Trends in the numbers of the shorebirds shortlisted for the single species action plan under India's National Action Plan for Conservation of Migratory Birds and their Habitats along Central Asian Flyway concerning Porbandar, Devbhumi Dwarka, and Jamnagar districts of Gujarat

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Introduction

At least 370 species of migratory birds from three different flyways are known to visit the Indian subcontinent. Among these, 310 primarily inhabit wetlands for their habitats, while the remaining species are land birds that inhabit various terrestrial regions. The Central Asian Flyway (CAF) is one of the nine major migratory routes globally, spanning over 30 countries. It connects the northernmost breeding areas in Siberia, Russia, to the southernmost wintering grounds in West and South Asia, including the Maldives and the British Indian Ocean Territory. India plays a crucial role in this flyway, serving as a vital stopover for more than 90% of the bird species that utilize this migration path. The National Action Plan (NAP) for the conservation of migratory birds and their habitats outlines the national priorities and specific actions needed to ensure healthy populations of these species in India within their migratory range across the flyway. The NAP is informed by the Central Asian Flyway Action Plan, which offers a unified strategic framework for regional cooperation and proactive initiatives aimed at protecting, conserving, restoring, and sustainably managing migratory bird populations and their habitats in the Indian subcontinent that are part of the Central Asian Flyway. This action plan is intended to empower national and state policymakers, those involved in species conservation and habitat management, stakeholders, and the broader community to take coordinated steps to secure and enhance migratory bird populations (Dasgupta et al., 2018).

Under the Species Conservation component, NAP proposed the Single Species Action Plan (SSAP) for coordinated conservation measures to select important migratory species with favourable conservation status within India. Twenty such species were identified as high priority for developing SSAP. Out of these 20 species, several species like Black-bellied Tern (*Sterna acuticauda*), Common Pochard (*Aythya ferina*), Yellow-breasted Bunting (*Emberiza aureola*), White-headed Duck (*Oxyura leucocephala*), Greater Flamingo (*Phoenicopterus roseus*), Lesser Flamingo (*Phoeniconaias minor*), Ferruginous Duck (*Aythya nyroca*), European roller (*Coracias garrulous*), and Sociable Lapwing (*Vanellus gregarius*) are excluded from this study.

Table 1 below describes the species covered in the present study.

Table 1. List of species covered under the present study where IUCN describes IUCN categories: LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered; 1% is 1% biogeographic population of the species; SOIB is State of India's Birds; LTT is Long term trend; and CAT is Current Annual Trend (more details available at https://stateofindiasbirds.in/interpreting-soib-results#soib-isp-faq)

#	Species	IUCN	1%	SOIB Priority Status	SOIB LTT	SOIB CAT
1	Eurasian Curlew (*Numenius arquata*)	NT	350	High	Rapid Decline	Rapid Decline
2	Crab Plover (*Dromas ardeola*)	LC	300	Moderate	Insufficient Data	Insufficient Data
3	Black-tailed Godwit (*Limosa limosa*)	NT	1500	High	Rapid Decline	Rapid Decline
4	Bar-tailed Godwit (*Limosa lapponica*)	NT	1200	Moderate	Insufficient Data	Trend Inconclusive
5	Red Knot (*Calidris canutus*)	NT	250 (rufa)	Not found	Not found	Not found
6	Long-toed Stint (*Calidris subminuta*)	LC	250	Not found	Not found	Not found
7	Indian Skimmer (*Rynchops albicollis*)	EN	40	High	Insufficient Data	Decline
8	Curlew Sandpiper (*Calidris ferruginea*)	VU	1000	High	Rapid Decline	Decline
9	Little Stint (*Calidris minuta*)	LC	2000	High	Rapid Decline	Rapid Decline
10	Tibetian Sand plover (*Charadrius mongolus*)	LC	1300	Not found	Not found	Not found
11	Great Knot (*Calidris tenuirostris*)	EN	15	High	Insufficient Data	Insufficient Data

Methodology

The study focuses mainly on the species counts recorded at any Porbandar, Devbhumi Dwarka or Jamnagar district wetland during the wintering period. Counts were made by Wetlands International's standard counting techniques like headcount or block count (Wetlands International, 2018). Along with these species, we focused on the waterbirds and other wetland-dependent bird species listed on Wetlands International South Asia's standard site count form, and the flock size for each species was recorded digitally or in a hard copy. The electronic database of the 5th Edition of Waterbird Population Estimates (Wetlands International, 2012) was used to assess a 1% biogeographic population. IUCN's latest red list was used for globally threatened categories of all species recorded (IUCN, 2021). Long-term status, current status, status of conservation concern, and migratory status were accessed from the State of India's Birds (SoIB, 2020). South Asian Ornithology has also been referred for published literature (Pittie, 2024). Data is referred to from the eBird checklists (eBird, 2024).

