

# Wintering population of four migratory species of waders in the Gulf of Kachchh and human pressures

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The number of Crab Plover *Dromas ardeola*, Curlew *Numenius arquata*, Black-tailed Godwit *Limosa limosa* and Avocet *Recurvirostra avosetta* are described for two study areas, in the Gulf of Kachchh, Narara island and Rozybundar coast, where salt-works, sand-banks and mudflats are important for birds for roosting, especially during high tide. These roosting areas are threatened by human activities.

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## INTRODUCTION

The Gulf of Kachchh is designated as a Marine National Park part of which is located at the north of the Saurashtra peninsula in the Jamnagar district, Gujarat, India. The long coastline, of which it is a part, consists of broad intertidal mudflats, coral reefs, sandy and rocky beaches. It offers a great diversity of habitats for birds to utilize, and is very rich in both the variety and number of migratory and resident birds. The Gulf of Kachchh, however, has been relatively less well studied than other areas and little published material exists (Ali 1945; Abdulali 1962, 1963; Himmatsinhji 1968; Parasharya 1984; Palmes & Briggs 1986; Naik *et al.* 1991; Mundkur 1991).

In total, 86 bird species have been recorded in the salt-works, and 80 species on the islands and coast along the Gulf (Naik *et al.* 1991). Many species found in the Gulf as well as in the salt-works are common. This study deals with four wader species; Crab Plover *Dromas ardeola*, Curlew *Numenius arquata*, Black-tailed Godwit *Limosa limosa* and Avocet *Recurvirostra avosetta*.

The Gulf of Kachchh including the Marine National Park and Sanctuary is used for fishing, pearl and marine product collection, industries, water transport and recreation (Singh

1994). In the Gulf, human activities have increased greatly. Fishing appears to have little effect on the bird life in the area but industrial development threatens both the roosting and foraging sites. Ship repairing works and the construction of the concrete jetty on Rozybundar are currently causing much disturbance to the birds.

## STUDY AREAS

The Gulf of Kachchh has an area of approximately 7,350 km<sup>2</sup> and a maximum depth of about 60 m (Hashimi *et al.* 1978). Inshore in the Marine National Park, however, the maximum depth does not exceed 25 m. The Gulf of Kachchh stretches from 69° 05' E at the entrance to 70° 20' E at the end (Figure 1). The average tidal range is 4 m with a tidal velocity of 2-5 knots.

Narara Island is situated 60 km west from Jamnagar and is very small, with a length of 0.5 km and width of 40 - 50 m during high tide (Figure 2). During low tide, up to 2 km of the intertidal area are exposed, comprising mainly rocky and sandy habitats and small mudflats. Rozybundar is situated 10 km north-west of Jamnagar and also has a 2 km long intertidal area which is chiefly mudflats with some rocky and sandy areas (Figure 3).

## MATERIALS AND METHODS

Narara island and Narara salt-works, and Rozybundar coast and Rozybundar salt-works will, from now on, be referred to as Narara island and Rozybundar respectively. The study was carried out during 1991-92 and 1993-94. Data were collected by direct visual counts. Observations were carried out once a month, and the surveys covered the entire Narara island and Rozybundar. Observations were recorded during high tide as the birds were found roosting more compactly at that time. Observations were made using a x30-x45 telescope and 8x30 binoculars.

## RESULTS

The roosting behaviour of Crab Plover and Curlew were completely dependent on the tidal cycle. Crab Plovers roosted

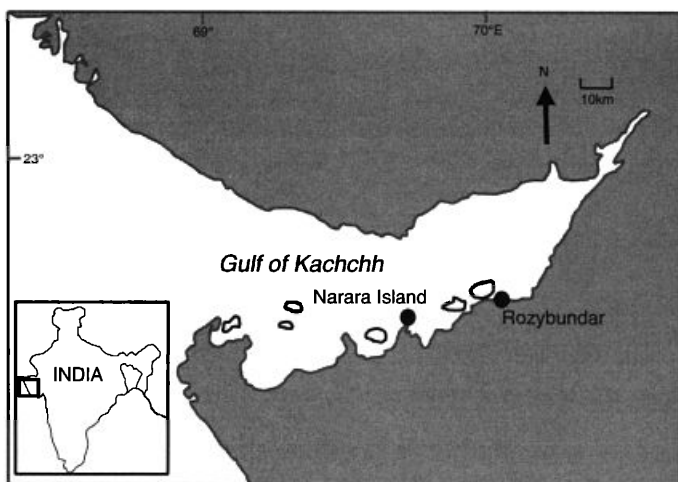


Figure 1. location of study sites in the Gulf of Kachh.



