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Recoveries of Ringed Terns in the Northern Persian Gulf, Iran

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Abstract
Individuals of many seabird species are highly philopatric, returning to breed where they hatched, while others move into colonies somewhere else. To date, there have been no published data reviewing the recoveries of breeding waterbirds ringed in the northern Persian Gulf islands. Tern chicks were ringed on the Mond Islands in the Persian Gulf between 2003 and 2010. The recording of ringed birds was carried out during the 2010 breeding season using a camera at the ringing site. Reports of ringed birds found away from the place of ringing up to the end of 2011 were also obtained. At least 57 ringed Lesser Crested Terns *Sterna bengalensis* and seven ringed Swift Terns *Sterna bergii* were observed nesting on the Mond Islands in June and July 2010. Moreover, one ringed Swift Tern and three ringed Lesser Crested Terns were found in western and southern India, a sea journey of some 2,400–3,500 km. Recovery data confirm site fidelity in Lesser Crested Terns and Swift Terns on the Mond Islands and also reveal their affinity with the oriental region.

1. Introduction

Bird ringing has been a major tool in scientific research based on the individual marking of birds for over 100 years (Kavanagh 2011). Records of ringed birds, either through recapture or final recovery as dead birds, can provide a great deal of information about the migration of the birds and their life cycle. This technique has been one of the most effective methods to study the ecology, behavior, biology, movement, breeding success and population demography of birds (Sutherland *et al.* 2004; Royle & Dorazio 2008).

Although the Persian Gulf lies at the edge of the Western Palearctic region, much of its bird fauna has a high affinity with the Indo-Malayan (Oriental) region (Cramp *et al.* 1983; Boere & Lenten 1998; Wei *et al.* 2009). Situated along the East Africa-West Asia Flyway, the Persian Gulf islands are of great importance as breeding, wintering, refueling or stopover sites for migrating birds particularly shorebirds and seabirds. At least nine waterbird species of the Indian Ocean breed on the islands of the Persian Gulf and many of these islands have been identified as key nesting habitats for these waterbirds (Scott *et al.* 1975; Scott 2007; Wei *et al.* 2009). Uninhabited islands of the northern Persian Gulf hold internationally important numbers of ground nesting waterbirds and they have been designated as Important Bird Areas (IBAs) in the Middle East (Evans 1994; Scott 2007). The Mond Islands, which include Nakhilu, Omol-Karam and Khan islands, provide comparatively safe breeding and wintering areas for some of these migratory waterbirds (Scott 2007; Behrouzi-Rad & Tayfeh 2008; Tayefeh *et al.* 2011).

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The species selected for the purpose of this study were the three most abundant tern species on the Mond Islands, namely Bridled Tern *Sterna anaethetus* (17,000 pairs), Lesser Crested (21,000 pairs) and Swift Tern (2,500 pairs) (Tayefeh *et al.* 2011). The reason for the selection of these species was that they breed in large enough numbers to meet the requirements of this study. The objectives of this paper are to provide recovery data for three tern species ringed during the breeding season on the Mond Islands and to draw attention to the distribution of recoveries within the central Asian flyway (CAF).

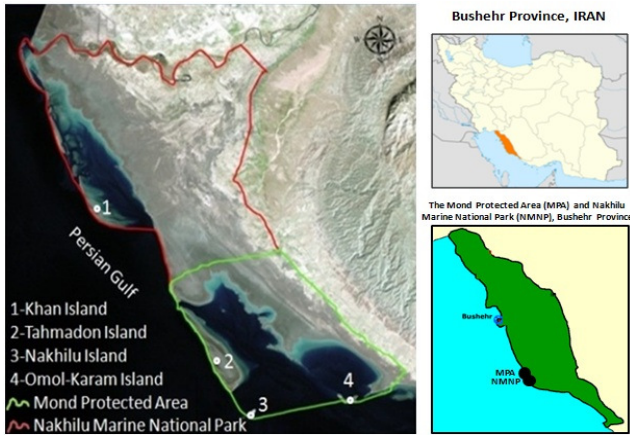

Fig. 1. Location of Mond Islands in the Mond Protected Area and Nakhilu Marine National Park, Bushehr Province, Iran.

