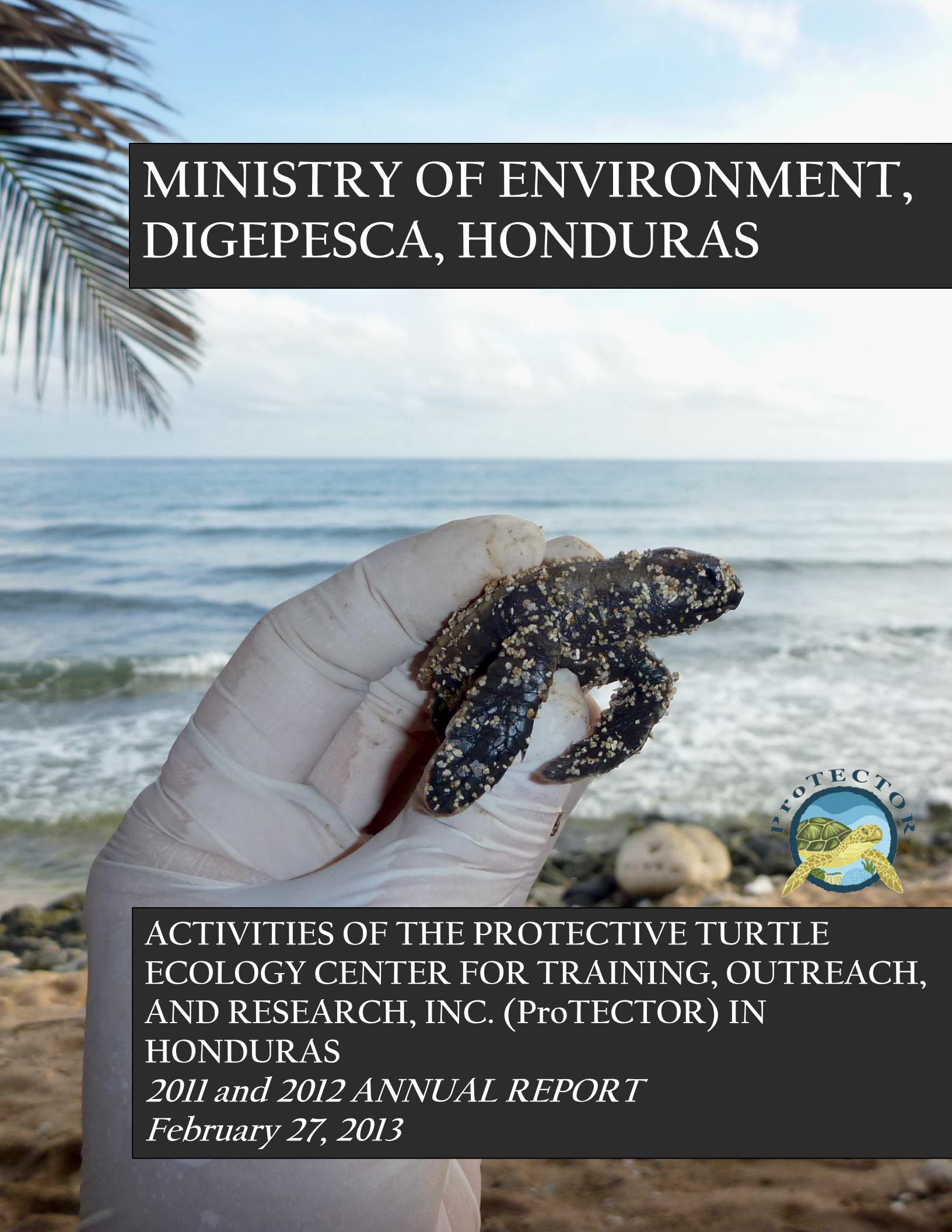

# MINISTRY OF ENVIRONMENT, DIGEPESCA, HONDURAS

## ACTIVITIES OF THE PROTECTIVE TURTLE ECOLOGY CENTER FOR TRAINING, OUTREACH, AND RESEARCH, INC. (ProTECTOR) IN HONDURAS

*2011 and 2012 ANNUAL REPORT*

*February 27, 2013*

# ACTIVITIES OF THE PROTECTIVE TURTLE ECOLOGY CENTER FOR TRAINING, OUTREACH, AND RESEARCH, INC (ProTECTOR) IN HONDURAS
## *ANNUAL REPORT OF THE 2011 and 2012 SEASONS*


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# PREFACE

**This report represents the ongoing work of the Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR) in Honduras. The report covers activities of ProTECTOR during the 2011 and 2012 calendar years, and is provided in partial fulfillment of the research permit agreements provided to ProTECTOR by DIGEPESCA.**

# ACKNOWLEDGEMENTS


**ProTECTOR recognizes that without the financial assistance of the Department of Earth and Biological Sciences (Loma Linda University), these ongoing projects could not take place. The Global Health Institute (LLU and the Students for International Mission Service (LLU) also supported various aspects of our community outreach. We are grateful to Loma Linda University graduate students Noemi Duran, Noel Wingers, and Lindsey Eggers Damazo for directing field studies, and to ProTECTOR Interns Amy Tan and Robyn Reeve, as well as SURP Student Ariana Cunningham, and ProTECTOR Volunteers Ken Lindsay, Terri Eggers, and Dustin Baumbach for all their hard work on field projects. Jason Damazo assisted with maps and beach plot figures. We also acknowledge students from the National Autonomous University of Honduras (UNAH) that were involved in the collection of some data provided in this report as part of their practical requirements for graduation. Some projects were facilitated, in large part, by Snr. Henrique Vihil and the community of El Venado who have formed a partnership with ProTECTOR to increase opportunities for continued investigations in the South Coast in the coming seasons. We are also indebted to the community of Punta Ratón and the Municipality of Marcovia for their participation in these sea turtle conservation efforts. We thank Noemi Duran for assistance in organizing and tabulating data collected from this and past years. The Reef House Resort, Fantasy Island Resort, CocoView Resort, their respective Dive Masters, and guests of all three resorts have been continuing partners in the conservation and research efforts on Roatan. We thank Angela Randazzo for directing the field work at Cuero y Salado Wildlife Refuge, along with the communities of Salado Bar, Orotina, La Rosita, and Boca Cerrada for their participation in the study there. We are grateful to Snr. Jose "Pepe" Herrero for his continued interest and support of the work of ProTECTOR. In addition, the Foundation for Cuero y Salado (FUCSA), especially Ana Paz and Ana Padilla, and the Bay Islands Conservation Association (BICA) in Utila, especially Pamela Ortega, Alba Giesella "Chel" Morales Rivera, Gene Gerald Jackson, Patricia Steffan, and Jenny Luque, have all been excellent allies in the efforts to further conservation in Honduras. These studies were conducted under approval from the Loma Linda University Institutional Animal Care and Use Committee (IACUC) (Protocol # 89029), and the Loma Linda University Institutional Review Board (IRB) (Protocol # 5120308 and # 5120097), and are in compliance with United States and Honduran law.**


**February 27, 2013**

**Cover image: This Hawksbill hatchling represents the potential for increasing the number of successful hatchlings and recovery of hawksbill populations throughout Honduras. Photo: Terri Eggers.**

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# INTRODUCTION AND BACKGROUND

A comprehensive background regarding previous work undertaken by ProTECTOR on the Hawksbill (*Eretmochelys imbricata*) and Olive Ridley (*Lepidochelys olivacea*) sea turtles, and the need for continuing research on their status and plight in Honduran waters, has been provided in previous reports to DIGEPESCA (Dunbar, 2006; Dunbar and Berube, 2008; Dunbar and Salinas, 2008). Those reports provided details on methods carried out by ProTECTOR under SAG permits **#DGPA/005/2006; DGPA/245/2006; DGPA/5428/2007, DGPA/707/2009, and SAG/251/2010**, and provided study results obtained up to November, 2010.

We provide the following report on the activities of ProTECTOR between January, 2011 and November, 2012, combining two years of activities into the current report. This report provides information on all ProTECTOR projects throughout Honduras, including the Bay Islands, North Coast and South Coast. These studies continue with the aim of tagging and tracking juvenile hawksbills, nesting hawksbills, and nesting Olive Ridley sea turtles in our study sites, as well as community outreach and development of additional sea turtle research and conservation activities. Over the past two seasons, we have continued to further develop strong research, conservation, and community development ties with the community of El Venado. Developments within the community of Punta Ratón have been more difficult, with the loss of the turtle center and the continuing issue of intra-community rivalries and lack of community direction.

In addition to the continuing work of ProTECTOR during the veda period, much work has been accomplished among many of the coastal communities of the Gulf of Fonseca in an effort to assess the distribution of nesting and in-water sightings of Hawksbills in this region of Honduras. This information has provided a basis from which new investigations can be launched into nesting beach monitoring, hatchery development, hawksbill home range and migrations studies, and population genetics analyses.

In addition to the work on the South Coast, several projects were undertaken along the North Coast, with the addition of a new community survey and Hawksbill monitoring project funded

by the United States Fish and Wildlife Service (USFWS), and carried out in collaboration with the Bay Islands Conservation Association (BICA – Utila). In conjunction with the Hawksbill project in Utila, we also carried out a community survey and Hawksbill monitoring project at the Cuaero y Salado Wildlife Refuge, also funded by USFWS. This project was carried out in collaboration with the Foundation Cuero y Salado (FUCSA).

This report has been furnished to all appropriate Secretariats, Ministries, and Departments of the Honduran Government, including SAG, DIGEPESCA, SERNA, and DiBio, in both Spanish and English languages. Data from this report may be included in the annual report of Honduras to the Inter- American Convention for the Protection and Conservation of Sea Turtles (IAC) with appropriate credit cited.

# ADDITIONAL METHODS

Only additional methods to those supplied in previous reports are provided here.

## Bay Islands

### *Utila 2011*

We began work with BICA-Utila in developing a standardized Hawksbill monitoring protocol for the areas of Pumpkin Hill Beach and Sandy Cay (Figure 1) in June, 2011. This entailed surveys of Sandy Cay throughout the night on three separate occasions. A workshop was conducted for the BICA-Utila staff, interested NGO personnel, and community members on basic sea turtle biology, monitoring, data collection, and flipper tagging. In addition, we received an adult Green (*Chelonia mydas*) turtle that had recently died offshore. The turtle was brought to the veterinary laboratory of Dr. Loretta Potts, where we conducted a full necropsy on the specimen to establish any obvious causes of death.

### *Utila 2012*

We continued to interview community members on Utila proper, and throughout Los Cayitos, gathering sightings data on all species of sea turtles seen in the water and on the beaches around Utila. For the first time, standardized research was undertaken focusing on the nesting beach at Pumpkin Hill, on the northeast area of Utila. The research was undertaken by Loma Linda University graduate student, Lindsey Eggers Damazo. This work focused on Hawksbill nesting ecology. She undertook data collection in the following areas:

- ambient temperatures of nests and pseudo-nests (controls) during incubation period
- intra-nesting period returns of flipper-tagged individuals
- satellite telemetry
- sex ratios of hatchlings through blood sampling
- beach profiling and vegetation characterizations

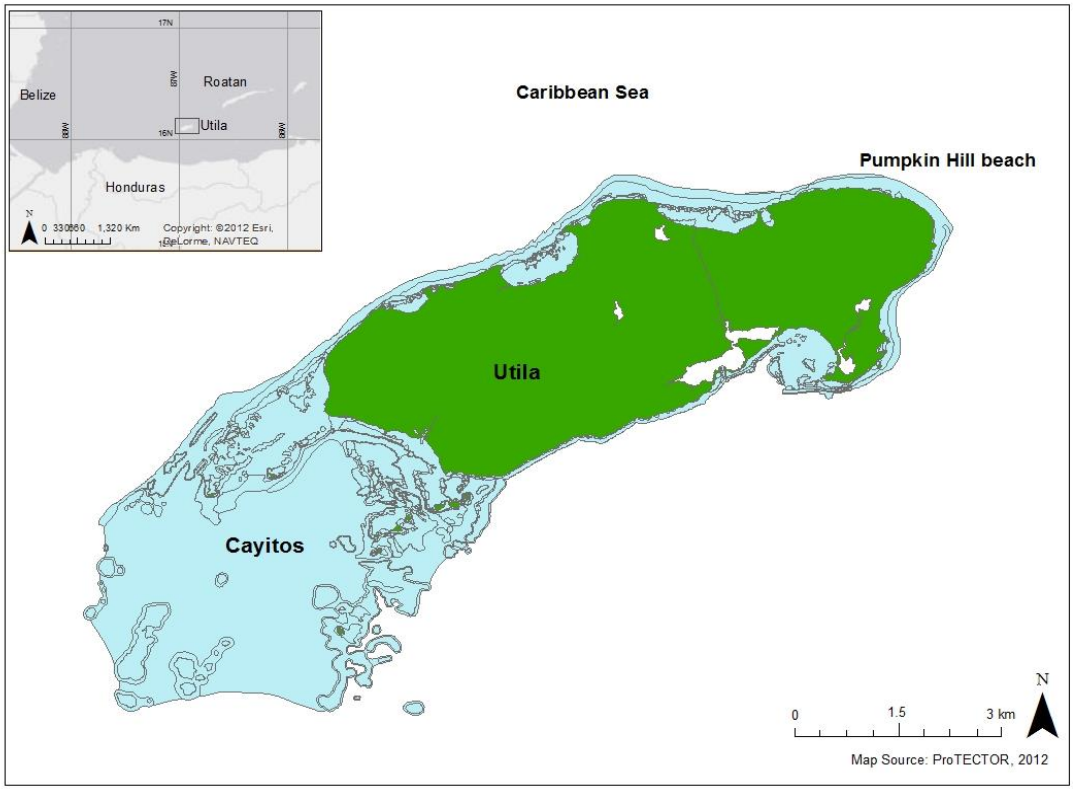


**Figure 1.** Map of Utila and Los Cayitos. Inset map showing the north coast of Honduras and the region of the Bay Islands.

