MIGRATION FLYWAY OF THE MEDITERRANEAN BREEDING LESSER CRESTED TERN *Thalasseus bengalensis emigratus*

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Abstract:

The Lesser Crested Tern (*Thalasseus bengalensis emigratus*) breeding population in the Mediterranean is found exclusively in Libya, on the two coastal islands of Gara and Elba and one wetland on the mainland coast at Benghazi. In order to improve knowledge of the species migration to wintering quarters in West Africa, a ringing programme was initiated in 2006 and continued until 2012. From a total of 1354 nestlings ringed using metal and/or colour rings, 64 were recovered along their flyway and in their wintering range, representing 6.90% of birds ringed with both colour and metal rings. This provided the opportunity to collect information on post-natal movements (staging and wintering ranges), breeding philopatry and recruitment, in addition to a preliminary estimation of their migration journey duration. This paper indicates

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sighting and recovery distributions in space and time, highlighting the important areas for the species during its journey between breeding and wintering sites. The findings indicate that several areas where ringed terns stop-over during pre- and post-breeding migration journeys are not protected, causing an additional threat to their survival, as some wintering areas are also not protected. Conservation of this highly localised and threatened population needs not only to address protection at breeding sites but also at migratory stop-overs and wintering strongholds.

Keywords: Lesser Crested Tern, ringing, migration, breeding, Libya, West Africa.

Introduction

Mark and recapture techniques, with accurately recorded information within a ringing scheme, are a relatively common and low-cost method to understand population movement and dispersal ecology (Spina, 1999). Bird ringing has provided valuable information, not only through ring sightings of live birds and recoveries from dead ones, but also by determining the migration routes and patterns of several species (Wernham et al., 2002). Bird ringing can also contribute to the monitoring of the population dynamics of a species (Balmer et al., 2008). It provides measures of survival, productivity and dispersal (Viana, 2013; Baillie, 2001) and it is a useful tool for behavioural studies (see review by Sharp, 2009). Ringing is also a support tool for conservation actions and adaptive management (Nichols, 2007). The probability of encountering recoveries decreases when wintering areas are distant from breeding grounds (Shiomi, 2015), therefore long-term ringing campaigns and intensive ring monitoring at targeted areas are central to successful migration studies in such cases.

While avian bio-geographical data for most North African countries are available, Libya in particular remains one of the least covered countries in terms of bird studies (Bundy, 1976; Etayeb, 2007; Smart et.al., 2006; EGA/RAC/SPA Team, 2012). The Lesser Crested Tern *Thalasseus bengalensis emigratus* is the smallest in population size compared to the other two subspecies *T. b. bengalensis* (Red Sea and East Africa) and *T.b. torresi* (Persian Gulf to southeast Asia and Australia). It is an endemic exclusive summer breeder to Libya and winters in West Africa (Hamza et al., 2012, Hamza, 2014). This localised small-sized population was classified as Endangered under the Mediterranean Action Plan on Seabirds (RAC/SPA, 2003), the action plan calls to conduct studies on ecology and movements of this subspecies being of high conservation relevance.

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The ringing of young birds at the breeding sites has been conducted during 2006-2008 (Azafzaf et al., 2006, Hamza et al., 2007) followed by a second campaign in 2009-2012 (Hamza, 2014). The present study aims to: (a) improve our understanding of post-natal dispersal using ring sightings and field observations; (b) investigate initial recruitment age at breeding colonies, and (c) identify the important staging and wintering sites based on sightings in North and West Africa.

Materials and Methods:

Study sites

Two coastal islands of Gara and Elba and one wetland on the Benghazi coast are the main breeding sites for this tern population (Fig. 1). Gara Island, is on the eastern side of the Gulf of Sirte at 30°48'N 19°54'E, approx.12 km off the coast near Ajdabiyah and has a total area of 4.5 ha and it is 7 m above sea level. Elba island is a small, low-lying Island situated in the Gulf of Bumbah, 32° 14'N 23° 17'E (20 ha). The third breeding site is located inshore at the northern section of Sebkhet Jeliana, Benghazi (a 30 ha. permanently flooded salt-marsh), on the islet of Jeliana (position 32°05'N 20°03'E and 35m^2).