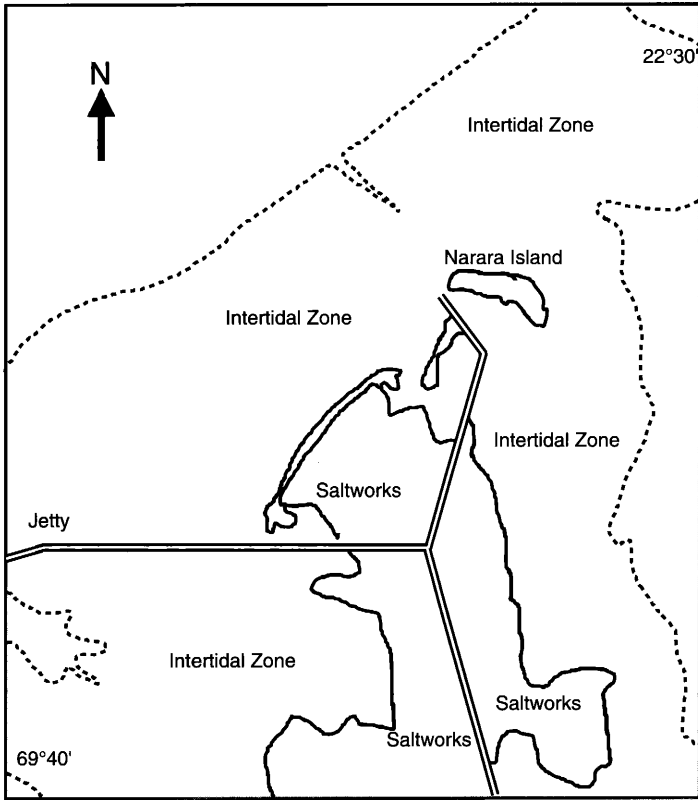


Figure 2. Narara Island and surrounding area.

together at sites along or close to the southwest coast, and Curlews roosted together on mudflats of the east coast of Narara island.

*Crab Plover*

Figure 4 shows the average population of Crab Plovers on Narara island was  $771 \pm 174.69$  and on Rozybundar  $86.5 \pm 14.31$ . The average Crab Plover population was about nine times higher at Narara island compared with that of Rozybundar throughout the winter. Overall, the Crab Plover population reached its peak in December and January.

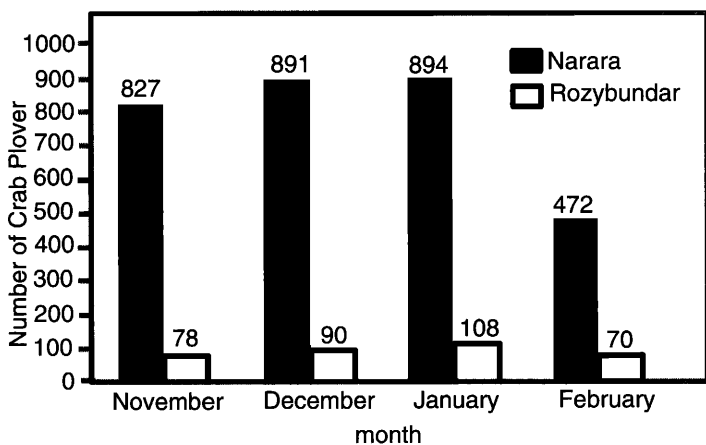


Figure 4. Average number of Crab plover at Narara and Rozybundar.

