



United Nations
Environment Programme



Mediterranean Action Plan
Barcelona Convention



*The Mediterranean
Biodiversity
Centre*



Republic of Lebanon
Ministry of Environment

National Training Session on monitoring techniques of marine turtles

Tyre Nature Coast reserve (Lebanon) , 3-7 July 2018

Population and habitat assessment

National Training Workshop on monitoring technique of Marine Turtles

Tyre (Lebanon), 3-7 July 2018

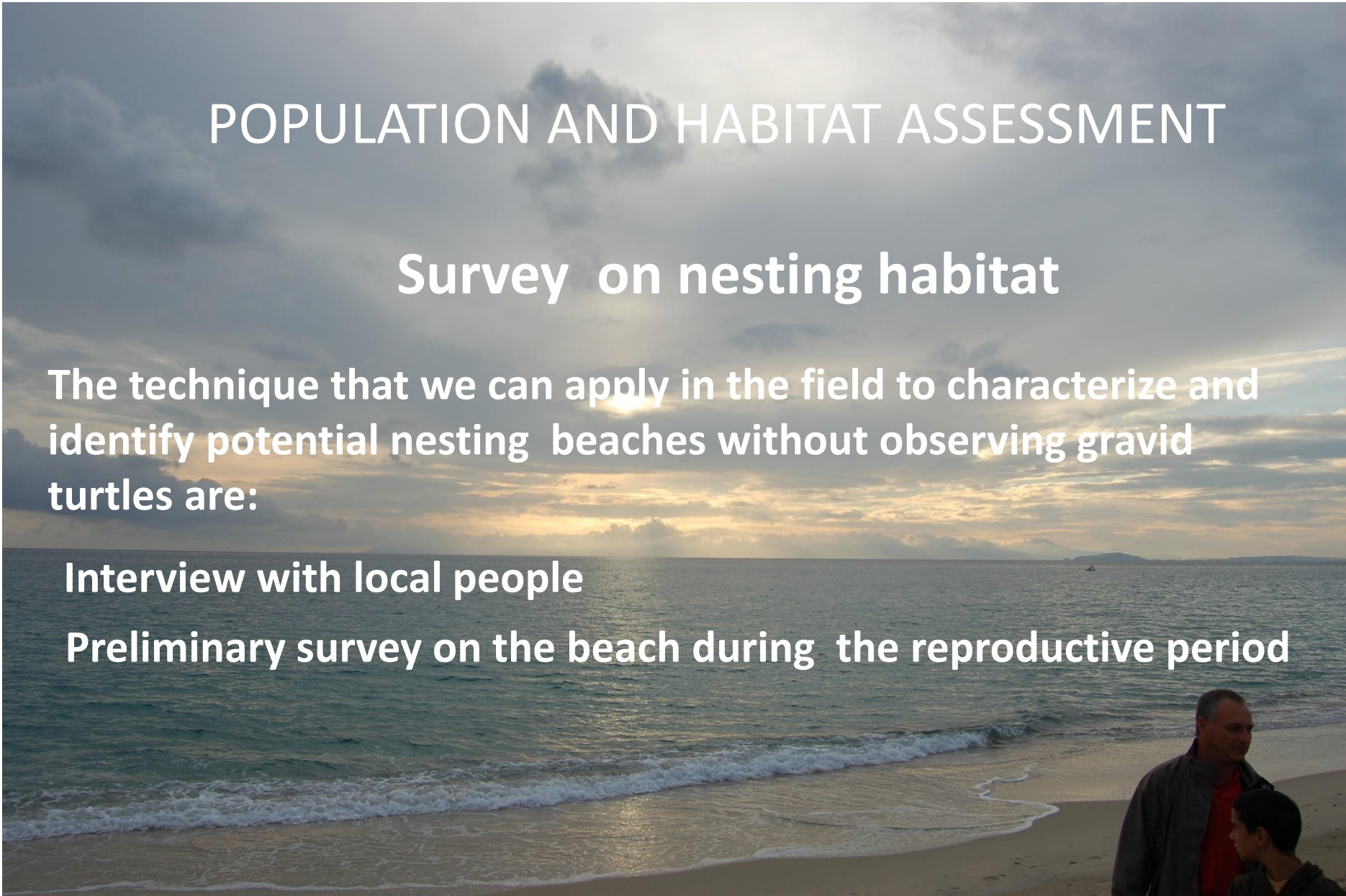
POPULATION AND HABITAT ASSESSMENT

Survey on nesting habitat

The technique that we can apply in the field to characterize and identify potential nesting beaches without observing gravid turtles are:

Interview with local people

Preliminary survey on the beach during the reproductive period



Questions to ask for basic information

- Have you ever observed sea turtles in your area?
- Have you ever seen a sea turtle laying eggs on the beach?
- If so , in what season?
- Have you ever observed the presence of sea turtle eggs at market?

