Nighttime

Protocol for:

Marine Turtle Monitoring Program 2006

North Beach of Tortuguero

Caño Palma Biological Station
Tortuguero, Costa Rica

COTERC	GVI
Canadian Organization for Tropical Education & Rainforest Conservation	**Global Vision International Costa Rica**
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I. INTRODUCTION

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Tortuguero National Park was established in 1975 with the purpose of protecting the forest and the great diversity of wildlife that resides within it. For the past one hundred years marine turtles have been seen nesting on these beaches. These include leatherback turtles (*Dermochelys coriacea*), green turtles (*Chelonia mydas*), Hawksbill turtles (*Eretmochelys imbricate*) and the loggerhead turtle (*Caretta caretta*) In general, man presents a great threat to these magnificent animals due to over-exploitation, illegal harvesting of their nests, fishing, contamination and habitat alteration. As Tortuguero and the surrounding areas are continuously developing the demand for protection and conservation of these marine turtles is increasing.

The beach that encompasses the study area is 3.5 miles long and extends from the Tortuguero river mouth (10°36'36,9"N - 83°31'52,1"W) as the most southern point until (10°37'56,3"N – 83°32'25,7"W), in the north. The Tortuguero area is predominantly being affected by ongoing changes and development of the neighbouring hotels. This in turn creates an increase in human activity, hence the reason in broadening the type of study conducted in this area. The development of this project to protect the marine turtles is of great importance.

The project will be conducted during the nesting season of the leatherback turtles (*Dermochelys coriacea*), which nest from March to June, that of the green turtle (*Chelonia mydas*) from June to November and for the Hawksbill turtle (*Eretmochelys imbricata*) and the loggerhead (*Caretta caretta*) which extend from June to September. The duration of the present study is 5 years with the results of the evaluation and revision of the protocols being revised at the end of each nesting season for each of the marine turtles described.

II. PURPOSE OF MONITORING PROGRAM

The purpose of the monitoring program is to collect as much data and species information about each of the marine turtles which nest on the north beach of Tortuguero. Studies that have been conducted in the past show that there is a large amount of illegal harvesting on the beach. A 'Marine Turtle Feasibility Study' has been conducted during the 2004 and 2005 nesting seasons in association with the University of York in Toronto, Canada. The data collected during those seasons (*see figures 1 and 2*) show the necessity for an in depth study of the females nesting and their offspring.

III. OBJECTIVES OF THE MONITORING PROGRAM

The following points are the objectives that should be followed as part of the

protocol during the 2006 nesting season.

The following points should be investigated for all species of marine turtles:

- Spatial and seasonal distribution of nesting females
- Number of re-emergences to the nesting beach and /or migration between beaches.
- Number of nests
- Number of illegal turtle harvesting on the nesting beach
- Number of illegal harvesting of the nests
- Amount of predation on the beach
- Hatchling emergence and orientation
- Biometric data collected for the nesting female
- Examination of the flippers for possible tags and/or marks or evidence of previous tags.
- Examination for fibropapilomas and other anomalies (i.e.: loss of a fin)
- Clutch sizes of turtles encountered before the beginning of the oviposition process
- Survival of the nests and hatchling success rates

The following data should be documented for all marine turtles and their habitats.

- Physical data such as precipitation measurement and ambient temperature
- Tourist and human development around the nesting site

IV. ACTIVITIES OF THE 2006 MONITORING PROGRAM

Several activities exist that are required to be completed by the end of the turtle season in order to have completed a successful season.

The Project biologist and the Project coordinator in association with the staff of the Caño Palma Biological Station are responsible to ensure that all activities are conducted in an appropriate manner and within an appropriate time frame. Patrols will be conducted during a 5 hour period over the course of the night between 9 p.m. to 2 a.m. during the Leatherback season and from 8 p.m. to 4 a.m during the Green turtle season.

