



トヨタ環境活動助成プログラム  
TOYOTA Environmental Activities Grant Program



## MONITORING OF MIGRATORY SHOREBIRDS AT GULF OF MOTTAMA

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**Biodiversity And Nature Conservation Association (BANCA)**

May 2019

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## 1. EXECUTIVE SUMMARY

An international survey team of over 19 surveyors from Bangladesh, China, Indonesia, Singapore, Thailand, Germany and the U.K. assembled in the remote coastal mudflats to survey the key wintering areas of the Spoon-billed Sandpipers and other shorebirds. They were accompanied by an experienced team of Myanmar surveyors of BANCA and local fishermen, who join up for these winter surveys for the tenth year. A total of 136,383 wetland depended birds of 64 species were recorded in the Gulf of Mottama between 20 January and 1 February 2019. The survey team recorded an estimated 112 critically endangered Spoon-billed Sandpiper, based on the SBS proportion in 137 flock counts of over 36,000 birds extrapolated to an estimated 62,000 birds of small waders in the area. These birds were encounter by the team at low tide feeding and widespread across the vast mudflat habitats.. A Total of at least 14 individually flagged birds were observed. Of these four birds could be identified individually. They include overall at least four head-started birds, as well as birds marked on the breeding grounds and in China. Most interesting and surprising is the record of one bird originating from the North Chukotka coast, an area that has very few birds left breeding there. The relatively high proportion of 18.8% flagged birds could allow us to determine the overall global population size, if we'd know of the total number of remaining flagged birds at this moment. For this we have to wait for the breeding season and observe the return of marked birds into the breeding population. Of other globally endangered species such as Great Knot 32 individual were observed, as well as seven globally near-threatened species such Black-tailed Godwit (5,625 individuals), Bar-tailed Godwit (21 individuals), Eurasian Curlew (597 individuals), Red-necked Stint (6,157 individuals - 50% of Little & Red-necked Stint), Curlew Sandpiper (3,003 individuals) and Black-headed Ibis (51 individuals). The most abundant species were Lesser Sand Plover (16,385), Whiskered Tern (8,088) and Kentish Plover (10,997).

## 2. INTRODUCTION

Coastal wetlands are important for the livelihood of the local communities, as well as offers invaluable habitat to migratory birds. Main coastline of Myanmar is approximately 2400 km long, which is perhaps the most intact coastline in Southeast Asia. Along the Myanmar coastal regions, the largest estuary in Myanmar, Gulf of Mottama (GOM) is located at Yangon Region, Bago Region and Mon State. The area is about 250,000 ha and the mudflat area (75,000) ha that bordered with mouth of Sittaung River and Bay of Bangal. Gulf of Moattama wetland area is funnel-shape, the tide range is wide, during the spring tide when the tide range is about (7-8) m covered the all mudflat area and during the need tide when the tide range is about (3) m height. Its tidal cycle is extremely pronounced in speed and amplitude causing a powerful bore phenomenon. The highly productive intertidal mudflats support up to 200,000 - waterbirds, of which 12 are globally threatened according to IUCN Red List of Threatened Species including the Critically Endangered Spoon-billed Sandpiper.

The Spoon-billed Sandpiper (*Calidris pygmaea*) is a long distance migrant, breeding in Russia and annually migrating more than 8,000 km to winter in South and South-east Asia, with approximately half of the global population is understood to be wintering in Myanmar and the large majority in the GOM

(Zöckler *et al.* 2016). This species is classified as globally Critically Endangered in the IUCN Red List of Threatened Species. That is the highest category of extinction threat for any species still present in the wild. In 2010, it was assessed that at the current rate of population decline this species could become extinct within a decade. Myanmar is the most important country as a wintering ground for this species with about half of the global population recorded wintering in Gulf of Mottama and harboring another important wintering site in Nanthar Island of the coast of Rakhine State. The presence of this species recorded at the Taninthayi coast and Delta are also the incoming indicators of important habitats for Spoon-billed Sandpiper and other migratory shore birds.

The biological productivity of this system supports a rich biota that exemplifies the importance of large estuaries on an international scale as source areas for fish and invertebrates and as non-breeding refuges for tens of thousands of migratory water birds. BANCA's previous studies (2008-2016) on the Gulf of Mottama clearly meet with the 6 out of 9 Ramsar Criteria and need to protect, important habitat of Spoon-billed Sandpiper global population. In 10<sup>th</sup> May 2017, the northern part of Gulf of Mottama area (42,500) ha was designated as Fourth Ramsar Site of Myanmar.

In order to monitor waterbird population of Gulf of Mottama BANCA organized an international survey team of over 20 surveyors from Bangladesh, China, Indonesia, Singapore, Thailand, Germany and the U.K. These scientists assembled in the remote coastal mudflats between 20 January and 1 February 2019 to survey the key wintering areas of the Spoon-billed Sandpipers and other shorebirds.