If an area could be a nesting site , you have to go and visit in the right season

- **First of all observe if there are: remains of crawls, nesting pits, or egg shells on the beach.**
- **Also note if there are : depredation of eggs , erosion or inundation of nests.**
- **Take note too: dominant vegetation type, beach composition (calcareous, volcanic, grain size, sand compaction) and profile , typical wave conditions , and the presence of rivers and estuaries.**



Nesting Habitat

Once you have ascertained that a particular area is a nesting site, you can begin a more detailed analysis.

One or two two-week periods of ground patrol (preferably nocturnal) during what is believed to be the peak nesting or hatchling season should be sufficient to confirm nesting, estimate nest density, verify species , and detect the main threats.

Foraging habitat

Studying sea turtles in water is much more difficult than studying them on land.

Some techniques can help to identify a potential feeding grounds, without observing resident turtles.

Foraging habitat



The technique that can help to identify a potential feeding ground without observing resident turtles are:

Interviews with the residents including fishermen, ferry or supply ship crews, Coast Guard or other marine patrol officers and divers

Definition of the Area

To be asked

Have You ever observed the presence of big (adult) or small (Juvenile) sea turtles in nearshore or offshore areas?

In what season and where ?

Are there any turtle catches data in the fisheries statistics?

Are there any turtle parts for sale at market of sea products?

To investigate on:

- Relevant biotic and abiotic characteristics (algae, corals, flora and fauna)
- Ecological data, including water temperature, current flows, depth and geological structure

Foraging Habitat

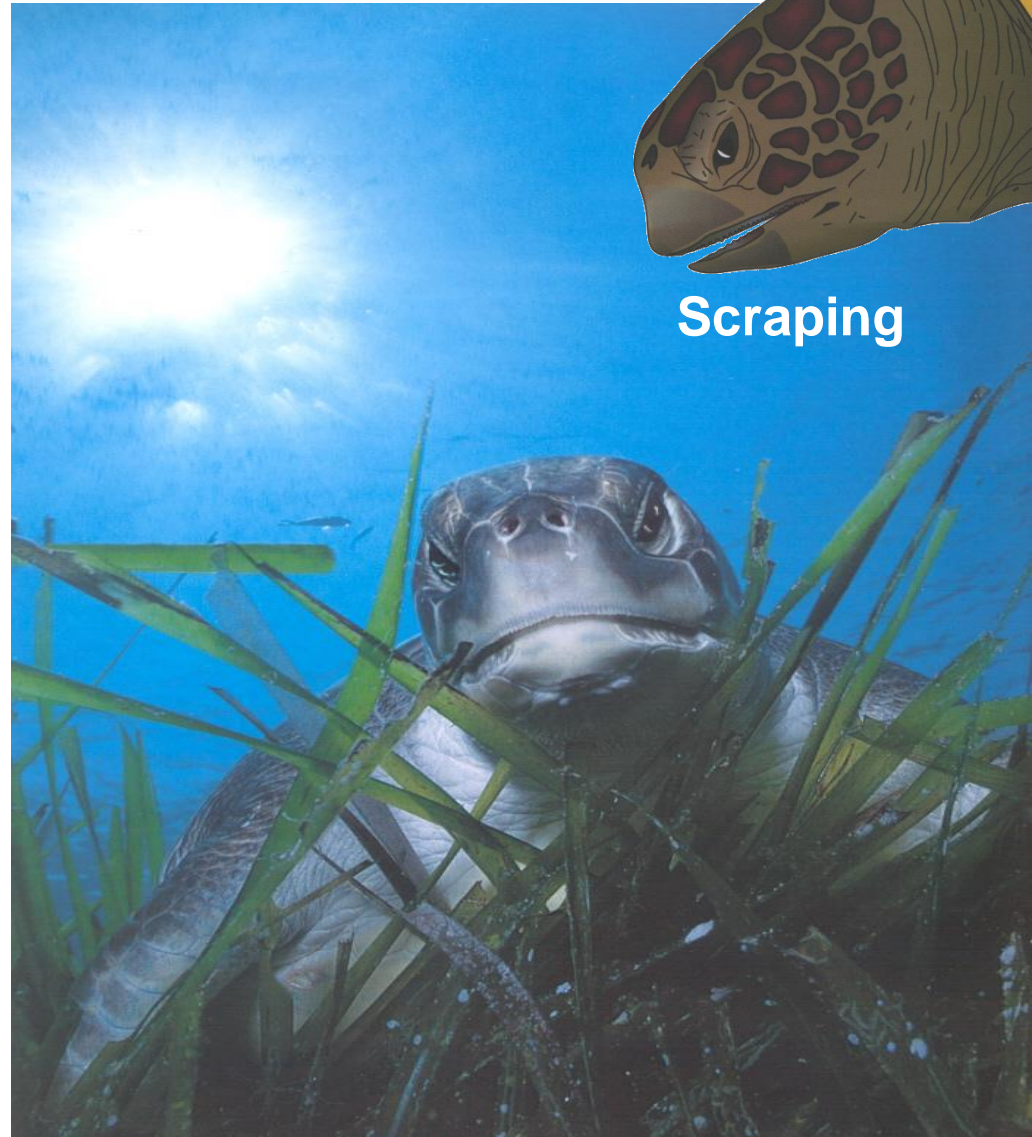
- If no data were available you could visit the suspicious habitat by boat and examine the area first hand using snorkel or SCUBA gear
- Standard methods, such as linear transects should be employed for rapid assessment of potential areas