Results

Ringing totals and recoveries

A total of 1352 young terns were ringed at their colonies between 2006 and 2012 breeding seasons. Most of the ringing effort occurred at Gara island (72.85%) being the largest colony with a population size of more than 2,000 breeding pairs, 19.9% and 7.25% of rings were used at the Jeliana and Elba colonies respectively (Table. 1). Ringed birds represented 20-60% of crèche size present in each season at both Gara and Jeliana colonies, while at Elba all young birds were ringed. A total of 64 ringed terns have been re-observed/recovered (Table 2) representing 4.73% of total ringed birds with metal and colour rings (n=1352) and 7.47 % of the colour ringed Lesser Crested Terns (n= 857) in the present study (Table 2).

Post-natal movements (staging areas)

The present study confirmed that fledging occur during late July for Jeliana and during late-August to early September at Elba and Gara. Juveniles continue to depend on their parents for feeding during their first months. Nine recoveries were juveniles accompanying their parents, 6

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from Gara and 3 from the Jeliana colony. For example, one bird ringed at Gara in 2008 has been sighted in Ceuta, Spain after one month and 27 days of its ringing date. Another two chicks from Gara ringed in were re-sighted at Almadraba beach, Spain within 47 days and 58 days after being ringed in Libya. They roost on small islets, and in estuaries and coastal wetlands during migration to and from wintering areas in West Africa between Senegal, Gambia, Guinea-Bissau and Sierra Leone. During this study, one bird was reported by a fisherman in Tripoli harbour after 144 days since its ringing date in August 4th at Gara Island (Figure 2).

The first part of the migration was monitored at several sites along the Libyan coastline. For example, a small group of 3-5 birds was seen in late August 2009 for two days at Al-Ghbeba beach, west of Sirte. Another 18 birds were seen earlier on August 15th 2009 roosting with Little Terns *Sterna albifrons*, and feeding their young on small rocky islets off the coast of Sabratah town (80 km west of Tripoli). The post-natal dispersal is unsynchronised, with some birds leaving the breeding sites much earlier than others.

Post-natal movements (wintering range)

Within-Libya wintering records ranged from three to fifteen individuals, reported during the mid-winter waterbird census between 2007 and 2011. The most distant dispersal recorded for a newly fledged Lesser Crested was reported from the Turtle Islands, Sierra Leone, having travelled some 6,700 km within 149 days after being ringed in Libya (average 45 km/day). Six of the 46 sighted birds were observed in Dakar (2), N'Gor Island in Senegal (2) and two at the Tanji Bird Reserve in Gambia.

Some birds were sighted more than once after being ringed at their natal sites, for instance an individual sighted in October 2013 after three years and two months of ringing at Gara in Melilla, Southern Spain, then again in January 2014 at Catabao Segundo, Guinea Bissau. The same bird was re-sighted in October 2014, exactly a year later, showing the same pattern in stopping at the same site each year on the way from breeding to wintering areas.

Another individual was ringed initially in 2007 at Elba Island, then was first re-sighted after almost 5 years (July 2012) in a different breeding site of Jeliana in Libya, and then it was re-sighted in Massa estuary, Morocco in April 2013.

These records confirm the regular migratory pattern of Lesser Crested Tern along the North-West African coastline between breeding and wintering zones.

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Site fidelity and recruitment

During the 2011 season, one ringed Lesser Crested Tern was observed in flight and bred at Elba Island where it had been ringed in August 2007. In 2012 three additional ringed terns were observed breeding at Elba. One adult bird had a blue ring (ringed in 2009), while the other two had white rings (ringed in 2010). These latter two were the youngest birds to return to a breeding site during this study. At Jeliana, eleven ringed adults were breeding in the 2012 season, eight of which were ringed at the same site in August 2008, one ringed in Jeliana in the 2009 season, the other two were a ringed bird from the Gara Island (ringed in August 2008) and a ringed bird from Elba in August 2007; these latter two records clearly demonstrate inter-colony movements of this species.