### **3. SURVEY METHODS**

#### *Study area*

In order to determine the survey area at the Gulf of Mottama, previous survey results were reviewed for data and potential sites were identified with Landsat 8 from USGS and Google Earth. Koe Tae Su, Wae Pyan (out), Thaungthit Lay and Thaungthit Lay (out) regions were surveyed in the eastern side of the Gulf, and Yae Din Kyun, Garr, Wae Pyan, Wae Pyan Auk, Anaing Auk, Baw Ka Gyi, Near the Main Channal, Gar Auk and Kyeik Hto regions were surveyed in the western part of the Gulf. The survey was timed to cover the highest spring tide because the boats we used only had free access over all of the intertidal flats at high spring tides and because shorebirds are likely to be concentrated at high tides and to gather in large flocks that we would be less likely to miss when attempting to count the total numbers of small shorebirds (Aung *et al.* 2018).

#### *Field surveys*

The survey team was transported to as many parts of the study area as possible in shallow-draft fishing boats, which were grounded on the mud in the intertidal zone at low tide to allow observation of birds from the boat and on foot. In this way, the observers were able to conduct scan surveys throughout the daylight period of tidal cycles and at a wide range of elevations relative to the high and low water marks. Following protocol outlined in Aung *et al.* (2018), the surveyors were separated in groups of 2-4, who walked across the mudflat during the ebb, diverging from the place where the boat was grounded, and also viewed birds from the boats, especially when the tide was high. Surveyors used spotting scopes and

binoculars to record number of waterbirds during each scan (see below) and also estimated total number of shorebirds, especially during high tide.

### *Spoon-billed Sandpiper*

Counting Spoon-billed Sandpipers at any wintering site is challenging because they are rare and usually dispersed within large flocks of other small shorebirds, especially the similarly coloured and sized red-necked stint *Calidris ruficollis*. In the Upper Gulf of Mottama, complete direct counts of spoon-billed sandpipers are impractical because of the large numbers of other small shorebirds that must be checked, the large size of the intertidal area, day-to-day variation in the extent and location of foraging habitat exposed at low tide and frequent changes in the location of high tide roosts. Roosts are often on very soft substrates making it impossible to approach them before the birds leave on the falling tide. Therefore, in order to estimate total number of Spoon-billed Sandpiper flock-count method (described below) was applied along with exact counts of true observations.

### *Flock-counts*

Each group of observers included individuals experienced in shorebird identification who scanned flocks of resting and foraging small shorebirds using a telescope. A scan consisted of a search by one observer through a group of small shorebirds, at the end of which the numbers of small shorebirds of each species were recorded, together with the date and time of the record and the location, with a GPS. An individual small shorebird was only included in the scan record if it was seen well enough to be sure whether it was a spoon-billed sandpiper or not and observers were trained to spend enough time observing each bird do this accurately. Training was given by the experienced observers to achieve consistency. Some scans were conducted by inexperienced observers for training purposes and checked by a repeat survey of the same flock by an experienced observe.

Shorebird species present, in addition to Spoon-billed Sandpipers, mostly comprised *calidrid* sandpipers (Curlew Sandpiper *Calidris ferruginea*, Broad-billed Sandpiper *Calidris falcinella* and Red-necked Stint) and plovers (Greater Sandplover *Charadrius leschenaultia*, Sesser Sandplover *Charadrius mongolus*, Kentish plover *Charadrius alexandrinus* and little ringed plover *Charadrius dubius*). These species tended to feed and roost in mixed species flocks and were readily distinguished at a distance on the ground and in flight.

### *Analysis*

The total proportion of small waders is based on the average mean of each species within all submitted flocks. The total number of small shorebird species is than extrapolated based on the estimates of the overall flock size of small waders. As the latter varies between counters and is likely more inaccurate than the actual flock counts, the total number of SBS and other species varies widely according to the range of overall flock size estimates.

#### 4. RESULTS & DISCUSSION

A total of 136,383 wetland depended birds of 64 species were recorded in the Gulf of Mottama between 20 January and 1 February 2019. Of these, 119,520 shorebirds were estimated, comprising 62,000 in the eastern side and 57,520 in the western side of the Gulf (Table 1 & 2). Other waterbirds such as gulls, terns, ducks, ibis, egrets and herons include a total of 16,793 individuals at both eastern and western parts of the gulf. In addition, 70 raptors (predatory birds) of 10 species were recorded during the survey. The most abundant species were Lesser Sand Plover (16,385), Whiskered Tern (8,088) and Kentish Plover (10,997). Highest concentration of shorebirds (estimated 42,000) were seen during high tide on 21 January 2019 at Thaugthit Lay, located in the eastern side of the gulf followed by 10,000 shorebirds were estimated at Garr and Wae Pyan, respectively on 23 and 25 January 2019 on the western side of the gulf.