In addition, we began a study to quantify beach plastic pollution on the nesting beach at Pumpkin Hill (Figure 2). This required the collection materials from random quadrats thrown onto the "wrackline" of seaweed gathered at the high tide line (Figure 3). Samples were then separated according to plastic type, counted and weighed to calculate a relative proportion of each plastic type.

**Figure 2.** A "high" pollution section of Pumpkin Hill Beach in which many types of plastic materials collect together to produce a potentially hazardous area of nesting beach for both adults and hatchlings. Photo: Lindsey Eggers Damazo, 2012

**Figure 3.** A random quadrat thrown onto the "wrackline" of seaweed and plastic pollution to estimate the types and relative abundances of plastics on the beach at Pumpkin Hill, Utila. Photo: Lindsey Eggers Damazo, 2012

***Roatán 2011***

In 2011, we continued work on the island of Roatán in the area of the Reef House Resort, CocoView Resort and Fantasy Island Resort along the south coast of the island. From June – September, we undertook hand captures of adult and juvenile Hawksbills in the area of CoCo View and Fantasy Island Resorts during sport diving events. Turtles were brought on board, and transported to the resorts where they were measured, flipper tagged on the right front and right rear flippers, and had skin tissue sampled for genetic analyses, as per protocols for previous studies in the Bay Islands (Dunbar, 2006; Dunbar and Berube, 2008; Dunbar et al., 2008). We also undertook reef transects in the area of dive sites shared by the two resorts in order to assess habitat suitability for resident or transient Hawksbills. Additionally, some turtles were fitted with radio and sonic transmitters to record locations for estimating home ranges.

***Roatán 2012***

We were unable to undertake any tagging in Roatán during 2012 due to logistical constraints and due to a change in management at the Reef House Resort that did not facilitate our work there during the regular summer season of turtle research.

***Guanaja 2011***

From October 2 – 5, a scouting team met with local community members to undertake casual interviews to determine where sea turtles have been and are currently being sighted around Guanaja. Community members were asked where they sighted turtles both in the water and on the beaches. We visited sites around the main island and throughout the nearby cays. We also attended a regional meeting and presented information on marine biodiversity and marine protected areas. We interviewed the owners of a private cay nearby Banaca Cay, to ascertain if regular nesting events were taking place on the Cay.

***Guanaja 2012***

We were unable to return to Guanaja in 2012. However, we had provided data sheets to the owners of the Cay for them to record turtle nesting and hatching events during the 2012 nesting season. We also provided materials for them to be able to identify the species of turtles nesting on the Cay.

## North Coast

### *Cuero y Salado Wildlife Refuge 2011*

In July 2011 we began the development of a survey and beach monitoring study for Cuero y Salado Wildlife Refuge (CSWR) (Figure 4) with funding support of the U. S. Fish and Wildlife Service – Marine Turtle Conservation Fund (USFWS-MTCF). Using a questionnaire survey we had previously utilized on the south coast of Honduras, we refined the questions and data collection to be used both at the CSWR and on Utila in a related study. Funds were received from USFWS too late in the season to launch the training and beach monitoring program for the 2011 nesting season. Instead, we focused on the development of the survey tool, and in developing meeting and community member selection protocols for the 2012 season.

In October 2011, we recruited Angela Randazzo as the Project Field Assistant for CSWR and prepared her to begin her work in the refuge beginning in January, 2012. Ms. Randazzo received additional training in surveying and the survey tool, as further development of the survey continued through 2011.

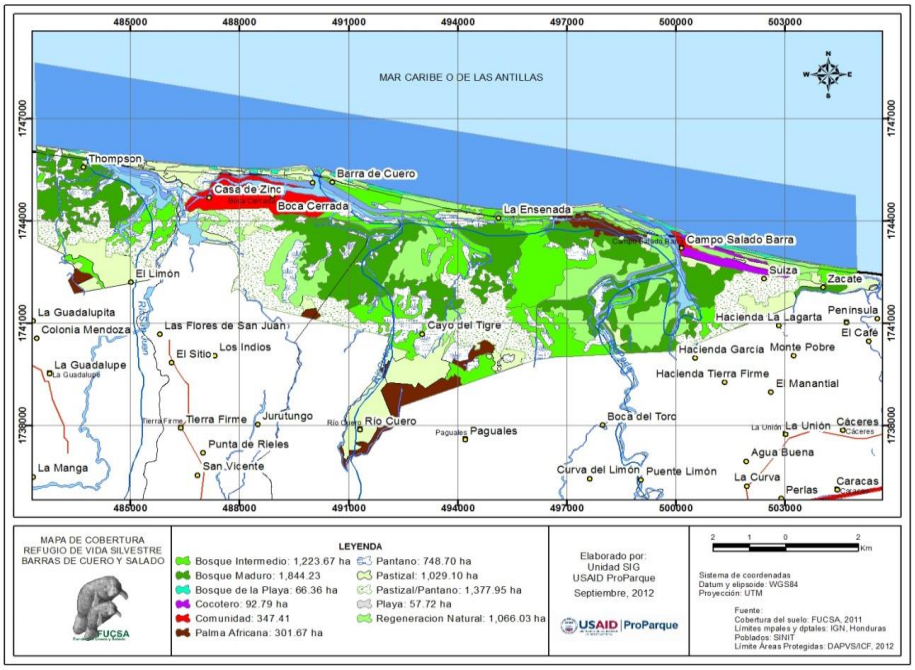


**Figure 4.** Map of the terrestrial use of CSWR, as well as the location of its river system and its position with respect to different communities in the department of Atlantida and the Caribbean Sea. Map source: USAID, ProParque, and FUCSA (2012).

### *Cuero y Salado Wildlife Refuge, 2012*

Survey interviews with community members at CSWR were conducted from February to April, 2012. Subsequent to interviews, we conducted in-water point monitoring and nesting beach monitoring from June 27 to August 26. Due to expense, in-water beach monitoring was limited to five weeks between the end of June and the end of August, and limited to irregular times when trained fishers were able to collect data while undertaking artisanal fishing activities.

Beach monitoring consisted of walking the beach to the East (East Beach) or West (West Beach) of the beach entrance at Salado Bar during the overnight hours from 6:00pm to 4:00am. Two teams undertook the monitoring of the same side of the beach (East or West), with one team monitoring the far portion, while the other team monitored the near portion, with each team covering an approximately 2.5 km section of beach. Night monitoring also included capacity building and training of accompanying military and refuge guard personnel, as well as young people from the community of Salado Bar. Additionally, beach monitoring also took place on alternate days to night monitoring, to search for the presence of tracks left by either nesting females, or hatchlings along the beach. We recorded the presence of turtles, turtle tracks, evidence of nests, and turtle morphometrics (curved and straight carapace lengths and width), as well as latitude and longitude of nests or turtle sightings, along with date, time, flipper tag number and data recording team. Environmental conditions, such as sea state, rain or storm conditions, and approximate temperature, were also recorded on encountering a turtle or nest.

Surveys were also conducted to gather data on beach slope, condition, and vegetation cover of both the East and West sectors of the beach. We used the polar line level method described by Mossa (1998) to survey the height dynamics of the beach, then plotted these data in a grid system using MatLab software (MathWorks Inc.; Natick, MA) to devise a profile of the beach. Digital photographs were taken of each plant species for identification. Further detailed methods can be found in Dunbar, et al. (2013).

## South Coast

### *Punta Ratón 2011*

In 2011, we continued to undertake flipper tagging at Punta Ratón, along with the collection of data on hatchling dynamics on release from the hatchery beach. Tagging and tissue sampling followed procedures described previously in other reports (Dunbar et al., 2009; Dunbar et al., 2010; Dunbar et al., 2011).

In addition, we undertook studies on predation rates of hatchlings released from the beach during the night and during the day. Hatchlings were followed by boat and sighted with the use of a modified Witherington float (with a glow stick at night, or a yellow balloon during the day) for up to 6 hours. A GPS was used to record the location of the hatchling every 5 minutes. These points, and any attempted predation events were recorded and plotted in a GIS.

A preliminary study was undertaken examining swimming behavior of hatchlings at night compared with swimming behavior during the day, by releasing hatchlings with modified Witherington floats, following hatchling movements, and recording hatchling position in the water over periods of up to 8 hours. Hatchlings were released from different positions along the length of beach. These data were recorded with a GPS and plotted in a GIS to identify trajectories of hatchlings as they swam away from the release beach.

### *Punta Ratón 2012*

In 2012, we continued the studies begun in 2011 with both nesting adults and hatchlings. During the nesting and hatching seasons from August to November, we carried out replicated experiments on hatchlings to determine the impacts of tides on hatchlings released from both the site of the hatchery and from the area where turtles laid most of the nests on the beach during 2012. We also assessed hatchling swimming pattern and hatchling predation through focal follows over different tidal regimes and over periods of up to 12 hours at a time. Hatchlings were released with a modified Witherington float and followed by boat from a distance of 50 – 80 meters. At 5 minute intervals, the boat was brought to the location of the hatchling (indicated by either the glow stick (night), or the balloon (day)), and a location was recorded with a GPS.

In addition, we began tracking nesting females to determine inter-nesting movements of select females by using cell phone-based data loggers (Global Tracking Group, Baltimore, MD). Data loggers were placed in small buoys tethered to individual turtles with fishing line and tracked in real-time. We also collected blood and skin samples from as many nesting adults as possible.

***El Venado 2011***

At El Venado, we expanded our flipper tagging efforts for *Lepidochelys olivacea* to extend through the entire 25 day period of the veda from September 1 – 25. During this period, we collected measurements (SCL, SCW, CCL, CCW) of each female encountered and recorded location (GPS), number of eggs deposited, date, time, and whether there were previous tagging records or indications of previous flipper tags. Work was conducted with the collaboration of the community of El Venado, who collected eggs during the veda to place into the hatchery at the Turtle Conservation Center.

In addition, we collected blood and skin samples from as many nesting females as possible to later be used for population genetic analyses. These samples were stored in cell lysis buffer and brought back to the United States under appropriate CITES export and import permits.

As part of our continuing effort to determine migratory pathways of sea turtles to and from Honduras, we fitted two nesting Olive ridleys ("Tenita" and "Brenda") with Spot 5 satellite transmitters and released them from the main beach at El Venado. These turtles were then tracked by satellite and their movements plotted by the Satellite Tracking and Analysis Tool (STAT), which can be found at: http://www.seaturtle.org/tracking/ .

***El Venado 2012***

We continued to work alongside the community of El Venado in developing infrastructure and providing social assistance to the community in the context of sea turtle conservation. This effort led to the partnership of ProTECTOR with the Global Health Institute (GHI) at LLU and the Students for International Mission Service (SIMS) at LLU, and culminated in the first SIMS trip from LLU to the south coast of Honduras.

We continued to flipper tag nesting Olive Ridleys in the area of El Venado throughout the veda period, including the collection of additional blood samples for genetic analyses, and the launching of additional satellite tags on "Reina-Christiana," "Sabine," and "Loanis."

### *East Pacific Hawksbills 2011*

A full assessment for the presence of Eastern Pacific Hawksbills along the south coast of Honduras was undertaken in 2011 in collaboration with the Eastern Pacific Hawksbill Initiative (ICAPO). We surveyed people in communities throughout the Gulf region of Honduras (Figure 5) to determine where fishers and community members were sighting turtles on the beaches, as well as at sea. We recorded anecdotes from interview participants regarding interactions with Hawksbills, perceived nesting season, threats, and directions for conservation efforts for this species in the region. More information can be found on the methods for this survey work in Dunbar et al. (2012).


**Figure 5.** Map of the Gulf of Fonseca showing the coastal area of Honduras, and the five zones in which communities were visited to conduct interviews with fishers, community members, and shellfish harvesters.

# OVERALL RESULTS

## Bay Islands 2011

In 2011, our research activities included all three of the main Bay Islands (Utila, Roatán, and Guanaja). These activities encompassed informal surveys among community members to locate areas where turtles have been reported to have nested in the past 3 – 5 years, flipper tagging intentionally and incidentally caught turtles, and flipper tagging nesting turtles on monitored nesting beaches.

### *Utila*

ProTECTOR has been working in collaboration with the Bay Islands Conservation Association (BICA) Utila since 2009 to develop a nesting beach monitoring program for the main island and nearby cays. On July 11 and 12, 2011, Stephen G. Dunbar carried out a two-day training session with BICA Utila staff, as well as staff and volunteers from the Utila Iguana Station, the Utila Whale Shark Research Project, community fishers, and a number of local dive operators (Figure 6).


**Figure 6.** A sea turtle tagging and monitoring workshop for community members, volunteers and NGO staff at BICA Utila headquarters.

In July, a subadult Green turtle (*Chelonia mydas*) was discovered floating at sea, just off shore along the southwestern end of the island. When brought ashore, it was already determined to be dead, and was subsequently placed on ice over the following two days, as there was no facility for cold storage of the animal until arrangements could be made to undertake a necropsy. On July 11, the turtle was brought to the BICA facility and the veterinary laboratory of Dr. Loretta Potts. Dunbar performed a necropsy on the turtle with assistance from Dr. Potts, Pamela Ortega, and Angela Randazzo (Figure 7A). We found no obstructions in the respiratory or digestive tracts, with fresh sea grass (*Thalassia testudinum*) and unidentified brown algae (Figure 7B) in both the stomach and in the anterior regions of the small intestine. In the posterior region, we found freshly digested sea grass (Figure 7C) that had not decomposed since time of death.