Discussion

Ring sightings and recoveries of Lesser Crested Terns in the present study showed that several sites along the North and Northwest African coast are used as staging sites during the migration to and from the breeding sites. Some juveniles spent their first winter with their parents, at some sites along the north and northwest African coast in what is known as 'a nomadism period' during the first year (Barlow, 1998) without wintering in West Africa as do most post-breeding migrant terns. In contrast, West Africa is the final wintering destination for this population, as there are no data available on *T. b. emigratus* dispersal to the Eastern Mediterranean basin or the Red Sea, despite some limited observations on the Egyptian Mediterranean coastline (Goodman and Meininger, 1989). The latter could have been foraging or non-breeding individuals from the nominate subspecies *T. b. bengalensis* that breeds in the Red Sea.

Some important staging sites were identified by the present study, the Strait of Gibraltar (5 sightings within 1-2 months after ringing) is a must-pass area for this species and many other migratory bird species (Hashmi, 2000, Paracuellos and Jerez, 2003) and consequently the Morroccan Mediterranean and Atlantic coastal areas are similarly important migration hubs.

Lesser Crested Terns are generally rare in the Iberian Peninsula, however, few individuals are detected around Cadiz, the Doñana National Park, Montijo and La Jara beaches (at the mouth of the Guadalquivir River), Salinas de la Tapa (El Puerto de Santa María) and Odiel marshes (Huelva), associating with Sandwich Tern *Thalasseus sandvicensis* and Common Tern *Sterna hirundo* (C. Gutiérrez, SEO/Birdlife, pers. com). During this study four ringed birds were reported from there.

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The present study has also identified areas that still require more monitoring efforts, particularly northern Tunisia and the Algerian coast during onward and outward migrations (Isenmann et al., 2005). The species is passage migrant in Mauritania, where the Banc d'Arguin National Park is an important hotspot (Isenmann et al., 2010). The peninsula of Nouadhibou to the north of the country represents the northern limit of the wintering range. Similarly, Senegal hosts large concentrations of Lesser Crested Terns. Over 825 birds were counted from 3 to 16 October 2005 at N'Gor, with a daily average of 59 birds (Holmström et al., 2005). The Tanji Bird Reserve and Barra Ferry Terminal on the Gambia River are also sites where the species has been frequently reported by several birdwatchers (Skov and Jensen, 2002). Senegal and Gambia are in fact at the centre of the wintering range for the species and more monitoring is essential to understand where the species is concentrated and what conservation measures need to be in place (Schricke et al., 2001).

Guinea-Bissau hosts an important numbers of wintering Lesser Crested Tern, a total of 400 individuals were counted along the coast and the total number of wintering individuals was estimated at 600-1000 (Meininger, 1988). However, no updated information is available on the species in this country.

More monitoring is necessary determine the wintering southern distribution of the species. In the Sierra Leone Western Area National Park, several Lesser Crested Terns were recorded in December 2008, associated with other tern species, such as the Royal Tern *T. maximus* (Valentine, 2008). In the present study one ring recovery was from Turtle Islands in Sierra Leone. This site is the southernmost wintering site known (Gatter, 1988), and although some isolated observations of small number of wintering individuals are mentioned for Ghana (Grimes, 1987) and Nigeria (Meininger, 1988), no recent data are available on these two countries.

Eleven out of fifteen individuals previously ringed at Jeliana in 2007-2008 had returned to their natal site to breed in 2012. Site fidelity is a common feature in several gull and tern species (see the review by McNicholl, 1975, Coulson, 2001), to increase breeding success (Greenwood and Harvey, 1982) and reduce the cost of prospecting for a new breeding site (Naves et al., 2006). Inter-colony movements were observed at Jeliana in 2012, this has been reported in several tern species e.g. Sooty Terns *Sterna fuscata* in Seychelles (Feare and Lesperance, 2002) and nominate Crested Terns *T. bergii bergii* (Crawford et al., 2002). The presence of individuals originating from a different site indicates that mate choice was made at either the wintering area or staging site(s) prior to arrival to Libyan colony site.

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The present study also accurately confirmed the breeding and migration phenology of this localized population. Threats to this species and other migratory seabirds/waterbirds on the flyway and wintering ranges need to be addressed and conservation measures should be taken by different countries. In addition, protection of breeding sites in Libya is also a priority for the maintenance of this limited population that face the threat of extinction from the Mediterranean.

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