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**State of knowledge and population trends of the
Lesser Crested Tern *Sterna bengalensis emigrata*
in the Mediterranean: threats identified and proposed actions for
small islands in the Mediterranean**

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Summary: Information on the Mediterranean breeding population of the Lesser Crested Tern has increased steadily during the last five years, as a result of a regular monitoring and ringing program initiation by the Libyan authorities at the species breeding sites off the Libyan coast. As a priority species of the Mediterranean Seabirds Action Plan (coordinated by RAC/SPA) and the Mediterranean Small Island Initiative (PIM), updated and available information has been compiled in a form of a species monograph, dealing with both breeding and stop-over sites. A new breeding site was added. Sightings of Mediterranean-ringed birds were obtained along the north-west African migration route and at wintering areas in West Africa. Basic information on the ecology and biology of the species (nest shape, nesting habitat description, feeding behaviour and diet information) was included. Population trends and conservation status were assessed for the Mediterranean population, with emphasis on proposed conservation actions required to maintain the stability of the population size at the small islands in Libya.

Key Words : Lesser Crested Tern, *Sterna bengalensis emigrata*, Mediterranean Sea, population, conservation

Introduction

The Lesser Crested Tern *Sterna bengalensis*, or *Thalasseus bengalensis* (Bridge *et al.* 2005), is not a globally endangered species, as its world population is estimated at 225,000 pairs, of which 50,000-60,000 pairs are found in the Middle East (Gochfeld 1996). However, the number of breeding pairs of the Mediterranean subspecies *S. b. emigrata* in Libya (and the Mediterranean region as a whole), does not exceed 2,400 pairs (Hamza *et al.* 2007). A further 5000 breeding individuals are located in the Egyptian Red Sea area (Goodman & Meininger 1989) and are given as transitional between Mediterranean *emigrata* and the nominate *bengalensis* (Cramp 1985).

The population that breeds in Libya – the only area regularly occupied in the Mediterranean – completely depends on 3-4 unprotected sites along the eastern Libyan coast. This extreme localization determines its particular conservation status at the Mediterranean regional level, as an endangered taxon under the Mediterranean Seabirds Action Plan (UNEP-MAP-RAC/SPA 2003).

A colony of Lesser Crested Terns was first found in Libya at Garah island, mis-identified as Caspian Terns *Sterna caspia* (Bini 1935). Two years later, in August 1937, the presence of a large colony was confirmed by Moltoni (1938) who estimated the colony to hold more than 2000 birds including both adults and nestlings. No further information was available until July 1993 when Meininger estimated a total of 1700 pairs at Garah island and 40 pairs at a new nesting site further east, at Al Ulbah island (Meininger *et al.* 1994). In mid-June 2004 there seems to have been a breeding colony of over 50 pairs on an islet in one of Benghazi's lagoons (Gaskell 2005). In 2006, both Garah and Ulbah were still hosting breeding populations of Lesser Crested Terns (Azafzaf *et al.* 2006), in an almost stable condition when compared to that reported by Meininger *et al.* (1994). The species was also recorded in 2006 in Benghazi, without confirmation of breeding; this was confirmed in August 2007 on the only islet of Sabkhat Julyanah, or Benghazi Western Lake (Hamza *et al.* 2007). Finally, a small colony was found in 2010 at Ftiha island within the Gulf of Bumbah, believed to be part of Ulbah colony which had moved to Ftiha due to human disturbance (Yahia, pers. obs.).

The aim of this paper is to update information on the Mediterranean population of Lesser Crested Tern by presenting the species monograph recently produced (Hamza & Azafzaf 2012) for the Mediterranean small islands initiative (Petites Iles de Méditerranée, PIM).

Study area

Colonies were monitored at the following sites in Libya (Figure 1):

Garah island (alternative names: Jazīrat Garah, Gezeret Garah, Le Garagh island, Gezerit Legarah, Gezerit Lahberi, Bird Island, Isola degli Uccelli): the main breeding site for the species in the Mediterranean, located within the Gulf of Sirt, about 12 km off the coast (30°48'N 19°54'E). Low sandstone cliffs or gentle slopes surrounding low hills with scattered rocks to the north, east and western sides, the southern side with small beach. The top plain has low halophytic plants and shrubs. The island is situated within the concessions of Zuwaytinah Oil Terminal, thus it is vulnerable to oil pollution, although it seems that it did not experience any major oil spills in recent times, and the general environmental status is acceptable.

Al Ulbah island (alternative names: Jazīrat al Ulbah, Jazīrat al Alba, Gezeret Ain al Ghazalah, Gezerit Um Elmaracheb, Gezerit el Elmarakeb, El Maracheb Island, Isola el Maràcheb). Larger low lying island situated in front of the Gulf of Bumbah (32°14'N 23°17'E), at about 2 km from the mouth of Ayn al Ghazalah bay. Halophytes are dominant, with few low shrubs. About 50% is bare area.

Julyanah islet (islet inside Sabkhat Julyanah): A very small low lying islet of ca. 30m² (32°05'N 20°03'E) made of stone pieces, with mud and litter accumulations, in the middle of the northern

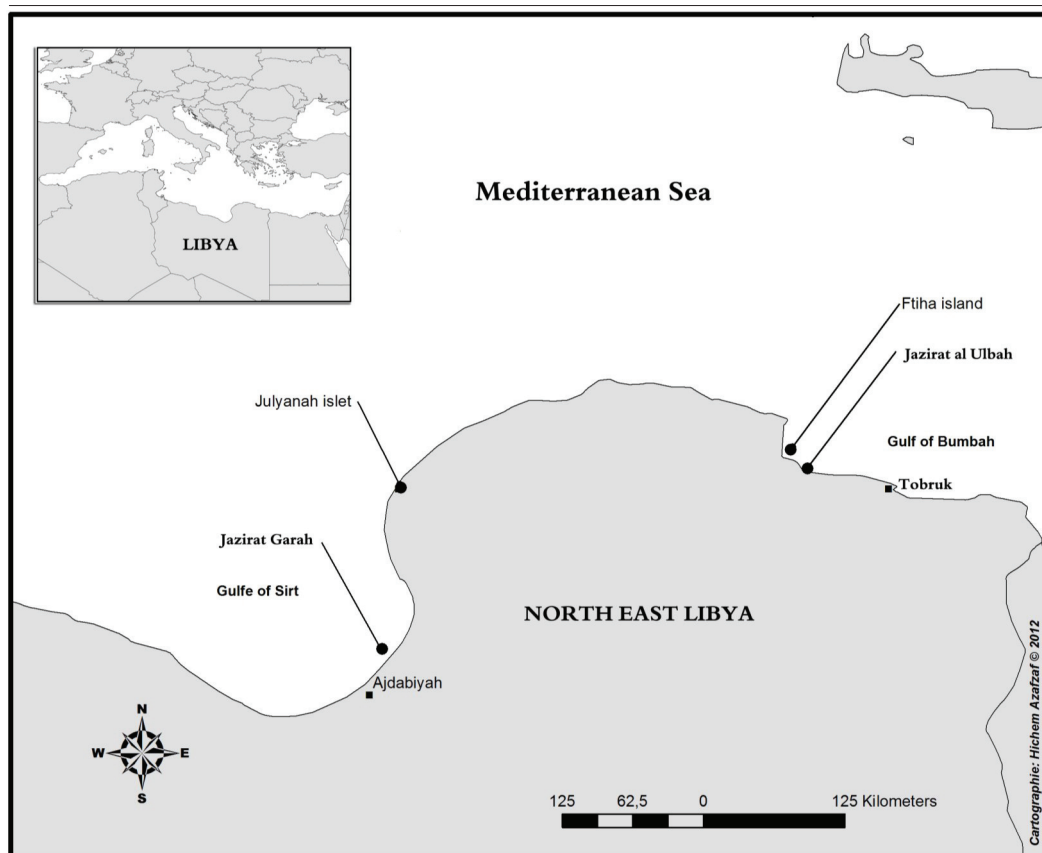


Figure 1. Breeding colonies of Mediterranean Lesser Crested Tern *emigrata* (filled circles) in Libya.

part of a lagoon which is permanently flooded. The islet is used in winter by Cormorants *Phalacrocorax carbo* as a roosting site.

Ftiha island (alternative names: Jazirah Al Watyah, Gezira el-Uàtia, Jazirat Ftiha). A flat islet in the Gulf of Bumbah (32°23'N 23°09'E), elongated in shape, ca. 6 ha large, with a flooded wetland and salt marsh inside. In 2010, 16 pairs from Ulbah colony bred here (Hamza, unpubl. data). The colony was deserted following poaching and disturbance by local people.

Methods

Activities were carried out following the guidelines for working in tern colonies on small islands, elaborated for the Red Sea region (PERSGA/GEF 2003) and the UK (Walsh 1995), in addition to the recent guidelines of the management plan for coastal and marine important areas to birds and/or marine and coastal protected areas (UNEP-MAP-RAC/SPA 2007). The following schedule was implemented: (a) Preparation of fieldwork trips, by obtaining information about marine conditions and weather and arranging logistics for boat transfers to breeding sites in islands: (b) Development of a specific protocol for fieldwork, including safe approaching at sensitive breeding

habitat of an endangered species and fast counting techniques for birds and nests; and (c) Ringing operations were carried out after herding the crèche of young terns (or a part of it) into enclosures, according to previous experiences by Italian and French team members, each participant being assigned of a fixed, specific task so that all chicks could be released within 30-40 minutes from capture.

Results

Population size. The numbers of breeding pairs varied from one year to the other, peaking at 2264 pairs in 2009 (Table 1).

Sites	1937 (a)	1978 (b)	1993 (c)	2005 (d)	2006 (e)	2007 (e)	2008 (e)	2009 (f)	2010 (f)
Garah	1000		1700		1920	1800	2000	2100	2000
Ulbah					29	24	14	24	16
Julyanah		164		50	200	125	120	140	70
Ftiha									12
Totals	1000	164	1700	50	2149	1949	2134	2264	2098

Table 1. Documented breeding population size (number of pairs) of Lesser Crested Terns in Libya. After (a) Moltoni (1937); (b) Baker (1984); (c) Meininger *et al.* (1994); (d) Gaskell (2005); (e) EGA and RAC/SPA surveys; (f) A. Hamza (unpublished data).

Nesting ecology. Eggs are laid on open bare soil, ridges, or on soil surrounded by low vegetation; the nest is a shallow scrape but edges may be occasionally fortified by adult droppings (at Ulbah; Hamza, pers. obs.). Some nests contain few sea shells and debris. Colonies are usually near island shores, possibly to give juveniles an escape way to water, or may occur at the centre of islands, near salt marshes connected to the sea (Ulbah colony). In Libya the nesting sites are moving from year to year (e.g. at Garah, colony site rotated anticlockwise from 2006-2010 breeding seasons); at Ulbah colony, about half of the parent birds moved to a nearby island (Ftiha) in 2010 season, as a possible response to disturbance. Colony size varies from small groups of a few couples (Ulbah) to thousands (Garah). Clutch size is commonly of one egg, with a small percentage of 2-egg nests. Replacement clutches, which are common in the Gulf region (for *Sterna bengalensis torresii*), were not noticed in the Mediterranean population.

Behaviour and diet. Fish are caught in both shallow and deep waters by plunge-diving. It takes surface fishes like sardines or flying fish or juvenile fish of other species. Feeds individually, or in groups of 10 to >70 individuals. Some birds can carry 1-4 fish at a time (Hamza, pers. obs.). Information is scarce on the feeding areas for the Mediterranean breeding population, however field observations at Libyan colonies indicates feeding areas up to about 10 nautical miles from the colony site. Techniques such as light-weight GPS tracking and intensive boat-based monitoring at sea can help in identifying the main feeding areas. These would help to draw precise maps of feeding sites, to be included in buffer zones for marine protected areas, which should be established for the conservation of the species (priority action).

Distribution of the Mediterranean population. The Mediterranean subspecies *emigrata* mainly winters in West Africa (Sierra Leone, Guinea Bissau, Senegal, Gambia, and possibly Ghana), with some individuals in Morocco and Mauritania. There is a series of winter records in Libya (Meininger *et al.* 1994), which suggests regular occurrence of isolated individuals in the winter months (Brehme 2003). Three to seven individuals were reported in the course of winter censuses of waterbirds of Libya between 2007 and 2010 (EGA - RAC/SPA waterbird census team 2012).

Banding activities. During 2006-2010, 1140 nestlings were ringed at the three main breeding sites in Libya (Table 2). The majority were at Garah (86.4%). Recoveries (usually sightings) of the juveniles were obtained from Spain (4, all from sites adjacent to Morocco), Senegal (2), Sierra Leone, Morocco and Libya (one bird each), making a recovery percentage of 0.79% of the total ringed nestlings. No birds from Ulbah colony were reported, either because of low number of banded chicks and high mortality in the first few years, or possibly because they could follow a different migration route (heading east instead of west, to join Red Sea birds). Tracking studies and field observations at the Egyptian Mediterranean coastline are necessary to test this hypothesis.

Ringling Sites	2006	2007	2008	2009	2010	Totals	Recovered
Garah	61*	425*	204	48	247***	985	8
Ulbah	9*	25	18	25	8**	85	0
Julyanah	0	0	66	4	0	70	1
Totals	70	450	288	77	255	1140	9

Table 2. Results of the ringing program of Lesser Crested Terns in Libya (2006-2010); * all birds ringed with metal rings only, ** one bird ringed with metal ring only, * 31 birds ringed with metal rings only; all the other birds were fitted with metal and engraved darvic rings.**

Conservation

A number of conservation problems were recorded during the study, all connected to the general issue of the lack of legal protection for the species and its breeding and foraging areas in Libya. Illegal waterfowl hunting in the easternmost part of the country is causing severe disturbance to the Ulbah colony. Habitat alteration by urban development, without taking national guidelines of Environmental Impact Assessment in consideration was a problem at Benghazi, where Sabkhat Julyanah was drained in 2010, causing the loss of more than 70 nests due to stray dog predation. Illegal blast fishing in the vicinity of breeding sites was recorded around both Garah and Ulbah islands. Some limited conservation action implemented to date has taken place on Garah, where a protective fence was erected at the top of the cliff, to prevent chicks from falling down the cliff (especially in case of human disturbance).

Parameters of interest in conservation biology (population size, capture-recapture data and fledging success) suggest an apparent stability of the population. However, being a continuous production

of about a thousand juvenile terns every season at Garah alone, some increase in population size could be theoretically expected. This not being the case at present, significant mortality rates at wintering sites should be assumed and need further studies and protection efforts.

A simplified action plan for the species was presented in the PIM monograph (Hamza & Azafzaf 2012), which identified threats (Table 3) as well as specific actions proposed on local, national and regional levels. On the local level, identified actions are education, public awareness and participation of local communities, site protection and management. On the national level, the action plan stresses the importance of species protection, education, public and government awareness, as well as activities to protect the species during breeding season. Finally, on the regional level, several actions were proposed, starting from a better implementation of the Action Plan on marine birds listed in the SPA protocol, and strengthening information sharing between countries on breeding, passage and wintering areas, with the organization of scientific meetings and symposia.

	Site	Habitat alteration	Climate change	Over-fishing	Pollution	Invasive or introduced species
Libya	Garah island	X	X	X	X	
	Ulbah and Ftiha islands		X	X	X	X
	Julyanah islet	X	X	X	X	X
NW and W Africa	Migration and wintering areas	X		X	X	X

Table 3. Main threats identified for Mediterranean Lesser Crested Tern.

As a future achievement, ongoing studies have to be mentioned on the phylogeny of the species in Libya, and its relationship to the breeding population of the Red Sea (Hamza *et al.* 2009) and the Gulf region (Bahrain). Results are suggesting some independency of the Mediterranean population, offering additional reasons for improving its conservation status. Furthermore, a detailed study on feeding biology of the species is underway, to inventory all diet components used by the species at its confined breeding sites in Libya.

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