



Protocol of NAST-Net for monitoring Sea turtle nesting activity

The final version, April 2022



Summary:

This NAST-Net simplified protocol was prepared to standardize nesting monitoring methodology across the northern African region. They were edited based on existing protocols used in the Mediterranean region, particularly the MedPAN protocol (Rees, 2020), and other protocols used in Asia (PROFAUNA 2022). These protocols are written in a simple way to collect most information with minimal time and effort. At a later stage, this document will be published also in Arabic and French to broaden its usage in the NAST-Net region.

Introduction:

Three species of Sea turtles are occurring regularly in the Mediterranean waters of North Africa, these are the Loggerhead turtle *Caretta caretta*, the green turtle *Chelonia mydas*, and the leatherback turtle *Dermochelys coriacea*. The main nesting species of Sea turtles in North Africa is the loggerhead turtle. Nesting occurs mainly in Libya, with smaller but increasing nesting activity in both Egypt and Tunisia. The other two species are using the region's marine waters for feeding and overwintering purposes. Green turtle nesting activity exists in Egypt, with two nests reported recently in both Tunisia and Libya.

Monitoring of nesting beaches to count nests and protect clutches, in addition to taking data from nesting females are essential requirements for any successful monitoring program, to assess the importance of a site as nesting habitat. In these simplified protocols, the reader will learn how to identify species based on their nesting crawl tracks, how to classify nesting tracks, and how to find the egg chamber of a nest, how to fill nesting data form and excavation data form, how to translocate a clutch to protect it from an imminent threat. Additionally, you will learn the role of temperature in determining the gender of hatchlings and how to monitor nest temperature to estimate the sex ratio.

We hope you will find this protocol useful and help NAST-Net to disseminate it for wider use across the north African region.



In the basic required beach monitoring protocol, the following protocols are advised:

1. Species identification Protocol:

To recognize what species of Sea turtles exist in the target site. Two species of turtles nest in North Africa, the most common is the Loggerhead turtle, in Libya and Tunisia, with minor nesting incidents in other countries, and the green turtle, which mainly nests on the Egyptian Mediterranean coasts, with accidental records from other countries. The leatherback is not a nesting species in the region (Figure 1). Knowing the species ID can be by direct observation through night patrolling of beaches for nesting females, or simply using their tracks on the beach, as each species has a different track pattern (Figure 2).

Species name or name code, i.e. common names: loggerhead/green/leatherback,

Scientific names *Caretta caretta* / *Chelonia mydas* / *Dermochelys coriacea*,

Species codes: Cc / Cm / Dc.

Follow the key to identify the species of turtle encountered:

