

Preliminary Results on the Study and Conservation of Marine Turtles in Djibouti

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Initial findings from the Djibouti project, which began in 2021, show a small yet consistent nesting population of hawksbill turtles, *Eretmochelys imbricata*, on Maskali Island, off the coast of Djibouti City to the north in the Gulf of Tadjoura (Fig.1) as well as the year-round presence of immature green turtles, *Chelonia mydas*, and hawksbills along the Djiboutian coast. Several aggregations of immature green turtles have also been observed around Tadjoura on the northern shore of the Gulf of Tadjoura (Fig.1). Adult turtles are rarely observed at sea. Only one instance of turtle meat being sold was reported, but testimonies also mentioned traditional exploitation practices.

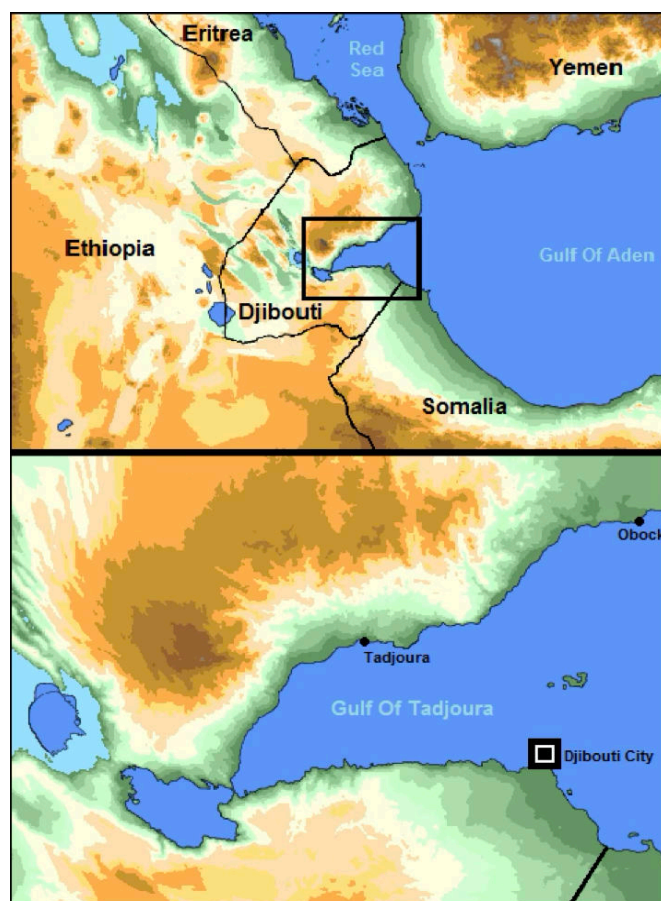


Figure 1. Location of Djibouti and Gulf of Tadjoura.

Since the beginning the 2025 nesting season, patrols have been conducted with varying regularity on the four beaches of Maskali Island by two local ecoguards. They mark nest locations with iron rods and numbered stickers and send information and photos via mobile phone to Djibouti City. We have also requested first-hand accounts from French military personnel stationed in Djibouti who frequently swim around Maskali Island. Two divers provided underwater photographs from various sites in the Gulf of Tadjoura, and additional images and videos were shared by various informants. Each underwater photo, nesting female, or nest is recorded in a centralized database and documented on a data sheet. Additional information on the customary use of sea turtles in Djibouti was collected through interviews with older fishermen. Results from this data collection effort are described below.

Presence at sea: Three species have been confirmed. Green turtles are the most frequently encountered species with mainly immature individuals and sub-adults. The second most frequently reported, but more localized, are hawksbills from juveniles to adults. Loggerheads, *Caretta caretta*, have also been observed but there have been only three sightings in five years, including one individual (which appeared sick) with an algae-covered carapace on 4 April 2025 in the first breakers of the Gulf of Goubbet el Kharâb (a cove separated from the Gulf of Tadjoura to the southwest by a narrow channel) whose bones and mandible were found on the beach some twenty days later.

