## Nesting of Green Turtles in Saint Leu, Réunion Island

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Réunion Island is a French island, situated in the southern Indian Ocean, off the eastern coast of Madagascar. As testified to by the first navigators to land on the island, Réunion Island was an important place for nesting marine turtles.

"The place of Saint-Paul (north west coast) is where sea turtles nest, because of large sandy beach .... 24 big sea turtles were caught alive and we have salted more than thirty. A thousand people can have a good meal with only one of these turtles." (Dubois 1669 in Lougnon, 1992).

Unfortunately, nesting on Réunion Island has been dramatically reduced as a result of intensive harvesting, the introduction of egg predators (i.e., rats, pigs and dogs) and the urbanization of the coast. Since 1986 only four observations of marine turtle nesting have been recorded. The species was not determined in all cases:

- on the 28 June 1986, three tracks were discovered on an black sand beach at Etang Salé (southwest coast) (Bertrand *et al.* 1986);
- the 13 May 1994, a green turtle nesting was observed, and a hatching recorded 93 days later at Grand Fond beach on the west coast (Vie Océane, pers. comm.);
- the 16 November 1996, a green turtle hatching was observed at Ravine Mulla beach in the south west of the island (Hunez, pers. comm.);

-in August 2002, two tracks were observed (Ciccione pers. comm.) at Souris Chaude beach, on the west coast of the island. They were confirmed by the CEDTM (Centre d'Etude et de Découverte des Tortues Marines de La Réunion / Sea Turtle Survey and Discovery Center).

Observations made by ultra-light aircraft and by boat since 1996 have shown that adult green turtles were present around Réunion Island (Sauvignet *et al.* 2000). A case of mating was also observed near the west coast of the island (Ciccione pers. obs). These observations have shown that despite the urbanisation of the coasts, sea turtles continue to migrate to Réunion Island to nest. Regulations put in place to protect marine turtles in 1983, awareness programmes and twenty years (1977-1997) of discussions concerning a sea turtle ranch at La Réunion may have had positive impacts.

Before regulations were brought into effect in 1983, many green turtle eggs and hatchlings were imported from the Eparses Islands (especially Tromelin and Europa atolls) to Réunion Island, by the people staying in those far away islands. This activity was not monitored and therefore the number of eggs and hatchlings translocated during this project is unknown. In 1979, during a scientific programme lead by ISTPM (now called Ifremer Institut) and CORAIL sea turtle ranch, eggs were taken from Tromelin's Atoll (one nest) and 50% of eggs buried in the sand of Ferme Corail beach. The eggs hatched and fifteen hatchlings were released. Since 1997, the CEDTM has reintroduced 140 green turtles, from the CORAIL ranch into the ocean. This ranch raised green turtles from 1977 to 1997. Europa and Tromelin hatchlings were taken for the ranch until 1992. The turtles released were between 6 and 15 years old. All of them were tagged with monel tags (1005-46 Monel tag 035 MO), with a transponder (Indexel) and since 2000 were photo-identified (right and left head profile). The first turtles released (6 to 7 years old) were tracked using satellite telemetry. These four captive-reared turtles migrated far from Réunion Island to Madagascar and Chagos Islands (Pelletier *et al.* 2002). On the other hand, some of the released adult green turtles (over 10 years old) remained along the west coast of Réunion Island. Presently, four of them (two males and two females) are regularly observed behind the reef barrier of Ferme Corail beach (Figure 1) where they come to sleep at the end of the afternoon.

In the early 1980s, a 100m<sup>3</sup> breeding tank of CORAIL sea turtle ranch of Saint Leu broke and hundreds of several-month-old green turtles escaped into the sea. This accidental release was reported by people working on the ranch. These turtles were not tagged and only a few of them were retrieved. Furthermore, in July (1984), 2,500 four month old green turtles were released by Ifremer Institute. Those turtles were brought over from Tromelin atoll and tagged with plastic tags on the marginal scute of their carapaces. Experiments carried out in the breeding tanks of CORAIL ranch demonstrated that turtles lost their tags after several months, leaving behind a lifelong characteristic scar.