2. Study Areas and Methods

The main study areas (27º48´–28º01´N, 51º18´–51º34´E) were situated on four Iranian islands known as the Mond Islands: Omol-Karam, Nakhilu, Khan and Tahmadon. The Mond Islands are located in the northern part of the Persian Gulf in south-eastern Bushehr Province, southern Iran. Khan Island is located in the Mond Protected Area and the rest are located in the Nakhilu Marine National Park (Fig. 1). From 2003 to 2010, chicks of tern species were marked with metal rings on Omol-Karam and Nakhilu islands by personnel of Bushehr Provincial Office and Wildlife Bureau of the Department of the Environment (DOE). Each metal ring fitted to a chick has a return address and a unique number identifying every ringed bird as an individual. A total of 5,897 terns were ringed during the period, including 628 Bridled Terns, 4,836 Lesser Crested Terns and 433 Swift Terns. Adult Bridled Terns were captured opportunistically at their nests under vegetation on foggy nights when the birds could not fly easily. To find out if the marked Lesser Crested Tern and Swift Tern chicks return to these islands to breed, we approached as closely as possible to the breeding colonies and searched for ringed birds using binoculars and a telescope. When we saw a ringed bird, we took large numbers of photographs using a Canon 500mm f4 with Tele-Zoom lens (Fig. 2). The recording of ringed terns was carried out during the incubation period in June and July 2010. We also analysed reports of ringed birds found dead and those found alive away from the ringing site (Coiffait *et al.* 2009) up to the end of 2011.

Fig. 2. Ringed Lesser Crested Tern photographed on Nakhilu Island.

3. Results

At least 57 ringed Lesser Crested Terns and five ringed Swift Terns were observed by telescope and photographed nesting in the Mond Islands in June and July 2010 (Table 1). Thirty of the ringed Lesser Crested Terns were observed on Nakhilu Island, 22 on Omol-Karam and five on Khan Island. The serial numbers of 15 of the 57 ringed Lesser Crested Terns could be read and documented using a camera and telescope, and the rest remained unknown. All of the 15 known rings were on birds ringed on Nakhilu Island. Three of the birds had been ringed in 2004, five in 2005, one in 2006 and two in 2007. In four cases, only a part of the ring could be read, but it was established that the birds had been ringed in 2005, 2006 or 2007. On Nakhilu Island, of 30

ringed Lesser Crested Terns, the serial numbers of 12 rings were readable and the rest were unknown. On Omol-Karam Island, the rings of three of the 22 ringed Lesser Crested Terns were readable. Five ringed Lesser Crested Terns were found on Khan Island, although no ringing has ever been carried out on this island. Unfortunately, none of these rings was readable. Two ringed Swift Terns were observed on Omol-Karam, one on Nakhilu and two on Khan Island. Of these five ringed Swift Terns, only the serial number of one ring (J 6174) could be read, but the date and place of ringing could not be determined. Moreover, two dead Swift Terns were found on Omol-Karam Island (with ring numbers EE 4440 and EE 6640) for which the date and place of ringing could not be found. The serial numbers of most unreadable rings were EE, J and JJ for Swift Tern and DH and DW for Lesser Crested Tern. These rings were issued in Iran by the bird ringing scheme in the Department of the Environment.

One Swift Tern and four Lesser Crested Terns that had been ringed on the Mond Islands were recovered elsewhere (Table 2). The Swift Tern had a sea journey of over 2,400 km (Fig. 3). Two Lesser Crested Terns were captured in southern India at a distance of over 3,510 km from the Mond Islands. A Lesser Crested Tern was found dead in India, and one was also found dead on Sheedvar Island (Fig. 3). None of the 380 Bridled Terns caught at their nests in 2010 and 2011 had a ring. However, there was one recovery in the Mond Islands of a bird that had been ringed elsewhere. In July 2011, a dead Bridled Tern was found on Nakhilu Island with the ring number CH3257. This bird had been ringed on Sheedvar Island, 230 km from its birth place.

Table 1 Ringing recoveries of Swift Tern and Lesser Crested Tern within the Mond Islands.

Species	Place of ringing	No. of terns ringed 2003–2010	No. of birds recorded in this study by camera and telescope	No. of ringed birds with readable ring numbers
Swift Tern	Nakhilu	538	1	0
Swift Tern	Omol-Karam	190	2	1
Swift Tern	Khan	0	2	0
Total		**628**	**5**	**1**
Lesser Crested Tern	Nakhilu	4,086	30	12
Lesser Crested Tern	Omol-Karam	750	22	3
Lesser Crested Tern	Khan	0	5	0
Total		**4,836**	**57**	**15**

Table 2. Ringing recoveries of Swift Tern and Lesser Crested Tern outside the Mond Islands.

