

Short note | Nota breve

## Nesting of green turtle *Chelonia mydas* on Sal, Cape Verde Islands, in August 2013

Jacque Cozens, Berta Renom, Albert Taxonera, Cheryl Sanchez, Antonio Cruz & Ravi Lopes

The Cape Verde Islands rank among the world's most important breeding localities for the loggerhead sea turtle *Caretta caretta*, while hawksbill *Eretmochelys imbricata*, green *Chelonia mydas*, olive ridley *Lepidochelys olivacea* and leatherback *Dermochelys coriacea* turtles are also known to occur in Cape Verde seas (Marco *et al.* 2011). Olive ridley and leatherback turtles are solely known as migrants, but hawksbill and green turtles regularly use these waters as feeding grounds (Marco *et al.* 2011, Varo Cruz *et al.* 2011). Here, we document a rare nesting event of green turtle on the island of Sal, one of the windward (*barlavento*) islands, situated in the north-east of the archipelago.

On 24 August 2013, at 06:00 AM local time, Antonio Cruz and Ravi Lopes of the *Associação das Amigos das Tartarugas do Ambiente (ADTMA)-SOS Tartarugas*, a local NGO which has been protecting turtles and collecting data since 2008, discovered a green turtle nest at Costa da Fragata, along the south-eastern coast of Sal. So far, the only nesting turtle species recorded on Sal by *ADTMA-SOS Tartarugas* had been loggerhead turtle. The rangers were conducting a standard morning patrol in order to count the number of loggerhead nests and tracks from the previous night and to relocate any nests that were in danger of inundation from high tides or to protect them from other dangers.



Fig. 1. Nest and track of green turtle *Chelonia mydas* at Costa da Fragata, Sal, 24 August 2013.  
Fig. 2. Nest and track of loggerhead turtle *Caretta caretta* at Ponta Preta, Sal, 15 June 2008.  
(ADTMA-SOS Tartarugas).

The turtle track and nest covered a considerably larger area than the usual loggerhead track and nest. Following the arrival of the project coordinators (AT and BR) and a ranger with considerable experience with green turtles elsewhere (CS), it was concluded that it had all the signs of a green turtle nest. The main indications were that the flipper marks in the track were symmetrical as opposed to loggerhead tracks, which alternate, and that the body pit and camouflage areas were much larger (Fig. 1-2). Except for egg chamber depth (see below), no measurements of track or nest were taken. The egg chamber was located at 16°37,257'N and 22°53,997'W. The nest had been laid in a narrow part of the beach within 2 m of the high water

mark and was threatened by inundation. It was therefore decided that the nest should be relocated to the *SOS Tartarugas* hatchery at Ponta do Sinó in the south-west of Sal in order to ensure the safe incubation of the eggs. In other circumstances it would also have been possible to relocate the nest to another position on Costa da Fragata, but the same level of protection would not have been possible. Once the relocation began it became clear that the eggs were much larger than loggerhead turtle eggs. The eggs were subsequently measured by using calipers and the width was found to be an average of 47 mm compared to loggerhead eggs which average 41 mm (Fig. 3-4).



Fig. 3. Measuring a green turtle egg. Fig. 4. Size comparison of green (left) and loggerhead (right) turtle eggs (ADTMA-SOS Tartarugas).

The number of eggs in the nest was 148, compared to the average loggerhead nest on Sal of 84 eggs. The egg chamber depth was 81 cm, compared to the loggerhead average of 45 cm. Due to the lack of depth available in the hatchery, it was decided to split the nest into two, both with a depth of 45 cm.

The first of the two nests to hatch did so on 13 October, i.e. after 51 days, with a hatching success of 60%. The second nest hatched on 16 October (54 days), with a hatching success of 51%, giving an overall success of 55.5%. Since the nest was split it is possible that the incubation period was thereby affected. The green turtle hatchlings were noticeably larger than loggerheads, with different markings, namely

white margins on the flippers and a white plastron (Fig. 5). Seven green turtle hatchlings and seven loggerhead hatchlings, born on the same night, were measured to obtain a comparison of size and weight (Table 1). The average length of the green hatchlings was 4.98 cm compared to loggerheads which averaged 4.13 cm and the average weight of greens was 27.5 g, compared to 16.2 g for loggerheads. The hatchlings were released on Costa da Fragata close to where the nest was originally laid. A study of genetic material taken from unhatched embryos is being undertaken to try and establish the geographic location of their maternal nesting grounds.

