

Breeding Brown Boobies *Sula leucogaster* on Egyptian islands of the Red sea

MOHAMED HABIB

In the Red sea of Egypt the Brown Booby *Sula leucogaster* is a scarce breeding resident on the islands. It is observed with some regularity in the gulf of Aqaba but rarely in the gulf of Suez. The subspecies in Egypt is *Sula leucogaster plotus* (Goodman & Meininger 1989, Cramp & Simmons 1977). Previously (Frazier *et al* 1984, Jennings *et al* 1985) the Brown Booby was found breeding at Ashrafi island with 7 breeding pairs in spring 1983, Geisum island had 46 breeding pairs in spring 1983 and there were 18 chicks there autumn 1984, Umm El Heimat had 3 pairs in spring 1983 and one chick autumn 1984.

METHODOLOGY

The Red sea governorate has the longest sea coast compared with any other Egyptian governorate, extending from El Zafrana in the north to Halib in the south, a distance of 1050 km. Along this coastline, there are several archipelagos. My survey started early June 2012 and continued in 2012, 2013 and 2014. Most islands were surveyed. All islands were reached by boat (mainly safari boats or boats used by the Red sea governorate). After landing, I used direct counting methods, mostly from higher vantage points to prevent any disturbance. Counting units were apparently occupied nests, defined as the summed numbers of occupied and unoccupied nests that appear to have been used during the current breeding season (Bibby *et al* 2007). The temperature varied from 37°C at the beginning of the season in late May to more than 47°C in late July and August. Visits to each colony were limited to less than 20 min to reduce nest disturbance (Bibby *et al* 2007).

RESULTS (Plates 1–17)

Before 1999 Brown boobies were regular breeders at Geisum and Umm El Heimat islands (Grieve & Millington 1999). During the survey, which covered most of the Red sea islands, we found that the Brown Booby bred mainly on two islands, Ashrafi in the north and Zabargad in the south. The distance between the two populations was over 400 km (Figure 1). Counts are presented in Table 1 and Figure 2.

Breeding

The breeding season at Zabargad started one month earlier than at Ashrafi. At Zabargad breeding started in the first week of February. The Brown Boobies started laying eggs in the second to third week of February with fledging end July–end August. Replacement clutches were laid after loss of eggs or young in June or July (probably at Ashrafi island after fishermen had hunted chicks before fledging). The nests were made by both sexes on a cliff at Zabargad island and on fossilized coral ground at Ashrafi. Nesting material consisted of old drift wood, twigs and dry algae. The clutch was 1–2 eggs, incubation between 40–44 days and hatching was asynchronous. Young were altricial and nidicolous; hatched and young chicks keep warm by sleeping on the top of parents' foot webbing. Parents cover back of the chick using parental belly feathers. After hatching both parents tend, care and protect the chicks from predators. When chicks reach 5 weeks old, they start to be able to protect themselves from predators, mainly Sooty Gulls *Larus hemprichii*. They utter defensive calls then regurgitate semi-digested fish when threatened which directs



Figure 1. Location of the main breeding islands of Brown Boobies of the Egyptian Red sea: 1 Ashrafi island, 2 Zabargad island, 3 Abu Mingar island and 4 Sayal island .

attention to the fish rather than the chick. Fledging depends on the food supply which lasts 4–5 months. The fledgling keeps with the female during foraging till they are able to survive alone.

Foraging

The population of Brown Boobies of Zabargad often foraged out to the sea to feeding grounds 20 km west of Zabargad island around Shawareet and Sayal islands. The population of Ashrafi forages east of the Ashrafi islands in pelagic water searching for schools of fish and reaches 30 km south around Abu Mingar island and Big Gifton island. We saw groups of 10 Brown Boobies one hour before sunset in pelagic water plunging from c10 m in which wings were angled then fully extended backwards chasing schools of fish. After foraging in the breeding season parents travel back to the breeding islands to feed young and change responsibility of tending the chicks, while after fledging they disperse with females around the islands and end back at the natal island. They roost at coral islands, rocks or buoys.

Table 1. Results of the survey count.

Brown Booby Breeding nests							
	nest with two eggs	nest with 1 egg	inactive nest	Adult	First Summer	Fledgling	Chick
Zabargad island 10 April 2014	14	4	22	16		2	
Zabargad island 14 August 2014					1	4	1
Ashrafi island 30 June 2012		2	8	23			2
Ashrafi island 19 June 2013				35		1	14
Ashrafi island 12 June 2014		1		17		3	14
Sayal island 28 July 2013				1		1	
Abu Mingar island July 2014				1		1	

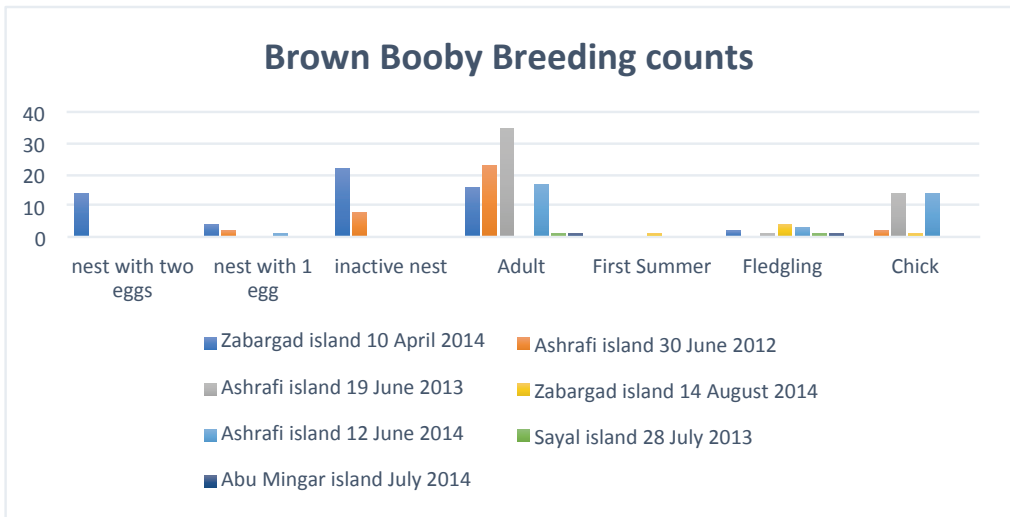


Figure 2. Diagram of the results.