Results and Discussion

(1) Eurasian Curlew is a common winter visitor of Gujarat and sightings from Saurashtra and Kachchh coastal areas. Moreover, it is present in small numbers in almost entire Gujarat's coastal areas (Ganpule, 2016). A Near Threatened long distant migratory species; its global population is decreasing due to disturbances in its habitat. Long-term tracking and monitoring data have confirmed a decline in the wintering population of this species in India. (Dasgupta et al., 2018).

Table 2. Counts of Eurasian Curlew

Date	Count	Wetland	District
29 December 2017	50	Sachana beach	Jamnagar
21 November 2020	150	Sachana beach	Jamnagar
23 November 2020	150	Sachana beach	Jamnagar
16 December 2023	253	Khara Mitha Chusna	Devbhumi Dwarka

While none of the wetlands supported more than 1% biogeographic population i.e. 350 birds (Li et al., 2009) of the species in our study, the notable counts of over 50 birds have been reported in table 2. A count of 12,082 was reported in 2002 from Chilika lake, Orissa. Birders should explore the Gulf of Khambhat for the status of the species since around 3000 birds were reported from the Juni Akhol coast in 2006 (Li et al., 2009). The global population is estimated to be around 835,000 to 1,310,000 individuals. This widespread species is still common in many areas of its range, making it challenging to assess population trends. However, significant declines have been observed in several important populations, leading to an overall estimation of a moderately rapid global decline. Consequently, the species has been reclassified to a higher conservation status to Near Threatened (BirdLife International, 2024). The species is likely present in more than 1% of the population in Jamnagar and the islands of the Gulf of Kachchh.

(2) Crab Plover is an uncommon winter visitor to Gujarat and seen mainly on the coasts around Jamnagar, Devbhumi Dwarka, Bhavnagar and Kachchh and probably rare in South Gujarat (Ganpule, 2016). This species is restricted to intertidal mudflats and has a limited distribution range. Information on this species in India is limited (Dasgupta et al., 2018).

Table 3. Counts of Crab Plover

Date	Count	Wetland	District
02 February 2019	300	Sachana beach	Jamnagar
23 November 2020	300	Sachana beach	Jamnagar
19 December 2020	350	Rozi Port	Jamnagar
21 January 2021	450	Sachana beach	Jamnagar
22 January 2021	601	Balachadi beach	Jamnagar
30 January 2021	384	Valsura beach	Jamnagar
23 April 2022	200	Sachana beach	Jamnagar

Several wetlands of Jamnagar and the islands of Devbhumi Dwarka support wintering populations of Crab Plovers. However, wetlands supporting more than 1% of the population (300 birds) have been reported here. Four wetlands of Jamnagar have met the 1% population criterion seven times, and more details are in Table 3.

The highest historical estimate of Crab-plover in Gujarat is 5,000 birds for the entire south coast of the Gulf of Kachchh in 1984. In addition to the above sightings, 1500 birds were reported from Pirotan in January 2000; 300 from Khijadiya in November 2012; 300 from Rozi port in November 2014; 500 from Sachana in November 2015; 2500 birds from Narara in December 2018; and 1000 birds from Balachadi in January 2019 (Solanki et al., 2021).

Modhva beach in Kachchh and the Gulf of Khambhat near Bhavnagar district are other sites where Crab-plover are sighted. In November 2007, 120 birds were sighted, which stayed till April 2008 at the Dhadhar estuary in Bharuch district, south Gujarat (Parasharya, 2009). 71 birds were reported in December 2009 by Andre Weiss at Modhva Beach (Weiss, 2009) and I counted 23 birds

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in February 2018 at the same site. I observed 175 birds at Hathab beach in the Gulf of Khambhat in February 2019. Around 500 were seen on Pagar Island and around 100 on Bhaider Island by Deven Mehta (pers. Comm.) in January 2019, which are in Devbhumi Dwarka district.