Nesting on Réunion Island takes place throughout the year. Between 01 June 2004 and 15 January 2006 daily surveys were conducted on the two main beaches (Ferme Corail Beach and La Cafrine Beach) of northern Saint Leu (Figure 1). When a track was observed, the beach was put under intensive observation between 22:00 and 05:00. This observation continued for 19 days following the initial observation in order to observe other nesting events of the same turtle (Dizon & Balazs 1982; Legall *et al.* 1985). If a female was recorded nesting, she was measured (Curved Carapace Length-CCL), tagged with a Monel Tag (1005-46 Monel Tag 035 MO) and a DNA sample taken.

Each nest was monitored every morning and afternoon during the incubation period in order to observe signs of deterioration and to detect precursory signs of hatching. After hatching, all clutch data were recorded and DNA samples taken from dead hatchlings.

Twenty-three tracks of nesting green turtles were observed on the two beaches (Table 1). Of these, seven were recorded as nests. Two periods of nesting were observed in 2004 (Table 1). We know that at least two different females nested during this period as nesting took place on the same night (Table1). For these two females, the nests were laid 19 days apart. In December 2004, four tracks and one nest were recorded (Table 1). In October 2005, on the Ferme Corail beach, one nest was recorded. We measured CCL of two females during this study, one measured 106cm the other 109cm. All

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Figure 1. Réunion Island and study areas in Saint Leu region.

the tracks were located on the Ferme Corail beach and La Cafrine beach (Figure 1) within approx 200 meters of one another. In 2004, we observed two females nesting and all nests were located on the Ferme Corail beach as was the one nest recorded in 2005.

The incubation periods were longer during the austral winter (over 80 days), and shorter during the austral summer (53 days, Table 1). Mean clutch size was 100 eggs (SD = 31.3; n = 5, range 52-139). All the 5 nests attained a high level of hatching (>91%). Mean hatching rate was 95.8% (SD = 4; n=5), and mean emergence success (proportion of hatchlings that emerged from the sand) was 77.4% (SD = 9.9; n=5). In the 3rd nest, 30 juveniles had become entangled in the sand with a fishing line. All of them were released.

La Cafrine beach is separated from buildings by a road. Road traffic is heavy from 05:00 - 23:00 and continues all night. Between July and October trucks transporting sugar cane drive all night. During the austral winter, a low level of nocturnal human activity was observed on the beaches. Nocturnal fishing activity peaked throughout the summer, especially at weekends and during school holidays. Campers were observed fishing. We also noticed the presence of rats and feral dogs on the beaches.

The apparent increase in the number of green turtles nesting on a frequented beach, bordered by a road and building construction is an encouraging sign for the population of green turtles at Réunion Island. The year-round presence of adult green turtles around the coast of Réunion Island is known, although it is not documented to what degree the translocation and release projects may have augmented numbers within this population. According to different authors (Legall et al. 1985; Marquez 1990), the delay between hatching and the sexual maturity of wild green turtles ranges from less than 20 to 30 years. This delay certainly depends upon the geographical area. The interval between the reintroduction operations of the 1980's and the nesting that occurred in 2004 and 2005 corresponds to the delay to maturity recorded in wild green turtles. In Réunion Island Corail Ranch, more than 100 matings were observed in the tanks holding captive green turtle 9 to 18 years old and 3 clutches were laid in the water of the tanks holding captive green turtles that were 13 - 22 years old (personal observation). Hatchlings and yearlings release by the Cayman Turtle Farm have been observed nesting or mating near the point of release after 17-19 years (Bell & Parsons 2002). In 1998, three Kemp's ridley turtles from the experimental head-starting project on North Padre Island nested in south Texas (Shaver & Caillouet 1998). So we cannot reject the hypothesis that the green turtles (hatchlings and yearlings) that were reintroduced in the 1980s may be the same turtles that came to nest on Réunion Island in 2004 and 2005. However, the two females observed nesting in 2004 did not have any scars on their carapace to indicate previous tagging. Therefore, although not marked headstarted animals, they may be animals that were accidentally reintroduced during the 80's or wild animals.

As all green turtles nested on the same beach in 2004, the principal element which has influenced these turtles may be the quality of Ferme Corail beach. Since 1999, CEDTM has been running a programme to regenerate Ferme Corail beach. This regeneration focuses upon reintroduction of the original vegetation of the upper beach. This upper beach vegetation provides a protection against human activities on the coast, protects the beach from erosion, which may in turn affect the choice of the nesting site by the female and may also have an important impact on the navigation of the sea turtles near the coast of a potential nesting site.

