

# Sea turtle populations and poaching implications on Playa Norte, Tortuguero, Costa Rica 2009-2011

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## Summary

Sea turtle populations continue to be under threat globally from organised poaching for human consumption and financial gain. In the northeast of Costa Rica four species of sea turtle nest annually at one of the country's most popular tourism destinations, Tortuguero. Over a four year nesting population survey, completed with anti-poaching strategies, we show that sea turtle poaching levels on the edge of the national park beach zones are maintained at a similar frequency annually and potentially could increase. Harvesting of sea turtles on the Atlantic coasts of Costa Rica is prohibited. Unsustainable poaching of adult sea turtles and their nests during years of poorer adult abundance has an unknown potential to damage future populations by degrading the number of nests that could hatch and the subsequent recruitment of hatchling turtles. We raise concern over the dwindling future of hawksbill turtles (*Eretmochelys imbricata*) on the beaches surrounding Tortuguero National Park.

## Introduction

Harvesting of Costa Rican sea turtles began in the eighteenth century when they were regarded as a food source for European sailors (Rieser 2012). The market for sea turtle products subsequently grew during this time and became an economical commodity, with all species of sea turtle being targeted. The main source of sea turtle products in local markets on the Atlantic side of Costa Rica derived from the green sea turtle (*Chelonia mydas*), due to its high abundance (Troëng 2004). Adult green sea turtles were poached for their meat, fat and oil that was consumed and included as ingredients in beauty products. Their eggs were also poached for consumption and were wrongly believed to contain aphrodisiac and unique nutritional properties. Critically endangered hawksbill sea turtles (*Eretmochelys imbricata*) were also poached for meat, eggs and their distinctive shells that were used for decorative purposes (Chacón 2002). Leatherback sea turtles (*Dermochelys coriacea*) were also harvested for meat and eggs.

Tortuguero is one such rural coastal village that has had a history of sea turtle poaching. It is located on the northeastern Atlantic coast of Costa Rica and is primarily a fishing and tourism village. Tortuguero is unique in being one of the largest and most important Atlantic nesting-sites for green sea turtles in the Western Hemisphere (Lewis 2003; Seminoff 2004). It is also a rookery for leatherback, hawksbill, and loggerhead sea turtles (*Caretta caretta*) (Seminoff 2004). In 1975 Tortuguero National Park (TNP) was formed to protect sea turtles and other endangered wildlife in the region (Fig. 1). The protection zone of the park is approximately 80,000 ha of which 46,000 ha extends offshore to safeguard marine life to a distance of three miles (Carr et al. 1978). The park also includes a twenty-two mile strip of beach extending from the mouth of the Tortuguero River, south to Parismina. The park is situated next to the Barra del Colorado Wildlife Refuge (BCWR). The BCWR is a 91,200 ha terrestrial wildlife sanctuary

that grants sea turtles a similar level of protection on its beaches as that of TNP. Due to the BCWR impressive size, enforcing wildlife protection within it, and the national park zone, is problematic. The park is administered by a single statutory authority; The Ministry of Environment, Energy and Telecommunications (MINAET). MINAET staff work with local law enforcement to protect sea turtles during their nesting season. However, it is widely known that poaching of sea turtles continues despite their best efforts.



**Figure 1.** Northeast Costa Rica, showing the Tortuguero National Park (Parque Nacional Tortuguero) and its offshore marine protection zone.

Poaching rates for adult sea turtles and their eggs has been studied for Tortuguero National Park (Troëng 1998, 2000, 2004) but enforcement of the prohibition laws protecting them was previously inadequate and had led to significant and unsustainable poaching levels (Troëng 2000). Insufficient human resources in the protective authorities and a lack of enforced regulation were suggested as causal factors (Troëng 1998). A steady and increasing eco-tourism trade has helped supply Tortuguero's economy with an alternative source of income over the years and has provided a seasonal presence on the beach by tourists that aids sea turtle conservation. Today, sea turtles nesting at TNP receive improved protective measures with lower rates of poaching because of local education and eco-tourism influences. However, outside the

national park boundaries prohibited harvesting continues due to its high profit margin, inadequate enforcement and limited prosecution of offenders.

This study took place on Playa Norte (North Beach), a section of beach within the Barra del Colorado Wildlife Refuge that connects with the northern end of Tortuguero National Park. Playa Norte commences north of the mouth of the Tortuguero River and borders part of the town of San Francisco. It is not officially part of TNP but it does receive similar protection due to its location within BCWR. Like TNP, Playa Norte hosts nesting green, hawksbill, leatherback and loggerhead sea turtles each year (Lewis et al., 2011), typically from February through to November, and is an integral part of the regions coastal habitat. Playa Norte also receives turtles each year that nested at Tortuguero, although abundance is often less than at TNP (COTERC unpublished data). Herein, we collated available abundance data and poaching records for Playa Norte during three years of survey. We contrasted our results and comment on the status of the future sea turtles that return to nest on Playa Norte.