The global population size is estimated at 52,200-69,500 individuals. The species faces threats from potential future oil spills and the possible introduction of nest predators on breeding islands. Additionally, planting mangrove stands over bare substrates in certain areas could limit the availability of nesting sites. Historically, eggs and young individuals of this species were collected from nesting colonies, and this practice may still be ongoing (BirdLife International, 2024).

(3) Black-tailed Godwit is a common winter visitor and is seen all over the state (Ganpule, 2016). A Near Threatened long distant migratory species, its global population is declining. This species is also listed as a priority in the African Eurasian Flyway (Dasgupta et al., 2018).

Table 4. Counts of Black-tailed Godwit

Date	Count	Wetland	District
01 February 2015	3118	Mokarsagar	Porbandar
02 February 2015	3000	Mendha Creek	Porbandar
29 January 2016	6000	Mokarsagar	Porbandar
29 January 2016	4412	Mokarsagar	Porbandar
27 March 2016	2000	Mokarsagar	Porbandar
19 May 2018	2000	Mendha Creek	Porbandar
13 January 2019	5000	Mendha Creek	Porbandar
30 December 2023	2673	Gaga	Devbhumi Dwarka

As shown in Table 4, many of our wetlands support more than 1% of the species' biogeographic population. Despite being widespread and having a substantial global population, this species has experienced a rapid decline in certain areas due to changes in agricultural practices. Overall, the global population is believed to be decreasing at a rate that categorizes the species as Near Threatened. The global population is estimated at 614,000-809,000 individuals (BirdLife International, 2024). Bhitarkanika and Chilika Lake, both situated in Orissa, support huge congregations of the species. Around 85,414 birds were recorded in Bhitarkanika in 2003 and 98,283 in Chilika in 2002 (Li et al., 2009).

(4) Bar-tailed Godwit is a common to uncommon winter visitor of Gujarat with sightings from the coastal areas of Saurashtra and Kachchh, especially seen in good numbers in Narara and Pirotan of Jamnagar (Ganpule, 2016). It is a Near Threatened, long, distant migratory species. Overall, the population is on the decline. This species is a priority in the East Asian-Australasian Flyway Action Plan 2015–2019. It is also a priority species in the African Eurasian Flyway (Dasgupta et al., 2018). In the *taymyrensis* subspecies, which breeds in Siberia, the population wintering in west and south-west Africa is estimated to be declining, whilst the trend for the population wintering in south and south-west Asia and east Africa is not known (BirdLife International, 2024).

While none of the counts made over 1% of the biogeographic population of 1200 birds of the species, the highest count made by us is 300 birds on 21 Nov 2020 from Sachana Beach, Jamnagar, followed by 268 birds on 30 January 2021 from Valsura beach, Jamnagar. Dr Arpit Deomurari reported 257 birds from Pirotan on 25 April 2007; Dr Maulik Varu reported 300 birds from Rozi port, Jamnagar, on 5 January 2010; Chirag Solanki reported 365 birds from Sachana, Jamnagar, on 3 January 2021; Kunal Joshi reported 450 birds on 23 January 2022 and 350 on 7 February 2022 from Balachadi, Jamnagar. It seems none of the sites in western India have yet met the 1% population threshold of the species. Historically, Chilika and Hirakund of Orissa have reported 6682 and 3126 birds in 1995 and 1996, respectively (Li et al., 2009).

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(5) Red Knot is a vagrant winter visitor which could be occurring in the entire Gulf of Kachchh. A group of six birds was noted in Narara in November 2004, the highest count recorded from Gulf of Kachchh (Ganpule, 2016). The species has been observed almost every year recently in small numbers with Great Knots till April. Since, it is not a species occurring in huge numbers, none of our sites have met over 1% population threshold. It is a Near Threatened long distant migratory species. The species has been rendered vulnerable owing to extensive land reclamation projects that have encroached upon important habitats across its range. It has been susceptible to avian influenza in the past, so could be threatened by future outbreaks of the virus. This species is listed as priority species in East Asian-Australasian Flyway action plan 2015–2019 (Dasgupta et al., 2018). Within its range, there is a decline of 10-29% suspected, largely in response to habitat loss and degradation, hunting and disturbance, but perhaps also other as-yet-unidentified threats associated with climate change (BirdLife International, 2024).