Immature green turtles are most often observed alone, sometimes resting between corals (Fig. 2). Seagrass beds (*Syringodium isoetifolium*, *Halophila ovalis*, and *Thalassa hemprichii*) are rare. However, several aggregations of ten to fifteen individuals were observed, mainly in the marine areas around the hotels, as well as at Khôr Raïssâli, an inlet in the Tadjourah Region, located close to Tadjoura town (Fig. 3). They appeared to be attracted to the growth of red algae on the corals (Fig. 4).

A fisherman told us that about 3 years ago, in October or November, a large turtle was caught in his net at a place called Dououl, some 15 km west of Tadjoura. He was forced to cut the turtle loose with his knife, as he was

unable to bring it on board due to its weight. Among the photos shown to him, he identified it as a leatherback, *Dermochelys coriacea*. This is the second sighting reported in Djibouti. A sub-adult had been seen diving in 2021 at “La Faille” (Boldrocchi *et al.* 2021). Could the presence of the leatherback at the end of the year, during the upwelling season in the Gulf of Goubbet el Kharâb, be explained by a peak in zooplankton and jellyfish at that time, as suggested by Boldrocchi *et al.* (2021)?



Figure 2. Immature green turtle on the coral beds of Khôr Raïssâli (© J.-M. Roux).

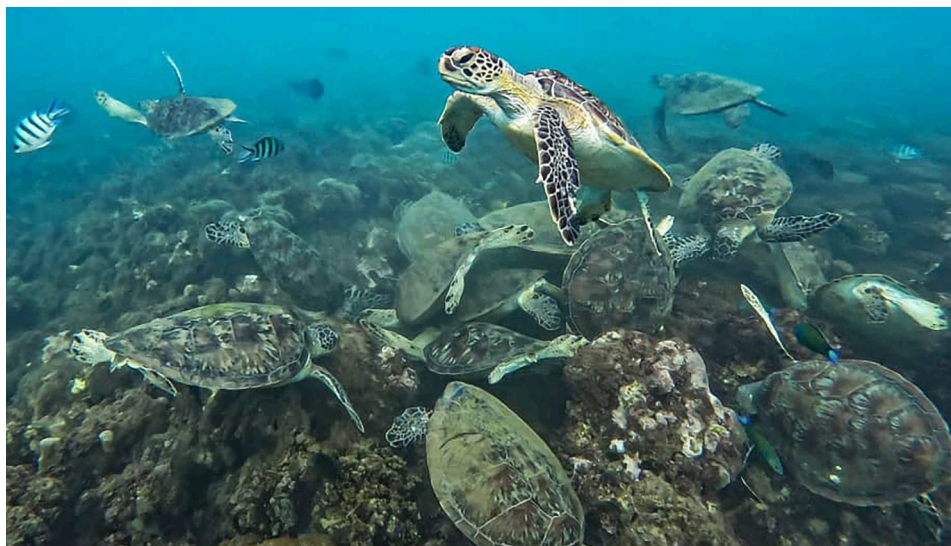


Figure 3. A dozen immature green turtles gathered to eat red algae growing on the coral (© M. Moussa).



Figure 4. Green turtle eating red algae (© M. Moussa).



Figure 5. Hawksbill photographed off Dankalêlo (Gulf of Goubbet el Kharâb) (© J.-M. Roux).