Foraging habitat

Information available about the benthos can help to predict a feeding ground

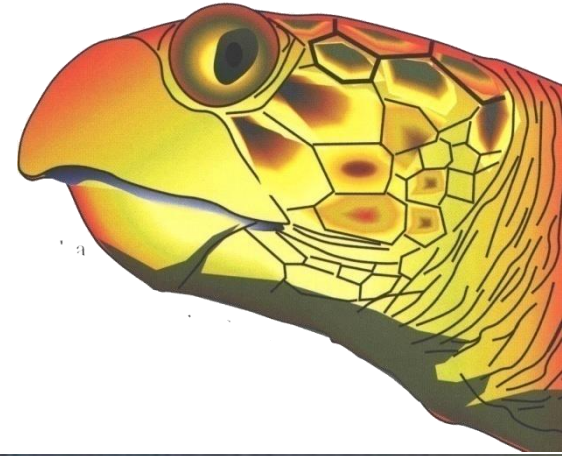
Green turtles are herbivores, the presence of sea grasses is a good indication

Adaptation morphologique
de la bouche au régime
végétarien



Foraging habitat

Loggerheads are omnivores with preference for crustaceans and mollusks



In many cases , key species are food items



Foraging Habitat

In stranded sea turtles stomach contents and the identification of ingested prey can suggest the environment that the turtle has frequented.