(6) Long-toed Stint is a vagrant in Gujarat, Rasmussen & Anderton (2012) also considers it to be an autumn and spring passage migrant in Gujarat. It is rarely seen in western India and no site surpasses 1% population threshold. It might be overlooked as it is difficult to distinguish it from other waders. The only published photographs available are from a sighting in January - February 2016 from Jamnagar in a brackish, swampy area consisting of soft mud and rich in grasses/ small shrubs by Adesh Shivkar followed by Jamnagar birds. The species has been also sighted from Charakla, Devbhumi Dwarka in 2009 and Ratnal Check dam, Kachchh in 2017 (Bhatia and Solanki, 2016; Ganpule, 2016; Varu, 2017).

There exists only 16700-16700 mature individuals globally and the overall population trend is suspected to be decreasing over three generations (BirdLife International, 2024).

(7) Indian Skimmer is an uncommon to rare migrant to Gujarat which start arriving from late monsoon months. The Sightings are mainly from Jamnagar wetlands where it's sighted in hundreds. It is also seen in Nalsarovar, elsewhere in Saurashtra and Kachchh (Ganpule, 2016). A globally threatened (Endangered) species and its population is undergoing a rapid decline as a result of widespread degradation and disturbance of lowland rivers and lakes. Its Indian population is estimated to be less than 2500 individuals (Dasgupta et al., 2018).

Increased fluctuations in water levels along the rivers where this bird breeds—caused by dams, irrigation, and sand mining—result in both flooding of colonies and low water levels that expose breeding islands to terrestrial predators and humans. These conditions lead to high mortality rates for eggs and chicks, and the reproductive rate does not seem adequate to sustain the population. This once-common and distinctive bird has experienced declines for many decades. It has been lost as a breeding species throughout Southeast Asia, Myanmar, and likely now also in Pakistan. Consequently, the current and projected rate of population decline is estimated to be between 34-46% over three generations. There are only 2450-2900 mature individuals (BirdLife International, 2024). The 1% population threshold of the species is set to just 40 birds in year 2021 from 75 birds which was set in 2012 (Wetlands International, 2024).

Table 5 Counts of Indian Skimmer

Date	Count	Wetland	District
01 December 2016	50	Dhinchda	Jamnagar
01 January 2019	350	Valsura	Jamnagar
18 December 2020	172	Dhinchda	Jamnagar
19 December 2020	125	Rozi Port	Jamnagar
19 December 2020	237	Dhinchda	Jamnagar
30 January 2021	43	Valsura	Jamnagar

Counts when the species is recorded over 1% population threshold is presented in the Table 5. It is very likely to observe above 1% population threshold numbers of Indian Skimmers at sites other than mentioned in the Table 5 in Jamnagar as well. In 1987, around 190 birds were reported from Khijadiya, Jamnagar during AWC (Li et al., 2009). Out of 45 surveys (15 in each month) conducted at Dhinchada wetland, Jamnagar from September to November 2020, the highest population of November was on 8th i.e. 245 individuals. Likewise, 234 individuals on 29th October and 179 individuals on 27th September 2020 (Solanki and Vargiya, 2020). A total of 75 birds were also recorded on Gulf of Khambhat on 27 December 2022 (Andharia and Vala, 2022). A highest of 11 birds were recorded at Mokarsagar wetland complex on 14 January 2019. No site of Porbandar was found to host above 1% population threshold of the species.

(8) Curlew Sandpiper is a common winter visitor seen mainly coastal areas of Gujarat especially Jamnagar with sightings from Saurashtra and Kachchh coastline as well. (Ganpule, 2016). It is a Near Threatened long distant migratory species. Population trends are very difficult to determine for this species; however, overall it is suspected to be declining. India supports its largest wintering population (Dasgupta et al., 2018).

Recent monitoring data have shown that this widely distributed species has probably declined by 30-49% over the past three generations (15 years). The exact causes of declines are unknown, but are likely to include habitat loss and degradation (particularly on stopover and wintering grounds) and climate change impacts (particularly affecting breeding productivity), as well as disturbance and hunting. The species is threatened on the south-east coast of India (Point Calimere) by illegal hunting (bird trapping), reservoir and marshland habitat alteration by salt-industries, and habitat degradation by diminishing rainfall (changing the salt regime). Rapid land use change and loss of mudflats are also major threats here. Around 200,000 birds are estimated wintering in South Asia, although this may be an overestimate. (BirdLife International, 2024). The trend of birds wintering in South Asia is uncertain, but reporting rates of citizen science data indicate that here too it may be declining, although there is considerable uncertainty with the rate (SoIB, 2020). Chilika Lake, Orissa, India with 20,708 and Erukkilampiddi Causeway, Sri Lanka with 30,000 individuals in 2007 alone represent then 20% of the South Asian population (Li et al., 2009).