**Figure 7.** Necropsy of a subadult *C. mydas* at the veterinarian laboratory of Dr. Loretta Pots. Dr. Stephen Dunbar removes the plastron while Pamela Ortega (far left) and Dr. Potts (far right) assist (A). We found undigested unidentified brown algae in the upper portion of the small intestine (B), while freshly digested sea grass was present in the lower segments of the large intestine (C).

Throughout the nesting season, staff from BICA Utila, in conjunction with ProTECTOR, continued to survey the beaches of Utila and nearby cays for Hawksbill nesting activity (Figure 8). We also began interviews with local community members regarding their knowledge of in-water sightings and nesting activities for Hawksbills and other species in the vicinity.

**Figure 8.** A nesting *E. imbricata* along the north coast of Utila provided confirmation of nesting in this area.

In July and August, 2011, the project team on Utila confirmed 10 nesting events, the majority of which were on a 50 m strip of the 1.5 km beach at Pumpkin Hill. A total of nine nests were also confirmed on this beach, with data collected on hatching success rates and the fate of all non-successful eggs. In collaboration with BICA Utila, we tagged three nesting Hawksbills late in the season with Inconel flipper tags on the right front and right rear flippers. We cannot confirm that the 10 nesting events through the season were 10 individual Hawksbills. It is likely that they were not, but that some individuals nested (or made nesting attempts) on more than one occasion.

***Roatán***

Work on Roatán continued with Loma Linda University graduate student, Noel Wingers. Wingers's work consisted of hand capturing juvenile and adult hawksbills in the area of Fantasy Island and CocoView Resorts in order to flipper tag and count the number of juvenile and adult turtles in this area. Turtles were captured by hand during SCUBA diving surveys (Figure 9). After collecting morphometric data (Figure 10) and flipper tagging, skin samples were taken for genetic analysis from the neck of each individual, and turtles were released back at the sight where they were captured. Wingers also undertook habitat surveys of the area, quantifying prey items and habitat suitability in the areas where both resorts undertake diving activities. This work is the field research portion of Noel's thesis work, and is currently being analyzed.

**Figure 9.** Juvenile and subadult *E. imbricata* were captured by hand and brought to the surface to be weighed, measured, and sampled for skin tissue during the study.

**Figure 10.** Noel Wingers measures a juvenile *E. imbricata* on board a dive boat shortly after hand capture at a dive site off the south coast of Roatán, while Christi Linardich records the data.

### *Guanaja*

The owners of a small, privately-owned cay were able to provide us with evidence that turtle nesting is taking place on the private cay on a regular basis. We confirmed that nests had been laid on the cay and turtles had hatched in 2010. However, the owners were unable to confirm the species identity of turtles nesting on the cay.

## South Coast 2011

### *Punta Ratón*

During 2011, we were able to collect data on 122 female *L. olivacea* nesting at Punta Ratón. Measurements of Curved Carapace Length notch to notch ($CCL_{n-n)}$ and Straight Carapace Length notch to notch (SCLn-n) for these females are shown in Figure 11. The number of measured females was 114 for CCL and 70 for SCL. The mean CCL was 65.11 ± 0.32 cm, with a range of 58.7 – 72.0 cm. The mean SCL was 60.96 ± 0.31, with a range of 54.7 – 65.9. A comparison of carapace measurements over the last five nesting seasons is shown in Table 4 A comparison of CCL across years is shown in Figure 12.

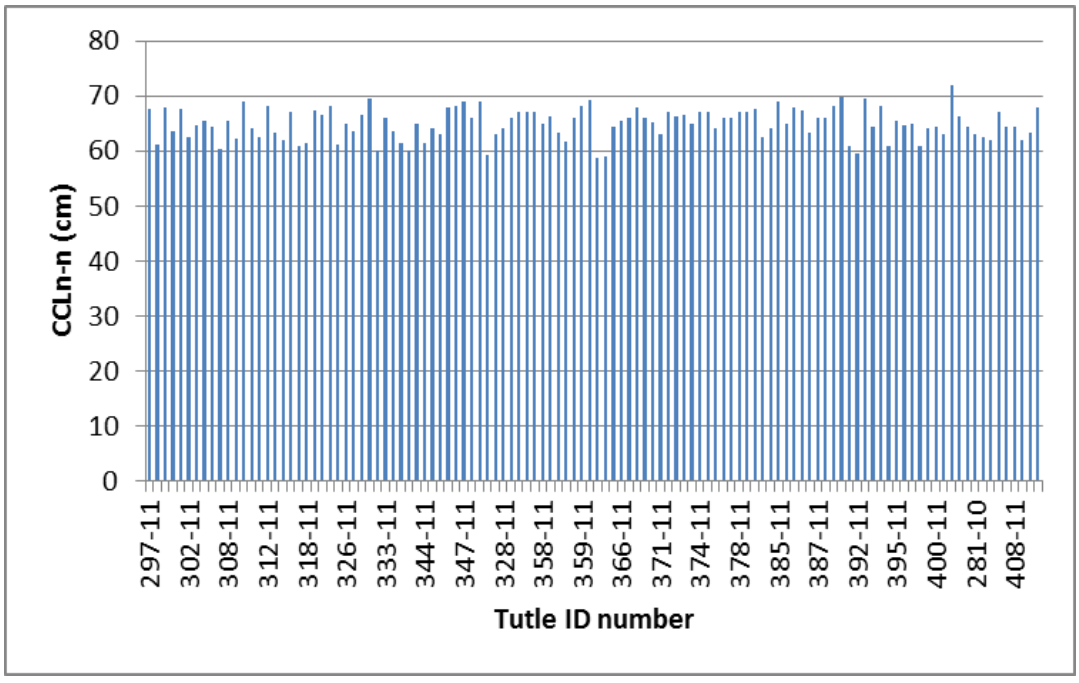


**Figure 11.** Curved carapace length (notch to notch) for nesting *L. olivacea* measured during the 2011 nesting season.

**Table 4.** Mean values for CCLn-n and SCLn-n for *L.olivacea* female turtles nesting at Punta Ratón during nesting seasons from 2007 to 2011.

| Nesting Season | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| **Mean CCLn-n (cm)** | 65.10 ± 0.57 | 65.97 ± 0.27 | 65.85 ± 0.38 | 65.04 ± 0.35 | 65.11 ± 0.32 |
| **Mean SCLn-n (cm)** | 59.02 ± 1.01 | 61.32 ± 0.25 | 61.62 ± 0.36 | 60.89 ± 0.34 | 60.96 ± 0.31 |

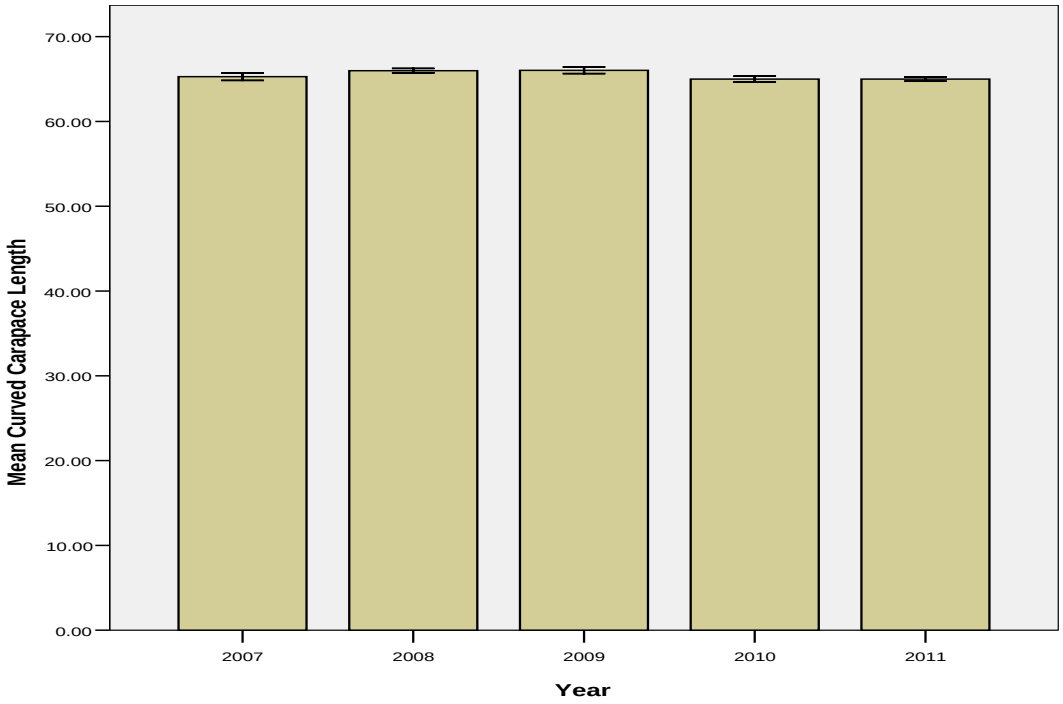


**Figure 12.** Comparison of Curved Carapace Length ($CCL_{n-n}$) of turtles measured during the 2007-2011 nesting seasons

During the 2011 nesting season 152 emergences were monitored, 130 of which ended in successful nesting (Table 5). We counted the number of eggs of 127 of these nests (Figure 13). The mean value for egg number was 90.08 ± 2.04, with a range of 11 – 139. A comparison of the mean number of eggs per nest over the last five nesting seasons is shown in Table 6 and Figure 14.

**Table 5.** Nesting results for female emergences during the 2011 nesting season.

| Total emergences | True nest | U-turn | False crawl | No data |
|---|---|---|---|---|
| **152** | 130<br>85.5 % | 5<br>3.3 % | 16<br>10.5 % | 1<br>0.7 % |

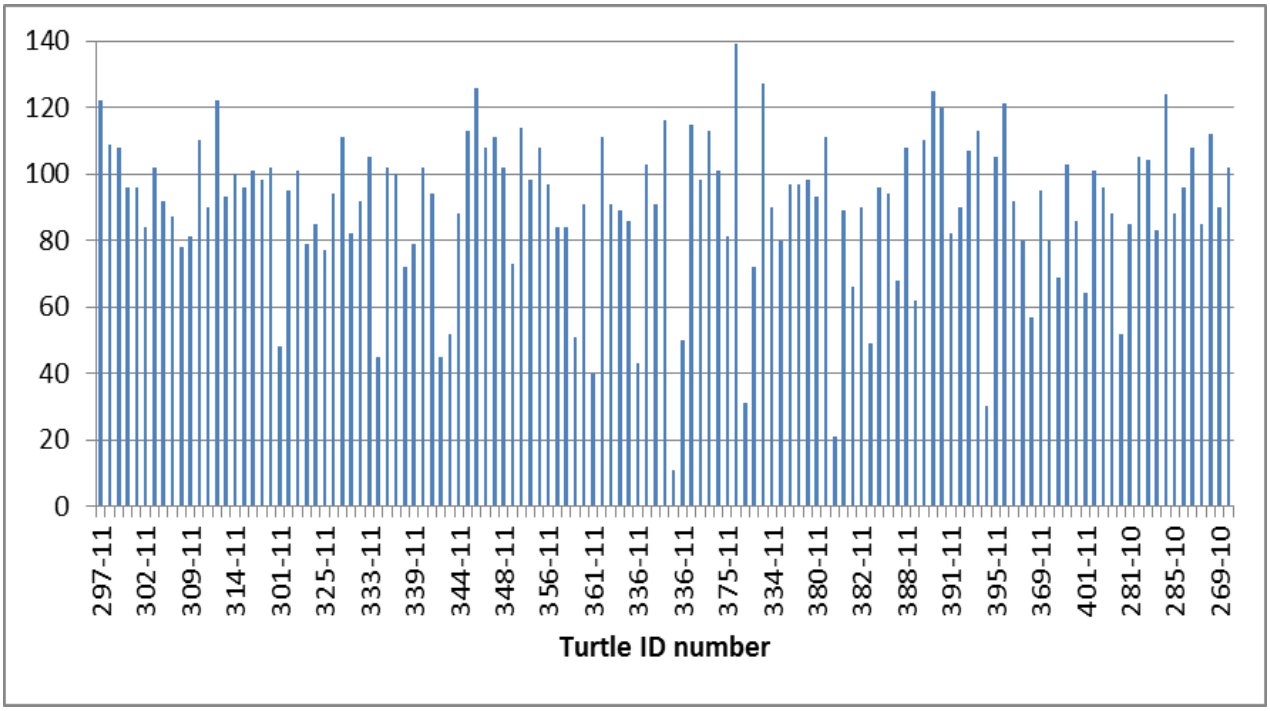


**Figure 13.** Number of eggs of the 127 nests monitored at Punta Ratón during the 2011 nesting season.

**Table 6.** Mean values for number of eggs of nests per nest deposited at Punta Ratón from 2007-2011 nesting seasons.

| Nesting Season | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| **Mean Number of Eggs** | 77.64 ± 3.32 | 87.25 ± 2.23 | 89.28 ± 2.96 | 93.42 ± 2.32 | 90.08 ± 2.04 |