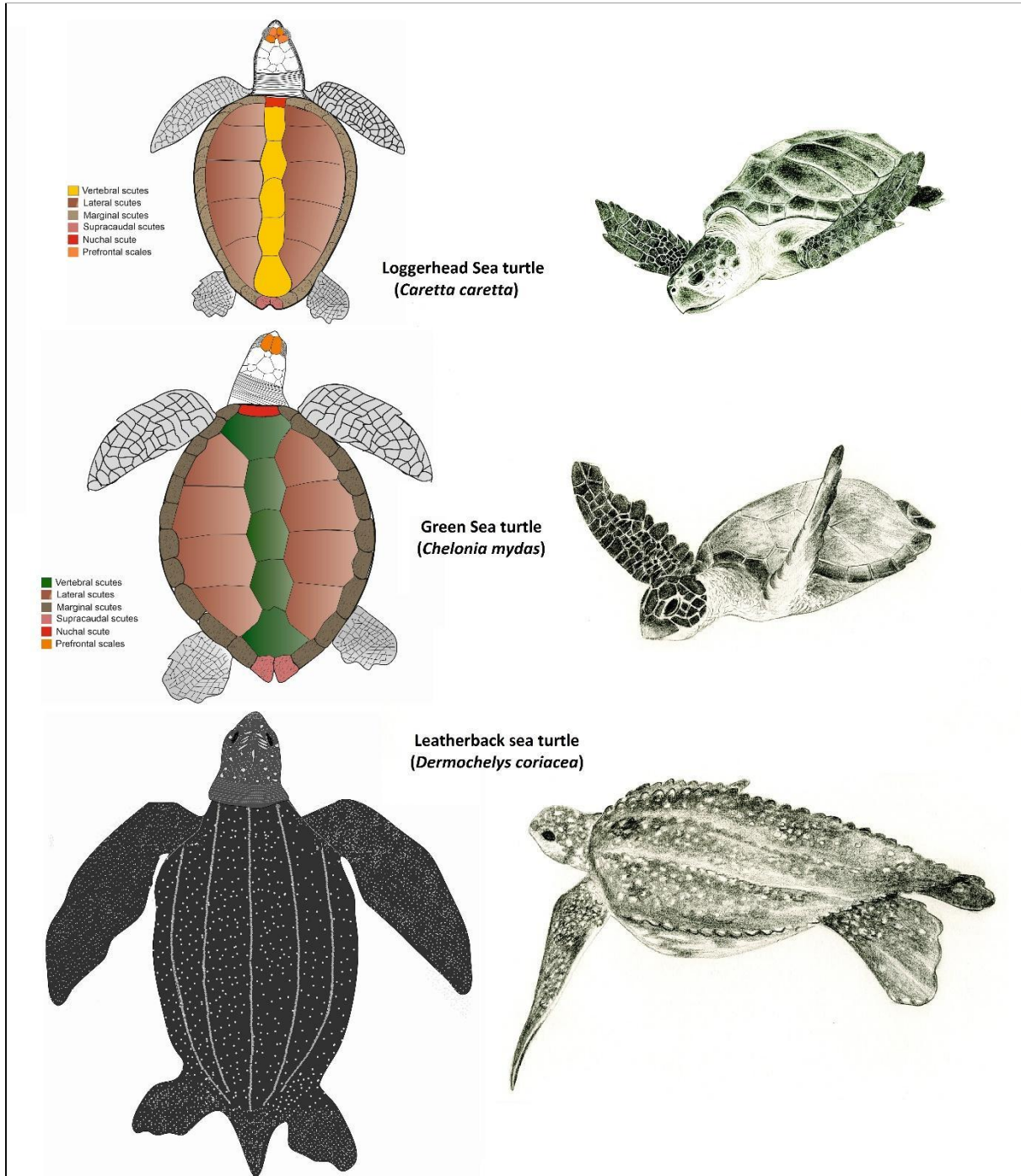


Figure 1. The three species of Sea Turtles in the NASTNet region: Loggerhead (top), Green (middle) and the Leatherback Sea turtle (bottom)



Figure 2. The tracks of Loggerhead (left) and Green (right) sea turtles. Adapted from <https://www.conservationtales.com/turtle-tracks.html>

2. Nest and track identification Protocol (adapted from MedPAN)

The main step in the monitoring of nesting activity is to identify turtle tracks, and the nest, if nesting has occurred. This step is conducted to determine which turtle species has emerged to nest and whether or not the emergence resulted in clutch depositing. If eggs have been deposited, they may be tracked down and properly preserved.

Three types of tracks are common for any nesting beach; a) False track (FT): a track of one or more nesting attempts without deposition of any clutches, ending by returning to the sea. This track can take several shapes (Schroeder and Murphy, 1999), but all represent tracks of failed nesting attempts. b) The U-track (U) is a track of emergence from the waters to the beach and returning directly to the waters without any nesting attempt. Usually, because the beach is not suitable or due to disturbance by human or natural predators; and c) the Nesting track (NT) is the track that successfully ended with a nest (Figure 3). In other instances, the nesting track disappears due to human tracks on the beach or the winds, and only the nest can be located. In this case, we assume the nest as NT as well. Tracks should be prospected during early or late hours of the day, as sunrise or

sunset can create shadows that help to make the track clearer. Night patrols can be used if tagging activity or other female turtle sampling protocol is applied.