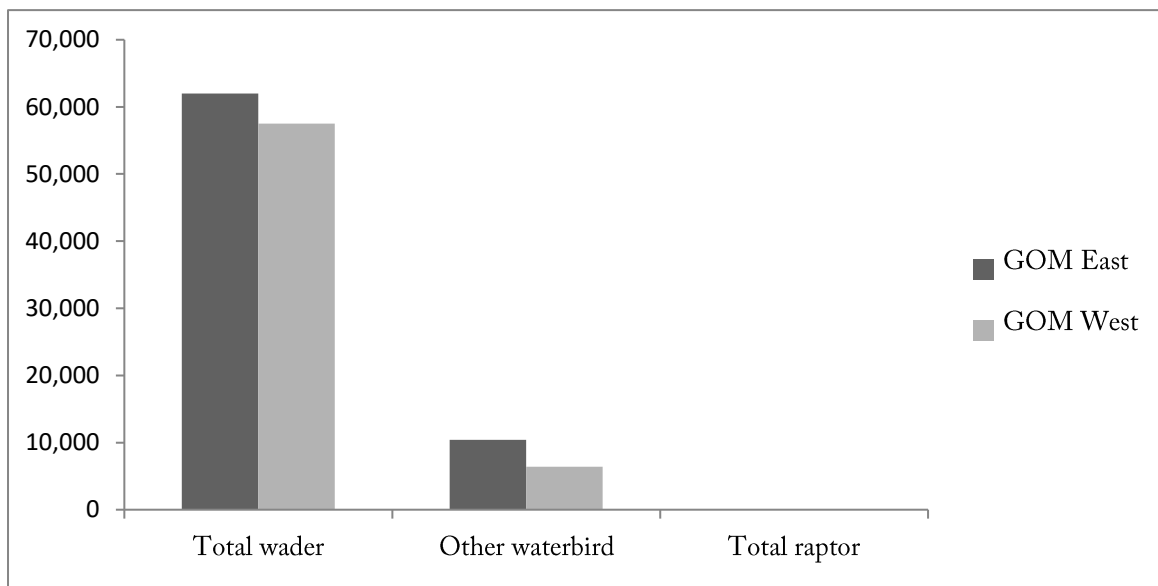


Figure 1: Number of birds recorded at East and West sides of Mottama

##### Estimated total number in Gulf of Mottama

Table 1 shows the average proportion of small waders in small wader flocks in the Gulf of Mottama during the survey period based on 137 flocks totaling over 38,000 small waders of eight or nine species (Red-necked Stint and Little Stint were summarized to one stint species only). Other small waders only occurring in very few samples were not included.

Table 1: Average flock proportions of small waders in the Gulf of Mottama in January 2019 (n= 137)

English Name	Scientific Name	Flock count total	Mean Proportion in %
Greater Sandplover	<i>Charadrius leschenaultii</i>	624	1.63
Lesser Sandplover	<i>Charadrius mongolus</i>	12292	32.20
Kentish Plover	<i>Charadrius alexandrinus</i>	11992	31.41
Little Ringed Plover	<i>Charadrius dubius</i>	129	0.34

Broad-billed Sandpiper	<i>Calidris falcinellus</i>	2030	5.32
Curlew Sandpiper	<i>Calidris ferruginea</i>	2501	6.55
Red-necked/Little Stint	<i>Calidris ruficollis/minuta</i>	8541	22.37
Spoon-billed Sandpiper	<i>Calidris pygmaea</i>	69	0.18
<b>Total of all flocks</b>		<b>38,178</b>	
<b>Total of SBS in flock @42,000</b>		<b>76</b>	
<b>Total of SBS in flock @62,000</b>		<b>112</b>	
<b>Total SBS in flock @100,000</b>		<b>180</b>	

Considering the total of 76 SBS referring only to the flocks on the East side we should add 36 more birds based on small wader flocks of 20,000 on the West side.

#### *Spoon-billed Sandpiper number*

The survey team recorded an estimated 93 (subjected to further analysis using flock-count method) critically endangered Spoon-billed Sandpiper, comprising 36 in the eastern side and 57 in the western side. These birds were encountered by the team at low tide feeding and widespread across the vast mudflat habitats. The total number is expected to be higher, based on the proportion within large flocks of small waders that were estimated to exceed 42,000 individuals. A Total of at least 10 or 12 individually flagged birds were observed. Of these four individuals could be identified. These birds include at least four head-started birds, as well as birds marked on the breeding grounds and in China. Most interesting and surprising is the record of one or maybe two birds originating from the North Chukotka coast, an area that has very few birds left breeding there.

#### *Flagged birds*

In total 14 Flagged birds were recorded (see table 2). X were from the Breeding ground of which xx from the head-starting programme. One bird is remarkable in the sense it has a blue flag that is only known from North Chukotka. It is not clear if the bird is from the Chukchi Peninsula or Russky Koshka near Anadyr, but accompanying accessories or the lack of it point to Russky Koshka. Several flags were from China (xx)

Table 2: Details of flagged Spoon-billed Sandpipers at the Gulf of Mottama.

Date	Obser Name	Time	Coordinate		No. SBS Flag	Flag Information
23.1.2019	MTHZ	5:15	17.17027	96.87886	1	White flag on the left leg
24.1.2019	MTHZ	10:11	17.1344	96.95889	1	Unidentified Color/Number
27.1.2019	MTHZ	11:20	17.07796	96.9385	1	Unidentified Color/Number
27.1.2019	MTHZ	5:10	17.07796	96.9385	1	Unidentified Color/Number