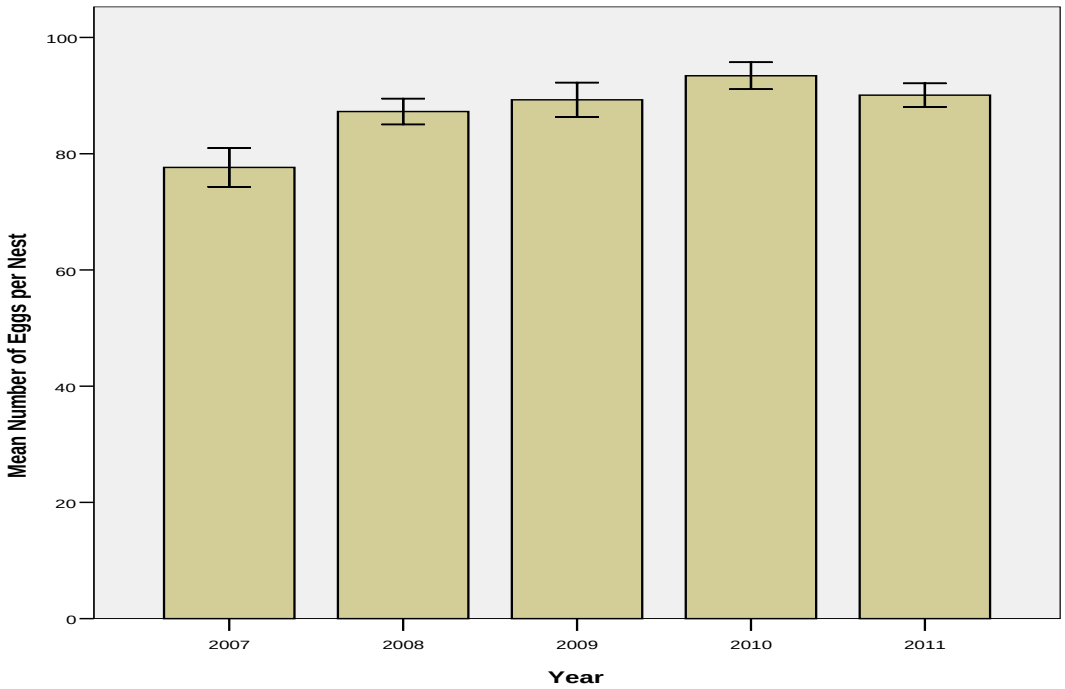


**Figure 14.** Comparison of number of eggs per nests deposited at Punta Ratón during the 2007-2011 nesting seasons.

Regarding inter-season remigration, 14 females were found with flipper tags from previous seasons, one of them from 2008 and the remaining 13 from 2010. Detailed information about these turtles is provided in Table 7 and Figure 15.

**Table 7 .** Dates of first 2011 emergence and previous emergence for inter-season remigrants.

| Turtle ID number | 2011 First emergence | Previous emergence | Interemergence interval (days) |
|---|---|---|---|
| 119-08 | 9/10/2011 | 9/23/2008 | 1082 |
| 216-10 | 9/6/2011 | 9/19/2010 | 352 |
| 228-10 | 9/23/2011 | 9/14/2010 | 374 |
| 254-10 | 9/18/2011 | 10/22/2010 | 331 |
| 260-10 | 9/5/2011 | 10/6/2010 | 334 |
| 265-10 | 9/10/2011 | 10/7/2010 | 338 |
| 269-10 | 9/30/2011 | 10/8/2010 | 357 |
| 270-10 | 9/13/2011 | 10/10/2010 | 338 |
| 274-10 | 9/26/2011 | 10/11/2010 | 350 |
| 276-10 | 9/6/2011 | 10/13/2010 | 328 |
| 280-10 | 9/16/2011 | 10/13/2010 | 338 |
| 281-10 | 9/22/2011 | 10/13/2010 | 344 |
| 285-10 | 9/27/2011 | 10/15/2010 | 347 |
| 291-10 | 9/24/2011 | 10/20/2010 | 339 |

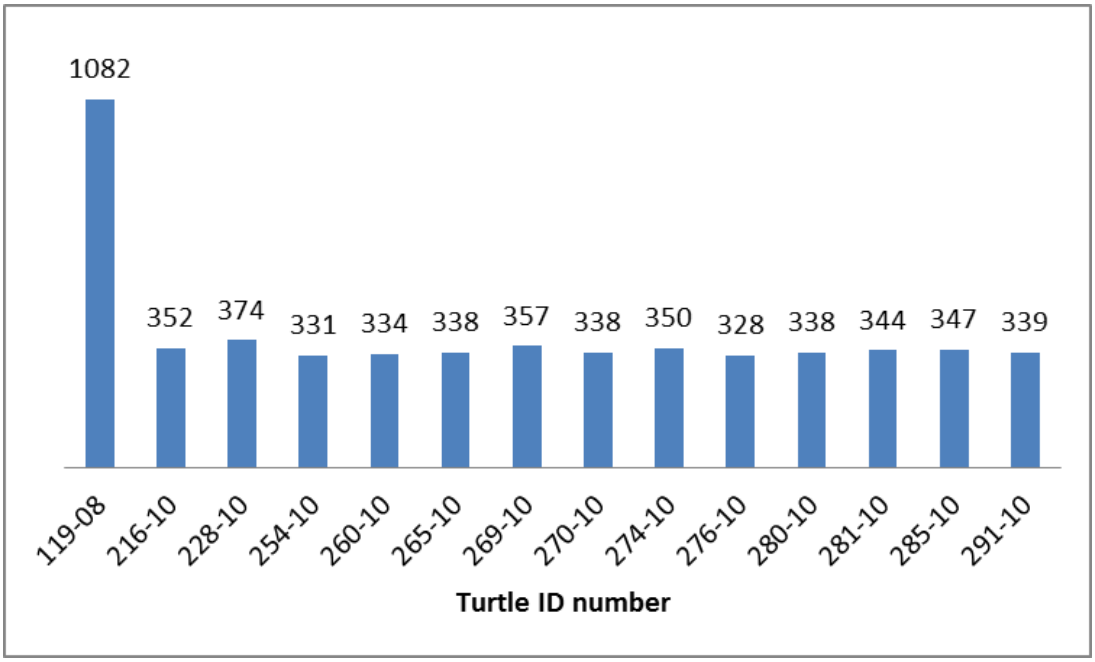


**Figure 15.** Inter-emergece intervals (days) for 2011 inter-season remigrants.

***El Venado***

During the 2011 nesting season we monitored 14 females that nested at El Venado beaches. Measurements of CCLn-n and SCLn-n are shown in Figure 16. The mean value for CCLn-n was 65.52 ± 0.95 cm, with a range of 61.0 – 69.1 cm. The mean value for SCLn-n was 61.24 ± 0.99 cm, with a range of 59.3 – 69.0 cm. Table 8 shows a comparison of measurements between the 2010 and 2011 seasons. Figure 17 shows a comparison of CCL between seasons.

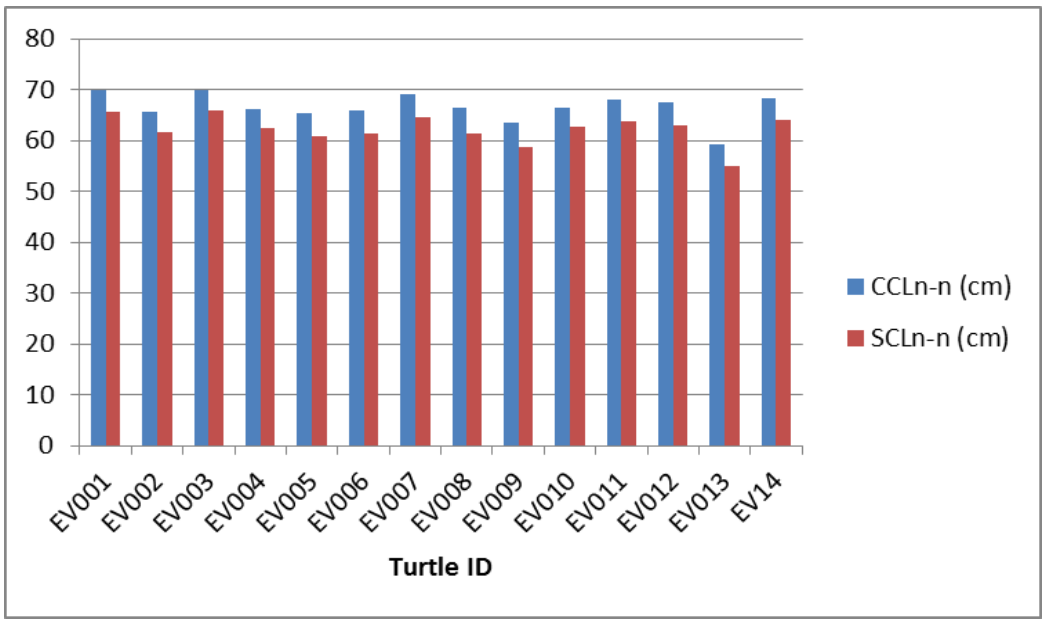


**Figure 16.** Curved Carapace Length and Straight Carapace Length (notch to notch) of the El Venado nesting females.

**Table 8.** Mean values for CCLn-n and SCLn-n for *L.olivacea* female turtles nesting at El Venado during nesting seasons 2010 and 2011.

| Nesting Season | 2010 | 2011 |
|---|---|---|
| **Mean CCLn-n (cm)** | 65.26 ± 1.01 | 65.52 ± 0.95 |
| **Mean SCLn-n (cm)** | 60.99 ± 1.31 | 61.24 ± 0.99 |

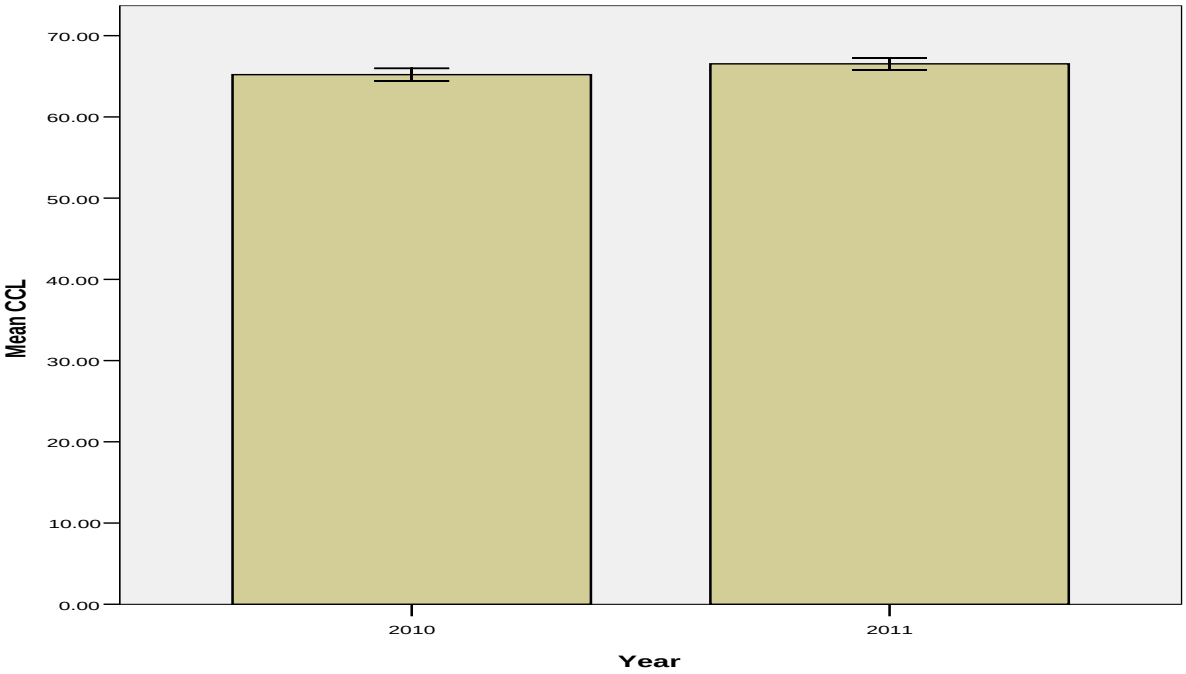


**Figure 17.** Comparison of Curved Carapace Length ($CCL_{n-n}$) of turtles measured at El Venado during the 2010 and 2011 nesting seasons.

The total number of emergences monitored at El Venado was 14, 9 of which resulted in true nesting events. The mean number of eggs was 95.67 ± 9.63, with a range of 52-135. Figure 18 shows the number of eggs for each nest. A comparison between the number of eggs for the 2010 and 2011 nesting seasons is shown in Table 9 and Figure 19.