Eight activities are planned for the 2006 nesting season:

1. Presentations and workshops
2. Beach preparation
3. Census of tracks and nests
4. Tagging of marine turtles
5. Collection of Biometric data
6. Determination of nest survivorship and hatchling success

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7. Collection of data pertaining to human impact
8. Physical data collection

1. Workshops and Presentations

Throughout the nesting seasons various presentation will be done in local area hotels (open to tour guides and employees with interest) as well as in the town of San Francisco.
These presentations will include general information on the biology of the sea turtles as well and the possible threats to the population. Explanations will also be given with regards to the work that will be conducted on the North beach by COTERC and GVI during the nesting season.

2. Beach Preparation

The beach will be marked every 200m (1/8th of a mile) to assist in providing a precise location of the nesting areas as well as the position of the nests throughout the 3.5 miles of beach which comprise the study site.

3. Track and Nest Surveys

At the beginning of March, daily patrols will be conducted to record the tracks and possible nests. Once the training of the interns in marine turtle tagging is completed, nocturnal surveys will be conducted. These nocturnal surveys will be conducted by one of the members of the team from the Caño Palma Biological Station and two volunteers. There can not be more than 5 people on the beach at a time conducting the survey (with the exception of the school groups visiting the station).

A. <u>First Case Scenario</u>:

The intention of the night patrols is an attempt to encounter as many of the nesting turtles as possible each night and accumulate as much data as possible on the nesting female and her clutch. Due to the fact that the beach is 3 $^{1/8}$ miles in length there is the possibility that not all turtles will be observed whilst nesting. Their tracks, however, will be documented; in this case the following procedures will be followed:

1) Confirm there are indeed two tracks (one ascending and one descending the beach)
2) Follow the ascending track to investigate whether that turtle has nested
3) Once nesting is confirmed, it must be inspected if the nest has been illegally harvested, predated by animals or if remains in its original state. To ensure that all involved are documenting the nests in a similar structured manner, here are the obvious signs:
   - Broken eggshells and/or holes or marks made by a stick which indicate

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an attempt to locate the nest chamber.
- Human or animals tracks around the nests or in the nearby area
- A large hole where the nest cavity has been encountered and dug up

If 2 out of the above 3 signs are present a nest should be noted as poached.

B. Second Case Scenario:

In the situation where only one ascending track is located the turtle is still possibly on the beach. In this case all should proceed with much care to reduce the possibility of disturbing or hindering the nesting process and risk that the turtle returns to the sea. Only the leader of the patrol group (the person who will be tagging the turtle) will approach the nesting turtle, with extreme caution and **without using a flashlight,** to observe what stage of the nesting process the turtle is involved in.

Notes on nesting behaviour:
It may be very difficult to establish whether a turtle (especially greens) is digging its body pit and preparing to make the egg chamber, or disguising the nest. There are several ways to tell (none of them conclusive):

- The turtle may still be wet while digging, but not anymore when disguising; the carapace (and often the head) is usually covered with sand when disguising.
- The rear flippers of the turtle move differently when (preparing for) digging → simultaneously, as if sweeping the sand; when disguising or covering the egg chamber they move in an alternating way.
- When disguising, a lot of sand has been moved and sand will be sprayed behind the turtle, outside the nest chamber.
- The front flippers are hardly used while digging the body pit; they are used actively when disguising.
- When in doubt: WAIT.

When establishing in what stage of the nesting process a turtle is (e.g., to determine how much time will pass before the turtle will go into oviposition) it is useful to know the approximate time needed by turtle species to complete each nesting phase:

Phase:	Leatherback	Green
1. Emerging from the sea		
2. Selecting nest site		

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3.	digging body pit	12 mins	23 mins
4.	digging egg chamber	20 -	23 -
5.	oviposition	11 -	15 -
6.	covering egg chamber	10 -	12
7.	disguising nest	28 -	43 -
8.	returning to the sea		

This is the best moment to tag, as the turtle has a high amount of hormones in her blood and is relatively insensitive.

Hawksbills and Loggerheads need a shorter time to complete the nesting process, approximately 45 and 55 minutes, respectively.