In the Gulf of Naples the favorite prey of *Caretta caretta* is the Sea horse



The Sea horse is abundant in the Gulf



Stomach contents of a loggerhead

Hippocampus hippocampus

Elements for the characterization of the local population

Nesting beach surveys

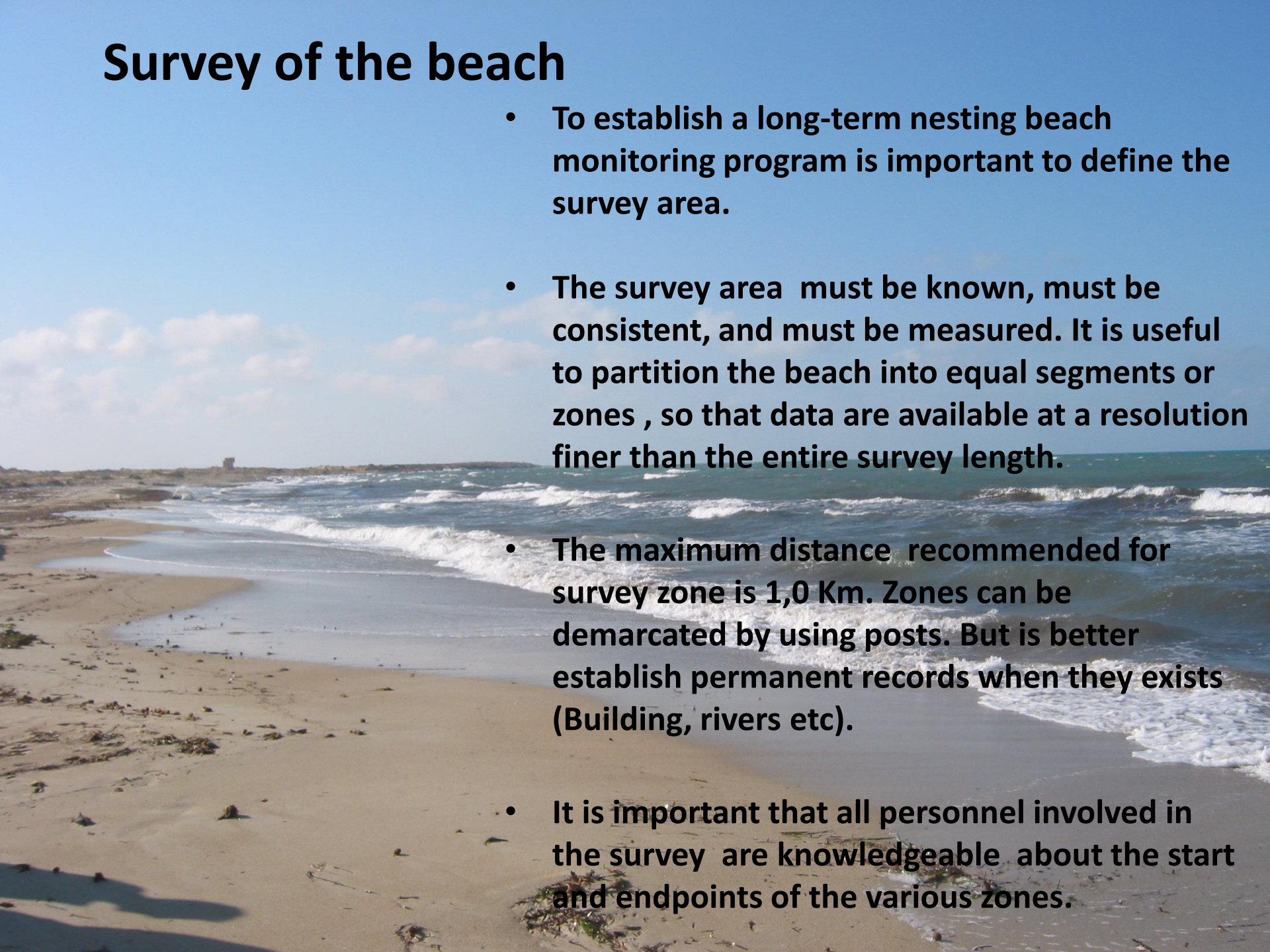
Studies of nesting females ;

Nest success

These elements provide information to the number of nests deposited annually, the number of nesting females that are reproductively active annually and annual nest productivity.

Survey of the beach

- To establish a long-term nesting beach monitoring program is important to define the survey area.
- The survey area must be known, must be consistent, and must be measured. It is useful to partition the beach into equal segments or zones, so that data are available at a resolution finer than the entire survey length.
- The maximum distance recommended for survey zone is 1,0 Km. Zones can be demarcated by using posts. But is better establish permanent records when they exists (Building, rivers etc).
- It is important that all personnel involved in the survey are knowledgeable about the start and endpoints of the various zones.



Survey of the Beach

The data to be collected during the beach patrol are : identification and counting of the false tracks and identification and counting of those with visible “body pit”.

It is recommended to follow the shoreline while looking for tracks. Emerging turtles leave tracks that start from the shoreline of that night.

Tracks from previous nights do not usually from this strip but higher up,as tides and waves usually cover up the traces



Checking for turtle tracks should be done early in the morning at the same time each day. The low sun angle in the early morning casts a deep shadow behind the tracks and makes them highly visible

Survey of the Beach

Keep in mind that :

Wind can obliterate the tracks depending upon intensity, duration and direction;

Rainfall can obscure crawls and confounds crawls identification and Tides and waves will also make difficult to distinguish between old and fresh tracks.