DISCUSSION

Brown Boobies do not breed any more at Geisum and Umm El Heimat islands due to disturbance by tourists and kite surfing safari boats. Ashrafi and Zabargad islands are far from tourism activity.

There is human disturbance by fishermen landing on Geisum and Ashrafi islands. They collect chicks before fledging as a food source during fishing excursions (pers comm local fishermen). There is a wide range of oil pollution from different sources. Oil rigs and bilge water from tourism boats are the main source of oil pollution at the surveyed areas. Oil pollution can have devastating effects on Brown Boobies and other sea birds breeding at those islands because their feeding behaviour makes Brown Boobies susceptible to oil pollution which can eliminate the insulation of feathers and can result in death of chicks or parents from ingesting the oil as the birds try to remove it during preening. The main natural predator is the Sooty Gull *Larus hemprichii* which steals unattended eggs and chicks. Preliminary plans to protect breeding and nursery ground areas and recommendations were delivered to the Red sea governorate for future implementation.



Plate 1 (left). Brown Booby *Sula leucogaster* female brooding egg, Ashrafi island, Red sea. © Mohamed Habib

Plate 2 (right). Brown Booby *Sula leucogaster* nest with one egg, Ashrafi island, Red sea. © Mohamed Habib



Plate 3 (left). Brown Booby *Sula leucogaster* male guarding chick, Zabargad island, Red sea. © Mohamed Habib

Plate 4 (right). Brown Booby *Sula leucogaster*: a few days-old chick, Zabargad island, Red sea. © Mohamed Habib



Plate 5 (left). Brown Booby *Sula leucogaster* male guarding chick, Ashrafi island, Red sea. © Mohamed Habib

Plate 6 (right). A Brown Booby *Sula leucogaster* chick, Ashrafi island, Red sea. © Mohamed Habib



Plate 7 (left). An older Brown Booby *Sula leucogaster* chick than the one in Plate 6, Ashrafi island, Red sea. © Mohamed Habib



Plate 8 (right). Five-week-old Brown Booby *Sula leucogaster* chick, Ashrafi island, Red sea. © Mohamed Habib



Plate 9 (left). Five-week-old Brown Booby *Sula leucogaster* chick, Ashrafi island, Red sea. © Mohamed Habib

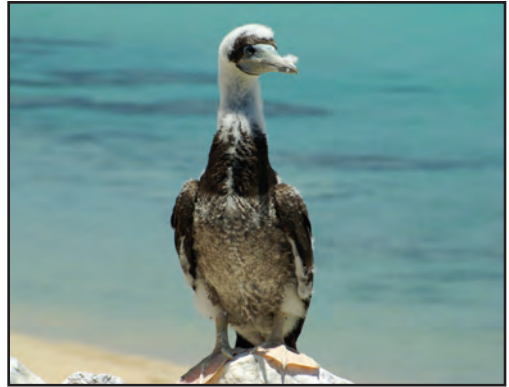


Plate 10 (right). A Brown Booby *Sula leucogaster* chick, Zabargad island, Red sea. © Mohamed Habib



Plate 11 (left). Brown Booby *Sula leucogaster* a few days before fledging, Zabargad island, Red sea. © Mohamed Habib



Plate 12 (right). Fledglings forage together with adult females 20–50 km from breeding island, Sayal island, Red sea. © Mohamed Habib



Plate 13. Fledgling Brown Boobies *Sula leucogaster* forage together with females 20–50 km from breeding island, Sayal island, Red sea. © Mohamed Habib



Plate 14. Adult male Brown Booby *Sula leucogaster*, Ashrafi island, Red sea. © Mohamed Habib



Plate 15. Adult female Brown Booby *Sula leucogaster*, Ashrafi island, Red sea. © Mohamed Habib

ACKNOWLEDGEMENTS

Many thanks to Red sea governorate staff during the survey: Sayed abd el Halim, Mohamed Abd El Ghany, Ahmed Galal, Boat skippers Alla, Saad and Syed Oada. Dr Yasser Said director of Red Sea governorate, Dr Tamer Kamal Northern Red Sea Islands manager permitted me to use patrol boats and survey protected islands including Wadi El Gemal protected area. Mr Mohamed Gad, Ahmed Shawky and Mohamed Ebada and Dr Mostafa Fouda are from the EEAA Nature conservation office.



Plate 16 (left). Sooty Gull *Larus hemprichii*, main predator of Brown Boobies *Sula leucogaster*, Ashrafi island, Red sea. © Mohamed Habib



Plate 17 (right). Semi-digested fish are regurgitated when Brown Boobies *Sula leucogaster* are threatened, Ashrafi island, Red sea. © Mohamed Habib

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Mohamed Habib, PO Box 432, Hurghada, Red Sea, Egypt. mrhydro35@hotmail.com