Once the turtle has selected the nest site, hollowed out the body pit and begun digging the egg chamber it is then safe to approach the turtle. At this moment the equipment that will be necessary to complete the work should be prepared. The next step is:

1) One person using latex gloves should be in position to begin counting the eggs using the egg counter that the turtle will be laying. Especially in the case of green and hawksbill turtles it is necessary to enlarge the upper part of the egg chamber in order to observe the eggs. It is important that no sand fall into the egg chamber (this may cause the turtle to abandon her nest) and it may be necessary to hold one hand in between the nest and the sand that is being dug out. In the case of the leatherback turtle the fertile and non-fertile (yolkless) eggs will be counted (the first ones are recorded on the counter, the latter should be remembered). Other species usually only lay fertile eggs.

Note: It is preferable that no light be used while counting the eggs. To this end one hand should be held below the turtle's cloaca in order to feel how many eggs are dropped. At NO point (this should be verified by the RA) should the hand touch the cloaca as this will result in the turtle abandoning her nest.
No other work should be conducted until the turtle has completed the egg laying process.

In both cases, after camouflage the following step is taken:

1) Once the turtle has been worked and all tasks have been completed all flash lights will be turned off to ensure her safe return to the sea. When a turtle is encountered the track of the turtle will be measured and referenced to the tag number of that individual turtle. Measurements of the track will only be taken on the external marking of the track. The exact position of the nest and the track will be noted and information passed along to the morning census team to ensure that nest is verified for illegal harvest or predation the next morning.

C. Data:

The following data should be collected in the field notebooks:

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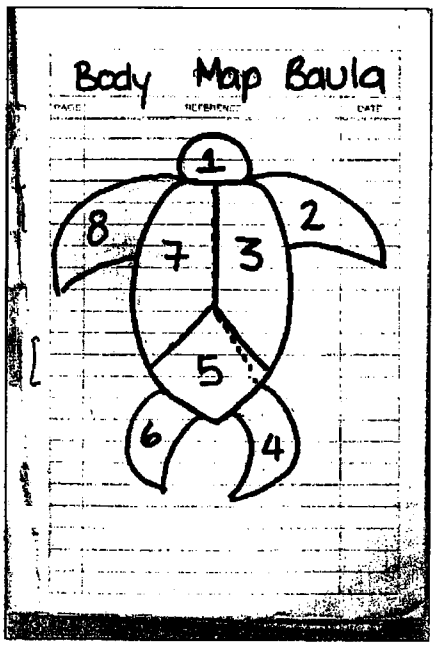
- The date and the time that the track was encountered including the time the nesting process ended and whether the turtle is encountered before having gone into the oviposition.
- The initials of each member of the team should be written for future reference.
- The distance in metres of the mile marker to the north (marked every 200 meters down the beach) and GPS position of each nest.
- The position of the turtle while is nesting (if she is facing **N**orth, **S**outh, **E**ast or **W**est) and the position of the nest on the beach in relation to the vegetation: if it is located in the Vegetation (**V**), in the Border (**B**) or Open Beach (**O**).
- Activity in which the turtle was found: Emerging, Selecting nest site, Digging body pit, Digging Egg Chamber, Ovipostion, Covering Egg Chamber, Disguising nest site, Returning to the sea
- If the nesting process has been observed a count of the number of eggs with yolk and yolkless eggs should be noted as well as the person's initials that will be doing the counting.
- Measurement of the Curved Carapace Length (CCL) and the Curved Carapace Width (CCW)
- Any cases of Fibropapilomas will be documented as well as their size
- Any other comment or anomalies that are observed should always be noted in the field notebook using the body map of the turtle and numbers.