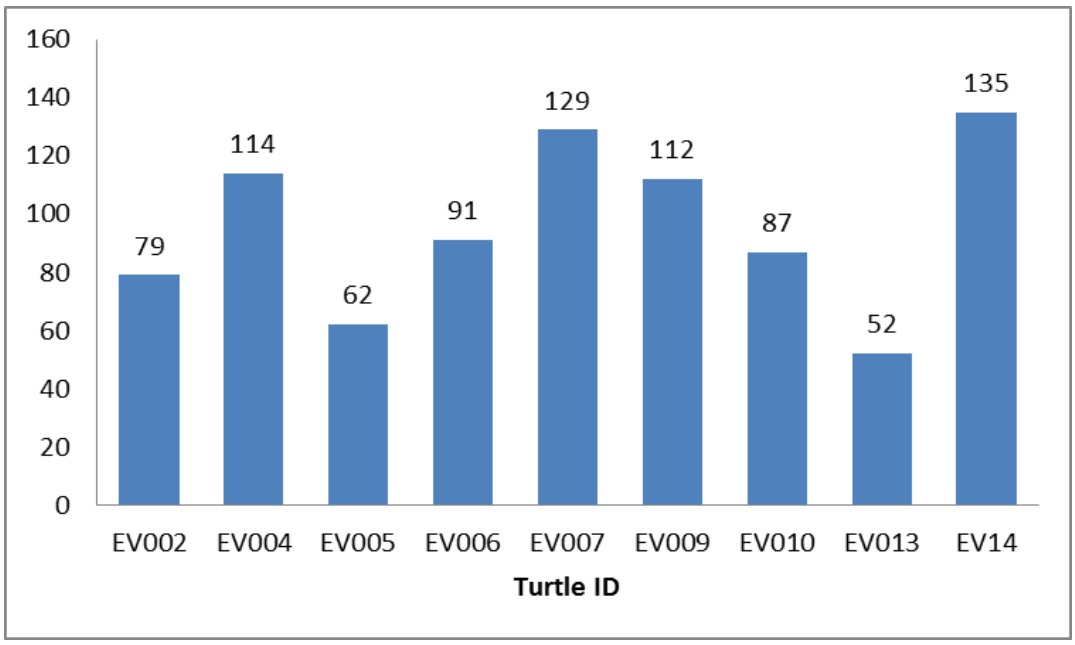


**Figure 18.** Number of eggs of nests deposited at El Venado during the 2011 nesting season.

**Table 9.** Mean values for number of eggs of nests per nest deposited at El Venado during the 2010 and 2011 nesting seasons.

| Nesting Season | 2010 | 2011 |
|---|---|---|
| **Mean Egg Number** | 83.43 ± 12.94 | 95.67 ± 9.63 |

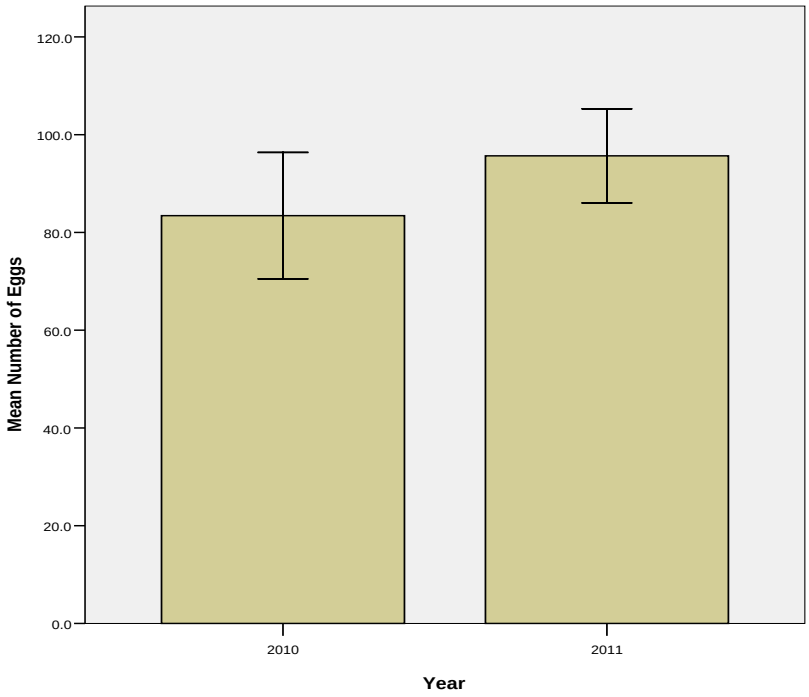


**Figure 19 .** Comparison of the mean number of eggs of nests at El Venado during the 2010 and 2011 nesting seasons.

During the 2011 season, we were able to affix satellite transmitters to two *L. olivacea* released from the beach at El Venado.

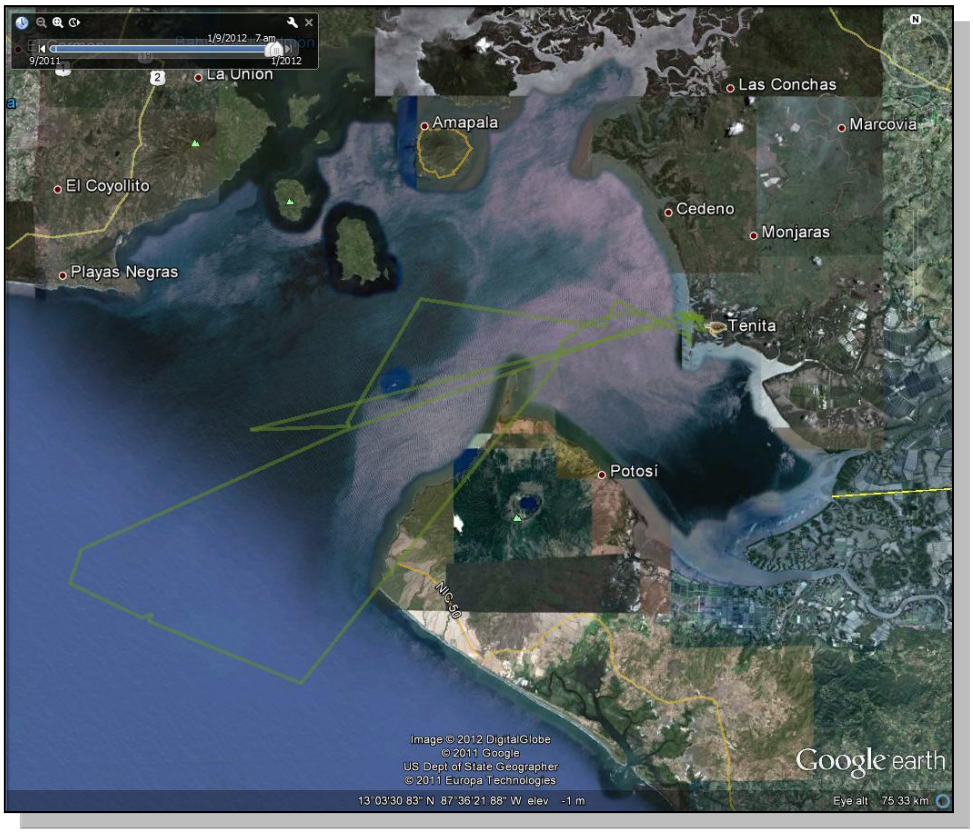


**Figure 20.** Movements of "Tenita" after release from the beach at El Venado.


**Figure 21.** Migration pathway of "Brenda" after leaving the beach at El Venado.

***East Pacific Hawksbills***

We conducted a region-wide survey of communities along the South Coast of Honduras in the Gulf of Fonseca in which we undertook 181 formal interviews in 28 communities. Interviews were conducted with local fishers, community members, Tortugueros, and shellfish harvesters. When occupations were compared among communities (Figure 22), we found the majority of interviewees were fishers, and that few interviewees were shellfish harvesters. Thus far, interviews with shellfish harvesters have only been undertaken in El Carretal and Punta Ratón. In contrast to the communities of El Venado, El Carretal, Punta Ratón, and Islitas, fishers in the majority of communities are not involved as Tortugueros in sea turtle conservation.

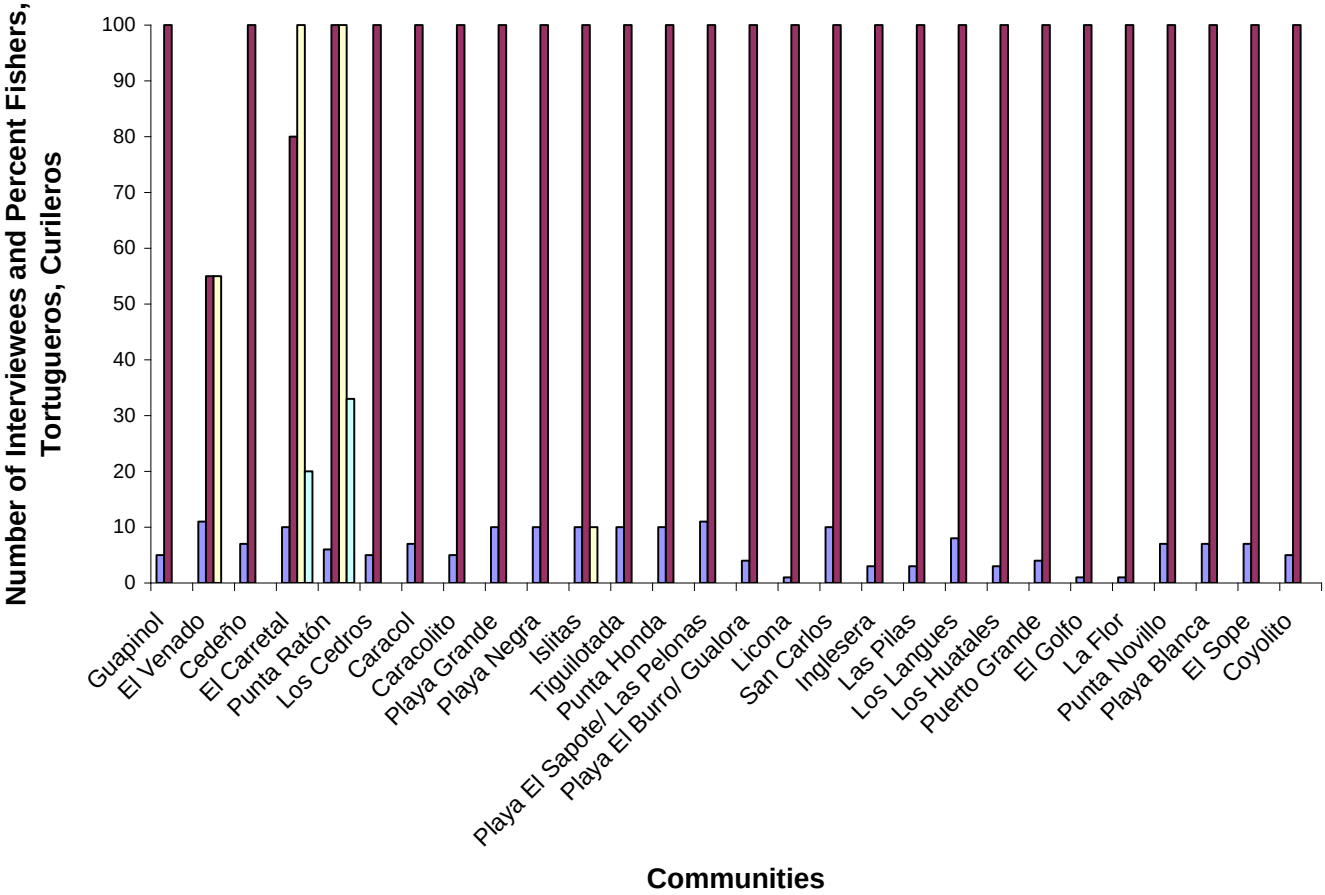


**Figure 22.** Comparison among communities of the number of interviewees and percentage of interviewees that are fishers , tortugueros , and shellfish harvesters (curileros) .

In addition to individual interviews, we conducted 28 workshops in 26 communities in this region. Each workshop was convened to bring fishers, community members, and shellfish harvesters together to provide a platform for both information gathering and dissemination about hawksbills and other turtle species in the GOF (Figures 23 and 24). In August 2011, ProTECTOR personnel organized a regional meeting held at the community of Amapala on Isla del Tigre for August 12. Local community members met with representatives from ProTECTOR, CODEFAGOLF, SERNA/DiBio, the Municipalities of Amapala and Marcovia, and ICAPO representatives from El Salvador and Nicaragua. This meeting facilitated presentations and interchange among participants regarding the status of hawksbills in the Eastern Pacific, current information on hawksbills in the GOF, and the collaboration of organizations toward conservation of this and other turtle species in the GOF.

**Figure 23.** Fishers from the community of Las Islitas on Isla del Tigre, in a small group meeting to discuss fishing practices, sightings of hawksbills during fishing, and areas of known hawksbill nesting.

**Figure 24.** Individual interview with a fisherman in the community of Playa Grande on Isla del Tigre.

Interviews in the communities provided important anecdotal information regarding nesting sites of hawksbills along the Honduran coast of the GOF, as well as the relative harvests of eggs at each site, as presented on the map provided in Figure 25. These data demonstrate that nearly 100% of all eggs laid at known nesting beaches along the Honduran coast are reported to be harvested for consumption. Despite the fact that interviewees report almost all eggs are harvested, they nevertheless report that the number of hawksbills seen has either increased or greatly increased over the last 20 years. It is somewhat surprising that there were no reports from any communities of a reduction in sightings among nesting beaches.


**Figure 25.** Map of the Pacific coast of Honduras showing the locations of beaches where eggs are harvested. The percentage of eggs collected are represented by the colors provided in the figure key.

Peak nesting months appear to differ slightly among nesting beaches in the five zones and among communities. However, the main months reported for nesting hawksbills in this region are May through October.

Community interviews also gathered data on in-water observations of hawksbills by fishers and shellfish harvesters, as well as fisheries gear types and direct interactions (captures). Although some fishing areas were roughly pointed out on hard copy maps, most fishers or shellfish harvesters related fishing or harvesting areas to known beaches. Figure 26 shows the locations that fishers and shellfish harvesters stated were areas in which they had seen hawksbills while carrying out their daily fishing or shellfish harvesting activities.


**Figure 26.** Map of sites throughout the Pacific region of Honduras where fishers and shellfish harvesters report seeing hawksbill turtles either at sea or on the beaches.

It is apparent, from responses of interviewees to date, that many of hawksbills incidentally captured by fishers are reported to be released. However, interviewees from the communities of Playa El Gulfo (San Carlos), El Venado, and Los Justillos, in the Municipality of Amapala, reported that hawksbills caught by fishers were often consumed. Observations reported by fishers suggest, overall, that fishers see hawksbills throughout the entire year. However, the communities of Las Doradas, Cedeño, and Estero Punta Raton mainly sight hawksbills in the months from June to November.

During July, 2011 ProTECTOR researchers received two juvenile hawksbill turtles at the Punta Ratón Turtle Center, brought in by collaborative fishers from the community. The first was brought to the center on July 14. Unfortunately, the turtle was already dead and appeared to have been debilitated for some time. Both hind flippers of this individual were missing. However, these injuries appeared to have taken place well before the turtle was collected, seeing that the injuries to both hind flippers had healed over, despite the seriousness of the trauma sustained. Both the dorsal and ventral surfaces of the animal were almost completely infested with cirripeds and bivalves (Figure 27), although many of these appeared to have already been dislodged prior to the collection.