In the Gulf of Goubbet el Kharâb, at a place called Dankalêlo (Fig. 5), hawksbills have been observed exhibiting signs of dwarfism (i.e., unusually small and round for one to two-year-old hawksbills) with carapaces covered in algae and barnacles (including very large or many small *Chelonibia testudinaria*, also on the flippers). Several witnesses reported that certain times of the year are marked by the stranding of numerous marine animal carcasses in the Goubbet region, a phenomenon some associate with sulfur rising from the seabed. However, to date, no scientific study or official report has confirmed the existence of sulfur emissions responsible for mass strandings of fish or sea turtles in this area. Additionally, in Goubbet, adult green turtles have sometimes been observed resting motionless on the bottom while being “cleaned” by striated surgeonfish, *Ctenochaetus striatus*, and yellowtail surgeonfish, *Zebrasoma xanthurum* (Jean-Michel Roux, *pers, comm.*).



Figure 6. A beach on Maskali Island (© J. Fretey).

Goubbet is renowned for its exceptional marine biodiversity. However, the threats identified in this area include intensive fishing, degradation of coastal habitats, and pollution.

Nesting: Nesting activity was monitored between 30 January — 12 April 2025 on Maskali Island (Figs. 6-7). Twenty-five nests were counted on three beaches, with a peak of five nests on the evening of 25 February. These were all hawksbill nests; although only three females were observed by the ecoguards, the photos were clear enough to identify them as hawksbills. The most important nesting areas for hawksbills in the Red Sea are on the Shadwan, Zabarga, Siyal, and Robala Islands in Egypt, as well as the Suakin Archipelago in Sudan. Nesting is significantly less frequent on the mainland compared to the islands (Frazier and Salas 1984). The primary nesting sites are located off Shedwan Island and near the Giftun Islands in Egypt (Hanafy and Sallam 2003). Nesting on Maskali remains low. Coastal development and the growing presence of tourists on the beaches during the evening hours act as deterrents to increased nesting activity.



Figure 7. Hawksbill turtle ovipositing on Maskali Island (© Benjamin Wattelet).

Additionally, many nests laid too close to the tide line are washed over during high tides and rot. Incubation results vary depending on the location of the nests. We analyzed two rotten nests: one had 135 eggs of which 41 (30.4%) were infertile, and the other nest had 153 eggs of which five (3.3%) were infertile. We also analyzed two hatched nests of which one had 11 infertile eggs (19.3%) out of 57 (Table 1). Hirth and Abdel-Latif (1980) reported that, on average, 27% of the eggs per nest were infertile in Sudan. On Jabal Aziz Island (People's Democratic Republic of Yemen), the average clutch size was 108 eggs, with 24% being infertile (Hirth and Carr 1970). On Masirah Island (Sultanate of Oman), a nest contained an average of 97 eggs of which 11% were small and infertile (Ross 1981).

Table 1. Number of eggs of each diameter and number of infertile eggs in two nests.

Egg diameter (mm)	31	32	33	34	35	36	37	38	39	Infertile eggs
Nest #: DJI 122	1	0	2	6	11	12	10	1	3	11
Nest #: DJI 146	0	4	57	28	1	0	0	0	0	1

Nests placed close to the vegetation have eggs entangled in the roots or attacked by a small 4 cm-long earthworm (species not identified). Hatchlings on this island are depredated by invasive crows (*Corvus splendens*) and horned ghost crabs (*Ocypode ceratophthalmus*). Old green turtle nests were reported at Rasyan and Ambado in the Gulf of Tarjouda. Al-Mansi *et al.* (2003) observed fresh tracks and body pits of green turtles in the Rasyan area, confirming what we had been told.

The president of the Tadjoura fishermen reported that leatherbacks used to come and lay their eggs at Les Sables blancs also in the Gulf of Tarjouda.



Figure 8. Nest with eggs completely rotted by the tide (© A. Fleury/J. Fretey).

Exploitation: Meat, oil and eggs—People do not differentiate between edible and inedible meat. The captain of the Djibouti-Tadjourah ferry told us that his grandfather, who ate turtle meat, would run his finger over the blood and lick it before starting the meal. If it burned, he would not eat the meat. An old fisherman told us the same story.

