 2012-2019 censuses.

学名 Scientific name	英文名 Common name	中文名 Chinese name	最大数量 Highest count	迁飞区数量 Flyway population size	最大值占迁飞区总数量的百分比 Flyway proportion (%)	年 _ 月 Year_Month
Tringa guttifer	Nordmann's Greenshank	小青脚鹬	944	500	189*	2014_09
Chroicocephalus saundersi	Saunders's Gull	黑嘴鸥	15,067	8,500	177*	2016_06
Pelecanus crispus	Dalmatian Pelican	卷羽鹈鹕	160	100	160*	2013_11
Limnodromus semipalmatus	Asian Dowitcher	半蹼鹬	22,469	23,000	98	2019_05
Grus japonensis	Red-crowned Crane	丹顶鹤	378	400	95	2015_03
Ichthyaetus relictus	Relict Gull	遗鸥	11,176	12,000	93	2016_03
Anser fabalis	Bean Goose	豆雁	19,092	20,500	93	2015_12
Calidris pygmaea	Spoon-billed Sandpiper	勺嘴鹬	226	300	75	2014_09
Haematopus ostralegus	Eurasian Oystercatcher	蛎鹬	5,002	7,000	71	2015_01
Leucogeranus leucogeranus	Siberian Crane	白鹤	2,213	3,500	63	2019_11
Grus grus	Common Crane	灰鹤	8,800	15,000	59	2016_02
Charadrius mongolus	Lesser Sand Plover	蒙古沙鸻	9,766	20,000	49	2015_08
Limosa lapponica	Bar-tailed Godwit	斑尾塍鹬	63,573	150,000	42	2015_04
Charadrius alexandrinus	Kentish Plover	环颈鸻	31,203	79,000	39	2014_10
Thalasseus bernsteini	Chinese Crested Tern	黑嘴端凤头燕鸥	37	100	37	2019_10
Tadorna tadorna	Common Shelduck	翘鼻麻鸭	42,924	120,000	36	2013_11
Calidris tenuirostris	Great Knot	大滨鹬	93,137	290,000	32	2015_04
Platalea minor	Black-faced Spoonbill	黑脸琵鹭	633	2,000	32	2014_12
Ciconia boyciana	Oriental Stork	东方白鹳	915	3,000	31	2013_12
Cygnus olor	Mute Swan	疣鼻天鹅	420	1,500	28	2017_12
Recurvirostra avosetta	Pied Avocet	反嘴鹬	26,216	100,000	26	2019_03
Calidris falcinellus	Broad-billed Sandpiper	阔嘴鹬	6,412	25,000	26	2019_05
Antigone vipio	White-naped Crane	白枕鹤	255	1,000	26	2017_11
Numenius madagascariensis	Eastern Curlew	大杓鹬	7,469	32,000	23	2015_07
Pluvialis squatarola	Grey Plover	灰斑鸻	21,036	100,000	21	2016_04
Grus monacha	Hooded Crane	白头鹤	210	1,000	21	2018_11

* The flyway population estimate was likely to be an underestimate, leading to a higher actual count than the total flyway population size.

Conservation status of the survey sites

Identifying wetlands of great value and including them in the list of wetlands of international importance is the joint obligation of the signatories to the Ramsar Convention. One evaluation criterion for wetlands of international importance is that the population of at least one waterbird species in the wetlands regularly reaches 1% or more of its flyway population. As one of the 171 signatories worldwide to the Ramsar Convention, China has now included 57 wetlands in the list of wetlands of international importance. The survey found that all 25 survey sites met the 1% criterion for wetlands of international importance in a given season, but only some parts (24%) of six survey sites were listed as wetlands of international importance, and some parts (24%) of six survey sites were listed as national nature reserves - areas protected by the most stringent regulations (Appendix Table 1). In addition, 14 out of all survey sites were under protection of other levels (provincial, wetland parks, etc.), and the remaining five sites have not yet been on any protection list, including Jiangsu Lianyungang with more than 200,000 waterbirds, and Jiangsu Dongling with more than 100,000 waterbirds.

Analysis of Waterbird Species

The data from the sum of all survey sites in a single round for the whole year showed that the most abundant waterbird species were Great Knot (93,137), Common Coot (73,248), Dunlin (71,594), Bar-tailed Godwit (63,573) and Common Shelduck (42,924) (Table 2). However, during winter (December to February), the most abundant waterbirds were Dunlin *Calidris alpina* (47,070), Common Coot *Fulica atra* (38,058), Spot-billed Duck *Anas poecilorhyncha* (25,838), Common Black-headed Gull *Chroicocephalus ridibundus* (19,167) and Bean Goose *Anser fabalis* (19,092).

Population Trend of Waterbirds

The analysis of changes in the population of some waterbird species and populations by screening out survey sites with sufficient data (data available for all years or missing for only one year) from July of the year to June next year on a yearly basis revealed that if calculated based on the annual peak of the sum of the population or species at all sites, no significant trends were shown for all eight waterbird groups from 2012 to 2019. However, if species-specific, the population of Bar-tailed Godwit and Common Black-headed Gull was on a significant declining trend (Figure 2), while that of Asian Dowitcher was on a significant increasing trend. The changes in the population of Bar-tailed Godwit and Asian Dowitcher were consistent with the latest findings that the population of Bar-tailed Godwit in the wintering grounds in Australia has been declining significantly over the past 30 years (Clemens et al. 2016; Murray et al. 2018; Studds et al. 2017); in contrast, thanks to increased survey efforts in the last two years, it was found that Asian Dowitcher would stop in Lianyungang in large numbers during northward migration and saw an increase in population as more complete data have been recorded than before (Yang et al. 2019)

The migration period is covered in using the whole year data to find the highest count, migratory birds move in and out frequently from one site to another, and the abundance is sometimes affected by weather, making it difficult to analyze the population trends of bird species between years. When we select only the data of December to February, the most stable wintering period for waterbird populations, and take the month with the highest abundance as the abundance of the year, the same analysis showed that there were no significant trends in waterbird groups (Table 4), but more species have saw significant changes than before (analysis was made on

55 species recorded more frequently and of concern). 12 waterbird species saw a significant increase in population size, including Bean Goose, Common Shelduck, Falcated Duck *Mareca falcata*, Eurasian Wigeon *Mareca penelope*, Eurasian Teal *Anas crecca*, Tufted Duck *Aythya fuligula*, Common Redshank *Tringa totanus*, Grey Plover, Little Grebe *Tachybaptus ruficollis*, Great Crested Grebe *Podiceps cristatus*, Chinese Pond Heron *Ardeola bacchus* and Eurasian Spoonbill *Platalea leucorodia*.

Guangdong Shenzhen Bay/Hong Kong Deep Bay, Fujian Quanzhou Bay, Shandong Dongying & Liaoning Dandong

Two sites were surveyed in all months between 2012 and 2019, i.e. Guangdong Shenzhen Bay/Hong Kong Deep Bay and Fujian Quanzhou Bay. There are many interesting findings if we focus on only Guangdong Shenzhen Bay/Hong Kong Deep Bay. Among wintering waterbird populations, the abundances of duck and geese and egret and heron were on an upward trend, while the abundances of crake, shorebird, gull and tern and cormorant decreased, and the total abundance of waterbirds remained stable (Table 4).

The results of the species-specific analysis showed that waterbirds wintering in Guangdong Shenzhen Bay/Hong Kong Deep Bay which saw a significant decrease in abundance during the survey period include Common Moorhen *Gallinula chloropus*, Common Coot, Eurasian Curlew *Numenius arquata*, Spotted Redshank *Tringa erythropus*, Common Greenshank *Tringa nebularia*, Black-winged Stilt *Himantopus himantopus*, Pied Avocet, Kentish Plover, Common Black-headed Gull and Great Cormorant *Phalacrocorax carbo*. Meanwhile, waterbirds with an increasing population include Eurasian Wigeon, Northern Shoveler, Eurasian Teal, Tufted Duck, Black-tailed Godwit *Limosa limosa*, Whimbrel *Numenius phaeopus*, Common Redshank, Common Sandpiper *Actitis hypoleucos*, Dunlin, Pacific Golden Plover *Pluvialis fulva*, Grey Plover, Heuglin's Gull *Larus heuglini*, Little Grebe, Great Crested Grebe, Little Egret *Egretta garzetta*, Great Egret *Ardea alba*, Chinese Pond Heron and Black-faced Spoonbill (Table 4).

In Fujian Quanzhou Bay, the total abundances of wintering duck and geese, crake, shorebird, cormorant, egret and heron and waterbird as a whole were increasing, excluding gull and tern, which experienced a decline in abundance. The results were consistent with those in Shenzhen Bay/Deep Bay, as evidenced by increasing trends including Northern Shoveler, Tufted Duck, Common Redshank, Dunlin, Pacific Golden Plover, Grey Plover, Great Crested Grebe, Little Egret and Great Egret, and decreasing trends including Eurasian Curlew, Kentish Plover and Common Black-headed Gull. Finally, the results in Quanzhou Bay were contrary to those in Shenzhen Bay/Deep Bay, as evidenced by decreasing trends including Eurasian Wigeon, and increasing trends including Common Coot, Common Greenshank and Great Cormorant in Quanzhou Bay (Table 4).

In addition to the aforesaid two sites, frequent surveys were also conducted in Shandong Dongying and Liaoning Dandong (84 surveys each) in the eight years. The total abundance of major bird groups (except seabirds) and waterbird as a whole in Shandong Dongying has been increasing. Species with an increasing population trend included Bean Goose, Gadwall, Falcated Duck, Spot-billed Duck, Northern Pintail, Common Coot, Eurasian Curlew, Common Black-headed Gull, Little Grebe, Great Crested Grebe, Little Egret and Grey Heron, while the abundance of Mallard has been decreasing. Besides, the abundances of Great Crested Grebe and Little Egret increased in Shenzhen Bay/Deep Bay, Fujian Quanzhou and Shandong Dongying. Finally, Liaoning Dandong has limited bird species with sufficient data for wintering trend analysis. Among species with adequate data, the abundances of Mongolian Gull *Larus vegae mongolicus* and gull and tern were increasing, while the abundances of Duck and Geese and waterbird as a whole were decreasing (Table 4).

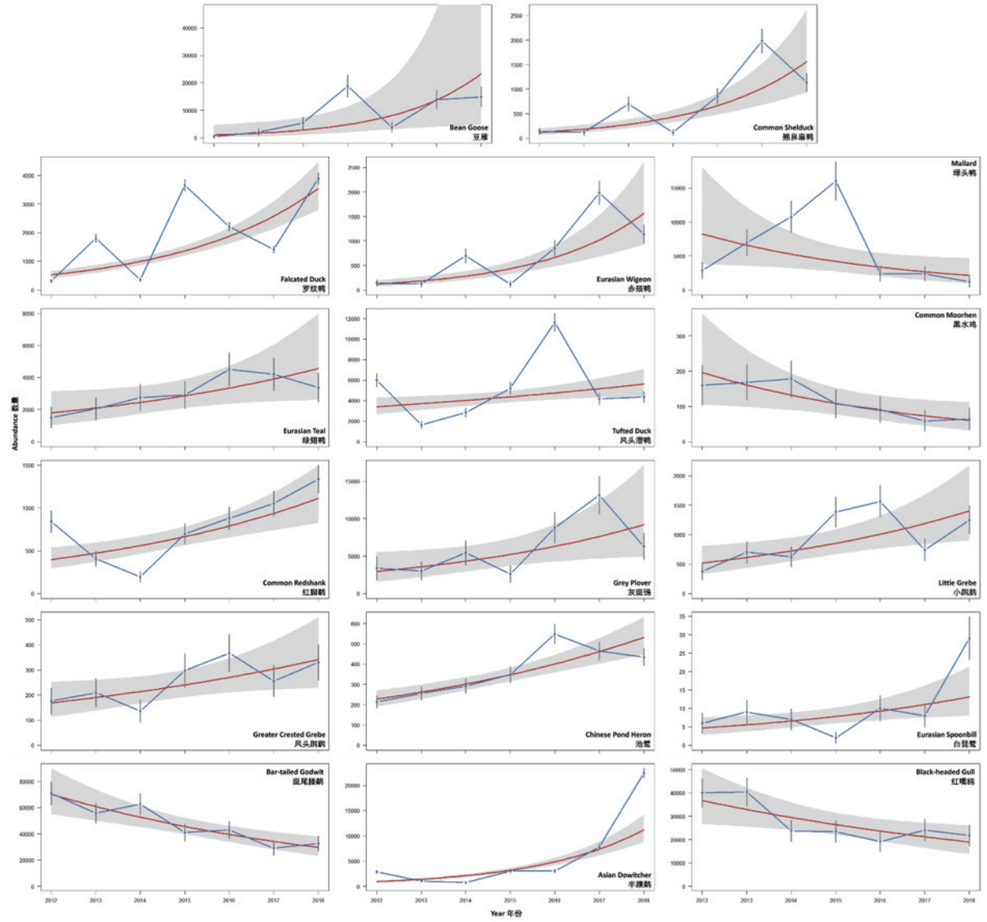

Figure 2. The population trends and 95% confidence interval of 15 waterbird species between 2012 and 2019. The annual abundance of Bar-tailed Godwit, Asian Dowitcher and Black-headed Gull were represented by the annual peak. For all the other species, the boreal winter peak in December and February was used. The abundance for each species was the sum from all locations with count > 0 for all years or all but one year.

Table 4. Population trends of some of the surveyed species betw een 2012 and 2019. ↑ denotes significant increase, ↑significant decrease, ST stable, – as uncertain, ID Inadequate data and NA untest.

学名 Scientific name	英文名 Common name	中文名 Chinese name	8 年种群数量变化趋势 8-year population trend (2012-2019)					
			年度峰值 – 所有地点 Annual peak - all sites	冬季峰值 – 所有地点 Winter peak - all sites	冬季峰值 – 深圳湾 / 后海湾 Winter peak - Shenzhen Bay/ Deep Bay	冬季峰值 – 泉州湾 Winter peak - Quanzhou Bay	冬季峰值 – 山东东营 Winter Peak - Shandong Dongying	冬季峰值 – 辽宁丹东 Winter peak - Liaoning Dandong
Anser fabalis	Bean Goose	豆雁	NA	↑	NA	NA	↑	–
Tadorna tadorna	Common Shelduck	翘鼻麻鸭	NA	↑	NA	NA	–	NA
Mareca strepera	Gadwall	赤膀鸭	NA	NA	NA	NA	↑	NA
Mareca falcata	Falcated Duck	罗纹鸭	NA	↑	–	NA	↑	NA
Mareca penelope	Eurasian Wigeon	赤颈鸭	NA	↑	↑	↓	NA	NA
Anas platyrhynchos	Mallard	绿头鸭	NA	↓	NA	NA	↓	NA
Anas poecilorhyncha	Spot-billed Duck	斑嘴鸭	–	–	–	↓	↑	NA
Spatula clypeata	Northern Shoveler	琵嘴鸭	NA	–	↑	↑	NA	NA
Anas acuta	Northern Pintail	针尾鸭	NA	–	ST	NA	↑	NA
Anas crecca	Eurasian Teal	绿翅鸭	–	↑	↑	–	–	NA
Aythya ferina	Common Pochard	红头潜鸭	NA	–	NA	NA	NA	–
Aythya fuligula	Tufted Duck	凤头潜鸭	NA	↑	↑	↑	NA	NA
Gallinula chloropus	Common Moorhen	黑水鸡	–	↓	↓	NA	NA	NA
Fulica atra	Common Coot	骨顶鸡	NA	–	↓	↑	↑	NA
Limosa limosa	Black-tailed Godwit	黑尾塍鹬	–	–	↑	NA	–	NA
Limosa lapponica	Bar-tailed Godwit	斑尾塍鹬	↓	NA	NA	NA	NA	NA
Numenius phaeopus	Whimbrel	中杓鹬	NA	NA	↑	NA	NA	NA
Numenius arquata	Eurasian Curlew	白腰杓鹬	–	–	↓	↓	↑	NA
Numenius madagascariensis	Eastern Curlew	大杓鹬	–	NA	NA	NA	NA	NA
Tringa erythropus	Spotted Redshank	鹤鹬	NA	–	↓	NA	NA	NA

学名 Scientific name	英文名 Common name	中文名 Chinese name	8 年种群数量变化趋势 8-year population trend (2012-2019)					
			年度峰值 – 所有地点 Annual peak - all sites	冬季峰值 – 所有地点 Winter peak - all sites	冬季峰值 – 深圳湾 / 后海湾 Winter peak - Shenzhen Bay/ Deep Bay	冬季峰值 – 泉州湾 Winter peak - Quanzhou Bay	冬季峰值 – 山东东营 Winter Peak - Shandong Dongying	冬季峰值 – 辽宁丹东 Winter peak - Liaoning Dandong
Tringa totanus	Common Redshank	红脚鹬	NA	↑	↑	↑	NA	NA
Tringa stagnatilis	Marsh Sandpiper	泽鹬	NA	–	↑*	–	NA	NA
Tringa nebularia	Common Greenshank	青脚鹬	NA	–	↓	↑	NA	NA
Tringa guttifer	Nordmann's Greenshank	小青脚鹬	–	NA	NA	NA	NA	NA
Actitis hypoleucos	Common Sandpiper	矶鹬	NA	–	↑	–	NA	NA
Limnodromus semipalmatus	Asian Dowitcher	半蹼鹬	↑	NA	NA	NA	NA	NA
Calidris tenuirostris	Great Knot	大滨鹬	–	NA	NA	NA	NA	NA
Calidris pygmaea	Spoon-billed Sandpiper	勺嘴鹬	–	NA	NA	NA	NA	NA
Calidris alpina	Dunlin	黑腹滨鹬	–	–	↑	↑	NA	NA
Calidris ferruginea	Curlew Sandpiper	弯嘴滨鹬	–	NA	NA	NA	NA	NA
Haematopus ostralegus	Eurasian Oystercatcher	蛎鹬	NA	–	NA	–	NA	NA
Himantopus himantopus	Black-winged Stilt	黑翅长脚鹬	–	–	↓	NA	NA	NA
Recurvirostra avosetta	Pied Avocet	反嘴鹬	–	–	↓	NA	NA	NA
Pluvialis fulva	Pacific Golden Plover	金斑鸻	NA	–	↑	↑	NA	NA
Pluvialis squatarola	Grey Plover	灰斑鸻	–	↑	↑	↑	NA	NA
Charadrius alexandrinus	Kentish Plover	环颈鸻	–	–	↓	↓	NA	NA
Larus crassirostris	Black-tailed Gull	黑尾鸥	NA	–	NA	↓	–	NA
Larus heuglini	Heuglin's Gull	乌灰银鸥	NA	–	↑	–	NA	NA
Larus vegae	Vega Gull	西伯利亚银鸥	NA	–	NA	NA	–	–
Larus vegae mongolicus	Mongolian Gull	蒙古银鸥	NA	–	NA	NA	NA	↑
Chroicocephalus ridibundus	Common Black-headed Gull	红嘴鸥	↓	–	↓	↓	↑	NA
Chroicocephalus saundersi	Saunders's Gull	黑嘴鸥	NA	–	–	↓	NA	NA