None of our surveys could meet 1% population threshold of the species from the study area. The highest count was of 260 birds from Charakla Saltpans, Devbhumi Dwarka on 12 August, 2021. Which is the also the highest count of the species reported from Charakla on eBird. Dr Maulik Varu Reported 300 birds from Gagva Saltpans, Jamnagar on 23 January 2010 (Varu, 2010). Forest department reported 650 birds from Pirotan island Jamnagar on 27 January 2024 (Danger, 2024). It is very likely to observe above 1% population threshold numbers of species at sites in Jamnagar.

(9) Little Stint is a common winter visitor seen all over Gujarat and mainly common in Jamnagar area (Ganpule, 2016). A long-distance migratory species, India supports its largest wintering population. Long-term marking and monitoring in India has revealed population decline due to illegal hunting (bird trapping), reservoir and marshland habitat alteration by salt industries, and habitat degradation owing to diminishing rainfall (changing the salt regime) (Dasgupta et al., 2018). In past, east coast of India reported higher counts of the species i.e. 40,191 birds from Chilika, Orissa in year 1994 and 21,000 birds from Puthupalli Alam, Tamil Nadu in year 1990 (Li et al., 2009). The species is threatened on the south-east coast of India (Point Calimere) by illegal hunting (bird trapping), reservoir and marshland habitat alteration by salt-industries, and habitat degradation by diminishing rainfall (changing the salt regime) (BirdLife International, 2024).

Table 6 Counts of Little Stint

Date	Count	Wetland	District
29 January 2016	9580	Mokarsagar	Porbandar
14 January 2020	1500	Mokarsagar	Porbandar
04 February 2021	2650	Mendha Creek	Porbandar
23 December 2023	1025	Mojap Ghed	Devbhumi Dwarka
31 December 2023	2500	Charakla	Devbhumi Dwarka

Though the 1% threshold is 2000 birds, the counts of above 1000 birds from our surveys are reported in Table 6. For the reference, 29,556 birds were reported from Nanda Beyt, Wildass Sanctuary, Gujarat on 29 December 2019 in the mix flock with Kentish Plover (*Anarhynchus alexandrines*) (Vora et al., 2019). It is very likely to observe above 1% population threshold count of species at sites in Jamnagar, Porbandar or Devbhumi Dwarka.

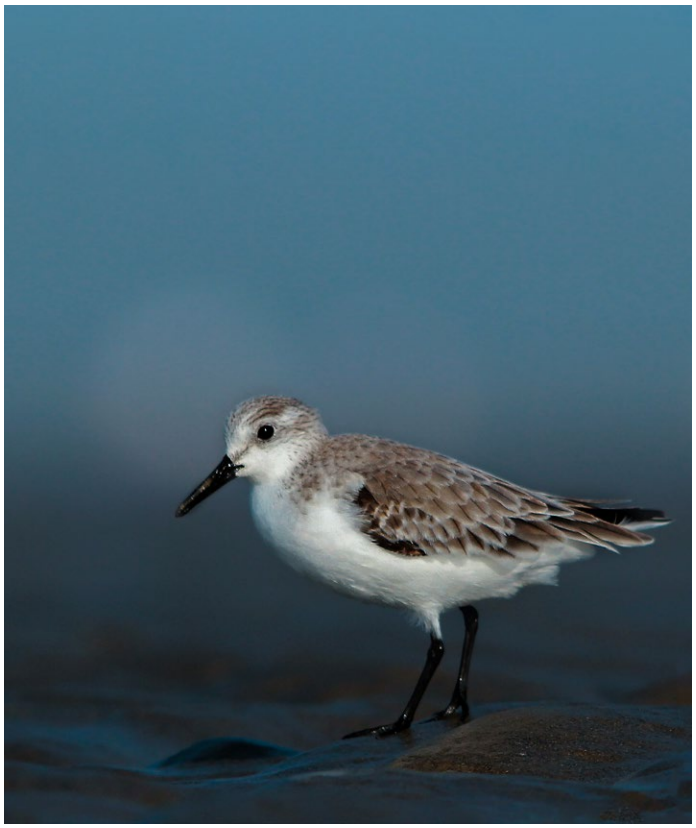

Photo: Dhaval Vargiya

(10) Tibetan Sandplover (previously known as Lesser Sand-Plover) is a common winter visitor of Gujarat, seen mainly from the coastal areas of Jamnagar (especially Narara and Pirotan), Porbandar and Bhavnagar and Kachchh (Ganpule, 2016). India supports its major wintering population. The global population trend is difficult to determine because of uncertainty over the impacts of habitat modification on

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population sizes; however, BNHS Bird Banding data shows population decline in India (Dasgupta et al., 2018). Evidence for *atrifrons* declines comes from India, where compiled eBird data suggest ongoing declines (BirdLife International, 2024).

