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Captive-raised Loggerhead Turtle (*Caretta caretta*) Found Nesting Eight Years After Release

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The Brazilian coast between the states of Sergipe and Rio de Janeiro (Figure 1) is considered the most important breeding site of the loggerhead turtle, *Caretta caretta* in Latin America (Marcovaldi & Marcovaldi 1999), with over 5,000 nests laid annually (Marcovaldi & Chaloupka *in review*). Patrolling and protection of marine turtle nesting grounds in Brazil has been carried out since 1982, with a gradual spatial increase, by Projeto TAMAR-IBAMA, the Brazilian Sea Turtle Conservation Program. Projeto TAMAR-IBAMA also maintains 22 Field Stations in feeding and breeding sites. Some of these stations have Visitor Centers, where sea turtles are kept in tanks for rehabilitation and public education (Marcovaldi & Marcovaldi 1999). Occasionally, rehabilitated turtles, as well as turtles raised in captivity since birth, were released in the wild.

The first turtles that were brought into captivity by Projeto TAMAR-IBAMA hatched on 21 March 1986 from a nest laid in Combios Linhares, Espírito Santo (19°40'S). More hatchlings were collected and placed in captivity after this date. One of the captive hatchlings from Comboios (exact date of hatching unknown) was released on 17 December 1994 with a curved carapace length (CCL) of 75cm. The turtle was tagged following Bolten (1999) before release with a monel tag (style 681, National Band and Tag Company, #BR5624).

Eight years later, on 29 November 2002, the turtle was observed nesting and identified by local TAMAR personnel at Santa Maria beach, Arembepe, Bahia (12°47'S), over 1,200 km north of the release site and natal beach. The animal had a CCL of 101cm. The nest was excavated after hatching: clutch size was 135 eggs with a hatching success of 62.96%. The calculated age range of this turtle when she nested is a maximum of 8.7/16.7 years (age at release/age at return). Based on growth analysis of 8 captive turtles (4 maintained at Comboios and 4 at Guriri, another TAMAR Station located 100 Km north of Comboios), a minimum of 4.75 years would be required for a turtle to reach the size of BR5624 when she was released (Table 1). Therefore, the recaptured turtle's minimum age is 4.75 when released and 12.75 years when observed nesting.

Figure 1. Breeding sites of loggerhead sea turtles in Brazil, showing the release and recapture points of female #5624.

Station	Turtle	Nest emergence	Measurement date	CCL (cm)	Interval (yr)
Comboios	A	16/02/1996	21/02/2000	70.0	4.07
	B	25/08/1997	14/09/2001	73.5	4.11
	C	?/01/1994*	15/09/1999	75.0	5.78
	D	25/11/1997	27/11/2002	74.5	5.07
			Mean	73.25	4.76
			SD	±2.25	±0.71
Guriri	E	?/12/1998*	09/09/2003	75.0	4.84
	F	?/01/1999*	09/09/2003	75.5	4.75
	G	?/01/1999*	09/09/2003	72.5	4.75
	H	?/02/1999*	09/09/2003	74.5	4.66
			Mean	74.37	4.75
			SD	±1.32	±0.06

Table 1. Biometric data from eight captive turtles maintained at Comboios and Guriri Field Stations. *=exact day of hatching not available; first day of the month used for calculations.

Sexual maturity is estimated to be 25-35 years in wild loggerheads (Chaloupka & Musick 1996). Effects of captivity on growth rates, however, preclude a meaningful comparison of age estimates of captive-reared animals at nesting with that of wild loggerheads (Zug *et al.* 1995). It is reasonable to assume early sexual maturity of female BR5624 because of higher growth rates during captivity. Additionally, intra- and inter-population growth-rate variability among wild *Caretta caretta* juveniles is high, between distinct populations or between individuals of the same population (Klinger & Musick 1995; Zug *et al.* 1995).