27.1.2019	MTHZ	11:20	17.07796	96.9385	1	Unidentified Color/Number
27.1.2019	MTHZ	5:10	17.07796	96.9385	1	Unidentified Color/Number
29.1.2019	MTHZ	8:31	17.03417	96.96107	2	One SBS has Yellow flag on the left leg, One Blue (EJ)
29.1.2019	MTHZ	1:00	17.05123	96.93377	1	Flag on right leg blue color
29.1.2019	MTHZ	1:39	17.04555	96.92387	1	Light green on the left leg
29.1.2019	MTHZ	4:22	17.04009	96.93031	1	One Yellow flag on the left leg
23.1.2019	CZ	10:40	17.09162	96.96185	1	White marked but not identified
23.1.2019	CZ	12:20	17.09162	96.96185	1	Lime green 48
24.1.2019	CZ	11:20	17.09162	96.96185	1	White 3K
24.1.2019	CK	17:30	17.12822	96.96214	1	One Yellow flag on the Right leg
24.1.2019	CK	15:47	17.10484	96.95732	1	Pale blue flag on the right leg
27.1.2019	CK	13:02	17.07888	96.93636	1	Yellow flag on the right leg (XE)
27.1.2019	CK	15:13	17.0805	96.93679	1	Yellow flag on the right leg (XE)
27.1.2019	CK	15:29	17.08143	96.93706	1	Yellow flag on the left leg
28.1.2019	CK	7:28	17.099	96.93191	1	Lime flag on the left leg
29.1.2019	CK	7:04	17.05729	96.93396	1	Yellow flag on the left leg
29.1.2019	CK	7:23	17.05866	96.9347	1	Yellow flag on the left leg
29.1.2019	CK	8:23	17.0589	96.93497	1	Lime flag on the left leg
29.1.2019	CK	12:20	17.05123	96.93375	1	Lime flag on the left leg
29.1.2019	CK	12:32	17.05123	96.93375	1	Unidentified leg (lime flag)
30.1.2019	CK	9:32	17.04176	96.92661	1	Yellow flag on the right leg (YE)

*Estimated total population number based on flagged birds*

Based on the flock counts 13 out of the total of 69 SBS were flagged, which is 18.84%. This is similar to other wintering sites: Nan Thar: 2 of 20 (10%), Gulf of Bangkok (3 of 9 (33%) and Sonadia 2 of 14 (14.3%). Considering the high number of count data the figure of 18.84% from the GoM appears to be closer to the real proportion. However, it is not quite known yet how many of the total flagged birds



globally are still alive in January 2019. This figures is likely to range between 80 and 110 which would translate into a 425 – 584 birds.

Comparisons of results with previous years

Table 3: The 2019 total estimated number of SBS compared with previous years in the period between 2010- 2019.

	2010	2012	2013	2014	2015	2016	2017	2018	2019
SBS observed	75	100	35		154	99	100	8	110+
SBS estimated	180-220								

*Other globally threatened waterbirds*

One globally endangered (32 individual Great Knots), seven globally near-threatened species such Black-tailed Godwit (5,625 individuals), Bar-tailed Godwit (21 individuals), Eurasian Curlew (597 individuals), Red-necked Stint (6,157 individuals - 50% of Little & Red-necked Stint), Curlew Sandpiper (3,003 individuals) and Black-headed Ibis (51 individuals).

*Overall conclusion*

In total the number of shorebirds have increased compared to previous years. This is largely true for almost all species. In particular small waders appear to have increased, although exact numbers are difficult to provide with. However, observations in recent years indicate that the Spoon-billed sandpiper continued to decline. This is in line with Aung *et al.* (2018) pointing to a continuing gradual decline. To determine how large the decline is, is not possible to say, considering the large number of varying factors such as the total flock size of all small waders and the total number of flagged birds still alive in 2019. The numbers of flagged birds have increased significantly pointing to a high number of surviving birds and reflecting also a heightened observer activity resulting in higher readings. It is quite possible that based on the survey results the total global population is between 425-583 individual birds, which equals 120-160 breeding pairs. This also means that we also do not know the wintering grounds of about 2/3 of the global population.

The Gulf of Mottama is still by far the most abundant and most common wintering site for the Spoon-billed Sandpiper and also for many other species. It is reassuring that the site is now fully protected as Ramsar site and also has been managed and mitigated from almost all hunting activities.

## 5. TEAM MEMBERS

Sl. #	Name	Organization	Sl. #	Name	Organization
1	Christoph Zöckler	Spoon-billed Sandpiper Task Force	11	Thaw Phyo Shwe	BANCA
2	Wing Kan Fu	East Asian Australasian Flyway Partnership	12	Min Thiha Zaw	BANCA
3	Sayam U. Chowdhury	Spoon-billed Sandpiper Task Force	13	Toe Tat Aung	BANCA
4	Ding Li Yong	BirdLife International Asia	14	Thiri Sandar Zaw	BANCA
5	Pannachet Kijja	Bird Conservation Society of Thailand	15	Poe Ei Nyein	BANCA
6	Tee, Suchart Daengpayon	Bird Conservation Society of Thailand	16	Ei Thinzar Aung	BANCA
7	Chairunas Adha Putra	Shorebird expert, Indonesia	17	Khaing Swe Wah	BANCA
8	Chris Kelly	UK Support Group	18	Saw Mosez	BANCA
9	Pyae Phyo Aung	BANCA	19	Sa Myo Zaw	BANCA
10	Aung Kyaw Nyunt	BANCA			
<b>Total</b>		<b>(19) Participants</b>			

## 6. ACKNOWLEDGEMENTS

We would like to thank Swiss Agency for Development and Cooperation (SDC) and TOYOTA Environmental Activities Grants Programme provided financial support to “Monitoring of Migratory Shorebirds at Gulf of Mottama” Additional thank to international volunteers who have kind contribution of their valuable time during the survey trips and Local Conservation Group members and boat drivers.