## **Methodology**

The population survey and anti-poaching methodology used in this study closely followed known protocols conducted by the Sea Turtle Conservancy (STC) in Tortuguero. Methods were approved and licensed by MINEAT. The data gathered annually supports a long-term strategy to monitor sea turtle populations. The surveys involved two types of census, nocturnal and diurnal. Diurnal census' used visual encounter to detect sea turtle tracks, signs, nests and poaching marks. Nocturnal census used visual encounters to detect sea turtles. Detected turtles were carapace measured, marked using individually numbered Inconel or Monel tags and allowed to continue nesting. For data collected from 2010-2011 sea turtle eggs were collected during nesting, counted and translocated to a different nest site nearby to alleviate poaching of the nest. Poaching activity was also monitored and reported to MINEAT on discovery.

Survey data was collected from February to December for 2009, 2010 and 2011. Both censuses began when the first sea turtle tracks were observed, ceased when the last nest recorded hatched, and were conducted on the same 3.12 mile section of Playa Norte. The section surveyed began at the mouth of the Tortuguero River, extending north to a small lagoon (lagoon 4) situated alongside the beach in the BCWR. Data was collected twice and daily during two census walks, one at night (PM census) and one early in the morning (AM census). Night census was conducted for a minimum of four hours. Survey teams comprised of three to six individuals with up to two teams per evening, depending on available personnel. Night census included tagging and egg counting of nesting adult females, together with collection of biometric, temporal and spatial data.

Morning census was performed from sunrise. All tracks from the previous night were recorded and nests checked for signs of poaching. Typical signs of poaching included stick holes, broken eggshells, flies, dog prints and human footprints. Nests with these signs that had a visible open egg chamber were determined to be poached. Nests with these signs but no visible egg chamber were recorded as possessing a high probability of having been poached, but ultimately were regarded as status 'unknown'. Both 'unknown'

and ‘poached’ nests were considered to be somewhat unnatural. Nests with no signs of interference were considered natural and undisturbed.

Both censuses tracked the number of poached or ‘lifted’ and dead turtles together with the number of undisturbed tracks and nests. Tracks were also used to determine the poaching of adult turtles. Turtles were identified as lifted when normal tracks abruptly stopped and were observed to be replaced with human made or ‘fake tracks’ and if drag marks were found due to the turtle being flipped upside down and dragged away. Turtles found deceased were identified by species and the cause of death determined. Deceased turtles were concluded to be poached if the turtle was clearly butchered for meat or the shell was removed. Turtles that were found alive, flipped on their back or tied up, were released and recorded as an attempted poaching incident.

Analysis and investigation of results was performed using summary statistics, ANOVAs and standard tests for normality. A combination of software was used for statistical analysis that included Microsoft Access 2007™, Statistica Ver. 7.0™ and ECOM (Seaby et al. 2007).

## Results

Total presence of 1512 green, 61 hawksbill, 87 Leatherback and zero loggerhead nesting sea turtles were recorded by their tracks by diurnal and nocturnal censuses from 2009-2012. Total number of nests laid for each species varied across years and is shown in Table 1.

Nest Type	Species	2009	2010	2011	Totals
Total Non-Triangulated	<i>Chelonia mydas</i>	170	954	186	1310
	<i>Eretmochelys imbricata</i>	19	13	20	52
	<i>Dermochelys coriacea</i>	*	*	87	87
Total Triangulated	<i>Chelonia mydas</i>	1	169	32	202
	<i>Eretmochelys imbricata</i>	1	4	4	9
	<i>Dermochelys coriacea</i>	*	*	*	0
<b>Totals</b>		191	1140	329	1660

**Table 1.** The total number of nests laid by each species of sea turtle 2009-2011.

\* not included due to small sample size and lack of data.

Natural nests that were successfully triangulated in 2011, and that remained undisturbed from poaching, were recorded and the average hatching success compared with the same nests for 2010 (Table 2). Success rates for green sea turtles showed significant differences ( $F = 5.44$ ,  $P < 0.05$ ) and no significant correlations between 2009, 2010 and 2011 seasons ( $r_s = 0.121$ ,  $P < 0.05$ ), suggesting a possible lower success rate for 2011.

Species	2009	2010	2011
<i>Chelonia mydas</i>	*	41.8	21.2
<i>Eretmochelys imbricata</i>	*	42.8	34.6
<i>Dermochelys coriacea</i>	*	*	*

**Table 2.** Average hatching success rates from triangulated nests for 2009-2011.

\* not included due to small sample size (n=2) and lack of data on those nests.