Species	Ring number	Place of ringing	Date of ringing	Place of recovery	Date of recovery	Reporter
Swift Tern	DW07196	Nakhilu Island	July 2009	Alibag, Maharashtra, India	January 2010	V. Deshmukh
Lesser Crested Tern	EE1612	Nakhilu Island	July 2005	Kanyakumari, southern India	27 August 2009	S. Balachandran
Lesser Crested Tern	DW05357	Nakhilu Island	30 August 2010	Kanyakumari, southern India	10 August 2011	S. Balachandran
Lesser Crested Tern	DH2377	Nakhilu Island	July 2006	Goa, Maharashtra, India (a dead bird)	13 November 2010	R. Kasambe
Lesser Crested Tern	DH1152	Nakhilu Island	3 August 2004	Sheedvar Island, Iran (a dead bird)	07 July 2009	M. Ghasemi

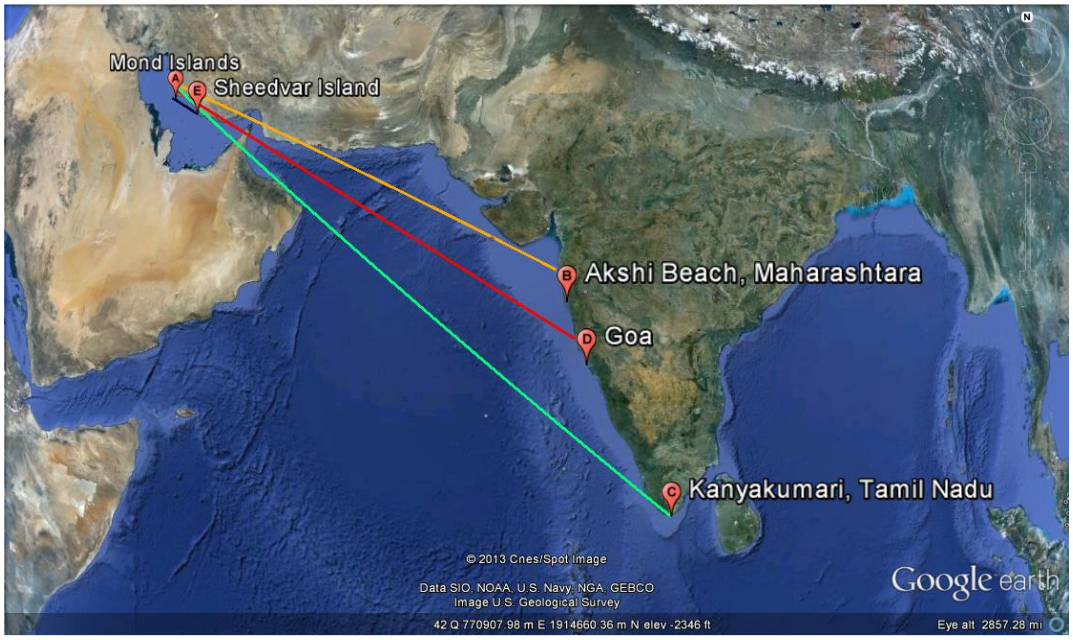

Fig. 3. Movement data of Swift Terns and Lesser Crested Terns ringed on the Mond Islands, Iran. One Swift Tern recovered in Akshi Beach, Maharashtara, in western India (AB). Two live and one dead Lesser Crested Terns recovered in southern (AC) and western (AD) India. A dead Lesser Crested Tern was found on Sheedvar Island in the Persian Gulf (AE).

4. Discussion

Despite the ringing of thousands of terns on the Persian Gulf islands, very few recoveries have been reported to date (Kavanagh 2011). The results of this study revealed that the youngest Lesser Crested Terns nesting on the Mond Islands were three years old (ringed in 2007 and observed at the natal colony in 2010). Moreover, a one-year old Lesser Crested Tern (ring number EE1612) was found in southern India in August 2009 when the adult birds were breeding in the Persian Gulf (Tayefeh *et al.* 2011). These findings are in accordance with the general tendency for the age of first breeding in long-lived seabirds to be delayed up to several years (Schreiber & Burger 2002).

We calculated the total number of birds ringed during the period 2003–2007 to obtain the recovery rates. Of the 2,610 Lesser Crested Terns ringed as chicks from 2003 to 2007, at least 15 and possibly as many as 57 were subsequently found breeding on the Mond Islands, representing a recovery rate of 0.57% to 2.18%. Similarly, of 291 Swift Tern chicks ringed from 2003 to 2007, five were found back at the colonies, a recovery rate of 1.71%. The recovery rates of Lesser Crested Terns and Swift Terns on the Mond Islands are in the same range as those of similar sized tern species in Europe (0.8%–2.9%, Coiffait *et al.* 2009). The recovery rates confirm site fidelity in the Lesser Crested Terns and Swift Terns on the Mond Islands. Many waterbird species show remarkable site fidelity, returning to the same nest or site for many years. This strategy provides a chance to find a suitable mate and to get together at the start of the breeding season to form pairs (Bried & Jouventin 2002; Coulson 2002). The noticeable benefits of site fidelity are that it is likely to lead to increased breeding success, it offers a place for returning mates to reunite, and it reduces the costs of prospecting for a new site (Greenwood & Harvey 1982). It also provides the birds with a better knowledge of food resources and refuges against predators (Coulson 2002; Matthiopoulos *et al.* 2005). Moreover, the ownership of a breeding place confers dominance in aggressive encounters in many species (Bried & Jouventin 2002; Naves *et al.* 2006). The fidelity of Lesser Crested Terns and Swift Terns to their natal colony as demonstrated in this study is in accordance with that of many other tern species, such as the Least Tern *Sterna antillarum* (Atwood & Massey 1988). The results suggest that long-term protection and management of current