Our observation during the nesting periods demonstrated that females do not nest when the beach is subject to human activities. The presence of campers during the austral summer may explain why the majority of turtles laid only one clutch instead of several as is more usual for green turtles (Legall *et al.* 1985; Roos *et al.* 2000), although we cannot rule out the fact that they were nesting elsewhere on the island. Nesting females however did not appear to be perturbed by the light coming from cars on the road.

In any case, this increase in the number of green turtle tracks and of nesting females, though limited, is encouraging for the preservation of sea turtles in Réunion Island. Green turtle populations have the ability to recover from very low numbers, and these observations should serve as a catalyst for the new development of a conservation programme whose goal is to maintain the reproduction and the nesting activities of the green turtles on the coast of Réunion Island. Presently, it is important to:

1) Continue to develop the regeneration programme of upper beach vegetation and to control the human activities on the beaches of the west coast of Réunion Island.

Date	Beach	No. Tracks	No. Nests	Incubation (days)
01/06/2004	Ferme corail	1	0	
19/06/2004	Ferme corail	1	0	
21/06/2004	Ferme corail	1	0	
21/06/2004	La cafrine	1	0	
23/06/2004	Ferme corail	1	1	
23/06/2004	La cafrine	2	0	
11/07/2004	Ferme corail	4	2	82, 85
29/07/2004	Ferme corail	4	1	83
18/08/2004	Ferme corail	2	0	
19/08/2004	Ferme corail	1	1	81
11/12/2004	Ferme corail	1	0	
12/12/2004	Ferme corail	1	0	
14/12/2004	Ferme corail	1	0	
18/12/2004	Ferme corail	1	1	53
14/10/2005	Ferme Corail	1	1	
Total		23	7	

Table 1. Activities of Chelonia mydas recorded on two beaches at St Leu (Réunion Island).

2) Maintain and increase the population of green turtles present around the island by preserving their marine habitats, reducing mortality due to human activities (poaching, boat accidents) and pollution.

- BELL, C.D.L. & J. PARSONS. 2002. Cayman turtle farm head-starting project yields tangible success. Marine Turtle Newsletter 98: 5-6.
- BERTRAND, J., B. BONNET & G. LEBRUN. 1986. Nesting attempts of *Chelonia mydas* at Réunion Island (S. W. Indian Ocean). Marine Turtle Newsletter 39:3-4.
- DIZON, A.E. &G.H.BALAZS. 1982. Radio telemetry of Hawaiian green turtles at their breeding colony. Marine Fisheries Review 44: 13-20.
- LEGALL, J.Y., D. CHÂTEAU & P. BOSC. 1985. Rythme de reproduction interannuelle des tortues vertes *Chelonia mydas* sur les sites de ponte de Tromelin et Europa (Océan Indien) C.R Acad. Sc. Paris. 301. sér. III(5): pp. 195-200.

- LOUGNON, A. 1992 Sous le signe de la tortue. Voyages anciens à l'île Bourbon. (1611-1725). Lib. Gérard Saint Denis.
- MARQUEZ, R.M. 1990. Sea turtles of the world, FAO Species catalogue, Roma, Italia, 11: pp. 25-30.
- PELLETIER, D., D. ROOS & S. CICCIONE S. 2002. Oceanic survival and movements of wild and captive-reared immature green turtles (*Chelonia mydas*) in the Indian Ocean. Aquatic Living Resources 16: 35–41.
- ROOS, D. 2000. Généralités concernant la tortue verte *Chelonia mydas*. Bulletin Phaethon 12: 7-98.
- SAUVIGNET, H., A. PAVITRIN, S. CICCIONE & D. ROOS. 2000. Premiers résultats des campagnes de dénombrements aériens des tortues marines sur la côte Ouest de La Réunion. Bulletin Phaethon 11: 8-12.
- SHAVER, D. J. & C. W. CAILLOUET, Jr. 1998. More Kemp's ridley turtles return to south Texas to nest. Marine Turtle Newsletter 82: 1-5.