In our survey, 2000 birds were counted at Mokarsagar, Porbandar on 29 January 2016. It is one of the most common species on our coast, but, possibility above 1% population threshold (1300) of species at sites in Jamnagar, Porbandar or Devbhumi Dwarka need to be surveyed. Chilika Lake, Orissa; and Gopnath Coast, Bhavnagar, Gujarat recorded more than 20,000 individuals in 2007 and 2005 respectively (Li et al., 2009).

(11) Great Knot is an uncommon winter visitor of Gujarat with sightings from coastal areas of Jamnagar, Bhavnagar and Kachchh. It is not seen in large numbers except Jamnagar (Ganpule, 2016). It is a globally threatened (Endangered) species and undergoing a very rapid population decline caused by reclamation of non-breeding stopover grounds. This species is listed as priority species in East Asian- Australasian Flyway action plan 2015–2019 (Dasgupta et al., 2018).

In 2006, the global population was estimated to be around 380,000 individuals. However, after the reclamation of tidal flats at Saemanguem in South Korea, approximately 90,000 non-breeding individuals vanished from the region. Surveys conducted in other parts of South Korea indicated that these birds had not relocated, while a similar decline in Australia suggests that those using Saemanguem likely died. Consequently, a revised estimate of the global population was made, placing it between 292,000 and 295,000 individuals in 2007. An analysis of monitoring data from Australia and New Zealand suggests the population is declining at a much more rapid rate than was previously thought, with an estimated 77.8% decline over three generations i.e. 22 years. Almost the entire global population (98%) is restricted to the East Asian-Australasian Flyway so trends in the Australasian population during the non-breeding season are thought to be representative of the overall global population (BirdLife International, 2024). A total of 1,67,353 birds were reported from 80 Mile beach, Western Australia during AWC in 2001 (Li et al., 2009).

Table 7 Counts of Great Knot

Date	Count	Wetland	District
29 December 2017	600	Sachana	Jamnagar
02 February 2019	25	Sachana	Jamnagar
21 November 2020	150	Sachana	Jamnagar
23 November 2020	125	Sachana	Jamnagar
21 January 2021	45	Sachana	Jamnagar
13 April 2022	37	Sachana	Jamnagar

Counts of Great Knot have been mentioned in the Table 7. It is clear that the Sachana coast of Jamnagar host at least 40% population (600 birds) of the species wintering in India, Pakistan, and Sri Lanka. 125 Great Knot were reported from INS Valsura, Jamnagar in January 2010 (Ganpule et al., 2011). Great Knot is also seen in Narara, Pirotan, Rozi Port, INS Valsura, Vibhapar, Khijadiya, and Balachadi area of Jamnagar. It is estimated that Jamnagar wetlands support at least 1000 birds. Great Knot count should be organised to validate this. It would be interesting to understand the change in population trends of the species before and after the year 2011's Sachana Ship breaking yard closure to understand the positive impact. A female Great Knot, 6Z (nicknamed as "Vhalam") tagged in Kamchatka in far Eastern Russia on 17 July 2019 has been sighted every year since October 2019 at Balachadi, Jamnagar (Bhatia et al., 2023). In the Philippines, India and Australia other threats may include mangrove afforestation, habitat degradation caused by intense fishing activities and harvesting of molluscs and bivalves, infrastructure projects, aquaculture, oil spills and invasive alien plant species (BirdLife International, 2024).

Summary

Birders should continue to monitor population trends and protect the roost sites with the Forest Department. The current work uses 1% biogeographic population threshold of select species to highlight wetlands of International Importance. The 1% threshold value is often used as a criterion in Ramsar, Important Bird Area or Key Biodiversity Area, Wetland of International or National Importance. All above sites supporting 1% population threshold of the species qualify to be a wetland of international importance and thus a Ramsar or Key Biodiversity Area.

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