Green turtle weight	Green turtle size	Loggerhead weight	Loggerhead size
26 g	5.1 cm	18 g	4.2 cm
29 g	5 cm	15 g	4 cm
29 g	5 cm	16 g	4.1 cm
26.5 g	4.9 cm	16 g	4 cm
28 g	5.1 cm	17 g	4.3 cm
27 g	5 cm	17 g	4.2cm
27 g	4.8 cm	15 g	4.1 cm

Table 1. Comparison of size and weight of seven green and loggerhead turtle hatchlings, Sal, October 2013.



Fig. 5. Hatchlings of green (left) and loggerhead (right) turtles, Sal, October 2013 (ADTMA-SOS Tartarugas).

During the 2013 season, nesting by green turtle was also reported from nearby Boa Vista Island (A. Marco, S. Martins, C. Roder *in litt.*), but further details have as yet not been published. In 2013, a rise in the numbers of green turtle was reported in many locations around the world (e.g. FWC 2013). Whether green turtles are expanding their nesting range to include the Cape Verde Islands remains to be seen. Nesting green turtles are globally distributed and widely found in tropical and subtropical waters along continental coasts and islands between *ca.* 30° N and 30° S, although there are some exceptions such as rookeries in Turkey and Cyprus (Márquez 1990). Green turtle occurs on the nesting beaches or in offshore waters of at least 139 countries and territories (Hirth 1997). Juvenile and subadult green turtles are often observed in Cape Verde waters (Ernst

& Barbour 1989), but nesting is exceptional. The assertion by Márquez (1990) that Cape Verde beaches rank among ‘the most important for the Atlantic population’ of green turtle is evidently in error. Subadult green turtles observed in Cape Verde seas will migrate to their natal beaches in the Caribbean, Guinea-Bissau, Ascension Island and the Gulf of Guinea to breed after they have reached sexual maturity (Monzón Argüello *et al.* 2010). There exists unpublished evidence (including photographs, currently unavailable) that green turtle has nested on Sal in 2002 (Anonymous 2010; E.C. d’Oliveira unpublished data), but the occurrence reported here is the first to be properly documented.

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## REFERENCES

- Anonymous, 2010. Plano nacional para a conservação das tartarugas marinhas em Cabo Verde. Boletim Oficial da República de Cabo Verde, I Série, No. 48: 2032-2058.
- Ernst, C.H. & R.W. Barbour, 1989. Turtles of the world. Smithsonian Institution Press, Washington D.C. 313 pp.
- FWC, 2013. Green turtles nest at unprecedented pace in Florida this year. Florida Fish and Wildlife Conservation Commission; <http://myfwc.com/news/news-releases/2013/october/30/sea-turtles/> [accessed 15 November 2013].
- Hirth, H.F., 1997. Synopsis of the biological data on the green turtle *Chelonia mydas*. Biological Report 97 (1). Fish and Wildlife Service, U.S. Department of the Interior, Washington D.C. 120 pp.
- Marco, A., E. Abella Pérez, C. Monzón Argüello, S. Martins, S. Araújo & L.F. López Jurado, 2011. The international importance of the archipelago of Cape Verde for marine turtles, in particular the loggerhead turtle *Caretta caretta*. *Zoologia Caboverdiana* 2: 1-11.
- Márquez, R., 1990. FAO species catalogue. Vol. 11: Sea turtles of the world. An annotated and illustrated catalogue of sea turtle species known to date. FAO Fisheries Synopsis No. 125, Vol. 11. FAO, Rome. 81 pp.
- Monzón Argüello, C., L.F. López Jurado, C. Rico, A. Marco, P. López, G.C. Hays & P.L.M. Lee, 2010. Evidence from genetic and Langrangian drifting data for transatlantic transport of small juvenile green turtles. *Journal of Biogeography* 37: 1752-1766.
- Varo Cruz, N., P. López Suárez, J. Cozens, A. Liria Loza, J. Fretey & L.F. López Jurado, 2011. New records of the olive ridley sea turtle *Lepidochelys olivacea* (Eschscholtz, 1829) from the Cape Verde Islands. *Zoologia Caboverdiana* 2: 53-61.

Jacquie Cozens, Berta Renom, Albert Taxonera, Cheryl Sanchez, Antonio Cruz & Ravi Lopes, ADTMA-SOS Tartarugas, Santa Maria, Sal, Republic of Cape Verde; [jacquie@sostartarugas.org](mailto:jacquie@sostartarugas.org)

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