Nesting tracks are important to calculate nesting activity during the study period (week, month, or the full season) on a selected stretch of nesting beaches. All tracks should be added and the total is divided by the length of the monitored beach, to obtain average nesting activity. Nest density is calculated by averaging the NT and N by the total length of the monitored beach.

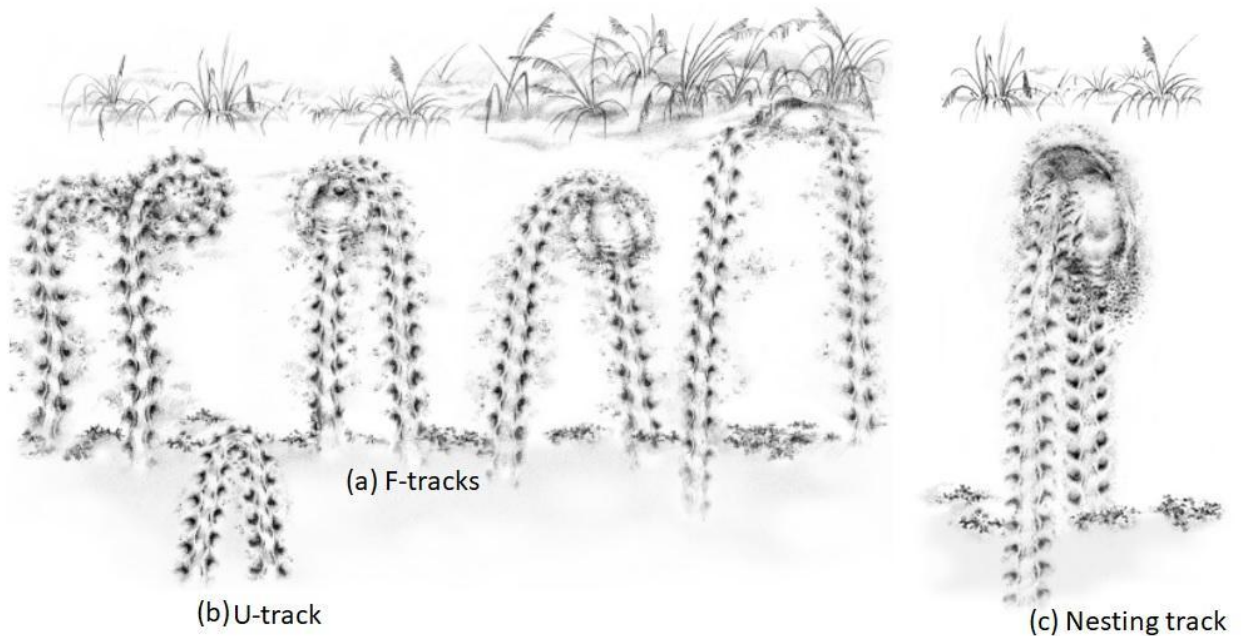


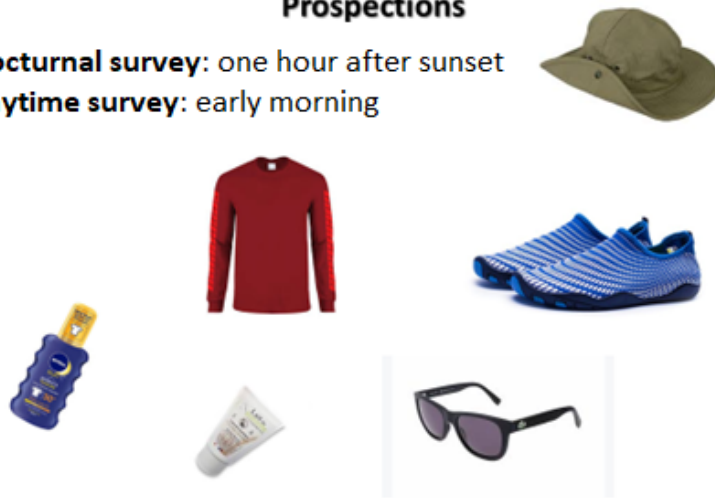
Figure 3. Types of Loggerhead Sea turtle *Caretta caretta* tracks on a nesting beach (modified from Schroeder and Murphy (1999).