Although the poaching of sea turtles and the collection of egg clutches is prohibited, the 2011 season resulted in a high percentage of illegal harvest. Of the 329 nests, 131 exhibited signs of human disturbance (Table 3). Seventy-two of the nests had signs of poaching but had no visible egg chamber and thus were recorded as ‘unknown’, but with a high probability of having been poached. A further 44 nests exhibited signs of poaching as well as visible egg chambers, confirming their identity as ‘poached’. Only 34 of the nests were undisturbed and determined to be in ‘natural’ condition. A visual comparison of the 2010 season confirmed a higher percentage of nests with visible signs of poaching (Table 3).

Year	2009			2010			2011		
	Poached Nest (visible egg chamber)	Nest with signs of poaching (no visible egg chamber)	Nest with no signs of poaching	Poached Nest (visible egg chamber)	Nest with signs of poaching (no visible egg chamber)	Nest with no signs of poaching	Poached Nest (visible egg chamber)	Nest with signs of poaching (no visible egg chamber)	Nest with no signs of poaching
<i>Chelonia mydas</i>	39	31	97	133	173	771	44	72	34
<i>Eretmochelys imbricata</i>	5	3	11	3	2	12	0	0	0
<i>Dermochelys coriacea</i>	-	-	-	-	-	-	3	12	38
Total	44	34	108	136	175	783	47	84	72

**Table 3.** Poaching rates of natural nests for Playa Norte 2009-2011.

Poachers also killed adult female sea turtles (Table 4). On three attempted poaching incidents, turtles were found alive, and flipped onto their back with their flippers bound. All of the turtles found like this were green sea turtles. Throughout the season we confirmed a total of eleven adult sea turtles poached from the beach. Of this eleven, five were identified as hawksbill and four as green sea turtles. Species identification could not be performed on the remaining two sea turtles because they were badly butchered, and their tracks had been wiped out, making positive identification difficult. Two green sea turtles were found dead on the beach, possibly butchered for meat.

Year	2009			2010			2011		
	Dead	Poached	Attempted	Dead	Poached	Attempted	Dead	Poached	Attempted
<b>Species</b>									

<i>Chelonia mydas</i>	4	5	1	2	11	2	3	4	3
<i>Eretmochelys imbricata</i>	0	0	0	0	1	0	0	5	0
<i>Dermochelys coriacea</i>	0	0	0	0	0	0	0	0	0
Unknown*	0	0	0	0	4	0	0	2	0

**Table 4.** Numbers of confirmed poached adult female sea turtles for 2009-2011.

## Discussion

The levels of human disturbance on sea turtle nests during the 2011 survey season confirmed high levels of human activity on Playa Norte. It is well known among local people that enforcement of anti-poaching laws on the beach by MINAET officials is sporadic, leading to brazen poachers taking advantage of this throughout the whole of sea turtle nesting season. Survey patrol teams encountered poachers on the beach almost daily on both the AM and PM censuses. During PM census poachers and associates regularly organized a system of communication for alerting each other on the beach. This was achieved by coded flashlight signaling. Poachers would use this system when teams or volunteers and researchers arrived to start patrols and alerted each other as survey teams would pass certain beach marker posts. On multiple occasions, groups of two or three poachers or associates would simply follow each team along the beach either behind them or alongside a footpath. Poachers would patiently wait at an indiscreet distance away from teams of volunteers to enable them to finish working on a nesting female sea turtle. When each team resumed a patrol, the poachers would walk to the nest and dig up the eggs, aware that the research team could do nothing to stop them. The AM census resulted in similar gamesmanship with poachers continuing to dig up nests at dusk and sometimes in broad daylight in front of patrol teams.

We postulate that most of the eggs and turtle meat would have been transferred by foot in bags and rice-sacks to safe-houses along the beach and in or around the nearby village of San Francisco. Turtle produce would possibly have been given away freely, sold, bartered, consumed, stored or transported up river and further inland. In one instance a particularly brazen poacher offered to sell poached eggs to a patrol team for relocation. Regretfully, it was apparent that nesting female sea turtles were just as subject to poaching as nests. A number of adult females were lifted (flipped on their back while alive on the beach).