The turtle was placed in plastic bags and stored in a freezer until August 15, 2011 when a necropsy of the turtle was performed. There were no obvious indications of internal trauma, or presence of plastic materials lining the respiratory or digestive tracts. We did not have the capacity to preserve tissue for later toxicological or pathological analyses, or to preserve the entire carcass. Once the necropsy had been completed, the remains were stored in plastic and buried. It is fully possible that this turtle may have been drowned in discarded net remnants, or entangled in fishing line. However, no such material was present on the turtle when it was brought to the center. Still, there was no external evidence of strangulation, line or net restrictions, or cuts to the areas of soft tissue.

**Figure 27.** Dorsal view of deceased hawksbill collected July 14, 2011. Note the heavy encrustation of cirripeds over the majority of the carapace. Photo: Noemi Duran, 2011

On July 18, 2011, fishers from the community of Punta Ratón presented members of the ProTECTOR research team working in the community, with a live juvenile hawksbill that had been captured at sea. This turtle was infested with large barnacles (unidentified sp.) on both the dorsal (Figure 28) and ventral surfaces. In addition, the carapace and plastron were covered with a layer of unidentified red algae. Aside from the infestation of cirripeds and the layer of algae, the turtle appeared to be in relatively good condition.

**Figure 28.** A juvenile *E. imbricata*, captured by a fisher from the community of Punta Ratón in the nearshore waters of the community on July 18, 2011. The turtle was released after measurements were recorded and the turtle briefly checked for general health. Photo: Noemi Duran, 2011.

This turtle was also measured for minimum and maximum curved carapace length ($CCL_{min}$ = 36.2 cm; $CCL_{max}$ = 38.5 cm), falling well within reported size classes for juvenile hawksbills. Although we received numerous anecdotal reports of adult hawksbills during 2011, we were unable to confirm these by direct sightings. However, many of the respondents were able to correctly distinguish hawksbill turtles from other species from photographs or illustrations. We are, therefore, confident that reports of adult hawksbills in the Pacific region of Honduras are correct and confirmation will be forthcoming as the study continues.

For full details on methods and results of this study, see Dunbar et al. (2012).

## Bay Islands 2012

### *Utila*

Surveys of local community members from both Utila and Los Cayitos continued with a total of 21 community members interviewed. Table 10 shows the number and proportion of survey participants in various local professions.

**Table 10.** The types of professions and numbers of survey participants involved with each profession.

| Profession | No. Interviewed | Proportion (%) |
|---|---|---|
| Marine Fisher | 12 | 57 |
| Fish Merchant | 1 | 5 |
| Police | 1 | 5 |
| Builder | 1 | 5 |
| Dive Boat Captain | 5 | 23 |
| Mayor | 1 | 5 |
| **TOTAL OBS.** | **21** | **100%** |

This work continued with funding from the United States Fish and Wildlife Service-Marine Turtle Conservation Fund (USFWS-MTCF) for this and the Cuero y Salado portion of the project, entitled "Community-Directed Capacity Building for Hawksbill Conservation and Population Recovery in Caribbean Honduras."

Results from community interviews provided important information on when and where fishers and community members sighted turtles at sea (Figure 29), as well as where and when turtles were being sighted on the beaches around Utila and Los Cayitos (Figures 30 and 31).

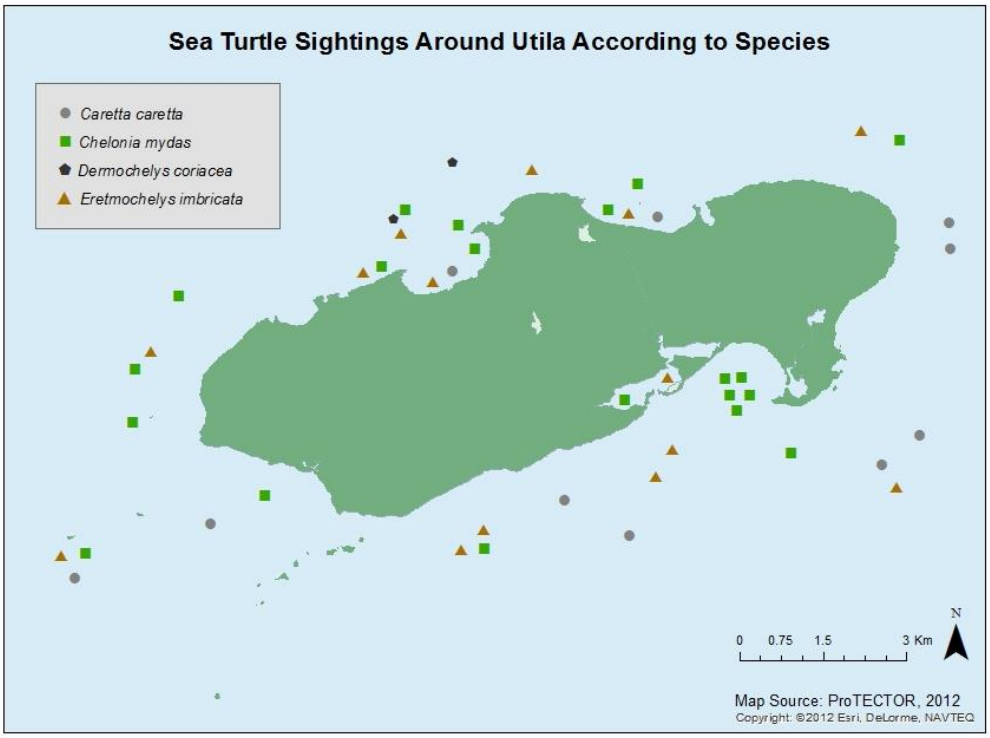


**Figure 29.** Map of the island of Utila and the outlying cays (Los Cayitos), showing the areas respondents suggested were important fishing areas, as well as areas where turtles are sighted.

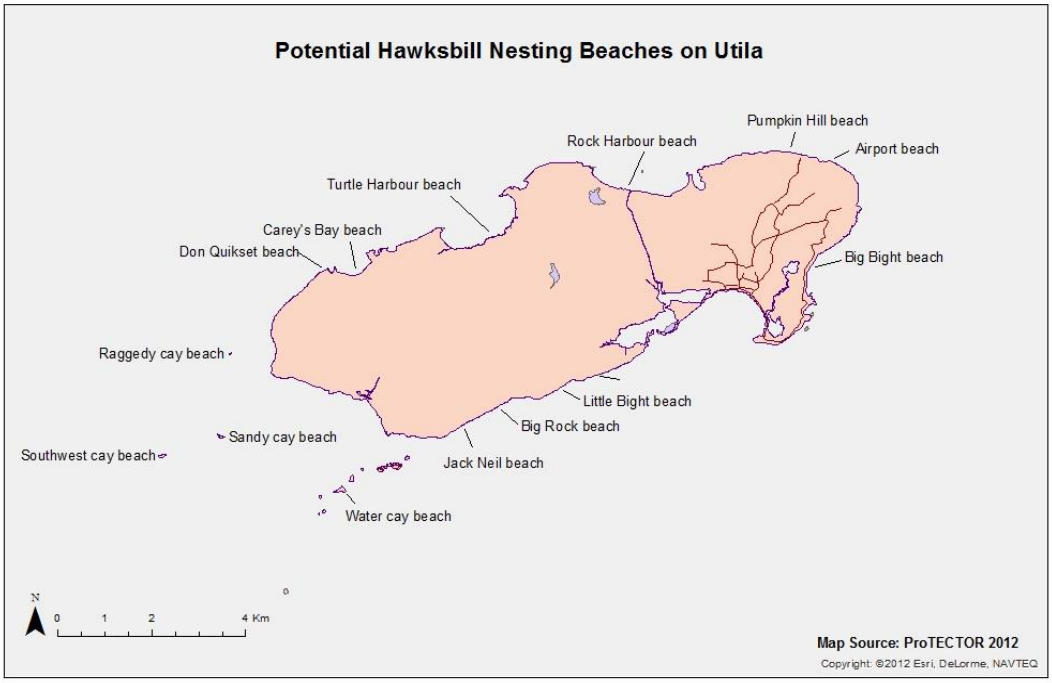


**Figure 30.** Map of Utila and Los Cayitos where turtles have been reported to nest. Some sites have had confirmed *E. imbricata* nesting, while the majority of potential sites have not been confirmed.

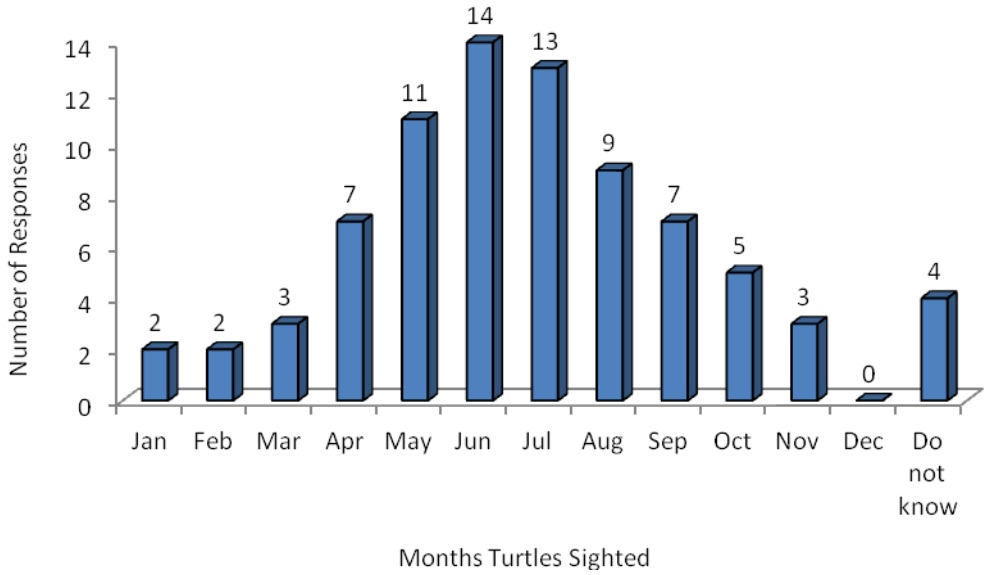


**Figure 31.** Seasonality of sightings of turtles on beaches on Utila and Los Cayitos, according to respondents.

We continued to hold workshops to facilitate training and capacity building of local community members, volunteers, and NGO personnel (Figure 32). In some cases, we held specific workshops regarding ProTECTOR research projects in which we provided overviews and details of projects to NGO personnel, volunteers, and research assistants (Figure 33).

**Figure 32.** Dr. Stephen Dunbar holds a training and information workshop at BICA Utila headquarters.

**Figure 33.** Loma Linda University and ProTECTOR graduate student, Lindsey Eggers Damazo, explains her research work to volunteers who will assist with some aspects of the project at the turtle research and conservation workshop at BICA headquarters on Utila.

During the 2012 season, we also undertook the initial portion of a study to quantify plastic beach pollution on the nesting beach at Pumpkin Hill. We collected as much material as possible from quadrates randomly thrown on the wrackline. Samples were taken to the laboratory where they were separated according to plastic type, and weighed to calculate the relative weight per sample of each type of plastic material. The initial study resulted in the collection of many types of plastic pollution materials, from macroplastics (shoes and bottle seen in Figure 34A), and mesoplastics (portions of larger plastic pollution, including caps, tubes, and utensils shown in Figure 34B), to microplastics (brittle and broken fragments of plastic materials, as seen in Figure 34C). All portions of materials were weighed and quantified. However, we are currently analyzing these results.


**Figure 34.** Results of plastic pollution collections at Pumpkin Hill, showing macroplastic (A), mesoplastic (B), and microplastic (C). Photos: Lindsey Eggers Damazo, 2012

In addition to plastic pollution analyses, we also conducted beach profile and vegetation characterization of the beach at Pumpkin Hill to determine key characteristics of the beach, as well as the area most used by turtles for nesting in this location. We plotted the vertical heights of points along the entire beach, resulting in a 3-D graphic of beach length, beach width, and beach height (vertical altitude) for this beach (Figure 35). We are currently continuing to analyze these data and develop additional graphics for this study.

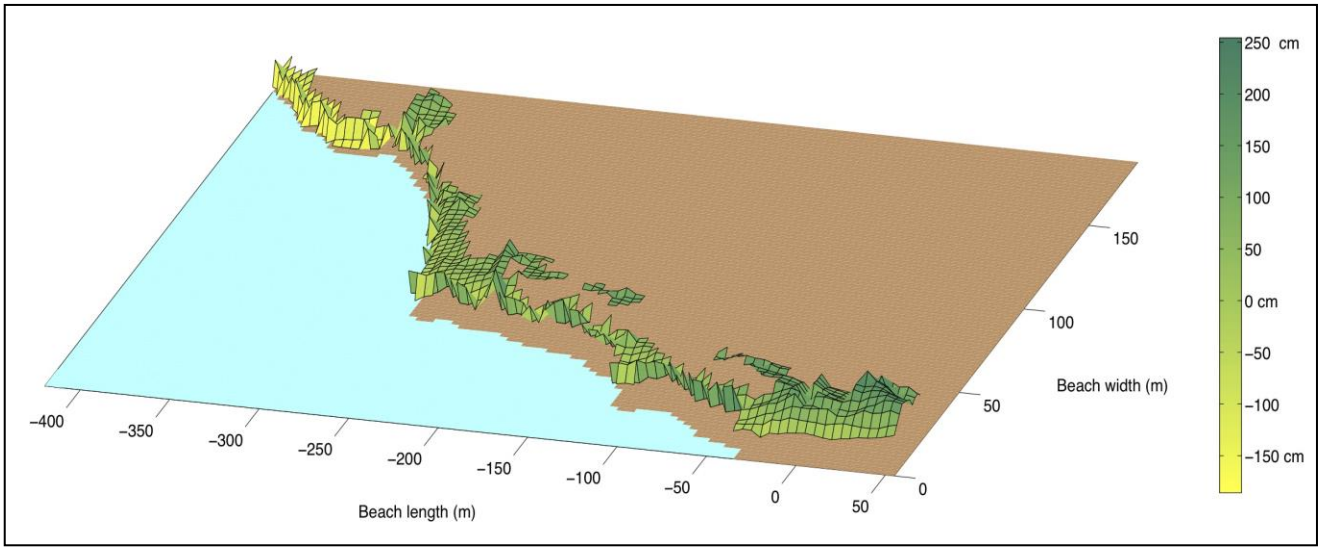


**Figure 35.** Map graphic displaying beach height, length, and width, according to points surveyed along the length of Pumpkin Hill Beach.