Equipment: A notepad and a pen, a GPS, a 50-meter tape measure, and a camera are also useful to have.

Prospections

Nocturnal survey: one hour after sunset

Daytime survey: early morning



Prospections

Necessary material





Locating clutches

The features of the nest site, particularly the entering (up) and exiting (down) tracks, may be utilized to determine where the clutch will be located. A loggerhead clutch is usually found approximately 50cm down the camouflage's midline. A green turtle clutch is usually located less than a meter back from the end of the camouflage where it changes into the secondary body pit. There are two basic approaches for determining the specific location of the clutch after an approximate estimate of its location has been ascertained. "The first method involves slow and methodical localized digging (use small diameter test holes and dig with the hands only—no implements!) to confirm that eggs are present or absent. The second method involves the use of a small, narrow-diameter probe stick which is gently inserted into the sand to test for the softened area of sand directly above the clutch. Extreme care must be exercised when probes are used so that eggs in the clutch are not punctured. Either technique should be used only by experienced, well-trained, and properly permitted personnel. Care should always be taken to ensure that clutch "finding" techniques are not taught (either directly or by indirect observation) to persons who may illegally [take the eggs]." Schroeder and Murphy (1999).

Protection measures

If natural predation is high (the case of most North African sites), a plastic 5 cm mesh can be placed at the top of the nest chamber, to prevent mammalian predators (foxes and stray dogs) from accessing the egg chamber. Putting a label indicating a protected species nest can also help to protect it from vandalism and indirectly raise awareness of high human activity on nesting beaches.

Reporting

Typical reporting covers the start and latest date of nesting for each species. Number of nests and non-nesting emergencies (as well as derived nesting success, i.e., the number of nests divided by the number of tracks multiplied by 100), nest densities (number of nests per kilometer of beach), and a map showing nest and track sites. Data on nest numbers and locations should be given regularly.

Frequency of protocol

Ideally, the beach monitoring should be conducted daily, if possible (pending beach length, accessibility, and manpower), however, a weekly survey can be used if the beach location is remote with less human activity, so the tracks and nests can still be located.

Note: The tracks should be erased by scuffing the sand surface or otherwise marked so that it is not confused with a new track during a later survey.



3. Nest translocation Protocol (*adapted from PROFAUNA, Indonesia*)

Purpose

To move a clutch of eggs (whole nest) from its natural position which cannot hatch successfully (due to proximity to wave line, or disturbance by local inhabitants or natural predators) to a location where safer incubation is assured.

Equipment

- Bucket or Foam box
- measuring tape
- Gloves or plastic bag
- Notebook and pen

Note: Moving a nest must be done BEFORE 10 a.m. or AFTER 6 p.m. Cover the eggs during transport.

Removing the Eggs

Please follow with care these steps in transferring clutches:

1. Carefully dig up the top egg. Measure the distance (cm) from the top of the sand to the first egg and write it in the notebook
2. Prepare the bucket by placing a 1-inch (2.5 cm) layer of sand on the bottom.
3. Use surgical gloves or a **CLEAN** plastic bag to remove the eggs one at a time, from the nest to the bucket. Count the eggs as you move them to the bucket.
4. DO NOT rotate eggs when transferring to the bucket. Hold the eggs VERTICAL.
5. Sand should not be placed between the eggs. Keep the eggs free of sand.
6. When the bottom egg has been removed from the nest, measure the distance from the top to the bottom of the nest and record it in a notebook.
7. Measure the width of the egg chamber (usually about 25 cm wide).
8. DON'T FORGET TO COUNT THE EGGS.



Transport of eggs

1. Hold the tray firmly while moving it to the new location to avoid damaging or disturbing the eggs.
2. The eggs must move as fast as possible. Cover them and keep them out of direct sunlight.

Building the new nest

It is important to remember that turtle nests ARE SHAPED LIKE PETS. This form must be replicated in the construction of the new nest, otherwise, the mortality rate will be very high.