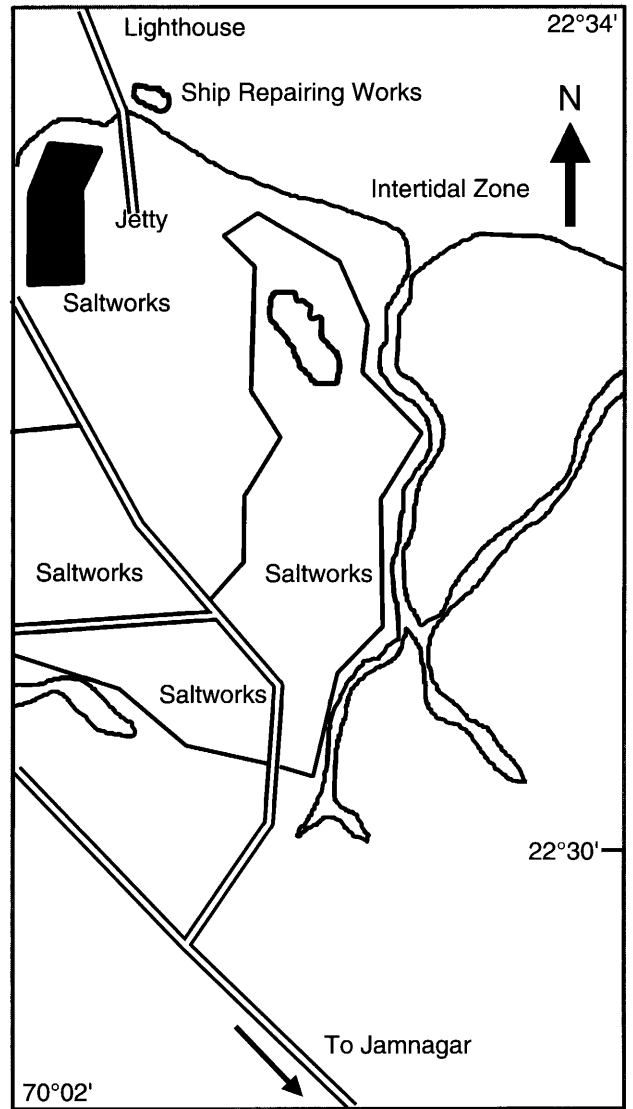


Figure 3. Rozybundar and surrounding area.

*Curlew*

The Curlew population was also higher on Narara island (Figure 5). In winter, the average population of Curlews on Narara island was about ten times higher ( $112.25 \pm 56.16$ ) than that of Rozybundar ( $11.75 \pm 4.38$ ). The highest number of Curlews recorded at Narara Island in January was 209 but only 16 at Rozybundar in December - January.

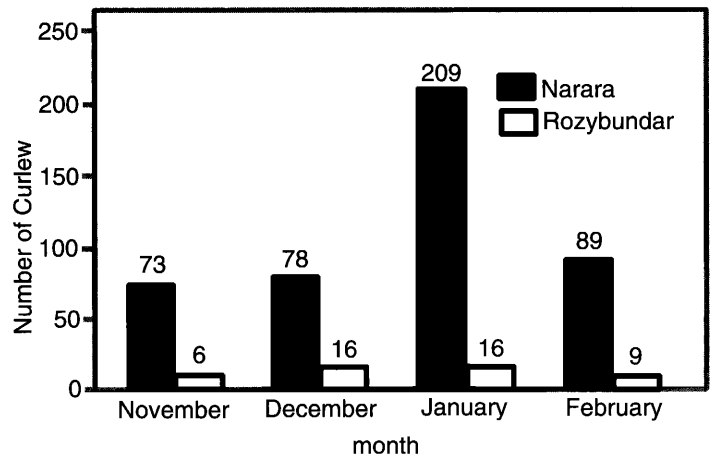


Figure 5. Average number of Curlew at Narara and Rozybundar.



### Black-tailed Godwit

In winter, the average population of Black-tailed Godwits on Narara island was  $247.25 \pm 39.75$  which was three times higher than that of Rozybundar where the average population was  $75.25 \pm 28.86$ . Figure 6 shows that numbers were higher in December and January at both sites.

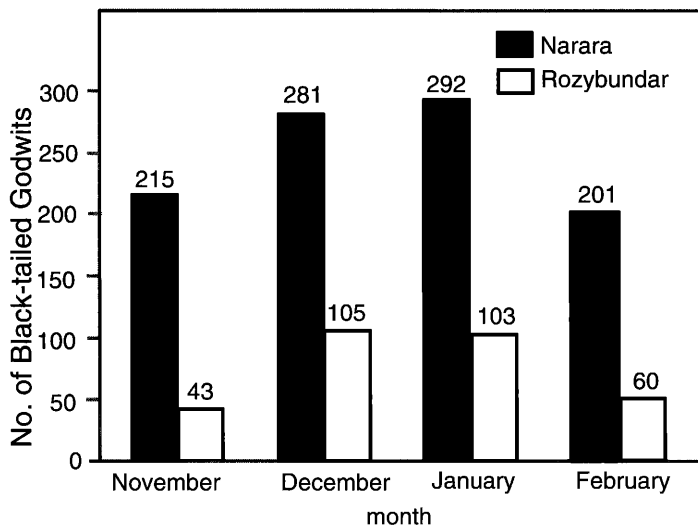


Figure 6. Average number of Black-tailed Godwit at Narara and Rozybundar.

### Avocet

Figure 7 shows the winter population of Avocets at Narara island and Rozybundar. The average population of Avocets was  $136.75 \pm 84.38$  on Narara island and  $60.25 \pm 35.35$  on Rozybundar, *i.e.* more than twice as high at the former site. As with the other three species, the highest counts were recorded in December and January at both sites.

There were significant differences between the populations on

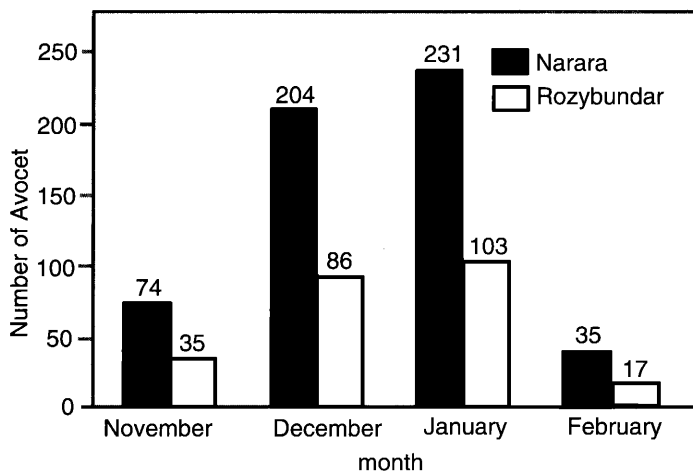


Figure 7. Average number of Avocet at Narara and Rozybundar.

Narara Island and those on Rozybundar in all months except November, December and February for Curlew and February for Crab Plover.

## DISCUSSION

Winter migratory wader populations are governed by three factors, namely temperature; human disturbance and availability of prey. Temperature and prey availability are natural factors but the bird population in the study area is greatly affected by constantly increasing human interference.

This comparison of the populations of the four most abundant species shows higher concentrations at Narara island than on Rozybundar, which we believe is due to Rozybundar site suffering more from human disturbance.

On Narara island, human activity is mainly restricted to a few fishermen who work across the intertidal area during the ebb tide. Oil tankers anchor far off-shore to empty crude oil; this reaches the mainland through a pipeline which does not cause any disturbance to birds. Narara Island is used for Nature Education Camps arranged by the Forest Department of Gujarat State during winter, but camp activities are limited to birdwatching and the study of marine organisms.

On Rozybundar, on the other hand, human activity is comparatively high and causing much disturbance to birds and has increased since 1991. Fishermen stake out nets across the mudflat in the ebb tide. Ship repairing works, situated on the eastern side of the concrete walkway are close to the high water mark and cause noise which scares the birds. Parallel to the west side of the concrete walkway, a big concrete jetty is also under construction. These activities are on sites used as roosts and thus affect the birds.

## CONCLUSION

For the conservation of waders in the Gulf of Kachchh, it is essential to protect the major roosting areas, particularly those used during high tide by the resident as well as wintering bird populations. Further, several industrial concerns are going to build in these areas and, if not restricted, are going to make the area inhospitable for birds.

## ACKNOWLEDGMENTS

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