学名 Scientific name	英文名 Common name	中文名 Chinese name	8 年种群数量变化趋势 8-year population trend (2012-2019)					
			年度峰值 – 所有地点 Annual peak - all sites	冬季峰值 – 所有地点 Winter peak - all sites	冬季峰值 – 深圳湾 / 后海湾 Winter peak - Shenzhen Bay/ Deep Bay	冬季峰值 – 泉州湾 Winter peak - Quanzhou Bay	冬季峰值 – 山东东营 Winter Peak - Shandong Dongying	冬季峰值 – 辽宁丹东 Winter peak - Liaoning Dandong
Ichthyaetus relictus	Relict Gull	遗鸥	NA	–	NA	NA	NA	NA
Hydroprogne caspia	Caspian Tern	红嘴巨鸥	NA	NA	NA	–	NA	NA
Tachybaptus ruficollis	Little Grebe	小䴙䴘	–	↑	↑	–	↑	NA
Podiceps cristatus	Great Crested Grebe	凤头䴙䴘	NA	↑	↑	↑	↑	NA
Phalacrocorax carbo	Great Cormorant	普通鸬鹚	–	–	↓	↑	–	NA
Egretta garzetta	Little Egret	小白鹭	–	–	↑	↑	↑	NA
Ardea cinerea	Grey Heron	苍鹭	–	–	ST	↑	↑	NA
Ardea alba	Great Egret	大白鹭	NA	–	↑	↑	–	NA
Ardeola bacchus	Chinese Pond Heron	池鹭	NA	↑	↑	–	NA	NA
Platalea leucorodia	Eurasian Spoonbill	白琵鹭	NA	↑	–	NA	NA	NA
Platalea minor	Black-faced Spoonbill	黑脸琵鹭	NA	–	↑	NA	NA	NA
Ciconia boyciana	Oriental Stork	东方白鹳	–	NA	NA	NA	NA	NA
Alcedo atthis	Common Kingfisher	普通翠鸟	–	–	–	NA	NA	NA
na	Duck and Geese	雁鸭类	–	–	↑	↑	↑	↓
na	Crane and Stork	鹤鹳类	–	NA	NA	NA	↑	NA
na	Crake	秧鸡类	–	–	↓	↑	↑	NA
na	Shorebird	鸻鹬类	–	–	↓	↑	↑	NA
na	Gull and Tern	鸥类	–	–	↓	↓	↑	↑
na	Seabird	海洋鸟类	–	NA	NA	NA	NA	NA
na	Cormorant	鸬鹚类	–	–	↓	↑	–	NA
na	Egret and Heron	鹭类	–	–	↑	↑	↑	NA
na	All waterbirds	所有水鸟	–	–	ST	↑	↑	↓

*The result of trend ana lysis for Marsh Sandpiper contradicted with that found by the Hong Kong Birdwatching Society, further analysis is needed to confirm the population trend.

Survey Progress

Compared with the seven years (2005-2011) when China Coastal Waterbird Census just started, the last eight years witnessed the addition of 13 new survey sites, i.e. Liaoning Zhuanghe, Shandong Jiaozhou Bay, Jiangsu Dongling, Tiaozini, Hangzhou Bay north, Zhejiang Hangzhou Bay, Shaoxing, Wenzhou Bay, Macau, Guangdong Maoming, Nansha, Zhanjiang and Guangxi Beihai, among which, however, some survey locations currently underwent fewer surveys than the other survey sites due to inadequate resources or late commencement of survey.

The results were generated from a questionnaire completed by coordinators of various regions, waterbirds could be surveyed and counted completely at five of the seven sites (71%) to the south of Yangtze River Estuary, in contrast with only two of the seven sites (29%) to the north of Yangtze River Estuary (inclusive) (Appendix Table 1). Therefore, improvement is needed in the Census to help coordinators from survey sites with high bird abundance to better complete the survey.

In the same questionnaire, human disturbance (e.g. aquaculture, bycatch in fishnets, or poaching) was ranked as the most frequent threat to waterbirds at survey sites both in the past and future, followed by tidal flat loss and high tide roost-loss (Appendix Table 1). How to improve the living environment of waterbirds has thus become an important direction for future work at survey sites.

Application Value & Case studies

1. Surveyors published the findings of early China Coastal Waterbird Census (2005-2013) after summarization and analysis in the peer-reviewed international SCI journal *Avian Research*, confirming that waterbird populations in many wetlands have reached the standards for wetlands of international importance, which laid an important scientific foundation for researchers, conservationists and decision-makers to conduct works related to waterbirds and wetlands. Meanwhile, the paper has been cited for up to 39 times since its publication (Bai et al. 2015), making it one of the most accessed and cited articles of the journal at present.

2. Other researchers also used early survey data to identify important wetlands requiring priority conservation (Xia et al. 2017), help with the development of the national ecological red line (Zhang et al. 2017), promote the establishment of reserves (Peng et al. 2017), and to study shorebird migration strategies (Choi et al. 2016).

3. In terms of the application of survey data, basic survey data, together with lobbying and promoting effort from many organizations, teams and individuals, played an important role in the process of transforming wetlands along coastal Jiangsu Tiaozini from being the core of reclamation of several million mu of mudflats (Figure 3) recognized 10 years ago, into the current world natural heritage site. In other words, the Waterbird Census data are one of the most important bases for conserving the Tiaozini coastal wetland area. Many teams are now striving to replicate the case of Tiaozini, in the hope of protecting more habitats that are currently unprotected but are of great importance to waterbirds.

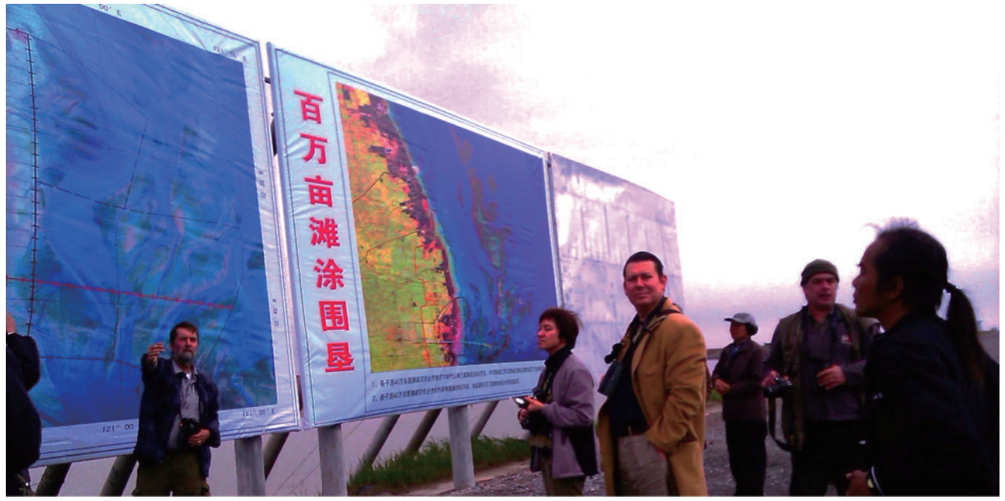

Figure 3. Jiangsu Tiaozini – once included in the "million mu (>667 km2) reclamation project" and now inscribed on the natural World Heritage Site list as part of a broader designation including other coastal areas in the Yellow Sea- Bohai Gulf (Photo was taken by Lin Zhang on 19-October-2013 at Tiaozini).

4. Waterbird resighting information collected in the extended survey efforts by surveyors improves our understanding of the behaviors of waterbirds. Recently, to expand tourism routes in Shenzhen, developers proposed a waterway dredging project to excavate the intertidal wetlands and increase the runs of sightseeing ships, but after a careful analysis on the project proposal, stakeholders found that the planned waterway overlaps with the home range of waterbirds and implementation of the project is very likely to have adverse impact on waterbirds. This event aroused extensive responses on social media, and the proposal is suspended for the moment due to various problems. This event again shows that waterbird survey data accumulated over years (including both count data and such information as resighting information) laid an important foundation for wetland conservation and management.

5. In recent years, bird survey data collected worldwide through citizen science, with the data size that is overwhelming to scientific institutions alone, have helped identify the causes of historical changes in waterbird population and bird population dynamics and migratory patterns. In Australia, by analyzing data from 153 survey locations in the country over the past 40 years, a recent paper found that the decline in the population of migratory waterbirds in Australia is very likely to be caused by changes outside Australia (Clemens et al. 2016), which again shows that data extensively accumulated over years laid a foundation of great significance to ecological research, environmental protection and management decision.

Prospect

The China Coastal Waterbird Census has lasted for 15 years, and the census group is one of the few groups in China that has maintained long-term and continuous monitoring on waterbirds. As mentioned above, these survey data are of paramount importance to the waterbird conservation and monitoring, wetland management and planning in China. With increasing attention paid on ecological civilization development, more and more reserves, research institutions, civil organizations and amateurs have been involved in bird monitoring in China in recent years. However, at present there is no unified format and requirements for data collection and processing in this regard, which means that a lot of effort and time will be spent on standardizing data format and verifying data in future data analysis. Therefore, there is a pressing need to coordinate the survey methods, record formats, and scope of survey among the survey units, to improve the division of labor and to maximize the efficiency of resource utilization (Fuller et al. 2020).

At present, data is collected frequently (once a month) for the national coastal waterbird census but data analysis lags behind to some extent. In such a case, when the bird population changes and management actions are urgently needed, we may have missed the best time for such actions despite the data we have collected. It should be an important part of our future work to properly allocate resources, analyze the data on a regular basis (annually or every other year), so as to truly achieve the goal of "monitoring". This report provides a preliminary analysis of changes in waterbird population. Due to a shortage of resources and restricted conditions, we were unable to cover more survey locations. Expanding monitoring and analysis of population changes to more survey locations is one of the priorities of our future work. Also, at some survey locations in the north, the number of waterbirds during peak season is too large for a comprehensive count, which is something that should be improved in the future. Last but not the least, waterbirds face threats at multiple survey locations, and these threats vary from site to site. Therefore, in addition to the usual waterbird census work, the census group should promote collaboration with local stakeholders to work on and mitigate the threats to waterbirds at each site.