## 7. REFERENCES

Aung *et al.* (2015). Monitoring Programme for the Critically Endangered Spoon-billed Sandpiper in its most important wintering grounds in Myanmar. unpublished report for BANCA.

Aung *et al.* (2016). Monitoring Programme for the Critically Endangered Spoon-billed Sandpiper in its most important wintering grounds in Myanmar. unpublished report for BANCA.

Aung *et al.* (2017). Monitoring Programme for the Critically Endangered Spoon-billed Sandpiper in its most important wintering grounds in Myanmar. unpublished report for BANCA.

Aung, P. P., Moses, S., Clark, N. A., Anderson, G. Q., Hilton, G. M., Buchanan, G. M., Zöckler C. & Green, R. E. (2018). Recent changes in the number of spoon-billed sandpipers *Calidris pygmaea* wintering on the Upper Gulf of Mottama in Myanmar. *Oryx*, 1-7.

Bird watching training and survey of Critically Endangered Spoon-billed Sandpiper 2013-2014 BANCA unpublished report.

Robson, C. 2011. New Holland field guide to the birds of South-east Asia. New Holland Publisher, London, 544 pp.

Zöckler, C, *et al.* (2016). The Wintering Distribution of the Spoon-billed Sandpiper. The winter distribution of the Spoon-billed Sandpiper *Calidris pygmaeus*. Bird Conservation International, Available on CJO 2016 doi:10.1017/S0959270915000295

Zöckler, C, Htin Hla, T, Clark, N, Syroechkovskiy, E, Yakushev, N, Daengphayon, S and Robinson, R (2010). Hunting in Myanmar is probably the main cause of the decline of the Spoon-billed Sandpiper *Calidris pygmaeus*. *Wader Study Group Bulletin* 117(1): 1–8

Zöckler, C., T. Zaw Naing, S. Moses, R. Nou Soe & T. Htin Hla (2014): The importance of the Myanmar Coast for Water Birds. *Stilt* 66: 37-51.

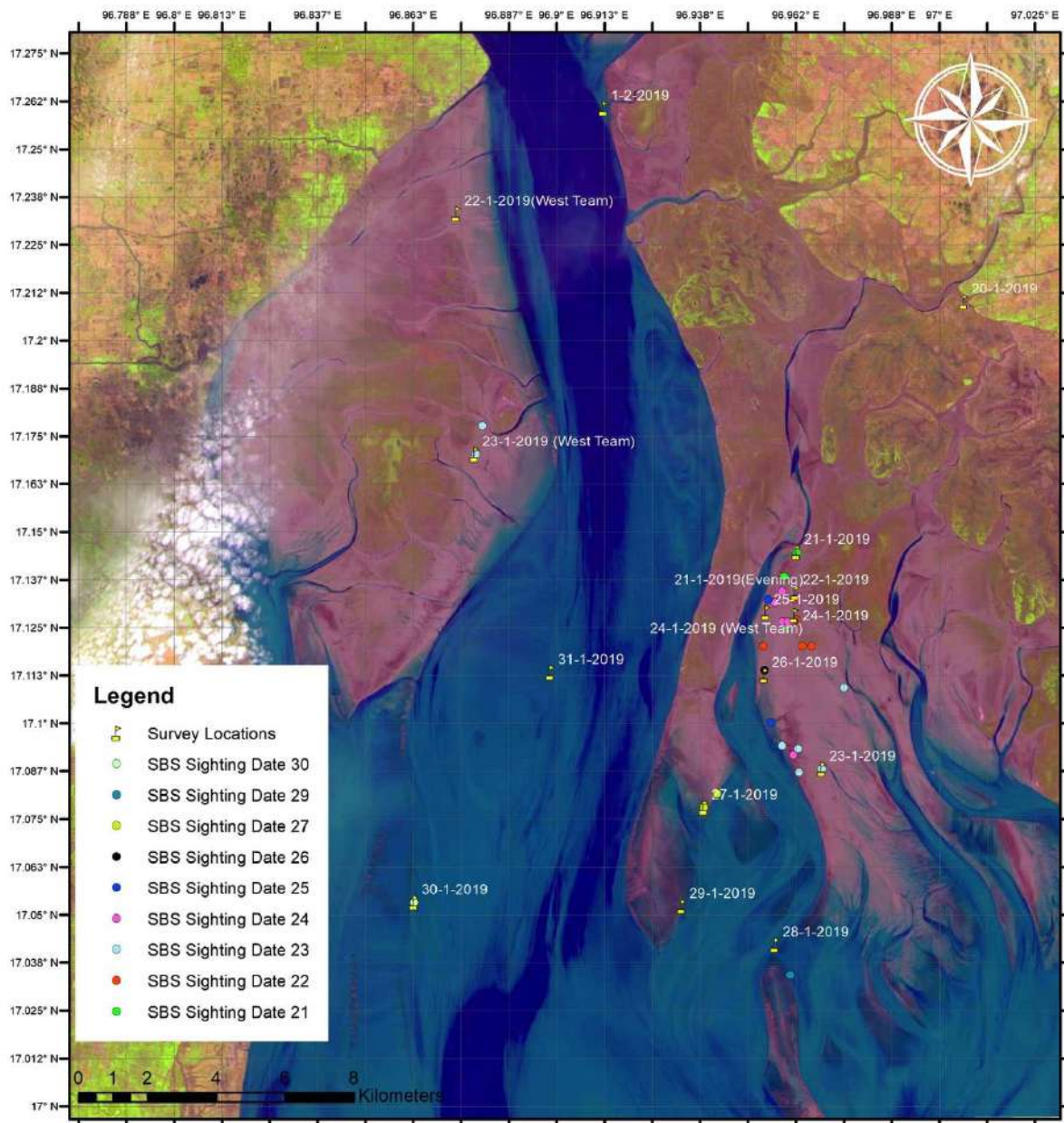


Figure 2: Map of Flyway surveyed conducted in January-February 2019.

## PHOTOS TEMPLATES



Small waders flock in Gulf of Mottama



Shorebird survey



Survey boats in mudflat



Shorebird survey



Survey team members



Habitat at Gulf of Mottama





Lime 48 at Gulf of Mottama in January 2019, this male was marked in Chukotka, Russia on 19 July 17.



White 3K at Gulf of Mottama in January 2019, this head-started bird was marked on 7 July 2017 in Chukotka, Russia and seen in China in 2017 & 18.

Table 1: List of birds recorded at the eastern side of Gulf of Mottama between 22 January and 1 February 2019

No	Date		IUCN Status (2017) ver 3.1	20-1-19	21-1-19	21-1-19	22-1-19	23-1-19	24-1-19	TOTAL Individuals
				Koe Tae Su	Wae Pyan (out)	Thaungthit Lay	Thaungthit Lay	Thaungthit Lay (out)	Thaungthit Lay	
	Approximate centre of survey - Latitude			17.21014	17.14472	17.13410	17.13410	17.08803	17.12819	
	Approximate centre of survey - Longitude			97.00650	96.96270	96.96243	96.96243	96.96939	96.96230	
	Common Name	Scientific Name								
1.	Black-tailed Godwit	<i>Limosa limosa</i>	NT	250	1020	2	180	-	300	1752
2.	Bar-tailed Godwit	<i>Limosa lapponica</i>	NT	-	10	-	-	-	8	18
3.	Whimbrel	<i>Numenius phaeopus</i>	LC	7	41	-	13	7	6	74
4.	Eurasian Curlew	<i>Numenius arquata</i>	NT	40	171	100	29	101	78	519
5.	Wood Sandpiper	<i>Tringa glareola</i>	LC	-	5	-	1	-	-	6
6.	Terek Sandpiper	<i>Xenus cinereus</i>	LC	-	4	-	5	H	3	12
7.	Common Sandpiper	<i>Actitis hypoleucos</i>	LC	10	1	-	5	-	1	17

8.	Spotted Redshank	<i>Tringa erythropus</i>	LC	18	11	-	-	H	3	32
9.	Common Redshank	<i>Tringa totanus</i>	LC	900	530	10	350	21	505	2316
10.	Marsh Sandpiper	<i>Tringa stagnatilis</i>	LC	19	26	70	15	4	61	195
11.	Common Greenshank	<i>Tringa nebularia</i>	LC	32	53	20	43	27	52	227
12.	Spoon-billed Sandpiper <sup>1</sup>	<i>Calidris pygmeus</i>	CR	-	3	3	8	12	10	36
13.	Little Stint/red-necked stint	<i>Calidris spp.</i>	LC	-	1016	500	700	1115	1293	4624
14.	Long-toed Stint	<i>Calidris subminuta</i>	LC	-	-	2	-	-	-	2
15.	Dunlin	<i>Calidris alpina</i>	LC	-	-	-	-	2	-	2
16.	Ruff	<i>Philomachus pugnax</i>	LC	-	3	-	6	-	13	22
17.	Great Knot	<i>Calidris tenuirostris</i>	EN	-	-	-	2	-	1	3
18.	Curlew Sandpiper	<i>Calidris ferruginea</i>	NT	-	46	500	300	928	308	2082
19.	Broad-billed Sandpiper	<i>Calidris falcinellus</i>	LC	-	24	600	500	301	484	1909
20.	Pied Avocet	<i>Recurvirostra avosetta</i>	LC	-	-	1	-	-	-	1
21.	Kentish Plover	<i>Charadrius alexandrinus</i>	LC	20	1300	1	1000	1023	1964	5308



22.	Lesser Sand Plover	<i>Charadrius mongolus</i>	LC	5	220	3500	200	1242	2779	7946	
23.	Greater Sand Plover	<i>Charadrius leschenaultii</i>	LC	-	7	-	400	46	376	829	
24.	Pacific Golden Plover	<i>Pluvialis fulva</i>	LC	20	501	-	288	-	15	824	
25.	Little Ringed Plover	<i>Charadrius dubius</i>	LC	50	32	-	20	1	3	106	
26.	Grey Plover	<i>Pluvialis squatarola</i>	LC	-	1	2	5	1	2	11	
27.	Temminck's Stint	<i>Calidris temminckii</i>	LC	-	-	-	3	-	-	3	
28.	Green Sandpiper	<i>Tringa ochropus</i>	LC	-	-	-	-	-	-	0	
<b>Total Waders counted</b>					<b>1371</b>	<b>5025</b>	<b>5311</b>	<b>4073</b>	<b>4831</b>	<b>8265</b>	28876
<b>Estimated Total Waders (include unidentified spp)</b>							<b>42000</b>	<b>20000</b>			62000
29.	Pallas's Gull	<i>Larus ichthyaetus</i>	LC	-	-	-	6	70	3	79	
30.	Heuglin's Gull	<i>Larus fuscus heuglini</i>	LC	-	-	-	1	-	-	1	
31.	Brown-headed Gull	<i>Larus brunnicephalus</i>	LC	-	3	23	72	20	232	350	
32.	Gull-billed Tern	<i>Gelochelidon nilotica</i>	LC	3	4		2	2	29	40	
33.	Caspian Tern	<i>Hydroprogne caspia</i>	LC	-	-	38	4	2	-	44	
34.	Little Tern	<i>Sterna albifrons</i>	LC	14	7	-	9	2	40	72	

35.	Whiskered Tern	<i>Chlidonias hybrida</i>	LC	5000	100	-	100	1600	-	6800
36.	White-winged Tern	<i>Chlidonias leucopterus</i>	LC	500	300	-	10	2000	-	2810
37.	Black Tern	<i>Chlidonias niger</i>		-	-	2	-	-	-	2
<b>Total Gulls and Terns</b>				<b>5517</b>	<b>414</b>	<b>63</b>	<b>204</b>	<b>3696</b>	<b>304</b>	10198
<b>Estimated Total Gulls and Terns (Include unidentified spp.)</b>				<b>5000</b>			<b>260</b>	<b>1600</b>		6860
38.	Little Egret	<i>Egretta garzetta</i>	LC	13	4	-	9	4	5	35
39.	Grey Heron	<i>Ardea cinerea</i>	LC	32	13	-	12	4	8	69
40.	Great Egret	<i>Ardea alba</i>	LC	14	2	-	33	1	14	64
41.	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	NT	10	1	-	-	-	8	19
42.	Pond Heron spp.	<i>Ardeola sp</i>	LC	4	-	-	2	-	-	6
<b>Total other dependent waterbirds</b>				<b>73</b>	<b>20</b>	<b>0</b>	<b>56</b>	<b>9</b>	<b>35</b>	193
43.	Eastern Marsh Harrier	<i>Circus spilonotus</i>	LC	4	-	5	-	13	11	33
44.	Pied Harrier	<i>Circus melanoleucos</i>	LC	4	-	1	-	-	-	5
45.	Common kestrel	<i>Falco tinnunculus</i>	LC	-	1	-	-	-	-	1

46.	Peregrine Falcon	<i>Falco peregrinus</i>	LC	1	-	1	-	1	-	3	
47.	Black-eared Kite	<i>Milvus lineatus</i>	LC	12	2	2	-	-	-	16	
48.	Bramany Kite	<i>Microcarbo niger</i>	LC	1	-	-	-	-	-	1	
49.	Booted Eagle	<i>Hieraaetus pennatus</i>	LC	-	-	1	-	-	-	1	
50.	Greater-spotted Eagle	<i>Clanga clanga</i>	LC	-	-	-	-	-	-		
51.	Short-toed Snake Eagle	<i>Circaetus gallicus</i>	LC	-	2	-	-	-	-	2	
52.	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	LC	1	-	-	-	-	-	1	
53.	Western Marsh Harrier	<i>Circus aeruginosus</i>	LC	-	1	-	-	-	-	1	
<b>Total raptors</b>					<b>23</b>	<b>6</b>	<b>10</b>	<b>0</b>	<b>14</b>	<b>11</b>	<b>64</b>

Table 2: List of birds recorded at the western side of Gulf of Mottama between 22 January and 1 February 2019

No.	Date		IUCN Status 2017	22.1.2019	23.1.2019	25.1.2019	26.1.2019	27.1.2019	28.1.2019	29.1.2019	30.1.2019	31.1.2019	1.2.2019	TOTAL Individuals
	Survey Area			Yae Din Kwin	Garr	Wae Pyan	Wae Pyan Auk	Anaing Auk	Baw Ka Gyi	Near the Main	Gar Auk	Gar Auk	Kyeik Hto	
	Approximate centre of survey – Latitude			17.23315	17.17027	17.12897	17.11254	17.07796	17.04215	17.05218	17.05	17.11329	17.26058	
	Approximate centre of survey – Longitude			96.87389	96.87868	96.95480	96.95432	96.93850	96.95713	96.93277	96.86	96.89838	96.91233	
	Common Name	Scientific Name												
1.	Black-tailed Godwit	<i>Limosa limosa</i>	NT	617	80			60	-	3000		116		3873
2.	Bar-tailed Godwit	<i>Limosa lapponica</i>	NT	-	-					3				3
3.	Whimbrel	<i>Numenius phaeopus</i>	LC	20	1	1	200	1		45	6	16		290
4.	Eurasian Curlew	<i>Numenius arquata</i>	NT	44	20	7	5		2					78
5.	Wood Sandpiper	<i>Tringa glareola</i>	LC	-	-									0
6.	Terek Sandpiper	<i>Xenus cinereus</i>	LC	-	-	1	1	6	4	15				27