See example below of body map:



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4. Tagging of Marine Turtles

For each individual encountered during the nocturnal patrol the following procedures should be followed:

- The females of the leatherback turtles will be tagged on the membrane located between the tail and rear flippers.
- Green, loggerhead and hawksbill turtles are tagged in the front flippers before the primary scale. If there is an Old tag hole (OTH) or an Old tag notch (OTN) then the turtle should be tagged in the first scale.
- All of the tags are positioned with appropriate distance to the border of the skin and the edge of the tag; this will prevent friction with the movement of the turtle.
- The females of the leatherback species will be tagged using Monel tags where as the females of the hawksbill, loggerhead and green turtles will be tagged using Iconel.
- Females will only be tagged after having completed the egg-laying process, while they are covering the nest or returning to the ocean.
- All tag numbers will be read and repeated verbally three times.
- If a tag has an unfamiliar sequence, the back of the tag should be read to see where it has come from.
- If previous tags exists, old tag notches or old tag holes should be noted.
- The following will be documented for all tags which are removed due to incorrect tagging: destroyed and recovered (when the tag is returned to the FC) and destroyed and lost, when the tag is misplaced on the beach.
- The following will be documented for all tags which are removed due to trauma to the area or a growth over the tag: Removed and recovered, when it is removed and returned to the FC and Removed and lost when it is misplaced on the beach.
- If a tag has been placed in an area with trauma or infection or where the skin has grown over the tag, it should be treated with Betadine Solution (Yodo) found in the equipment container with the tags. We will not be removing as we risk causing more trauma to the area.
- The tag with the lowest number should be tagged on the right flipper and the higher of the two numbers on the left.
- The turtle should only have ONE set of tags. Also, tags should be of the same type: Monel and Iconel tags are made of different metals and may create an electronic current when in the water, thus hindering the turtle.

A. <u>Data</u>:

As seen in IV.3.C., all data should be written and new data taken as follows:

- Number of the Monel or Iconel tags.
- If there is evidence of old tag holes or old tag notches.

- If there is trauma or an infection due to tagging.

5. Biometric Data

For each individual, the curved carapace length should be taken with metric tape. (*see figure 3*):

A. Curved Carapace Length (CCL):

Minimum Curved Carapace Length:, For Leatherbacks, the metric tape is placed at the beginning of the carapace, extending along **the side of** the central dorsal ridge, until the tip of the caudal projection. In green, hawksbill and loggerhead turtles measurements should be taken along the centre of the carapace; for greens this means that the measurement is taken until the beginning of the wedge at the back of the carapace and NOT until the outer ridge.

B. Curved Carapace Width (CCW):

This measurement is taken along the widest area of the carapace.

All of the measurements of the length and the width of the carapace of nesting females should only be taken after they have completed the oviposition, never before. The measurements should also be taken if the nocturnal patrol team is sure that the turtle has nested and is now returning to the ocean.

In the case of half moons, females may, in the best judgement of the RA, be halted to conduct all measurements, including tagging when necessary.

It is recommended that the measurement of females be taken by two people and reviewed three times. If the female is missing part of her carapace or there is some sort of malformation of the carapace, this should be noted on the data sheets. During measurement in either case the carapace should be measured as though there are no missing pieces or mis-formations. If there is a disparity between the data of more than 3 mm, the team must conduct 3 more measurements to ensure the dimensions of the turtle fall within these parameters.
It is very important to be sure to clean off the carapace of any sand before you begin to take the measurements.
The RA is responsible to review all the information taken down on the data sheets thus ensuring that quality work and reliable data has been collected.

C. Data Sheets:

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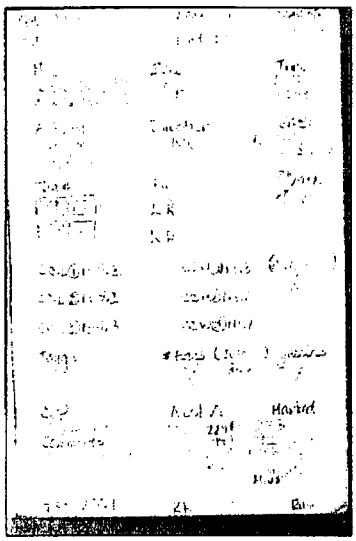
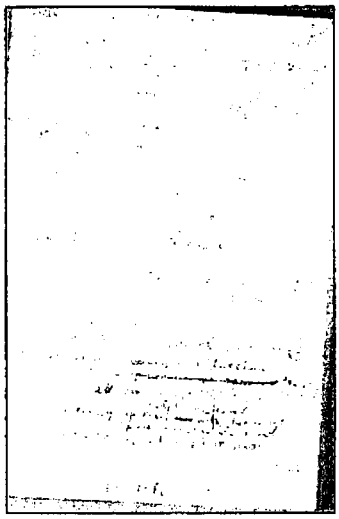
As seen previously in IV.3.C. and IV.4.A. all data should be written and new data added as follows:

- The width and the curved carapace length should be written in the data sheets in **centimetres**.
- If there is a deformation or pieces missing in the carapace, flippers or any other relevant data it should be noted using only the numbers of the different body parts as indicated in the body map in the front of every night book. To avoid confusion, numbers for body parts should be written with a circle around them.

See example below of field book:



Leatherback Field book



Green Field book

6. Determining hatchling success rates and emergence success

Nest marking will be done for all leatherback females that are encountered before or during oviposition. During the green season, depending on how many females are nesting, only one nest (when many turtles are nesting) or as many nests as possible (during very quiet nights) will be marked. There is a separate field book and kit for the triangulation of the nest. Depending on the size of the patrol group, the volunteer/RA who will be counting the eggs will also be in charge of holding the measuring tape when triangulating. Flagging tape will be attached to the vegetation at 3 points (North, South & Center).
The following data will be collected during nest triangulation:

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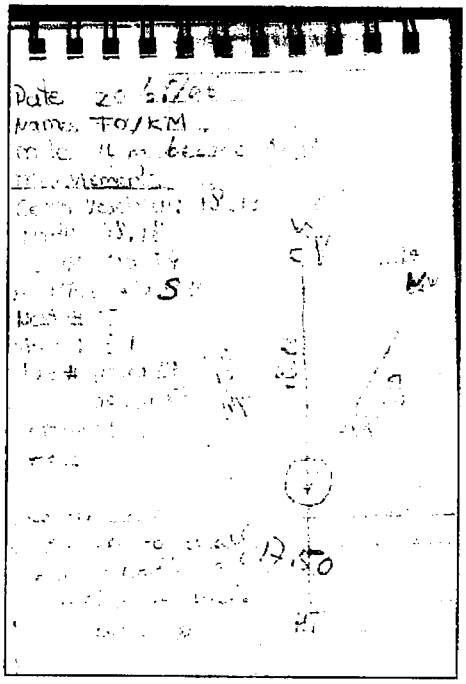
Date: *Date of triangulation*
Names: *Names of those on patrol*
Mile: *Nearest northern mile marker*
Species: *Species of Turtle ie: Cm, Dc, Ei, Cc*
Tag Number: *Tag numbers if turtle was tagged or is a re-nester*
Distance measurements from nest **in metres** to the following.
Vegetation: *Centre marker in triangulation*
North: *Northern marker in triangulation*
South: *Southern marker in triangulation*
High Tide: *High Tide Line*
Nest Code: *Code given to nest i.e.: Caño Palma 15*

Example of field book for triangulation:



During the morning census, triangulated nests should be checked to determine if they have possibly been predated by crabs, dogs or whether they have been eroded by the sea or covered by the vegetation.

After 75 days (for leatherbacks) or 65 days (for green, hawksbill and loggerhead turtles) have passed since the date they were laid, or 5 days after hatchling emergence, excavation will begin to determine hatchling survival/success and the success of emergence from the nest. During the excavation, latex gloves are to be worn at all times and due to the nature of the work one of the research assistants should be present at all times. See Morning Census protocol for further details on

the process.

7. Collecting human impact data

The Project coordinator should visit the two hotels in the area, Vista al Mar Lodge and Turtle Beach Lodge and ask to receive the following information from the establishment:

a) Number of rooms and available beds in each hotel.
b) Number of guests housed in the hotel during the nesting season.
c) Number of night tours that took place during the nesting season and how many guests participated in the tours.

Each night patrol should take note if any of the following is observed:
a) If there are more than 10 participants in tour groups.
b) If physical contact has been had between the turtle and the tourists.
c) If white light or flash photography was used on the beach.