Acknowledgements

Thanks are due to Xu Zhiwei(许志伟), Yao Chengjie(姚成捷), Zhang Lin(章麟), David Melville, Adam Sharp and Alex Thomas for their help in report preparation and data processing and analysis. Thanks are also due to the coordinators of various survey sites, including Bai Qingquan(白清泉), Zhang Ming(张明), Meng Derong(孟德荣), Wang Fengqin(王凤琴), Chen Jianzhong(陈建中), Shan Kai(单凯), Han Yongxiang(韩永祥), Li Jing(李静), Zhang Lin(章麟), Yang Zhidong(杨志栋), Wu Yifeng(吴毅锋), Chen Zhihong(陈志鸿), Lin Zhi(林植), Zeng Xiangwu(曾向武), Zhang Gaofeng(张高峰), Tian Li(田丽), Yu Yat Tung(余日东), Vivian Fu (傅咏芹) and Lai Nga Yee(黎雅仪), for their efforts in coordinating the survey work in various places, and thanks are given to all the surveyors who have participated in the census in the past eight years. These surveyors are: A P(阿 P), A Juan(阿娟), A Zhen(阿贞), Babudou(巴布豆), Bai Qingquan(白清泉), Bai Yu(白煜), Ban'an(半按), Bao Houjia(包厚甲), Bao Xiaomao(包小猫), Beilin(北林), Bianxing(变形), Bo Niao(博鸟), Bufengzhuoying(捕风捉影), Cai Kangyuan(蔡抗援), Cai Shangxiao(蔡上逍), Cai Zhenyuan(蔡振远), C. Y. Jimmy Choi(蔡志扬), Zeng Hongmei(曾红梅), Zeng Linya(曾琳雅), Zeng Weibin(曾伟斌), Zeng Xiangwu(曾向武), Zeng Zhaochi(曾昭驰), Zeng Zhibin(曾志斌), Chen Chuxian(陈楚贤), Chen Dongxia(陈冬夏), Chen Fan(陈凡), Chen Guanghui(陈光辉), Chen Guoling(陈国玲), Chen Hao(陈浩), Chen Haorong(陈浩荣), Chen Hongfan(陈泓帆), Chen Hongfan(陈鸿帆), Chen Jiaxin(陈嘉欣), Chen Jianzhong(陈建中), Chen Jie(陈劼), Chen Jinlian(陈金连), Chen Jingrui(陈景瑞), Chen Junrong(陈骏荣), Chen Kai(陈凯), Chenlaoshi(陈老师), Chen Qiuhe(陈秋和), Chen Shiwang(陈什旺), Chen Shiqian(陈世倩), Chen Tan(陈坦), Chen Tengyi(陈腾逸), Chen Xiaoqun(陈小群), Chen Xuejun(陈学军), Chen Xuejun(陈学军), Chen Yanhui(陈燕辉), Chen Yibing(陈乙炳), Chen Ying(陈莹), Chen Ying(陈颖), Chen Yongchang(陈永昌), Chen Yuqian(陈雨茜), Chen Yuesheng(陈跃生), Chen Zeru(陈择茹), Chen Zhiyang(陈之阳), Chen Zhihong(陈志鸿), Chen Shu(陳述), Cheng Li(程立), Qiu Boyuan(仇博元), Chuai Xiuping(啜秀萍), Danyang(丹阳), Shan Kai(单凯), Daogu(稻谷), Deng Biwen(邓碧文), Diandian(点点), Diaomin(刁民), Dielang(叠浪), Dong Jiangtian(董江天), Dong Wenxiao(董文晓), Duxing(独行), Du Jun(杜军), Duan Tianlin(段天琳), Fanqie(番茄), Fan Ruyu(范如宇), Fan Xiaoyuan(范晓元), Fang Cheng(方成), Fang Yang(方杨), Feilong(飞龙), Feiyu(飞鱼), Fengdianxiaoliu(风电小刘), Fenghuo(风火), Fengyexiaoxiao(风也萧萧), Fengye(风野), Fuguang(浮光), Fu Jianbai(福建柏), Fu Wei(傅伟), Fu Xinchun(傅新春), Vivian Fu(傅咏芹), Gan Donghai(甘东海), Guyuan(古远), Guan Xiangyu(关翔宇), Guannian(观念), Guo Chunpeng(郭淳鹏), Guo Jiansan(郭建三), Guo Jin(郭瑾), Wang Ruiqing(王瑞卿), Haifeng(海风), Wu Xijing(吴西京), Haixing(海星), Han Yongxiang(韩永祥), Hao Muzheng(郝木征), He Tao(何韬), He Tianmeng(何天萌), He Xin(何鑫), He Yansen(何彦森), Hong(虹), Hong Anqi(洪安琪), Honghucainiao(洪湖菜鸟), Hou Xiaoru(侯笑如), Hu Dianshi(胡典世), Hu Shanlin(胡山林), Hu Wei(胡伟), Huanxiong(浣熊), Huang Can(黄灿), Huang Guojin(黄国进), Huang Haiqun(黄海群), Huang Huiming(黄惠明), Huang Jiaru(黄家茹), Huang Jun(黄君), Huang Kaichi(黄恺驰), Huang Pengzhen(黄鹏真), Huang Qifeng(黄启锋), Huang Qin(黄秦), Huang Shaonan(黄少南), Huang Shenghong(黄生鸿), Huang Shigui(黄世桂), Huang Xueding(黄学鼎), Huang Xuemei(黄雪梅), Jia Kejian(贾克坚), Jian Qinxiang(简勤乡), Jiang Lei(蒋磊), Jiang Lei(蒋磊), Jiao Qingli(焦庆利), Jiao Shengwu(焦盛武), Jiaobu(脚步), Jin Mengjie(金孟洁), Jin Xiaohui(金晓辉), Jin Ying(金莹), Junrong(骏荣), Kang Jiajia(康嘉佳), Ke Cuiyan(柯翠颜), Ke Weiguo(柯伟国), Ke Zhujun(柯竺君), Kele(可乐), Kuaileaoxiang(快乐翱翔), Kui Yufei(奎玉飞), Laoqi(老祁), Laotang(老唐), Laoyang(老杨), Li Dongming(李东明), Li Fan(李帆), Li Hongyan(李红岩), Li Jing(李晶), Li Jing(李静), Li Ling(李凌), Li Li(李莉), Li Qiang(李强), Li Qiaoyun(李巧云), Li Xihui(李熙慧), Li Xinwei(李新维), Li Xin(李鑫), Li Yulong(李玉龙), Li Yuxiang(李玉祥), Liang Dan(梁丹), Liang Jiahui(梁嘉慧), Liang Qiaoyun(梁巧云),

Liang Qiaoyi(梁俏仪), Liang Yuemei(梁月媚), Liang Zhibing(梁志兵), Liao Jiying(廖继英), Liao Zhijie(廖志洁), Lin Ge(林哥), Lin Guangxuan(林广旋), Lin Jianbo(林建波), Lin Jinpeng(林金鹏), Linlaoshi(林老师), Lin Meihua(林美花), Lin Qingxian(林清贤), Lin Sheng(林昇), Lin Sheng(林晟), Lin Simin(林思敏), Lin Siming(林思明), Lin Xiao(林鸮), Lin Xin(林鑫), Lin Yujie(林宇杰), Lin Yu(林雨), Lin Zhi(林植), Lingdan(零蛋), Liu Chengyi(刘成一), Liu Danyan(刘丹燕), Liu Detian(刘德天), Liu Huiyu(刘慧宇), Liu Junfu(刘俊甫), Liu Kangquan(刘康全), Liu Na(刘娜), Liu Shuilian(刘水莲), Liu Simin(刘思敏), Liu Tao(刘涛), Liu Wei(刘威), Liu Xiangzhong(刘响忠), Liu Yazhou(刘亚洲), Liu Yanhe(刘彦和), Liu Yang(刘阳), Liu Yebin(刘业斌), Liu Yihong(刘一红), Liu Yong(刘勇), Liu Yuzhen(刘玉真), Liu Zhongxiang(刘忠祥), Liu Zuyao(刘祖尧), Liu Mumu(柳木木), Long Xiaoyan(龙晓燕), Lu Guocheng(卢国成), Lu Xueqiang(卢学强), Lu Lisha(吕丽莎), Lu Yan(吕岩), Luyemumu(绿野木木), Ma Shisheng(马士胜), Ma Yan(马艳), Ma Yun(马云), Mai Jin(麦劲), Maomao(猫猫), Mao Renbo(毛仁波), Mao Xiaomeng(毛晓萌), Meiguoan(美国安), Menwaihan(门外汉), Meng Derong(孟德荣), Meng Weiyue(孟维悦), Momo(莫莫), Mo Yanhua(莫艳华), Motong(墨瞳), Muziyi(木子依), Nikang(尼康), Ni Guanghui(倪光辉), Ni Ming(倪明), Niaoyuhuaxiang(鸟语花香), Nie Yanqiu(聂延秋), Ning Linqi(宁琳琪), Ou(欧), Ou Dongping(欧东平), Pan Haifeng(潘海峰), Pan Hao(潘浩), Pang Yongxiong(庞永雄), Pang Yun(庞云), Peng Hebo(彭鹤博), Peng Xiaolan(彭小蓝), Pin Ming(品茗), Pu Ying(蒲颖), Qi Feng(启锋), Qianwanli(千万里), Qian Feng(钱锋), Qian Gang(钱刚), Qin Jiabin(秦嘉彬), Qingcao(青草), Qingtian(情天), Qiu Jie(邱洁), Qiu Wenling(邱文玲), Quan Shengyi(全胜义), Ren Xiaotong(任晓彤), Rong Wenquan(荣文全), Ruyi(如意), Sanpi(三皮), Sanshao(三少), Shangshanruoshui(上善若水), Shao Xiaolong(邵小龙), Shen Rubing(沈如冰), Shen Shiqi(沈世奇), Shou Danyi(寿丹艺), Shuidiyu(水滴鱼), Shuimu(水木), Shuita(水獭), Shuizhuyu (水煮鱼), Si Ting(思婷), Song Jiangping(宋江平), Songsiji(宋司机), Song Weixiao(宋伟晓), Song Yanqing(宋燕青), Su Leyi(苏乐怡), Su Tao(苏涛), Sui Xing(随行), Sun Renjie(孙仁杰), Sun Sai(孙赛), Sun Xiaoming(孙晓明), Sun Yanyan(孙艳雁), Sun Zhixiong(孙志雄), Qin Li(覃莉), Tan Mengna(谭梦娜), Tan Jinqing(譚金慶), Tang Zhenghua(汤正华), Tang Xuan(唐铉), Taozhiyaoyao(桃之夭夭), Tianjin University Xiaosu(天津大学小苏), Tian Li(田丽), Tian Suixing(田穗兴), Tian Yuan(田园), Tu Ziqin(涂梓钦), Wang Xueying(汪学英), Wang Can(王灿), Wang Di(王镝), Wang Fengna(王凤娜), Wang Fengqin(王凤琴), Wang Fuping(王富平), Wang Gengshen(王庚申), Wang Hongjun(王洪军), Wang Jialei(王嘉蕾), Wang Jun(王军), Wang Lian'gen(王连根), Wang Mingsuo(王明锁), Wang Qingliang(王青良), Wang Ruhong(王汝红), Wang Shaohua(王少华), Wang Wen(王文), Wang Xia(王霞), Wang Xiaoning(王小宁), Wang Xuejing(王雪婧), Wang Yitong(王一桐), Wang Yixiao(王翊肖), Wang Zhengzhen(王铮臻), Wang Zijun(王子隽), Wei Guide(韦贵德), Wei Jianxian(魏建贤), Wei Wei(魏巍), Wei Zhihua(魏志华), Wen Baoda(文宝达), Weng Xiangyu(翁翔雨), Weng Zhen'e(翁桢娥), Wu Kansong(吴坎宋), Wu Qunfang(吴群芳), Wu Xiaodan(吴晓丹), Wu Yifeng(吴毅锋), Wu Yinghua(吴英华), Xia Xu(夏旭), Xiang Yun(祥云), Xiang Le(项乐), Xiao Bingxiang(肖炳祥), Xiaodao(小刀), Xiaofeixia(小飞侠), Xiaolingling(小玲玲), Xiaolinglingma(小玲玲妈), Xiaoliu(小刘), Xiaolu(小鹭), Xiaomaque(小麻雀), Xiaopingtou(小平头), Xiaosun(小隼), Xiaoyou(小攸), Xiaoyuma(小羽妈), Xiaozhou(小周), Xiaozhuang(小庄), Xiaomei(晓梅), Xie Hong(谢洪), Xie Xuan(谢璇), Xingzhiguang(星之光), Xing Dongyao(邢东耀), Xiong Guangping(熊光萍), Xu Jiawen(徐嘉雯), Xu Keyang(徐克阳), Xu Meng(徐萌), Xu Xueyin(徐雪寅), Xu Yang(徐阳), Xu Zhaopeng(徐兆鹏), Xu Cheng(许成), Xu Danxia(许丹霞), Xu Xiajuan(许夏娟), Xu Zhiwei(许志伟), Xue Lin(薛琳), Xue Wenjie(薛文杰), Xuexiao(雪枭), Xuexiao(雪鸮), Yase(亚瑟), Yan Feng(闫峰), Yan Yikang(闫亦康), Yansun(燕隼), Yansunmama(燕隼妈妈), Yang Jin(杨金), Yang Man(杨蔓), Yang Shangzhen(杨尚臻), Yang Weimin(杨伟民), Yang Zhidong(杨志栋),