7.	Common Sandpiper	<i>Actitis hypoleucos</i>	LC	2	-	10	1							13
8.	Ruddy Turnstone	<i>Arenaria interpres</i>	LC	-	-					1				1
9.	Spotted Redshank	<i>Tringa erythropus</i>	LC	5	2			2				6		15
10.	Common Redshank	<i>Tringa totanus</i>	LC	178	79	430	65			44		30	240	1066
11.	Marsh Sandpiper	<i>Tringa stagnatilis</i>	LC		57	39	10	2				1		109
12.	Common Greenshank	<i>Tringa nebularia</i>	LC	20	16	10	5	2		7		6	45	111
13.	Spoon-billed Sandpiper <sup>1</sup>	<i>Calidris pygmeus</i>	CR	-	5	12	9	10	5	12	4			57
14.	Long toed Stint	<i>Calidris subminuta</i>	LC	-	-									0
15.	Little /red-necked Stint		NT	462	578	500	1500	3000	260	481	600	109	200	7690
16.	Dunlin	<i>Calidris alpina</i>	LC	-	1									1
17.	Ruff	<i>Philomachus pugnax</i>	LC	8	4		2				1			15
18.	Great Knot	<i>Calidris tenuirostris</i>	EN	-	-					29				29
19.	Sanderling	<i>Calidris alba</i>	LC	-	-			1		1				2
20.	Curlew Sandpiper	<i>Calidris ferruginea</i>	NT	103	35	100	300	230	60	57		66		951
21.	Broad-billed Sandpiper	<i>Calidris falcinellus</i>	LC	361	44	200	200	114	46	130	84	360		1539

22.	Kentish Plover	<i>Charadrius alexandrinus</i>	LC	555	916	1000	500	700	420	428	320	350	500	5689
23.	Lesser Sand Plover	<i>Charadrius mongolus</i>	LC	298 9	957	342	152	160	329	2090	800	620		8439
24.	Greater Sand Plover	<i>Charadrius leschenaultii</i>	LC	3	-	5	2	2	47	15	39			113
25.	Pacific Golden Plover	<i>Pluvialis fulva</i>	LC	315	-		10	650		53				1028
26.	Little Ringed Plover	<i>Charadrius dubius</i>	LC	21	25	20							6	72
27.	Grey Plover	<i>Pluvialis squatarola</i>	LC	2	1				1	3				7
28.	Small Pranticole	<i>Glareola lactea</i>	LC	300	-									300
<b>Total Waders counted</b>				<b>600 5</b>	<b>2821</b>	<b>2677</b>	<b>2962</b>	<b>4940</b>	<b>1174</b>	<b>6414</b>	<b>1854</b>	<b>1680</b>	<b>991</b>	<b>30,527</b>
<b>Estimated total waders (include unidentified spp.)</b>				<b>600 0</b>	<b>10000</b>	<b>10000</b>	<b>5000</b>	<b>5000</b>	<b>3500</b>	<b>7000</b>	<b>6000</b>	<b>5000</b>	<b>100 0</b>	<b>57,500</b>
29.	Pallas's Gull	<i>Larus ichthyaetus</i>	LC	-	20		3			61				84
30.	Gull-billed Tern	<i>Gelochelidon nilotica</i>	LC	-	2	6				1				9
31.	Caspian Tern	<i>Hydroprogne caspia</i>	LC	3	7	3	1					1		15

32.	Little Tern	<i>Sterna albifrons</i>	LC	1	35		15	6						57	
33.	Whiskered Tern	<i>Chlidonias hybrida</i>	LC	63	1200			25						1288	
34.	River Tern	<i>Sterna aurantia</i>	NT	-	-	2	35								
35.	White-winged Tern	<i>Chlidonias leucopterus</i>	LC		2800					40		393		3233	
36.	Whiskered/White-winged Tern			-	-	150	200							350	
<b>Total Gulls and Terns</b>					<b>67</b>	<b>4064</b>	<b>161</b>	<b>279</b>	<b>32</b>	<b>2</b>	<b>171</b>	<b>0</b>	<b>544</b>	<b>0</b>	<b>5,320</b>
<b>Estimated total Gulls and Terns (include unidentified spp.)</b>					<b>300</b>	<b>4000</b>	<b>200</b>	<b>500</b>	<b>100</b>		<b>200</b>		<b>1000</b>		<b>6,300</b>
37.	Little Egret	<i>Egretta garzetta</i>	LC	-	3					5			4	8	
38.	Grey Heron	<i>Ardea cinerea</i>	LC	6	11	3	1	2	4				20	27	
39.	Great Egret	<i>Ardea alba</i>	LC	-	23	4				1				28	
40.	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	NT	32	-									32	
41.	Ruddy Shelduck	<i>Tadorna ferruginea</i>	LC	-	-								60	60	
42.	Common Shelduck	<i>Tadorna todorna</i>	LC		7									7	
<b>Total other dependent waterbirds</b>					<b>38</b>	<b>44</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>84</b>	<b>102</b>

43.	Pied Harrier	<i>Circus melanoleucos</i>	LC	2	1										3
44.	Black-eared Kite	<i>Milvus migrans</i>	LC	-	-								2		
45.	Brahminy Kite	<i>Microcarbo niger</i>	LC	-	1										1
<b>Total raptors</b>					<b>2</b>	<b>2</b>							<b>2</b>		<b>6</b>