Human Activity on the beach obscure crawls, body pits and other nest field signs.

It is important to have an understanding of the level of human activity on your survey beach

Organize a single data sheet very simple that all observer of that beach can use

Appendix I
[SAMPLE] Nesting Beach Ground Survey

Daily Report Form

Date of Survey _____ Beach Name _____

Observer(s) _____

Time Start _____ AM PM Time End _____ AM PM

Beach Zone or LAT/LONG	Species 1 (e.g., <i>Caretta</i>)		Species 2 (e.g., <i>Chelonia</i>)		Species 3 (e.g., <i>Dermochelys</i>)	
	#Nests	#False Crawls	# Nests	#False Crawls	#Nests	#False Crawls
A						
B						
C						
D						
E						
F						
G						
etc/						
Total						

Comments

Barbara Schoereder example

Locating the nest before the emergence



To locate the eggs a short , thin stick of about 1 cm in diameter and 70-90 cm in length is pushed gently into the sand at various places in the nest.

The sand “gives” easily where the egg chamber is

Locating the nest before the emergence



On most beaches it is not usually possible to locate the egg-chamber in Green turtle nests with a stick, as the chamber is fairly deep, unless a layer of sand (30 cm), is removed first.

Loggerhead nests do not present such a problem.

Locating the nest before the emergence



For the Green Turtle the egg-chamber is usually about 2 meters from standing point of the nest where the turtle began digging. For the loggerhead is 0,50-1m

Locating the nest before the emergence



It is good practice to mark the location of the chamber with a stick

Protecting *in situ* eggs



Protecting *in situ* eggs



To Protect nests *in situ* you put a protective cage on top of the egg-chamber.

Half this cage (about 20 cm) has to be buried in the sand to stop foxes or other predators.

The cages used to protect eggs *in situ* have a slit about 3 cm in height for about half the circumference of the cage, at sand level, to allow hatchlings to escape to the sea.

The cage is buried with the slit facing the sea.

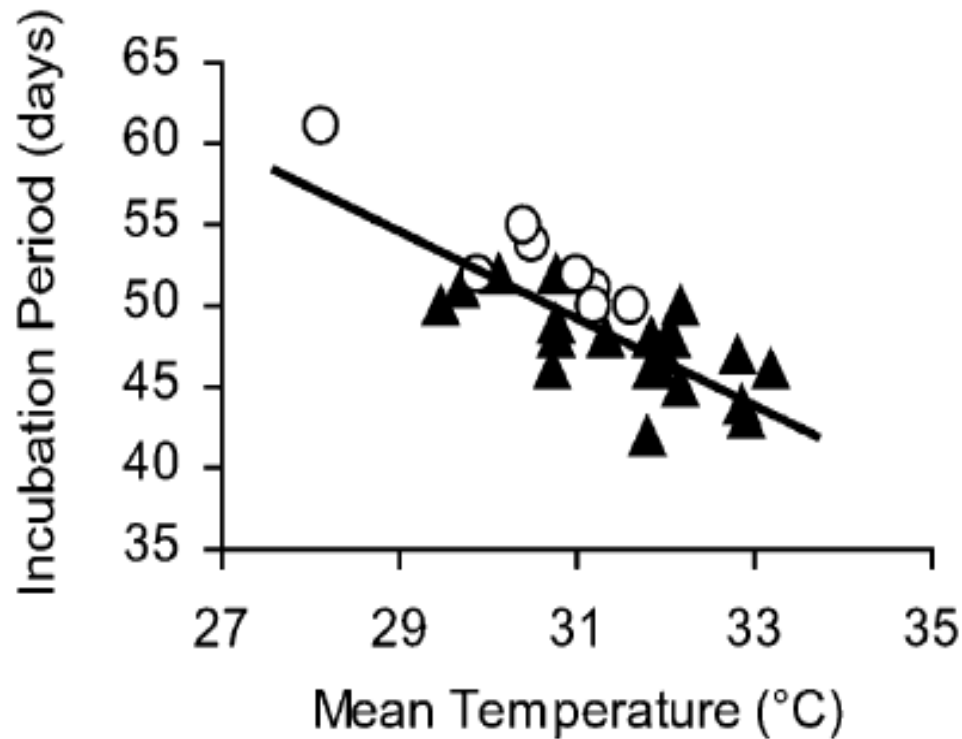


Temperature monitoring

- Incubation takes about seven weeks may vary from 44 to 60 days or more, varying with the incubation temperature
- Incubation temperature is very important as it determines the sex of embryo.
- The sex of embryo is determined at about the third week of incubation.
- High temperatures of about 31-32 °C or more result in the production of females while Low temperatures of less than 28 °C result in the production of males
- For Green the pivotal temperature is between 28,75°C and 29,75°C For Loggehead 30°C.
- The pivotal temperature apparently varies somewhat on a global scale