Yang Ziyou(杨子悠), Ye Xinyan(叶心言), Ye Zhiying(叶志英), Yizhichan(一指馋), Yi Fengli(衣凤丽), Yin Runyu(尹润雨), Yin Yuzhu(尹玉柱), Yongliu(咏柳), You Yanchun(尤艳春), You Sun(游隼), You Yi(游弋), You Yubing(游宇兵), Yu Jun(于军), Yu Tao(于涛), Yu Hui(余辉), Yutou(鱼头), Yufu(渔夫), Yuwei(雨薇), Yu Qiang(喻强), Yuan Pin(袁屏), Yundanfengqing(云淡风清), Yunhe(云鹤), Zhan Lingxue(詹凌雪), Zhan Xia(湛霞), Zhang Gaofeng(张高峰), Zhang Guiju(张桂菊), Zhang Guoan(张国安), Zhang Hang(张航), Zhang Jie(张杰), Zhang Jiejun(张杰君), Zhang Jing(张菁), Zhang Jun(张俊), Zhang Li(张莉), Zhang Ling(张灵), Zhang Manling(张曼玲), Zhang Ming(张明), Zhang Nan(张楠), Zhang Shoudong(张守栋), Zhang Wei(张伟), Zhang Wei(张苇), Zhang Xuecong(张学聪), Zhang Xuefeng(张雪峰), Zhang Yu(张宇), Zhang Zhechun(张蛰春), Zhang Zhenkun(张朕坤), Zhang Zhengyun(张征云), Zhang Zheng(张铮), Zhang Lin(章麟), Changgong(长弓), Zhao E(赵锷), Zhao Liang(赵亮), Zhao Zimeng(赵子梦), Zhaozi(照子), Zheng Boyang(郑博洋), Zheng Chong(郑冲), Zheng Ding(郑鼎), Zheng Huaizhou(郑怀舟), Zheng Jie(郑洁), Zhenglaoshi(郑老师), Zheng Xiaobing(郑小兵), Zheng Zhiwu(郑智武), Zhidao(知道), Zhong Jingzhen(钟静贞), Zhong Yuetao(钟悦陶), Zhou Jinwen(周金文), Zhou Jinfeng(周进锋), Zhou Minjun(周敏军), Zhou Minxian(周敏贤), Zhou Minxian(周敏贤), Zhou Mo(周末), Zhou Zhuoya(周卓雅), Zhou Zichen(周子琛), Zhu Jing'en(朱敬恩), Zhu Mingyue(朱明月), Zhu Xiaohong(朱小红), Zhu Zijian(朱子健), Zhuzi(柱子), Zhuang(庄), Zhuang Guozheng(庄国郑), Zhuang Lifeng(庄礼凤), Zhuo Ying(卓英), Zixiaodong(紫啸鸫), Zongheng(纵横), Zou Sheng(邹胜), Zuozaiyunshangpiao(坐在云上飘).

In addition, in 2004 Hong Kong Bird Watching Society and Shenzhen Bird Watching Society were commissioned by the Agriculture, Fisheries and Conservation Department of the Hong Kong SAR Government to conduct a survey in Hong Kong Deep Bay and Guangdong Shenzhen Bay, and data about both survey sites is sourced from this project. Finally, we would like to express gratitude to Swire Trust for funding the survey and training from August 2017 to July 2020, and for publishing this report and summarizing the survey results from 2012 to 2019.

Appendix

Appendix A - Description of individual survey site

Jiangsu Lianyungang

The Qingkou Estuary survey site is located in the southeast of Qingkou Town, Ganyu County, Lianyungang City. It officially replaced Linhongkou in 2011, but the name Linhongkou is still used in the records. The observation site is the estuary of Qingkou River. Waterbirds are pushed into the mudflats by the tide, making the dike surrounding the south side of the mudflats at the estuary of the river a good place for observation.

The GPS of the centre point of Qingkou Estuary is 119.231198°E and 34.789779°N

- Linhongkou wetland is located in the northernmost part of Lianyun District, Lianyungang City, at the border with Ganyu County, and is the estuary of Xinshu River. The observation site at Linhongkou is basically abandoned because most of the mudflats are covered with *Spartina alterniflora*, making it no longer suitable for observation. It has been replaced by the Qingkou Estuary since 2011.

- After low tide, surveyors observe newly landed and feeding waders on a mudflat below Xingzhuang River Grand Bridge at Xingzhuang Estuary, and record important resighting information.

- The survey is conducted using the line transect method. Each survey is carried out by one to two surveyors. The date of each survey is not fixed, but usually on a Sunday in the middle of a month when the tide is right. A right tidal height is chosen to reduce the distance between waterbirds on the mudflats and the observer, or in the hope that the tide would drive the waterbirds to the fish ponds or shrimp aquaculture ponds on the landward side of the seawall, so as to get the highest concentration of waterbirds.

- Given small birdwatching population in Lianyungang, local surveyor Han Yongxiang has long been solely responsible for most of the surveys, which however may cause some count bias during the peak migration period of birds. Starting from 2019, Lianyungang survey site, together with other survey sites in Jiangsu, conducted a joint survey of no less than three days in May and September, covering three estuaries including Xingzhuang, Qingkou, and Linhong, and found large concentrated population of Asian Dowitcher species.

- Lianyungang is currently unprotected.

Jiangsu Tiaozini

Tiaozini mudflat wetland is situated in an intertidal wetland between Liangduo Estuary and Fangtang Estuary in Yancheng.

The GPS of the centre point of Tiaozini mudflat is: 120.90°E, 32.76°N

- The survey in Tiaozini is generally conducted on the days with relatively high high tide height in a month, and generally runs for 2 days. On the second day of survey, adjustments are made according to the problems encountered on the first day, so as to get the accurate data. The survey is conducted in two groups simultaneously by region or in the order of tidal inundation of mudflats, taking into account the tide height and survey manpower.

- The frequency of survey is once a month or twice during the peak migration period in April, September and October. During data analysis, if there are two surveys in a month, the highest count of the species in the two surveys is taken as the number of that species surveyed in that month, and the sum of the highest counts of various species is the total number surveyed in that month.

- The survey in Tiaozini was initiated partly through the exploration of suitable habitats for Spoon-billed Sandpiper around Tiaozini by a survey team focusing on Rudong, Jiangsu. The scope of survey has been gradually expanded from the mudflat area near Fangtang Estuary in the early days to the whole Liangduo Estuary and Fangtang Estuary.

Jiangsu Yangkou

Yangkou mudflat is situated in a mudflat southeast of Haiyin Temple in Xiaoyangkou Town, Rudong. The survey area ends at Huangang Xinzha.

The GPS of the centre point of Yangkou mudflat is 121.11°E, 32.54°N

- The survey in Yangkou was interrupted from time to time after 2016 due to the invasion of *Spartina alterniflora*. The surveyors continue to conduct waterbird surveys in Fengli, south of Xiaoyangkou. The waterbirds move between the two sites, not ruling out the possibility of partial non-overlapping.

- The survey sites in Fengli include a bare mudflat without *Spartina alterniflora* in Fengli mudflat. The waders on the mudflat are counted at high and low tides on spring tide days, with Shipping checkpoint as the center.

- At Fengli mudflat, the population of waders that fly into the high tide roost at high tide is counted. The population of waders for short stay in the dry land of the fish pond at the intersection of Xiaoyangkou and the seawall of Fengli is counted. Based on the heading direction of birds at high tide, we estimate that some of the birds will fly to the high tide stopover site at Xiaoyangkou, and some large and medium-sized waders will fly south to the upland in the pond near Huandong Village.

- In Yangkou, there are not only a lot of construction inside the dikes, including chemical plants, but also frequent changes in fish ponds, and new photovoltaic panels. So the surveyors will look for suitable high tide stopover sites according to habitat changes to ensure accurate counts.

Jiangsu Dongling

The survey in Dongling focuses on silty intertidal mudflats. In recent years, by reclaiming silt, human beings have transformed natural intertidal mudflats and supratidal areas into aquaculture ponds and other land-use types for human activities or left the reclaimed land idle for further development. The invasive plant, *Spartina alterniflora*, spreads over large areas of the mudflat, extending at least 1 km outward on the seaward side of the 6 km long north-south seawall, further encroaching the foraging habitats of waders and limiting their range. In addition, there is a jellyfish aquaculture pond with an area of about 5.4km2 in the south of Dongling. The jellyfish breed from spring to autumn every year, and the water in the pond is about 1 meter deep. When the pond is drained after the fishing season, it can be used as a high tide roosting site for waders and other waterbirds such as duck and geese, gull and tern.

The GPS of the centre point of Dongling survey is 121.45°E, 32.22°N

- Surveyors arrive at the survey site 2-3 hours before high tide and use telescopes to count all waders and search for individually marked birds on the mudflats during high tide (if available) and to note the heading direction of waders after being forced to leave by the rising tide. During high tide, surveyors look for high tide stopover sites near the mudflats, record their GPS locations, and take record of bird species, abundances, and flags (if any) in the stopover sites. In view of double counting of waterbirds observed during incoming tide and peak tide, the final data for each species will be the highest count among different periods in the same region. Each survey path is recorded using the mobile software "Outdoor Assistant".

Appendix Table 1. Survey locations, conservation status and threats to waterbirds. The letter superscript "a" denotes national nature reserve and "b" denotes Ramsar site (wetlands of international importance).

地点 Location	纬度 Longitude	经度 Latitude	2012-2019 年间观察到的潜在威胁 Potential threats observed between 2012-2019				未来可能面临的威胁 Potential threats in th future				目前调查是否能数清所有水鸟？ Were all waterbirds counted during survey?
			人为干扰 Human disturbance	潮间带栖息地丧失 Tidal flat loss	高潮栖息地丧失 High tide roost-loss	其它 Other	人为干扰 Human disturbance	潮间带栖息地丧失 Tidal flat loss	高潮栖息地丧失 High tide roost-loss	其它 Other	
辽宁丹东 Liangning Dandong a	124.18° E	39.85° N									
辽宁庄河 Liaoning Zhuang he	123.00° E	39.67° N									
辽宁盘锦 Liaoning Panjin a,b	121.50° E	40.83° N									
天津 Tianjin	117.58° E	38.77° N	✓				✓				No
河北沧州 Hebei Cangzhou	117.68° E	38.38° N									
山东东营 Shandong Dongying a	118.83° E	38.00° N									
山东胶州湾 Shandong Jiaozhou Bay	120.14° E	36.18° N	✓ (Sea cucumber farming)	✓ (*Spartina alterniflora*)			✓ (Sea cucumber farming)				No
江苏连云港 Jiangsu Lianyungang	119.23° E	34.79° N	✓ (Tidal flat farming)	✓ (*Spartina alterniflora*)	✓			✓			No
江苏条子泥 Jiangsu Tiaozini	120.90° E	32.76° N	✓ (Bycatch)	✓	✓				✓		No
江苏洋口 Jiangsu Yangkou	121.11° E	32.54° N	✓ (Bycatch)	✓	✓			✓	✓		Yes
江苏东凌 Jiangsu Dongling	121.45° E	32.22° N	✓	✓	✓		✓	✓	✓		No
上海 Shanghai a,b	121.97° E	31.50° N									
上海杭州湾北部 Hanzhou Bay north	121.5° E	30.81° N	✓	✓	✓		✓	✓	✓		Yes
浙江杭州湾 Zhejiang Hangzhou Bay b	121.39° E	30.34° N	✓ (Illegal hunting)		✓		✓ (Illegal hunting)		✓		No
浙江绍兴 Zhejiang Shaoxing	120.79° E	30.22° N									
浙江温州湾 Zhejiang Wenzhou Bay	120.87° E	27.93° N									
福建闽江口 Fujian Minjiang Estuary a	119.66° E	26.03° N		✓ (*Spartina alterniflora*)		Desertification				Deterioration of benthos	Yes

地点 Location	纬度 Longitude	经度 Latitude	2012-2019 年间观察到的潜在威胁 Potential threats observed between 2012-2019				未来可能面临的威胁 Potential threats in th future				目前调查是否能数清所有水鸟？ Were all waterbirds counted during survey?
			人为干扰 Human disturbance	潮间带栖息地丧失 Tidal flat loss	高潮栖息地丧失 High tide roost-loss	其它 Other	人为干扰 Human disturbance	潮间带栖息地丧失 Tidal flat loss	高潮栖息地丧失 High tide roost-loss	其它 Other	
福建泉州湾 Fujian Quanzhou Bay	118.77° E	24.83° N	✓ (Bycatch)	✓ (*Spartina alterniflora*)	✓		✓ (Bycatch/ *Spartina alterniflora*)	✓	✓		No
广东海丰 Guangdong Haifeng b	115.32° E	22.87° N									
广东深圳湾 / 香港后海湾 Guangdong Shenzhen Bay/ Hong Kong Deep Bay a,b	114.00° E, 114.04° E	22.53° N, 22.49° N	✓	✓	✓	Infrastructure/ Tall buildings	✓	✓ (Expansion of mangrove)			Yes
澳门 Macau	113.55° E	22.14° N		✓			✓	✓			Yes
广东南沙 Guangdong Nansha	113.67° E	22.60° N									
广东茂名 Guangdong Maoming	111.11° E	21.46° N	✓ (Illegal hunting)			Sand mining/ Dredging	✓ (Sand mining/ Tourist)				Yes
广东湛江 Guangdong Zhanjiang a,b	110.19° E	20.88° N	✓ (Illegal hunting/ Bycatch)				✓ (Bycatch)				Yes
广西北海 Guangdong Beihai	109.18° E	21.40° N									

Appendix Table 2. The survey frequency of the 25 survey areas between 2012 and 2019. The year starts from July and finishes in June the next year to match the annual cycle of migratory waterbirds.

地点 Location	2011 – 2012	2012 – 2013	2013 – 2014	2014 – 2015	2015 – 2016	2016 – 2017	2017 – 2018	2018 – 2019	2019 – 2020	总数 Total
广东深圳湾 / 香港后海湾 Guangdong Shenzhen Bay/ Hong Kong Deep Bay	6	12	12	12	12	12	12	12	6	96
福建闽江口 Fujian Minjiang Estuary	6	11	12	12	12	12	12	12	6	95
福建泉州湾 Fujian Quanzhou Bay	6	12	12	12	12	12	12	12	6	96
广东海丰 Guangdong Haifeng	6	12	12	12	12	0	0	0	0	54
广东茂名 Guangdong Maoming	0	0	0	0	0	0	0	6	6	12
广东南沙 Guangdong Nansha	0	1	9	12	12	11	0	0	0	45
广东湛江 Guangdong Zhanjiang	0	0	0	3	9	11	11	12	6	52
广西北海 Guangdong Beihai	0	3	1	0	0	5	6	0	0	15
河北沧州 Hebei Cangzhou	6	0	0	6	0	0	0	0	0	12
上海杭州湾北部 Hanzhou Bay north	0	0	0	0	0	0	6	12	6	24
江苏东凌 Jiangsu Dongling	0	0	9	10	10	11	11	12	5	68
江苏条子泥 Jiangsu Tiaozini	0	0	1	9	10	11	12	2	0	45
江苏连云港 Jiangsu Lianyungang	6	12	9	12	11	10	12	12	6	90

地点 Location	2011 – 2012	2012 – 2013	2013 – 2014	2014 – 2015
江苏洋口 Jiangsu Yangkou	6	12	12	10
辽宁丹东 Liangning Dandong	4	6	12	12
辽宁盘锦 Liaoning Panjin	3	9	8	11
辽宁庄河 Liaoning Zhuang he	1	0	0	0
澳门 Macau	0	0	9	12
山东东营 Shandong Dongying	6	12	6	6
山东胶州湾 Shandong Jiaozhou Bay	0	0	0	0
上海 Shanghai	6	12	6	0
天津 Tianjin	6	10	12	12
浙江杭州湾 Zhejiang Hangzhou Bay	0	0	0	0
浙江绍兴 Zhejiang Shaoxing	0	0	0	5
浙江温州湾 Zhejiang Wenzhou Bay	0	0	0	0
总数 TOTAL	74	136	154	180

2015 – 2016	2016 – 2017	2017 – 2018	2018 – 2019	2019 – 2020	总数 Total
6	0	4	0	0	50
11	9	12	12	6	84
9	6	2	4	6	58
0	0	0	0	0	1
12	12	12	12	6	75
12	12	12	12	6	84
0	0	0	6	6	12
0	0	0	0	0	24
10	7	7	8	3	75
0	0	0	5	6	11
0	2	0	0	0	7
0	0	0	6	5	11
166	143	149	169	97	1268

Appendix Table 3. The cases where a Threatened or Near Threatened waterbird species were recorded in an abundant greater than its 1% flyway estimate during the 2012-2019 censuses in 25 locations.

VU - 易危 Vulnerable
NT - 近危 Near Threatened
CR - 极危 Critically Endangered
EN - 濒危 Endangered

DEBA - 广东深圳湾 / 香港后海湾 Shenzhen Bay/Deep Bay
FJMJ - 福建闽江口 Fujian Minjiang Estuary
FJQZ - 福建泉州湾 Fujiang Quanzhou Bay
GDHF - 广东海丰 Guangdong Haifeng
GDMM - 广东茂名 Guangdong Maoming
GDNS - 广东南沙 Guangdong Nansha
GDZJ - 广东湛江 Guangdong Zhanjiang
GXBH - 广西北海 Guangxi Beihai
HBCZ - 河北沧州 Hebei Cangzhou
HZBN - 杭州湾北部 Hangzhou Bay north
JSDL - 江苏东凌 Jiangsu Dongling
JSJG - 江苏条子泥 Jiangsu Tiaozini
JSLY - 江苏连云港 Jiangsu Lianyungang
JSYK - 江苏洋口 Jiangsu Yangkou
LNDD - 辽宁丹东 Liaoning Dandong
LNPJ - 辽宁盘锦 Liaoning Panjin
LNZH - 辽宁庄河 Liaoning Zhuanghe
MACA - 澳门 Macau
SDDY - 山东东营 Shandong Dongying
SDJZ - 山东胶州湾 Shandong Jiaozhou Bay
SHA - 上海 Shanghai
TIJI - 天津 Tianjin
ZJHZ - 浙江杭州湾 Zhejiang Hangzhou Bay
ZJSX - 浙江绍兴 Zhejiang Shaoxing
ZJWZ - 浙江温州湾 Zhejiang Wenzhou Bay

物种 Spscies	IUCN 保护级别 IUCN Status	1% 标准 1% Criterion	最高数量超出迁飞区种群数量 1% 的地点（数量，年 _ 月） Sites with more than 1% of the flyway population (highest count, Year_Month)
半蹼鹬 Asian Dowitcher (*Limnodromus semipalmatus*)	NT	230	JSLY (22432, 2019_05)
青头潜鸭 Baer's Pochard (*Aythya baeri*)	CR	5	HBCZ (15, 2012_03); SDDY (15, 2017_02); TIJI (5, 2019_10); ZJHZ (42, 2019_01); ZJWZ (5, 2019_02)
斑尾塍鹬 Bar-tailed Godwit (*Limosa lapponica*)	NT	1500	JSDL (4500, 2017_05); JSJG (7375, 2018_08); JSLY (4702, 2013_04); LNDD (50722, 2015_04); LNPJ (12000, 2013_09); SDDY (7136, 2013_05); TIJI (2200, 2013_04); ZJHZ (2679, 2019_05)
豆雁 Bean Goose (*Anser fabalis*)	LC	100	HBCZ (1040, 2012_03); JSJG (700, 2013_11); LNDD (1900, 2017_03); LNPJ (15500, 2017_03); SDDY (18070, 2015_12); TIJI (3422, 2017_01)
黑脸琵鹭 Black-faced Spoonbill (*Platalea minor*)	EN	20	DEBA (455, 2014_12); FJMJ (145, 2019_11); GDHF (144, 2016_01); GDNS (22, 2016_02); GDZJ (91, 2018_01); JSDL (38, 2014_10); JSJG (49, 2018_05); JSYK (33, 2017_10); LNDD (35, 2019_09); MACA (62, 2015_01); SHA (23, 2013_02); ZJHZ (25, 2019_10); ZJWZ (83, 2019_04)

物种 Spscies	IUCN 保护级别 IUCN Status	1% 标准 1% Criterion	最高数量超出迁飞区种群数量 1% 的地点 （数量，年 _ 月） Sites with more than 1% of the flyway population (highest count, Year_Month)
黑尾塍鹬 Black-tailed Godwit (*Limosa limosa*)	NT	1400	DEBA (1924, 2013_04); JSDL (6316, 2016_07); JSJG (3590, 2018_06); JSLY (23120, 2018_05); LNDD (1485, 2018_08); LNPJ (5100, 2016_04); SDDY (22550, 2016_08); TIJI (7130, 2018_03); ZJHZ (3500, 2019_05); ZJWZ (4505, 2019_05)
黑翅长脚鹬 Black-winged Stilt (*Himantopus himantopus*)	LC	1000	LNPJ (1026, 2016_04); SDDY (2250, 2015_09); TIJI (1816, 2014_06)
黑鹳 Black Stork (*Ciconia nigra*)	LC	1	LNPJ (1, 2013_09); SDDY (11, 2015_10)
阔嘴鹬 Broad-billed Sandpiper (*Calidris falcinellus*)	LC	250	JSDL (816, 2018_08); JSJG (513, 2018_05); JSLY (5530, 2019_05); JSYK (710, 2014_08); LNDD (1040, 2018_05); ZJWZ (407, 2019_05)
红嘴巨鸥 Caspian Tern (*Hydroprogne caspia*)	LC	250	JSLY (363, 2015_11); SDDY (440, 2019_10); SDJZ (350, 2019_10)
黑嘴端凤头燕鸥 Chinese Crested Tern (*Thalasseus bernsteini*)	CR	1	FJMJ (8, 2013_04); SDJZ (37, 2019_10)
黄嘴白鹭 Chinese Egret (*Egretta eulophotes*)	VU	35	JSLY (37, 2019_08); LNDD (88, 2018_09)
灰鹤 Common Crane (*Grus grus*)	LC	150	SDDY (8800, 2016_02)
青脚鹬 Common Greenshank (*Tringa nebularia*)	LC	1000	DEBA (1276, 2012_08); LNDD (1651, 2013_08); LNPJ (1200, 2014_08); SDDY (1100, 2015_11); ZJHZ (5225, 2019_05)
普通秋沙鸭 Common Merganser (*Mergus merganser*)	LC	750	LNDD (1890, 2014_03)
红头潜鸭 Common Pochard (*Aythya ferina*)	VU	3000	SDDY (6880, 2018_12); TIJI (20000, 2015_10); ZJWZ (4000, 2019_01)
红脚鹬 Common Redshank (*Tringa totanus*)	LC	1000	DEBA (1329, 2019_04); LNPJ (1200, 2014_08); ZJHZ (2431, 2019_05)
翘鼻麻鸭 Common Shelduck (*Tadorna tadorna*)	LC	1200	HBCZ (2407, 2015_03); JSLY (1920, 2017_12); LNDD (6192, 2012_03); LNPJ (40000, 2013_11); SDJZ (12000, 2019_02); TIJI (2054, 2019_12); ZJWZ (4000, 2019_01)
弯嘴滨鹬 Curlew Sandpiper (*Calidris ferruginea*)	NT	1400	DEBA (6316, 2017_04); FJQZ (1742, 2018_04); HBCZ (2481, 2012_05); JSLY (3200, 2014_05); TIJI (2800, 2017_05)
卷羽鹈鹕 Dalmatian Pelican (*Pelecanus crispus*)	NT	1	FJQZ (3, 2019_12); GDHF (2, 2012_01); JSJG (112, 2013_11); JSLY (63, 2012_11); SDDY (86, 2015_10); ZJSX (1, 2014_11); ZJWZ (44, 2019_02)

物种 Spscies	IUCN 保护级别 IUCN Status	1% 标准 1% Criterion	最高数量超出迁飞区种群数量 1% 的地点 （数量，年 _ 月） Sites with more than 1% of the flyway population (highest count, Year_Month)
黑腹滨鹬 Dunlin (*Calidris alpina*)	LC	10000	FJQZ (18000, 2017_02); JSDL (21000, 2017_05); JSJG (21870, 2017_04); JSLY (39198, 2019_09); JSYK (10000, 2012_04); LNDD (30650, 2014_04); LNPJ (12400, 2015_08); SDDY (24500, 2012_04); SDJZ (11000, 2019_01); ZJHZ (18190, 2019_05)
大杓鹬 Eastern Curlew (*Numenius madagascariensis*)	EN	320	JSDL (1030, 2017_06); JSJG (1172, 2018_06); JSLY (543, 2016_10); JSYK (482, 2015_07); LNDD (6420, 2019_07); LNPJ (2500, 2013_08); SDDY (3665, 2018_08); SDJZ (320, 2019_08)
白腰杓鹬 Eurasian Curlew (*Numenius arquata*)	NT	1000	DEBA (1542, 2017_02); FJQZ (1539, 2013_12); HBCZ (5448, 2015_01); JSDL (3400, 2017_02); JSJG (7800, 2014_10); JSLY (3250, 2018_01); JSYK (1445, 2013_10); LNDD (8020, 2018_03); LNPJ (2400, 2015_08); LNZH (1225, 2012_01); SDDY (4550, 2017_03); SDJZ (2400, 2019_12); TIJI (3000, 2016_04); ZJWZ (1300, 2019_12)
蛎鹬 Eurasian Oystercatcher (*Haematopus ostralegus*)	NT	70	JSDL (3700, 2014_01); JSJG (1320, 2017_01); JSLY (3130, 2015_01); JSYK (235, 2013_08); LNDD (2720, 2017_10); LNPJ (2600, 2015_07); SDDY (136, 2018_04); SDJZ (1100, 2019_01)
白琵鹭 Eurasian Spoonbill (*Platalea leucorodia*)	LC	100	LNPJ (108, 2019_09); SDDY (1550, 2017_05); TIJI (111, 2017_03)
罗纹鸭 Falcated Duck (*Mareca falcata*)	NT	830	HBCZ (1120, 2012_04); JSJG (1830, 2014_12); JSLY (4000, 2013_01); SDDY (12000, 2012_11); SHA (1580, 2012_02); TIJI (1910, 2015_03); ZJHZ (1700, 2019_02)
赤膀鸭 Gadwall (*Mareca strepera*)	LC	7100	SDDY (9700, 2015_12)
普通鸬鹚 Great Cormorant (*Phalacrocorax carbo*)	LC	1000	DEBA (10569, 2013_01); GDHF (1850, 2012_01); JSJG (1442, 2016_03); LNPJ (1400, 2013_04); SDDY (8770, 2016_10); ZJWZ (2554, 2019_02)
凤头䴙䴘 Great Crested Grebe (*Podiceps cristatus*)	LC	350	SDDY (493, 2017_10); ZJSX (822, 2014_11)
大白鹭 Great Egret (*Ardea alba*)	LC	1000	DEBA (1448, 2015_10); GDHF (2060, 2016_01)
大滨鹬 Great Knot (*Calidris tenuirostris*)	EN	2900	JSDL (8526, 2016_07); JSJG (6010, 2018_08); JSLY (3018, 2012_08); LNDD (64876, 2016_05); LNPJ (50000, 2015_04); SDDY (6572, 2013_05); TIJI (6000, 2018_04)
铁嘴沙鸻 Greater Sand Plover (*Charadrius leschenaultii*)	LC	1000	FJMJ (3200, 2019_07); FJQZ (1717, 2012_08); JSDL (2060, 2015_07); JSJG (6920, 2018_06); JSYK (2886, 2015_07); ZJHZ (1847, 2019_05)
白额雁 Greater White-fronted Goose (*Anser albifrons*)	LC	180	LNDD (568, 2014_03); LNPJ (300, 2017_04)