Results from beach vegetation characterization were plotted according to the main categories of ground cover (sand, vegetation, rock, or trees). The coverage is plotted in Figure 36 and shows that while vegetation is present along the length of the beach, the majority of tree coverage occurs along the northwest section of the beach. Further detailed analyses of these data are currently ongoing.

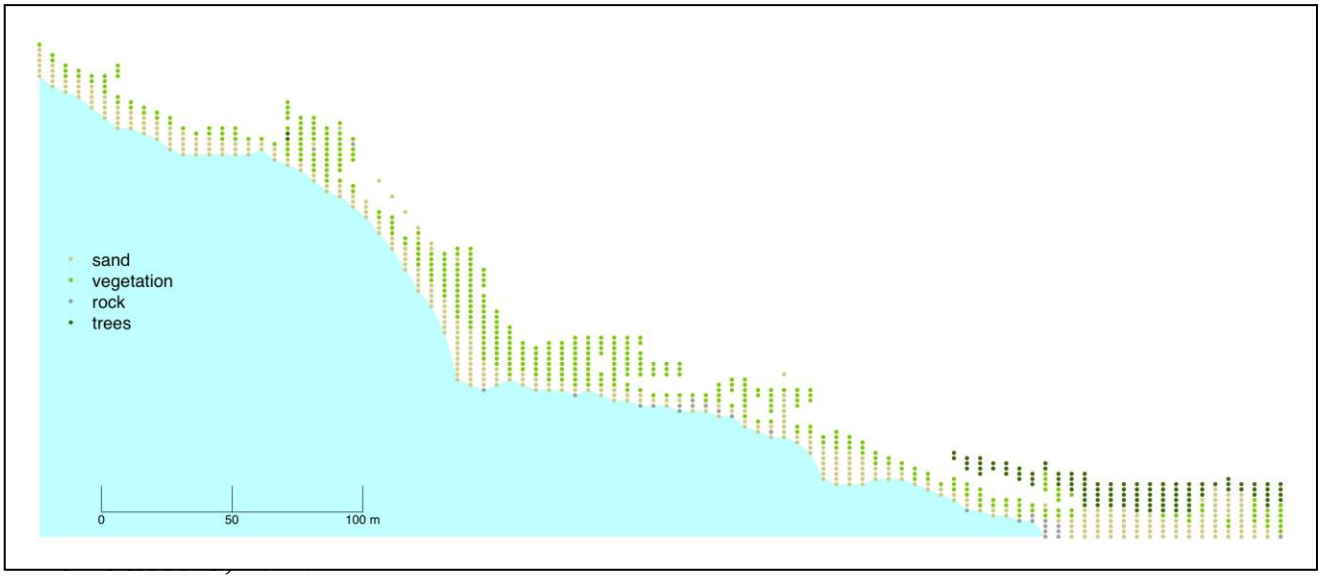


**Figure 36.** Map graphic displaying ground cover characteristics along the length of beach at Pumpkin Hill. Note the tree cover represented by the dark green dots in the northwest (lower right) section of the beach.

**Figure 37.** "Chel" fitted with a satellite tag for tracking migratory movements away from Pumpkin Hill Beach on Utila. Photo: Lindsey Eggers Damazo, 2012

We fitted "Chel" with the first satellite tag on any Hawksbill from Caribbean Honduras (Figure 37). She was released from Utila on July 11 and ceased transmitting on October 9, 90 days after release. She travelled a distance of 403 km (unfiltered data; Figure 39).

A second satellite tag was launched on August 12 on "Ginger" (Figure 38). This turtle left the Bay Islands on August 13 and moved directly toward the coast of Belize, skirting south of Glover Reef, and moving northwest toward Dangriga. She continued a northern trek along the coast until stopping near Water Cay at the southernmost end of the Drowned Cays (see Figure 39).

Ginger appears to have settled near Water Cay, possibly representing the end of her post-nesting migration to her regular foraging ground. The transmission from Ginger stopped on October 3, 2012, just 20 days after launch, travelling approximately 181 km (unfiltered data; Figure 39).

**Figure 38.** "Ginger" outfitted with a satellite tag and receiving the second flipper tag on the right rear flipper. Photo: Lindsey Eggers Damazo, 2012

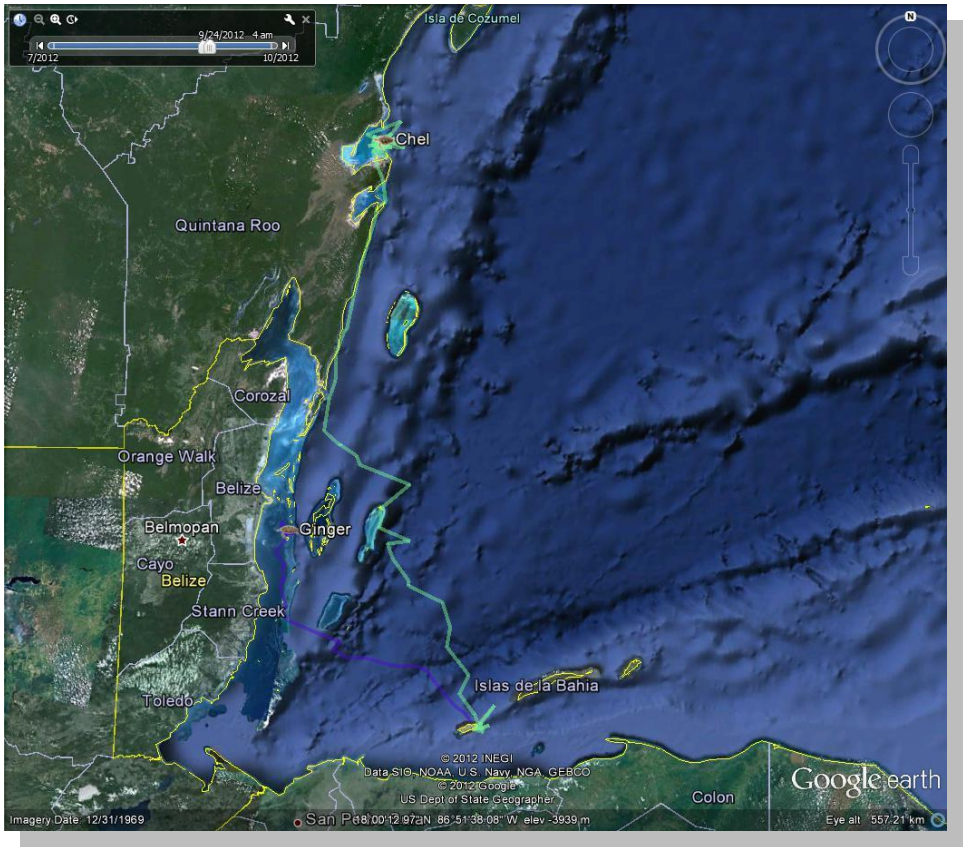


**Figure 39.** A Google Earth map showing the unfiltered migration paths of "Chel" and "Ginger" after nesting on Utila.

In Table 11, we summarize the results of the Utila portion of this study. For further details on results to date from this study, see Dunbar et al. (2013).

**Table 11.** Activities and outcomes of study undertaken on Utila in 2012.

| Activity | Number | Result Summary |
|---|---|---|
| Beach monitoring | 100 days | Confirmation of nesting activity and successful hatching at PHB location |
| Training/Capacity Building | 6 individuals | Prepared individuals to continue monitoring nesting beach and collecting data. |
| Workshops/Meetings | 3 training workshops | Increased public awareness of sea turtle biology, ecology, threats, and conservation efforts |
| Education outreach | 6 community outreach events | Increased public awareness among children and young people of sea turtle issues in the area |
| Hatchlings released | 258 individual hatchlings | Hatchlings successfully reached the sea |
| Hatchling blood samples | 222 individual hatchlings | Samples collected and awaiting analysis |
| Nesting events | 12 nesting attempts | Confirmed nesting and flipper tagging for subsequent identification. |
| Successful nestings | 9 nests laid | Confirmation of nesting activity and studies on nests and hatchlings |
| Nests monitored | 4 real nests and 4 pseudo nests | Temperature data from nests currently being analyzed |
| Nesting turtles flipper tagged | 5 individuals | Tagged individuals contribute to a population estimate |
| Nesting turtles satellite tagged | 2 individuals | Turtles successfully tracked for a maximum of 90 days |
| Beach profile and vegetation characterization | 475 m | Data regarding beach profile and vegetation characterization currently being analyzed and correlated with nest temperature data |
| Survey respondents | 20 individuals | Community involvement and input on direction of conservation efforts in the area |
| Beach pollution estimates | 475 m | Quantification of beach pollution; initiation of studies of pollution impacts on nesting/hatching activities |
| Beach clean-ups | 1 events | 356 large bags of garbage removed |

### *Roatán*

No research work was undertaken on Roatán during the 2012 season.

### *Guanaja*

Some information on turtle nesting was collected on the private Cay east of Banaca. However, these data have not yet been confirmed with photographs or actual sightings by any member of the ProTECTOR team. It remains unclear which species is nesting at this location. We continue to work with the owners of the island to collect data on nesting turtles at this location

with the intention to eventually conduct research on site, with the permission and assistance of the owners.

## North Coast 2012

### *Cuero y Salado Wildlife Refuge*

In early 2012, we formalized the survey and began collecting data from interviewees in the communities of Orotina (OR), Salado Bar (SB), Boca Cerrada (BC) and La Rosita (RO) (Figure 40). These interviews were undertaken by Angela Randazo with support from project partner, Fundacion de Cuero y Salado (FUCSA).

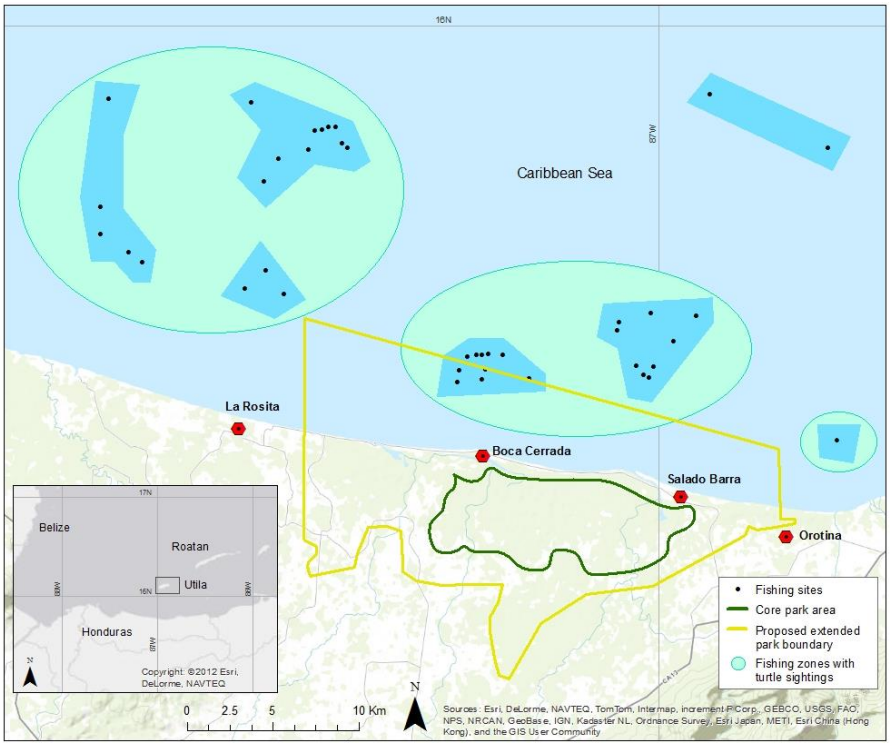


**Figure 40.** Map of the coastal area of Cuero y Salado Wildlife Refuge (CSWR), showing the location of the four communities in which we conducted interviews with community members. Additionally, important fishing locations and zones of turtle sightings are indicated on the map (see key in bottom right corner for details).

We surveyed a total of 49 individuals from the communities within and around CSWR, and found a range of occupations (Table 12). Among fishers, we found a range of fishing experience and ages, influencing turtle sighting experiences and general knowledge regarding

sea turtles at sea and on the beaches of the refuge. Fishers, more than other community members, tended to be the ones reporting that they sighted turtles at sea. Although there was some uncertainty among fishers of how to confirm the species identity of turtles sighted at sea, fishers reported seeing *E. imbricata* most frequently, followed by *C. caretta* (Figure 41).