Temperature effects

The duration of incubation is inversely proportional to the temperature



Goodley et al. 2001

Temperature monitoring

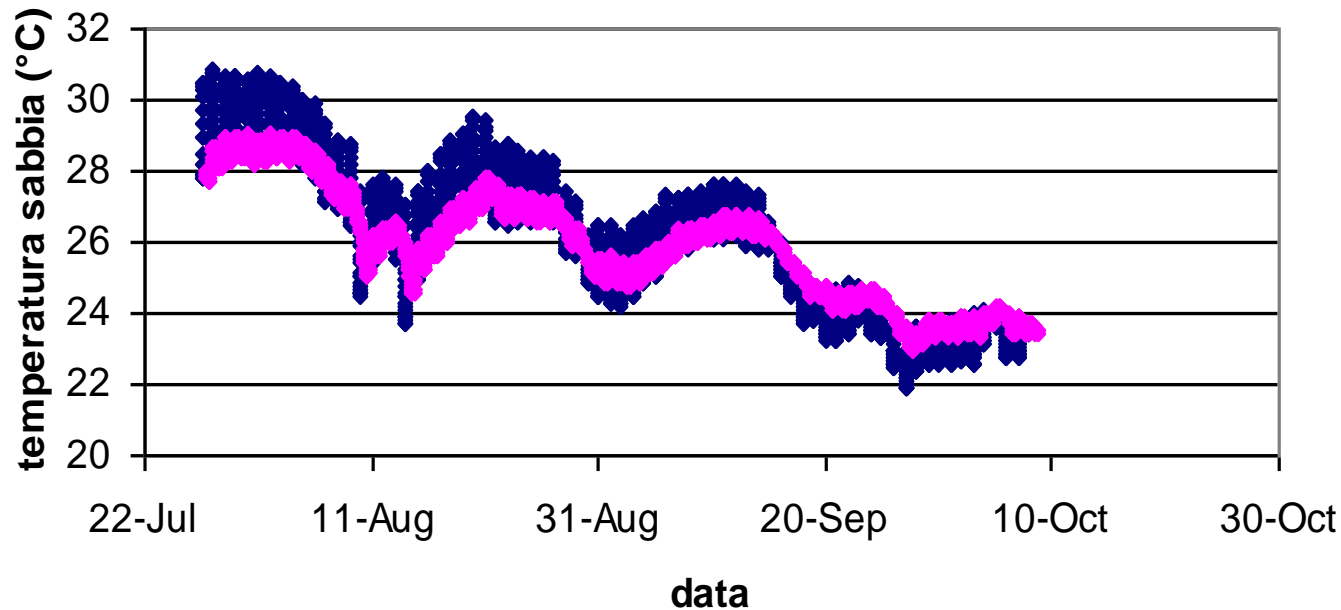


Thermistor probe

Temperature monitoring

To monitor the temperature without disturbing the nest, measurements are taken out in proximity of the nest, each day every six hours, at 30 cm and 50 cm depth

Ogliastro - 30 cm + 50 cm



Temperatures of the sand are taken manually with a hand-held digital immersion thermometer.

The temperature in the egg chamber can be monitored with a thermistor probe or with a data logger placed on top of egg-chamber. Such work require an accuracy of at least $0,1^{\circ}\text{C}$



CEFAS and i-Button DS1923-FS data storage tags

Tools needed



Thermistor probes and hand-held digital immersion thermometer.
Graduated metal rod for digging at 20 and 50 cm in the sand next the nest
Data sheets

Nest ready to hatch



At moment of hatching in the sand a crater is formed



The first hatchling emerging

Nest contents

Upon completion of hatching, three days after the first hatchlings emerged from the sand , the nest should be dug up to take stock of situation and to rescue the odd hatchling that may be stuck in the nest.