We could find in the literature only one record of a loggerhead turtle tagged as a hatchling, and recaptured as an immature female loggerhead from the Australian coast with 75.6 cm CCL after 15.2 years (Limpus *et al.* 1994). This length is similar to that of BR5624 when released in the wild, when she was no more than 8.07 years old. Skeletochronological studies carried out in the North Atlantic indicate that a loggerhead turtle of this age would typically be 50 to 55 cm CCL (Bjorndal *et al.,*2003). The only other recapture record of a captive-reared loggerhead from Brazil is that of a juvenile, released at Comboios at 1-year age, and recaptured 40 months later in the Azores (Bolten *et al*. 1990).

This is the first documented record of a turtle tagged on the Espírito Santo coast and found nesting in a different state. However, historically there has been a low rate of recapture of tagged females along the entire coastline monitored by Projeto TAMAR (see Barata 1996). There are 9 long-distance recapture records of loggerhead turtles that had been tagged on nesting beaches (n=8) or on foraging grounds (n=1) in Brazil. All of the recaptures were individuals found dead and far from the original tagging locations; four of these records were animals found outside the known current Brazilian nesting range for this species (Marcovaldi *et al.* 2000; Almeida *et al.* 2000; Laporta & Lopez 2003). In addition, satellite telemetry studies of eight nesting loggerheads from Espírito Santo showed both northward and southward movements, bypassing northern and southern limits of Brazilian loggerhead nesting grounds (Frazier *et al.*, 2003).

This recapture raises new questions about the relationship among *Caretta caretta* nesting sites along the Brazilian coast: do the breeding sites located in the states of Rio de Janeiro, Espírito Santo, Bahia and Sergipe host individuals from distinct populations or are they the remainders of an ancient and larger population, fragmented by coastal human occupation? Genetic studies comparing turtles from different nesting grounds in Brazil are being carried out and may shed some light on this matter.

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Tarballs and Early Life Stages of Sea Turtles in Paraíba, Brazil

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Although not ranked as one of the main threats to the sea turtles, oil exploration and transport are potential sources of direct and indirect threats to these animals (NMFS 1991; NOAA 2003). Large oil spills attract much attention of the media due to the massive damage they cause, but these events are not frequent. In contrast, smaller scale contamination events not highlighted by the media, but they are more frequent and the additive value of may have considerable impact. Tarballs are common byproducts of maritime operations, often a result of, illegal at-sea discharge. They are found in every ocean and convergences zones can aggregate them. (NOAA 2003). Here we report the stranding of a dead juvenile green turtle, *Chelonia mydas*, with curve carapace length (CCL) of 13.5 cm, completely covered by tarballs (images available at http://www.seaturtle.org/cgi-bin/imagelib/index.pl?photo=1410) on August 29 2004, in Bessa beach, João Pessoa, Paraíba, Brazil. Unfortunately, it was not possible to collect the gastric contents of the animal.

The specimen belongs to the most vulnerable life stage to tarballs, hatchlings and post-hatchlings. This vulnerability is related to their relative small size; to their low motility, that lead them to concentrate in convergence zones, where the oil also tends to concentrate; and to their swimming mode, surface swimming, which increases their chances of interaction. In Florida convergence zones, from 103 post-hatchling analyzed, tar was found in 65 individuals (Lohoefener *et al.* 1989). Witherington (1994) showed that 34% of post-hatchling at "weed lines" off the Florida coast had tar in their mouths or esophagi. Lutz (1989) reported that hatchlings have been found dead, apparently starved to death, with their beaks and esophagi blocked with tarballs.

This specimen also represents a register of the occurrence of a size class that has not been found in Paraíba yet. The mean CCL size of green turtles found stranded in this area was 56.5 cm (2002-2003) and the smallest was 29.3 cm (Mascarenhas *et al.* 2005). Until the current specimen was found, there were only unpublished fishermen reports regarding the presence of individuals of this size class, captured in entanglement nets in the reefs close to the coast. The CCL of green turtles recruiting to the neritic zone is between 20-35 cm (Bjorndal 1997; Musick & Limpus 1997) with smaller individuals thought to reside in the pelagic zone (Carr 1987). The occurrence of this specimen and the fishermen reports Mandate further investigation as to the possibility of small juvenile green turtles in the neritic.

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