1. Place the new nest well above the high watermark of the spring, preferably in a shady area where there are no roots.
2. The sand should contain some moisture.
3. Excavate the new GLASS-SHAPED nest, using the measurements taken from the original nest.
4. VERY CAREFULLY, using gloves/a plastic bag, place the eggs from the top of the bucket into the nest box, being careful not to tip them over. The eggs should be touched, with a minimum of sand.
5. COUNT THE EGGS AS YOU PLACE THEM IN THE NEW NEST and record them in your notebook.
6. When all the eggs are in the nest chamber, cover the nest below the surface with damp sand (do not put hot sand on the surface of the eggs) and press down firmly.
7. Note the position of the new nest.



4. Beach Temperature Monitoring Protocol (adapted from MedPAN)

Purpose

Beach sand temperature can affect the hatchling sex, higher (>29.0 C) would result in more females, whilst lower temperature can produce more males. Monitoring beach sand temperature can infer the potential outputs of incubated clutch hatchling gender.

Equipment

Miniature temperature or temperature/humidity data loggers, that can record nest sand temperature for the duration of the incubation period.

Method

1. Temperature loggers should be buried in the sand in May, before or at the start of the nesting season.
2. Temperature sampling intervals should be set between 30 -and 60 minutes.
3. The loggers should be buried at the deepest point (40 Cm for loggerhead turtles, and deeper for green turtles).
4. The burial site should be located at a greater distance from the seashore than a conventional nest (>15m).
5. At least one logger should be present on each beach, and ideally, one logger should be present every 2 kilometers on longer beaches.
6. Each logger's GPS position should be recorded, to retrieve it at the end of the monitoring period.
7. Recorded raw data should be sorted (after retrieval of data logger), to obtain daily mean temperature. Each temperature profile should be associated with a location and GPS coordinate.
8. Researchers can use nest data to estimate the likely sex ratios produced in the study region.



Annex

Nesting / Hatching datasheet

Name of staff:

Date:/...../..... (DD/MM/YYYY) Survey Type: Day Night

Hour:

Beach name: Beach sector:
.....

Track and nest

Turtle species: Loggerhead Green

Nesting track type : U-TRACK N-TRACK FALSE TRACK OLD NEST

Track width (cm) :..... GPS coordinates: N
..... E

Nest number: Nest status: Natural Predated human poached

Protection measures: Protected *In situ* Translocated

Distance to the sea:

Temperature Datalogger: Yes No If Yes, Number:

Notes:

Nesting female

Female seen laying? Yes No

Turtle measurements CCL: CCW:

Tagged: Old tag? Yes No If Yes, Tag number: (left) (right)

New tag: Tag number left..... Tag number right

Female condition (any injuries



/epibionts).....

Photos Taken: Yes No **Comments:**

Hatching / Nest Excavation

Actual Hatching date: **Depth to top eggs (Cm):** **Depth to bottom eggs (Cm):**

Total No. Hatched eggs: **No. Infertile eggs:** **No. Broken eggs:**.....

Unhatched eggs/Early mortality (E): **Late mortality (L):**

Dead in the egg embryo:..... **Dead in the nest embryo:**

The incubation period (hatchling emergence date – Laying date):

Fertility rate (fertile eggs/ Total eggs)*100:.....

Hatching success (hatched/total eggs) *100:

Emergence success (Hatched – Dead in the nest)/total eggs *100:

Notes :

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References cited:

1. Schroeder, B. and Murphy, S. (1999) Population surveys (ground and aerial) on nesting beaches. In Research and Management Techniques for the Conservation of Sea Turtles (eds K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois & M. Donnelly), pp. 45–55. IUCN/Species Survival Commission Marine Turtle Specialist Group Publication No. 4, Washington, DC, USA.
2. Rees, A. (2020). Marine Turtles in MPAs: a monitoring and management guide. MedPAN Collection. 68 pp
3. PROFAUNA (2022). Guidelines for Relocating a Sea Turtle Nest. Online at <https://www.profauna.net/en/sea-turtle-campaign/sea-turtle-conservation-perancak-beach-bali/guidelines-relocating-sea-turtle-nest> accessed 1 February 2022.