colony sites should be an important conservation target.

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References

Atwood J.L. & Massey B.W. (1988). Site fidelity of least terns in California. *Condor*, **90**, 389–394.

Behrouzi-Rad B. & Tayfeh F.H. (2008). Nest Counts for Western Reef Heron Egretta gularis and Four *Sterna* species (*repressa, anaethetus, bergii, bengalensis*) on Nakhiloo Island in the Persian Gulf from 2005 to 2007. *Podoces*, **3**, 45–52.

Boere G. & Lenten B. (1998). The African-Eurasian Waterbird Agreement: a technical agreement under the Bonn Convention. *International Wader Studies*, **10**, 45–50.

Bried J. & Jouventin P. (2002). Site and Mate Choice in Seabirds: An Evolutionary Approach. In: *Biology of marine birds* (eds. Schreiber EA & Burger J). CRC Press New Yourk, pp. 263–305.

C Naves L., Yves Monnat J. & Cam E. (2006). Breeding performance, mate fidelity, and nest site fidelity in a long-lived seabird: behaving against the current? *Oikos*, **115**, 263–276.

Coiffait L., Clark J.A., Robinson R.A., Blackburn J.R., Grantham M.J., Leech D.I., Marchant J.H., Barber L.J., De Palacio D. & Griffin B.M. (2009). Bird ringing in Britain and Ireland in 2008. *Ringing & Migration*, **24**, 281–320.

Coulson J. (2002). Colonial breeding in seabirds. In: *Biology of Marine Birds* (eds. Schreiber E.A. & Burger J.). CRC Press New York, pp. 88–113.

Cramp S., Simmons K., Brooks D., Collar N., Dunn E., Gillmor R., Hollom P., Hudson R., Nicholson E. & Ogilvie M. (1983). *Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic: 3. Waders to Gulls*. Oxford University Press, Oxford, UK.

Evans M.I. (1994). *Important Bird Areas in the Middle East*. BirdLife International Cambridge, UK.

Greenwood P.J. & Harvey P.H. (1982). The natal and breeding dispersal of birds. *Annual Review of Ecology and Systematics*, **13**, 1–21.

Kavanagh B. (2011). Bird ringing programme in Bahrain 2005–2010, *Wildlife Middle East News*, 5(4). Retrieved 30 January 2013 from www.wmenews.com/newsletters/1303320013wme_V5I4_En_06.pdf

Matthiopoulos J., Harwood J. & Thomas L. (2005). Metapopulation consequences of site fidelity for colonially breeding mammals and birds. *Journal of Animal Ecology*, **74**, 716–727.

Royle J.A. & Dorazio R.M. (2008). *Hierarchical modeling and inference in ecology: the analysis of data from populations, metapopulations and communities*. Academic Press.

Schreiber E.A. & Burger J. (2002). Seabirds in the Marine Environment. In: *Biology of Marine Birds* (eds. E. A. Schreiber & J. Burger). CRC Press New Yourk, pp. 1–16.

Scott D. (2007). A review of the status of the breeding waterbirds in Iran in the 1970s. *Podoces*, **2**, 1–21.

Scott D.A., Hamadani M.M. & Adhami Mirhosseyni A. (1975). *The Birds of Iran*. Department of the Environment, Iran.

Sutherland W.J., Newton I. & Green R. (2004). *Bird Ecology and Conservation: a Handbook of Techniques*. Oxford University Press, USA.

Tayefeh F.H., Zakaria M., Amini H., Ghasemi S. & Ghasemi M. (2011). Breeding Waterbird Populations of the Islands of the Northern Persian Gulf, Iran. *Podoces*, **6(1)**, 49–58.

Wei D.L.Z., Mundkur T., Bakewell D., Chong G. & International W. (2009). *Status of Waterbirds in Asia: Results of the Asian Waterbird Census, 1987–2007*. Wetlands International.