物种 Spscies	IUCN 保护级别 IUCN Status	1% 标准 1% Criterion	最高数量超出迁飞区种群数量 1% 的地点 （数量，年 _ 月） Sites with more than 1% of the flyway population (highest count, Year_Month)
灰斑鸻 Grey Plover (*Pluvialis squatarola*)	LC	1000	FJQZ (1197, 2016_02); HBCZ (1708, 2015_04); JSDL (4670, 2017_01); JSJG (7390, 2017_04); JSLY (12500, 2016_04); JSYK (1741, 2012_10); LNDD (5822, 2015_04); LNPJ (8000, 2015_04); SDDY (4123, 2013_05); SDJZ (4800, 2019_01); TIJI (3000, 2017_01); ZJHZ (1624, 2019_12); ZJWZ (1120, 2019_12)
灰雁 Greylag Goose (*Anser anser*)	LC	710	SDDY (11020, 2015_12); TIJI (4210, 2017_03)
鸥嘴噪鸥 Gull-billed Tern (*Gelochelidon nilotica*)	LC	1000	SDDY (2100, 2015_06)
白头鹤 Hooded Crane (*Grus monacha*	VU	10	LNPJ (96, 2015_10); SDDY (210, 2018_11)
姬鹬 Jack Snipe (*Lymnocryptes minimus*)	LC	100	JSLY (124, 2013_03)
环颈鸻 Kentish Plover (*Charadrius alexandrinus*)	LC	790	DEBA (3221, 2013_01); FJMJ (1083, 2018_11); FJQZ (1952, 2016_10); GDZJ (890, 2019_01); HBCZ (2462, 2012_04); HZBN (1910, 2018_02); JSDL (6500, 2014_11); JSJG (11000, 2014_10); JSLY (5952, 2019_09); JSYK (8050, 2014_10); LNDD (14700, 2017_09); LNPJ (12000, 2015_08); SDDY (2105, 2018_04); SDJZ (800, 2019_03); SHA (1420, 2013_09); TIJI (2430, 2017_05); ZJHZ (1535, 2019_10); ZJWZ (2043, 2019_03)
蒙古沙鸻 Lesser Sand Plover (*Charadrius mongolus*)	LC	200	FJMJ (500, 2016_07); FJQZ (1034, 2016_04); GDMM (1000, 2019_04); GXBH (900, 2013_07); JSDL (4500, 2014_09); JSJG (1300, 2014_09); JSLY (3426, 2019_09); JSYK (3942, 2015_07); LNDD (1477, 2013_08); LNPJ (6000, 2015_08); SDDY (305, 2013_05); SDJZ (430, 2019_05); ZJHZ (2880, 2019_05); ZJWZ (749, 2019_05)
金眶鸻 Little Ringed Plover (*Charadrius dubius*)	LC	250	SDDY (450, 2017_05); TIJI (600, 2017_05)
白额燕鸥 Little Tern (*Sternula albifrons*)	LC	1000	JSDL (1568, 2016_07)
长嘴剑鸻 Long-billed Plover (*Charadrius placidus*)	LC	250	ZJHZ (507, 2019_08)
长趾滨鹬 Long-toed Stint (*Calidris subminuta*)	LC	250	JSLY (600, 2012_07); SHA (301, 2013_09); ZJWZ (310, 2019_05)
鸳鸯 Mandarin Duck (*Aix galericulata*)	LC	200	LNDD (212, 2014_04); SDDY (650, 2019_11)
海鸥 Mew Gull (*Larus canus*)	LC	1000	LNDD (2490, 2015_02); LNPJ (1200, 2013_11); LNZH (1570, 2012_01)
疣鼻天鹅 Mute Swan (*Cygnus olor*)	LC	15	HBCZ (16, 2015_03); SDDY (420, 2017_12)

物种 Spscies	IUCN 保护级别 IUCN Status	1% 标准 1% Criterion	最高数量超出迁飞区种群数量 1% 的地点 （数量，年 _ 月） Sites with more than 1% of the flyway population (highest count, Year_Month)
小青脚鹬 Nordmann's Greenshank (*Tringa guttifer*)	EN	5	DEBA (7, 2013_04); JSDL (90, 2016_08); JSJG (840, 2014_09); JSLY (122, 2019_09); JSYK (171, 2013_10); LNDD (46, 2016_05); SDJZ (11, 2019_05); ZJWZ (5, 2019_04)
针尾鸭 Northern Pintail (*Anas acuta*)	LC	2400	DEBA (3747, 2018_01); SDDY (3570, 2018_11)
琵嘴鸭 Northern Shoveler (*Spatula clypeata*)	LC	5000	DEBA (7560, 2012_01); TIJI (6000, 2018_10)
东方白鹳 Oriental Stork (*Ciconia boyciana*)	EN	30	HBCZ (161, 2012_03); LNDD (80, 2012_02); LNPJ (432, 2015_03); SDDY (880, 2019_11); TIJI (550, 2014_12)
金斑鸻 Pacific Golden Plover (*Pluvialis fulva*)	LC	1000	DEBA (1081, 2018_04)
反嘴鹬 Pied Avocet (*Recurvirostra avosetta*)	LC	1000	DEBA (14604, 2012_02); FJQZ (1690, 2019_02); GDNS (2900, 2016_01); HBCZ (2480, 2015_03); JSDL (1136, 2019_11); JSLY (14000, 2019_09); SDDY (6550, 2015_10); SDJZ (3800, 2019_03); TIJI (11006, 2019_03); ZJWZ (5250, 2019_03)
丹顶鹤 Red-crowned Crane (*Grus japonensis*)	EN	4	JSLY (25, 2012_03); LNPJ (308, 2015_03); SDDY (220, 2018_03)
红颈滨鹬 Red-necked Stint (*Calidris ruficollis*)	NT	3200	JSDL (14000, 2016_05); JSJG (15267, 2018_05); JSLY (6853, 2012_08); JSYK (3400, 2014_05)
红腹滨鹬 Red Knot (*Calidris canutus*)	NT	710	HBCZ (1116, 2012_05); JSDL (1360, 2014_08); JSLY (2500, 2013_04); LNPJ (6500, 2015_08); SDDY (3320, 2017_04); TIJI (2000, 2012_05); ZJWZ (4780, 2019_04)
遗鸥 Relict Gull (*Ichthyaetus relictus*)	VU	120	HBCZ (4827, 2015_02); JSLY (900, 2019_03); LNDD (2543, 2015_02); LNPJ (940, 2015_08); LNZH (1730, 2012_01); SDDY (4111, 2017_03); TIJI (11000, 2016_03)
翻石鹬 Ruddy Turnstone (*Arenaria interpres*)	LC	290	FJMJ (320, 2017_08); LNDD (345, 2019_05); LNPJ (650, 2016_04)
三趾滨鹬 Sanderling (*Calidris alba*)	LC	220	FJMJ (2500, 2019_05); FJQZ (330, 2013_04); GXBH (420, 2017_09); JSDL (2300, 2016_03); JSJG (470, 2017_05)
黑嘴鸥 Saunders's Gull (*Chroicocephalus saundersi*)	VU	85	DEBA (114, 2017_01); FJQZ (742, 2013_01); HBCZ (256, 2012_02); JSDL (2555, 2013_10); JSJG (2666, 2018_02); JSLY (287, 2017_12); JSYK (1085, 2012_06); LNDD (2190, 2015_09); LNPJ (7600, 2017_06); SDDY (8200, 2016_07); SDJZ (370, 2019_07); TIJI (420, 2013_12); ZJHZ (851, 2019_09); ZJWZ (910, 2019_12)
尖尾滨鹬 Sharp-tailed Sandpiper (*Calidris acuminata*)	LC	1600	HBCZ (2549, 2012_05); JSJG (2043, 2018_05); JSLY (12590, 2018_05); LNPJ (4000, 2014_08); SDDY (2393, 2013_05); ZJWZ (5780, 2019_05)
白鹤 Siberian Crane (*Leucogeranus leucogeranus*)	CR	35	LNPJ (500, 2013_11); SDDY (2200, 2019_11)

物种 Spscies	IUCN 保护级别 IUCN Status	1% 标准 1% Criterion	最高数量超出迁飞区种群数量 1% 的地点 （数量，年 _ 月） Sites with more than 1% of the flyway population (highest count, Year_Month)
白秋沙鸭 Smew (*Mergellus albellus*)	LC	250	SDDY (902, 2016_12); TIJI (2500, 2017_02)
雪雁 Snow Goose (*Anser caerulescens*)	LC	1	LNDD (1, 2014_11); TIJI (2, 2018_11)
勺嘴鹬 Spoon-billed Sandpiper (*Calidris pygmaea*)	CR	3	FJMJ (8, 2012_01); GDZJ (32, 2017_12); JSDL (44, 2014_09); JSJG (144, 2014_09); JSYK (53, 2012_09)
斑嘴鸭 Spot-billed Duck (*Anas poecilorhyncha*)	LC	11300	SDDY (24400, 2015_12)
鹤鹬 Spotted Redshank (*Tringa erythropus*)	LC	250	DEBA (263, 2013_02); FJMJ (254, 2014_12); HBCZ (338, 2012_05); JSLY (656, 2014_04); JSYK (300, 2012_04); LNDD (320, 2017_08); LNPJ (2800, 2016_04); SDDY (1584, 2019_10); SDJZ (420, 2019_06); TIJI (1200, 2013_10)
鸿雁 Swan Goose (*Anser cygnoides*)	VU	680	FJMJ (1200, 2016_12); LNDD (1058, 2016_03); SDDY (1145, 2017_11)
翘嘴鹬 Terek Sandpiper (*Xenus cinereus*)	LC	500	FJMJ (1100, 2015_08); FJQZ (862, 2015_04); JSDL (2262, 2016_07); JSJG (570, 2014_09); JSLY (1400, 2019_05); JSYK (880, 2013_08); LNDD (2206, 2014_07); LNPJ (1200, 2013_05)
凤头潜鸭 Tufted Duck (*Aythya fuligula*)	LC	2400	DEBA (11613, 2016_12); LNDD (21100, 2015_03); ZJWZ (5920, 2019_02)
小天鹅 Tundra Swan (*Cygnus columbianus*)	LC	1000	SDDY (2200, 2017_11); TIJI (7600, 2014_03)
中杓鹬 Whimbrel (*Numenius phaeopus*)	LC	550	FJQZ (909, 2012_08); LNDD (810, 2016_08); SDDY (1152, 2018_08)
海南鹃 White-eared Night Heron (*Gorsachius magnificus*)	EN	5	ZJHZ (212, 2019_04)
白枕鹤 White-naped Crane (*Antigone vipio*)	VU	10	SDDY (255, 2017_11)
大天鹅 Whooper Swan (*Cygnus cygnus*)	LC	600	SDDY (3550, 2013_11); TIJI (2300, 2016_03)

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