Categories and definitions of nest contents to be recorded on data sheets

E=Emerged	Hatchlings leaving or departed from nest
S=Shells	Number of empty shells counted
L=Live in nest	Live hatchlings left among shells
D=Dead in nest	Dead hatchlings that have left their shells
UD=Undeveloped	Unhatched eggs with no obvious embryo
UH=Unhatched	Unhatched eggs with obvious embryo
UHT=Unhatched term	Unhatched apparently full term embryo in eggshell or pipped with yolk material
P=Depredated	Open,nearly complete shell containing egg residue

Hatching success refers to the number of hatchlings that hatch out of their egg shell %

$$\frac{\text{n. shells}}{\text{n.shells+n.UD+n.UH+n.UHT+n.P}} \times 100$$

Emergence success refers to the number of hatchlings that reach the beach surface

$$\text{Emergence success\%} = \frac{\text{shells- (L+D)}}{\text{Shells +UD+UH+UHT+P}} \times 100$$

P=Depredated eggs



The shell of eggs depredated in nest usually contain a quantity of egg material



Unhatched =UH

**Unhatched eggs with obvious
embryo**



Unhatched = UH



Unhatched egg with embryo



Measuring and weighing Hatchlings

Ten hatchlings from each clutch should be measured and weighed to establish hatchling size

S. Z. "Anton Dohrn" - NAPOLI

Before weighing the hatchling
Remove the sand gently

SCL should be measured using caliper



Tools and materials needed

Digital scale with precision to one hundredth of gram

Caliper with precision to the tenth of millimeter

Soft brushers

Disposable gloves

Scalpel

Meter

Thermal boxes for the maintenance of hatchlings in the first 5 minutes after the emergence

Thermal boxes for the maintenance of small groups before release

Nursery for the development of hatchling with the yolk sac

Sterile containers for sampling storage

Plastic bags

Camp tent

Field table

Torches

Thermal box : polystyrene box at least 30 cm high with bottom covered with damp sand taken from the nest

Eggs handling and hatchings



Transplantation of nests



Sometimes it necessary to move the nest to a safer place because placed too close to water's edge

Transplantation of nests



After the location of egg-chamber has been ascertained, a layer of sand should be removed

Lower down it is preferable to work with the hands and wear disposable gloves

Transplantation of nests



The eggs should not be moved if they have been laid more than 12 hours before the transplantation or before 25 days

Transplantation of nests



Turning the eggs will break the extra-embryonic membranes and blood vessels and kill the embryo.

Transplantation of nests



Eggs can be moved in a narrow, vertical cooling box preferably square or cylindrical

Transplantation of nests



Cooling boxes should have single handle and be about 30 cm in height and 25 in diameter. Larger and smaller boxes are not recommended.

Eggs should be transported with a minimum of vibration

Replanting



Egg-chamber should be dug in moist sand after the top layer of dry has been removed.

Remplanting



The best way to estimate the depth of the chamber is by measuring the depth of the chamber of “natural” nests

Remplanting

The eggs should be recounted as they are placed in the new egg-chamber.

Care should be taken not to turn eggs while transferring them to the new chamber

Remplanting



When the eggs have been put into place they should be covered carefully with the moist sand which was removed in making the egg chamber, making sure that as little sand as possible falls between the eggs

Releasing of hatchlings



Hatchlings should be released high on the beach at level of the nest to safeguard possible Imprinting mechanism

Releasing of Hatchlings



Lights should be out when release are made

Releasing of hatchlings



Nests which are hatching under cages should be checked frequently for day emergence
If the hatchlings remain in the sun in the cage even a few minutes they will die very quickly

Diseases

Often the hatchlings that remain trapped in the nest are too weak to emerge and in many of these the yolk sac has not yet been absorbed.



In these cases do not release these hatchlings but hold them for a few days placing them in a box of polystyrene with a bed of wet sand. The box should be placed in a sheltered place away from the sun.