**Table 12.** Professions, numbers and frequencies of interview respondents from the preliminary study in CSWR.

| Profession | No. Interviewed | Frequency (%) |
|---|---|---|
| Marine Fisher | 45 | 92.0 |
| Refuge Guard | 1 | 2.0 |
| Housewife | 1 | 2.0 |
| Fish Merchant | 1 | 2.0 |
| Retired Fisher | 1 | 2.0 |
| **TOTAL OBS.** | **49** | **100%** |

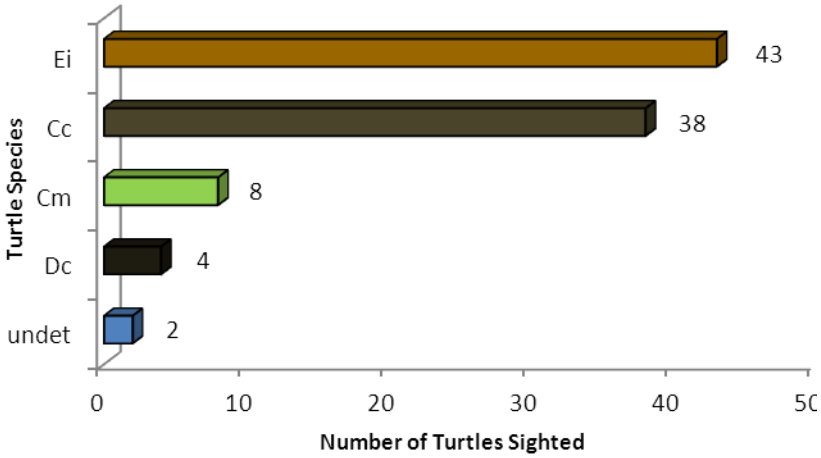


**Figure 41.** The number of each turtle species sighted by fishermen at sea. Species codes are: Ei (*Eretmochelys imbricata*); Cc (*Caretta caretta*); Cm (*Chelonia mydas*); Dc (*Dermochelys coracea*); undet (undetermined).

Information was also provided and analyzed for sightings of sea turtles on the beaches. For a full report on the details and findings of the study at CSWR, see Dunbar et al. 2013.

Data collection was accompanied by education outreach in each community school, providing information about sea turtle ecology, and the importance of conservation efforts, such as those undertaken by ProTECTOR. One outreach event included accompanying children from the community of Salado Bar to La Ceiba, where they took part in a 2-day campaign on the campus of El Centro Regional de Documentación e Interpretación Ambiental (CREDIA) to raise the awareness of the general public regarding the Cuero y Salado Wildlife Refuge.

During the preliminary study from February to April, 2012, we conducted 6 night patrols over a total of 14.5 hours and 29 km of beach. On March 27, 2012, on the beach between the community and Salado Bar (western sector), we observed the successful nesting of a single Leatherback (*Dermochelys coriacea*) (Figure 42). This constitutes the first reported citing of a Leatherback nesting on the beach at Salado Bar.


**Figure 42.** The lone *D. coriacea* that nested on the western sector of the beach between the community and Salado Bar on the night of March 27, 2012.

## South Coast 2012

### *Punta Raton*

ProTECTOR work at Punta Ratón continued through Loma Linda University graduate student, Noemi Duran. During the 2012 nesting season, there were multiple issues of concern taking place in this community. The Turtle Center, constructed by the Municipality of Marcovia and run by the Punta Ratón Sea Turtle Comité, was undermined by rising tide levels (Figure 43), was rapidly falling apart, and eventually materials, such as the new roof and timbers, had to be salvaged before they were also destroyed. The tide level washed away the foundations of both the old center building, as well as the newer facility, built in 2008. Due to the loss of the Center, there were discussions among community members as to where the best location would be for the community hatchery. On this point, there was much division of opinions between the Comité and the remainder of the community, resulting in two hatcheries and very little cooperation between them. Unfortunately, both local and central government officials encouraged the lack of collaboration, and many tensions resulted.

**Figure 43.** The Punta Ratón Turtle Center, just before the entire building collapsed. The state of the building made it uninhabitable for the 2012 season, while the loss of the center and the area for the hatchery caused divisions between the Comité and the community.

Despite these concerns, we flipper tagged 38 nesting females, and collected blood samples from 36 for population genetic analyses. In addition, we collected blood from 192 hatchlings (Figure 44) and tissue from 10 nests to use in analyzing multiple paternity among turtles

nesting at Punta Ratón. Again, and unfortunately, the Turtle Comité was unwilling to assist with research, not allowing hatchlings from their hatchery to be sampled for blood, despite being fully informed before the veda season began, and seeking the opinion of ProTECTOR researchers as to how best to proceed with the veda season after the loss of the Center.

**Figure 44.** Noemi Duran and Robyn Reeve (ProTECTOR Intern), collect blood samples from hatchling *L. olivacea* after weighing and measuring.

In Table 13, the number of blood and tissue samples collected from males, females, hatchlings and nests are presented.

**Table 13.** Sample numbers of blood and tissue collected at Punta Ratón during the 2011 and 2012

| | FEMALES (Blood/Tissue) | MALES (Blood/Tissue) | HATCHLINGS (Blood) | NESTS |
|---|---|---|---|---|
| 2011 | 47 | 2 | | |
| 2012 | 36 | | 192 | 10 |
| TOTAL | **83** | **2** | **192** | **10** |

Blood samples are currently being stored in Honduras until CITES export permits can be obtained.

***El Venado***

Immediately prior to the veda period, ProTECTOR, working in partnership with the Global Health Institute (GHI) at Loma Linda University, and the Students for International Mission Service (SIMS) at Loma Linda University, provided 9 days of health screening and dental care

to the communities of El Venado and Guapiñol. In addition, we provided one day of health screening, dental care, and medication disbursement to the community of Punta Ratón. These services included diabetes checks, general health screening, the disbursement of medications for adults and children, tooth extractions, tooth restorations, and nutritional education to community members and Turtle Center cooking staff (Figure 45).

**Figure 45.** Health outreach organized and facilitated by ProTECTOR for the communities of El Venado, Guapiñol, and Punta Ratón. These free services included health checks, dental care, and nutrition education.

Additionally, a grant to ProTECTOR from GHI (Loma Linda University), allowed us to purchase the materials needed for developing a rain water catchment system for the Turtle Center, increasing the potential and capacity for Center visitors to stay at the Turtle Research and Conservation Center (Figure 46).


**Figure 46.** Funds from a grant to ProTECTOR, along with in-kind contributions from the El Venado Turtle Research and Conservation Center, have allowed the purchase of rain water tanks, and building materials to build a rain water catchment system for the Center. This will facilitate much-needed running water at the Center.

Throughout the 2012 nesting season at El Venado, we were able to flipper tag and measure 29 individual females. Measurements included CCLmin and max, and SCLmin and max. Blood

samples were taken from 25 individuals for genetic analysis. These data have not, yet been compared to data from previous years, but are currently being prepared for comparative analyses. In addition, we are currently applying for CITES export permits from the Government of Honduras in order to bring the blood samples back to the U.S. for genetic analysis.

Satellite tracking of one individual ("Sabine") did not provide any data. We are unsure if the tag failed immediately after deployment, or if the turtle was killed, captured, or was entangled in fishing net and drowned. We did witness illegal fishing activity during the veda just off shore of the nesting beach. However, satellite telemetry from both "Reina-Christiana" and "Loanis" did provide important information regarding post-nesting migrational movements of *L. olivacea* from the Gulf of Fonseca. Reina-Christiana was released September 9, and transmissions ceased on November 10, 2012 approximately 20 km southwest of Aposentillo, Nicaragua, after travelling a reported 9,739 km (unfiltered data; Figure 47).


**Figure 47.** Movements of "Reina-Christiana" after leaving the nesting beach at El Venado on September 9, up until November 10, 2012. She transmitted for 58 days.

In contrast, Loanis was released Sept. 23 and transmission from her ceased on November 25, 2012 approximately 32 km southwest of Isla Darwin, Galapagos Islands, Ecuador, after travelling approximately 1,385 km (unfiltered data; Figure 48).

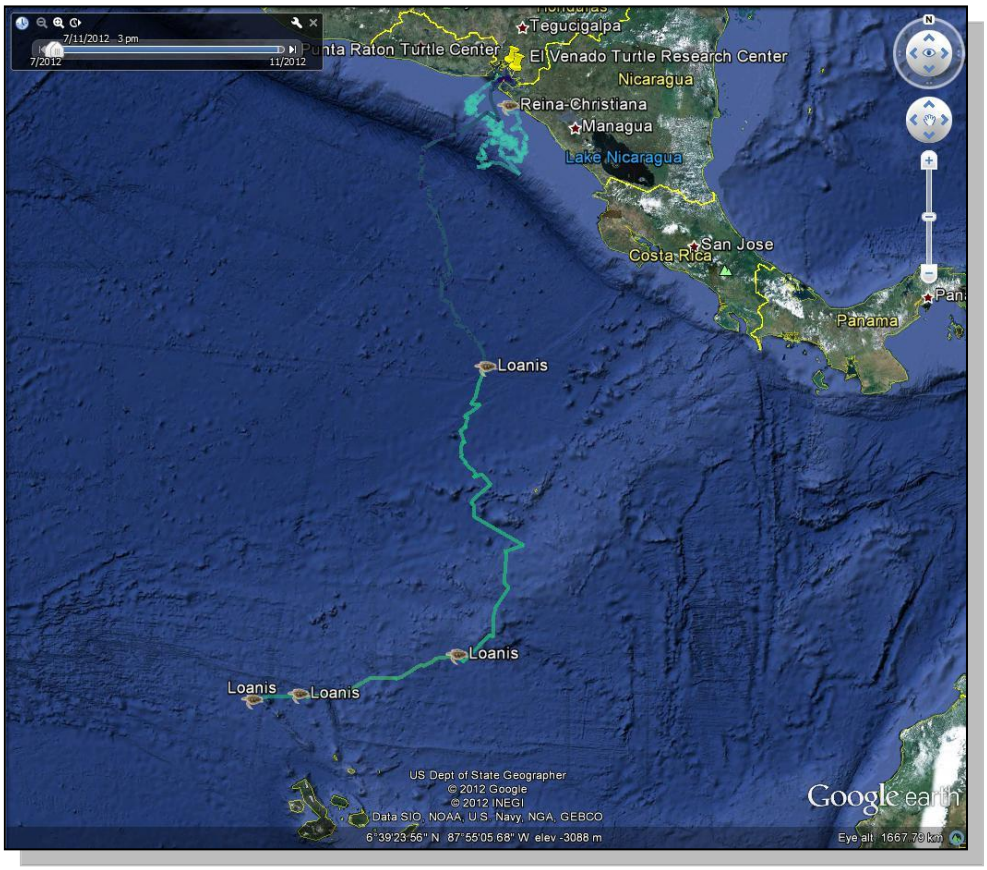


**Figure 48.** Migration route of "Loanis" after leaving the nesting beach at El Venado on September 23, up until November 25, 2012. She transmitted for 63 days.

### *East Pacific Hawksbills*

We were unable to undertake further studies on East Pacific Hawksbills through 2012, except for the confirmation (by photographs) of another juvenile Hawksbill (approximately 38 cm SCL) brought to El Venado by local fishers and released in the Gulf shortly after capture and photographing. In addition, we hired local fishers for two days (September 23 and 24) to assist with sighting adult Hawksbills in the area of El Venado, where fishers report sighting this species on a fairly regular basis. However, we were unable to confirm the presence of adults in this area during the brief preliminary survey. Work is continuing on this project during 2013.

# RECOMMENDATIONS

## Volunteer Research Assistants Program

Whereas there is a continuing need to train young people and those interested in the conservation of endangered species in Honduras, **we recommend** the continuing development of the ProTECTOR Volunteer Program as a way to introduce students and visitors to the areas of Honduras in which sea turtles play an important role in community economics and eco-tourism. This will include the training of students from the National Autonomous University of Honduras (UNAH), and the Polytechnic University of Engineering (UPI), in accordance with agreements between these institutions and ProTECTOR currently being developed.

## Research and Conservation

Whereas there is a great need to ensure that sea turtle conservation efforts throughout Honduras contribute to population recoveries of sea turtle species in the country, **we recommend** that research efforts by ProTECTOR be used and further developed to inform sea turtle conservation efforts throughout the country. The training of community members, UNAH, and UPI undergraduate students alongside the ProTECTOR research team and graduate students from Loma Linda University, will further expand capacity building for research and increase the production of results that will be used to direct conservation and environmental education. Furthermore, we propose to work in collaboration with Central Government entities to incorporate these results into the Honduras National Report provided to the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) each year, as part of the international reporting requirement of the Convention for Honduras. The data provided by ProTECTOR is critical to Honduras fulfilling its obligations to the Convention.

Whereas Honduras does not, at this time, have a national strategic plan for assessing, managing, or monitoring any sea turtle species in the country's marine areas, **we recommend** that a national assessment of sea turtle populations be undertaken, and that a national strategic plan be developed, publicized, and initiated, and that continual monitoring of sea turtle populations be undertaken.

**Environmental Education and Outreach**

Whereas there is great value in utilizing modern technological data collection systems (i.e. satellite telemetry) as the basis of powerful education outreach efforts, **we recommend** that funding support be provided by the Ministry of Environment and/or the Ministry of Education of the Honduras Government to ensure a standardized, national program is developed and implemented with respect to sea turtle conservation and environmental education outreach among coastal communities throughout the country. A program of training and environmental education may be built on the basis of satellite telemetry data from turtles released from various locations throughout Honduras. These data can provide powerful lessons in international resources, international cooperation and diplomacy, the migratory routes of sea turtles and potential conflicts with commercial fisheries, and a highly interactive mechanism for involving adults and children.

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