Conversation with local informants revealed that flipped sea turtles would have had their flippers bound together, creating a rope handle. Females would then be dragged from the beach. Poachers attempted to disguise lifting activities by wiping out the turtle's tracks or creating fake tracks that returned to the ocean. Patrol teams became adjusted to interpreting and recording fabricated tracks. Through the 2011 season, eleven turtles were lifted from the beach, possibly to be killed and two were found dead and stripped of meat *in-situ*. It should be noted that the numbers of lifted sea turtles should be considered conservative. Tracks from turtles flipped beneath the high tide lines were sometimes washed away, making accurate recording impossible. It was also made known to us by informants that one technique of lifting turtles involved tying a rope around a female's flippers, creating a leash, and allowing her to return to the ocean. The turtle was then 'walked' up the beach on a leash to be reeled in and butchered at a desired location in sanctuary from disturbance. Evidence of this activity was concluded from observing multiple poached turtle bodies found near the mouth of the Tortuguero River and further upstream of the

estuary at the village of San Francisco. These areas are both estuarine habitats where sea turtles are seldom observed to be active or nest. On four occasions, patrol teams discovered poachers in the act of dragging adult female sea turtles from the beach. Three of these occasions resulted in the successful rescue and release of these sea turtles. Patrol teams unbound the flippers, flipped the turtle right-side up, and escorted the sea turtles to the ocean.

As a community whose income derives from the tourism industry, particularly sea turtle tourism, it is imperative local law enforcement has a presence within San Francisco and on Playa Norte beach. We believe the individuals responsible for poaching nests are a small sub-section of the community. This is a lamentable situation considering many members of the community are honest workers deriving a primary income from ecotourism. During one incident, a local hotel boat operator telephoned Cano Palma Biological Station (CPBS) to alert the team that a poacher was attempting to take an adult female nesting near the hotel. The boat driver accompanied the turtle the entire time she nested to ensure her survival.

Throughout the 2010-2012 turtle seasons CPBS staff were in receipt of information from informants in the area about poaching activity. This is evidence that suggests that residents are concerned and disapproving of poaching. With a community that is divided between the majority that are invested in conservation, and the few that are not, it is important that the CPBS Playa Norte Marine Turtle Project continues to increase its presence and patrols on the beach. It is also imperative that the local government increases funds and supplies further numbers of park rangers.

As a result of our studies and observations, and with desire to uphold Costa Rica's green ecotourism image, we recommend the following future joint conservation initiatives be continued and funded;

- 1) A fully funded education program for sustainable development and alternative sources of income in the village of San Francisco.
- 2) Improved law enforcement presence provided for the village of San Francisco and Playa Norte.
- 3) Community engagement of local participation in sea turtle monitoring.
- 4) Proposal to create licensed ecotourism on Playa del Norte similar to Tortuguero National Park.

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### **References**

- Chacón, D. 2002. Assessment about the trade of sea turtles and their products in the Central American isthmus. Red Regional para la Conservación de last Tortugas Marinas en Centroamérica. San José, Costa Rica.
- Carr, A.F., Carr, M.H. and Meylan, A.B. 1978. The ecology and migrations of sea turtles, 7. The Western Caribbean green turtle colony. *Bull. Amer. Mus. Nat. Hist.* 162: 1-46.

Lewis, T.R. 2003. Nesting of green sea turtles (*Chelonia mydas*) on Tortuguero beach, Costa Rica. *The Natterjack* 100/101: 3-7.

Lewis, T.R., Grant, P.B.C., Feltham, J., Filipiak, D., Mason, T., Figueroa, A. and Mayne, G. (2011). Herpetofauna found at Cano Palma Biological Station, Cerro Mountain and Tortuguero area. Canadian Organisation for Tropical Education and Rainforest Conservation. 8 pp.

Rieser, A. (2012). *The Case of the Green Turtle: An Uncensored History of a Conservation Icon*. Baltimore: The Johns Hopkins University Press. 352 pp.

Seaby, R.M.H., Henderson, P.A. and Prendergast, J.R. 2004. Environmental Community Analysis 2.0. Pisces Conservation Ltd, Lymington.

Seminoff, J., 2002. IUCN Red list global status assessment, green turtle *Chelonia mydas*. IUCN Marine Turtle Specialist Group Review, p 42.

Seminoff, J.A. (Southwest Fisheries Science Center, U.S.) 2004. *Chelonia mydas*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded 31 January 2013.

Troëng, S. 1998. Poaching threatens the green turtle rookery at Tortuguero, Costa Rica. *Marine Turtle Newsletter* 79:11–12

Troëng, S., S.A. Gonzales-Rankin. 2000. Illegal harvesting of nesting green turtles *Chelonia mydas* in Tortuguero National Park, Costa Rica. In: Abreu-Grobois FA, Briseno- Duenas R, Marquez R, Sarti L (eds) Proc. 18th Int. Sea Turtle Symp. US Dept. of Commerce. NOAA Memo NMFS-SEFSC-436, 30–31.

Troëng, S., and C. Drews. 2004. Money talks: Economic aspects of marine turtle use and conservation. Gland, Switzerland: WWF-International.

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