Always keeping wet sand by spraying seawater

Head starting



At the beginning they were kept in a tank with a little sea water kept at a temperature of 25°C

Head starting



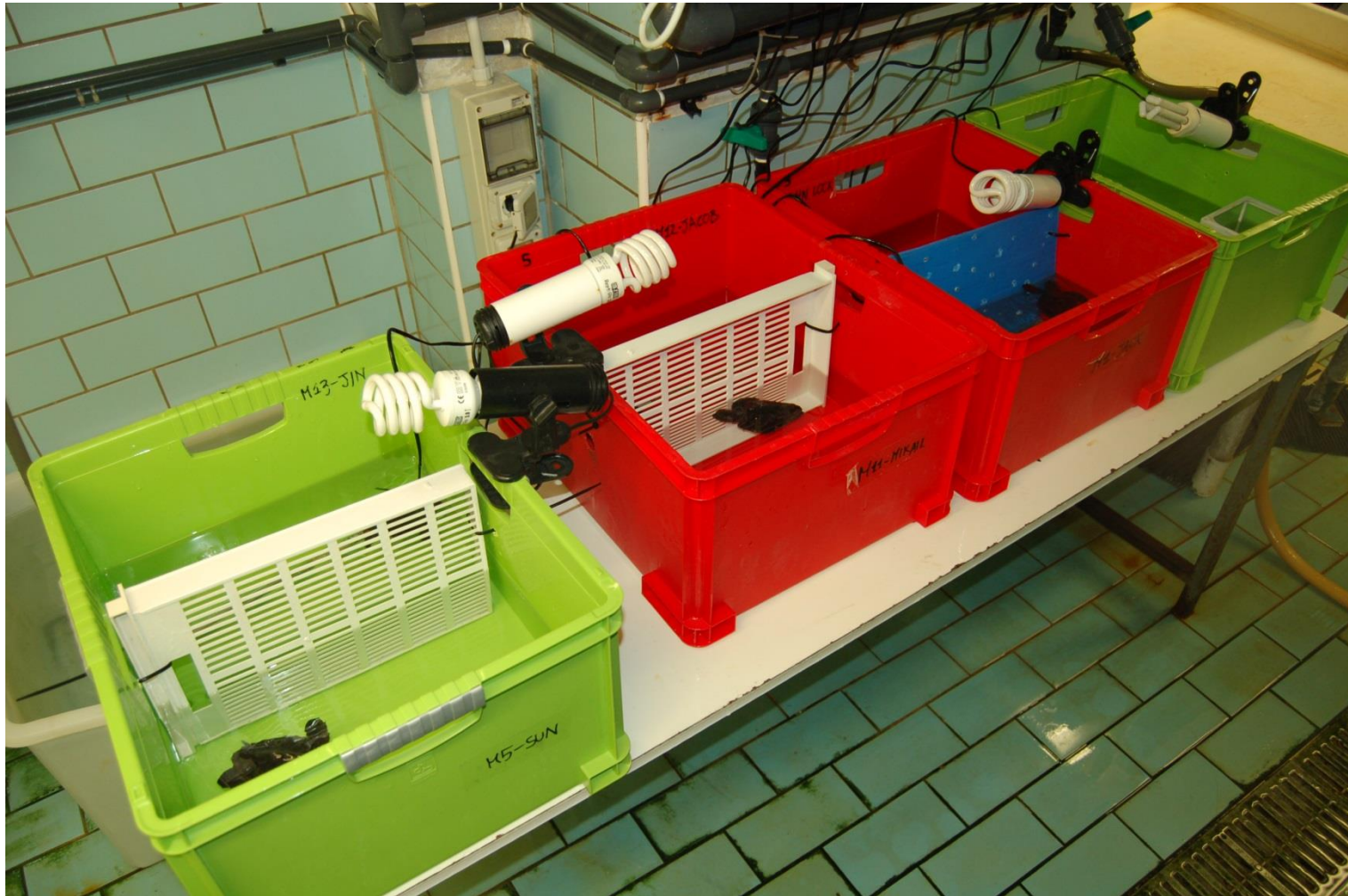
They were fed, one by one, several time a day,
with shrimp and mollusk sauce.

Head starting



Later with the help of tweezers with rounded tips , they began to eat tiny bits of food

Head starting



They were put in the nursery tanks (31x62x29) filled with sea water and equipped with internal filters and 50 watt thermostats to ensure temperature between 27-30°C

Head-Starting



After few months they started eating alone
fish and cephalopods eggs and were able to
swim quickly





Head starting

Every week the weight was checked to make sure that the growth was regular.



Head starting



In the second year of life they were released in South Italy