In the coastal regions of Tadjoura and Obock (Djibouti) and Nordicho (Somalia), sea turtles hold an important place in certain cultural practices, particularly during pre-nuptial periods. Turtle oil, believed to also have curative properties against asthma, is traditionally considered an aphrodisiac and used on these occasions to promote fertility and strengthen virility. Turtle eggs are also eaten for their supposedly fortifying properties, while the meat is renowned for its analgesic properties, high mineral content, and distinctive flavor that requires no seasoning.

Turtle poisoning—The practice of consuming meat and oil is not without risks. Green turtles, which feed on red coral, can accumulate toxins in their flesh, making their consumption dangerous or even fatal. Cases of poisoning from ingestion of hawksbill meat are also known. Several cases of serious poisoning, even death, have been reported in Djibouti and other areas (Hirth and Abdel Latif 1980; Frazier and Salas 1984; Hasen Salem, *pers. comm.*) but fishermen still claimed that it is regularly consumed, illustrating a persistent lack of understanding of the differences between edible and toxic species.

From a health perspective, the consumption of turtle oil also raises concerns due to its high lipid content, which can contribute to metabolic or cardiovascular disorders in frequent consumers. An old fisherman told us that his uncle died after eating turtle fat.

The president of the Obock fishing cooperative reported the death of a young man named Ali in 2015 in the village of Moulhoule after consuming turtle meat. A second case was reported in Djibouti City in 2020. The individual had received turtle meat from a local fisherman and was subsequently poisoned. The hospital emergency room confirmed chelonotoxin poisoning and the individual did not survive.

Sale of carapaces—Despite the legal protection (Decree No. 2004-0065/PR/MHUEAT) enjoyed by sea turtles, some illegal practices persist. For example, the sale of live turtles, often turned onto their backs to prevent them from escaping, has been observed, including in local markets such as in Nordicho (Somalia). Furthermore, reports suggest that about six years ago, turtle products (oil, meat) were allegedly sold by some members of the Coast Guard, raising ethical and legal questions regarding the effective enforcement of conservation laws.

Curiously, it wasn't hawksbill carapaces that were on sale, but those of immature green turtles. Despite the ban on trade, people openly admit to this commerce. One fisherman told us that he readily sells them to the Chinese. Documentation of these practices through firsthand accounts and visual aids is underway, with the aim of raising awareness and strengthening actions to protect marine turtles in Djibouti.

Al-Mansi *et al.* (2003) documented numerous turtle shells on the beaches, indicating previous killings. While we suspect that turtles continue to be hunted for their meat or fat, legal protections appear to have had an effect because such activities now occur more rarely and with greater discretion.



Figure 9. Sale of immature green turtle shells on Dankalêlo Beach (© J. Fretey).

Conservation actions: Raising awareness—Signs have been installed indicating that Maskali's beaches are nesting sites. Awareness-raising activities are being undertaken on Maskali Island, primarily among children and fishermen, through the restoration of their properties, in exchange for the island's protection (overall biodiversity conservation through the reduction of plastic waste).

Nest relocation—Many nests on Maskali Island are placed too close to the tide line and in areas where invasive vegetation has proliferated the beaches in recent years. Several nests, with no signs of emergence after almost 2 months of incubation, were opened. The eggs were completely rotten or contained dead embryos at between 10 and 15 days old (stages 11 to 17). We observed that the tides had been submerging these nests. We decided to relocate them further up the beach and to build a screened enclosure where all the nests could be relocated.

Much work remains to be done to ensure that the rich biodiversity of Djibouti is protected in the long-term.

Acknowledgements

We would like to thank Bruno Pardigon, Director of Sovereign Global Agency, for his financial and material support for this project. We also thank Mohamed Moussa and Jean-Michel Roux for granting us access to their photos. Special thanks go to Benjamin Wattelet, Bourhan Mohamed Abass (ferry captain), Mohamed Houmed, Ibrahim Ouge (the president of the Obock fishing cooperative), and all the fishermen who generously shared their time and knowledge with us.

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