Due to the increase of human activity on the north beach (workers returning home from work, tourists or locals out walking the beach), one night every month during new moon, all flashlights with white or red light observed during the night walks should be noted in the data sheets.

8. Collection of physical data

The ambient temperature as well as rainfall and relative humidity are taken on the beach. The ambient temperature and the relative humidity are taken with the handheld Skymaster machine (at the beginning of the first patrol) and rainfall is measured in front of Vista Al Mar Lodge at 6 a.m. and 6 p.m. on a daily basis.

Storms, Lighting and Patrols
During certain times of the year there is a higher risk of lighting and rain. To ensure the RA's and volunteers' safety the following should be observed when the patrols are faced with bad weather and/or tropical storms.
In the case of heavy rain the RA may decide to take shelter or abort the patrol. If there is lightening groups are advised to continue patrols close to the vegetation, or, when there are fewer than seven seconds between lighting and thunder refuge may be taken at Turtle Beach Lodge & Vista Al Mar Lodge (remember this is for a limited time and patrols are to portray appropriate behaviour). Should the situation become dangerous the RA will decided to return to base. All radio and electronic equipment is to be turned off.

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Behaviour of Research Assistants and Volunteers

It is important that the patrols are conducted In an orderly fashion and that volunteers are guided properly. In this way injury to RA's, volunteers and the sea turtles is prevented. The use of cell phones, IPods, MP3 Players, Discman's, photographic and video equipment on the beach at all times during a patrol. White light is not allowed and only 2 flashlights will be allowed out with each patrol.

RA's, volunteers and others accompanying the project are not allowed to drink alcohol the day of a walk to ensure judgement is not hindered.

Food may be brought to the beach but only consumed when the patrol is on break or rest stop.

Volunteers are not to walk ahead of RA's nor assume responsibility for checking the turtles. The pace of the walk is kept even so that all team members can keep up. No one is to be left behind when walking.

Talking is to be kept to a minimum and the RA reserves the right to ask any volunteers to be keep noise to a minimum. If anyone if found in breech of these norms, the FC and the RA on duty along with other staff members reserves the right to remove anyone from continuing the patrols for a determined period of time.

Guides, Tourists and Patrols

TO BE COMPLETED FOLLOWING MEETINGS

V. MANAGEMENT OF DATA COLLECTED

All the collected data should be kept at the Caño Palma Biological Station and is analyzed by the Project biologist and the Project coordinator. All the data should be transferred from the data sheets to electronic copies in the computer of the Caño Palma Biological Station the day after the night patrols.

During the nesting season safety backups will be made on a weekly basis and at the end of each nesting season. The final copies will be sent to the COTERC office in Canada. The results of the Leatherback Monitoring Project 2006 will be compiled by both organizations working on the project: COTERC and GVI.

The data collected during the nesting seasons will be made available to the CCC (Caribbean Conservation Corporation) based in Tortuguero and to MINAE (Ministerio del Ambiente y Energía) whose offices are based in Guapiles as well as to all interested parties.

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VI. FIGURES

Figure 1:

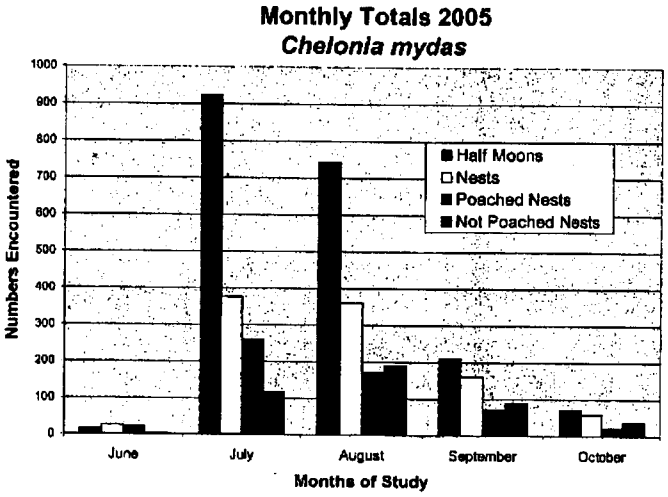

Figure 2: