

## WP1 – Activity 1.2

### OUTPUT 1.1

#### Transnational monitoring guidelines

<b>Work Package</b>	<b>WP1: Joint development of the transnational strategy for the monitoring sentinel species</b>	
<b>Activity</b>	<b>Activity 1.2: Creation of the coordination model and monitoring protocols in the EUSAIR Region</b>	
<b>Name of output</b>	<b>1.1 Transnational monitoring guidelines</b>	
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## MONITORING OF MARINE SPECIES ALONG THE ADRION REGION

This document contains a set of protocols for the monitoring of the sentinel species of SAMESEA project (*Tursiops truncatus*, *Caretta caretta* and *Monachus monachus*), created *ad hoc* or adopted from existing guidelines. The protocols are focused on the mentioned species, but are applicable for a larger number of cetaceans and sea turtles of the Mediterranean Sea. When possible, a multi-tiers approach was adopted, with the aim to allow the application of the protocols with different levels of in-depth data collection and analysis, depending on the availability of resources, equipment and experience.

The document is structured as follow:

- Main document: monitoring protocols;
- Annex 1: supporting document for data collection;
- Annex 2: printable data collection forms;
- Annex 3: database Excel files.



## MONITORING PROTOCOLS

### 1. FREE-RANGING MONITORING

#### MONITORING AT SEA (Cetaceans, Sea turtles, Mediterranean monk seal)

Monitoring of free-ranging animals can be done:

- Opportunistically: when animals are spotted by chance during other research activities or monitoring (**Tier 1**)
- Through dedicated survey: the monitoring is conducted through planned surveys effort, covering a pre-determined survey area (**Tier 2**)

Photo-identification techniques can be applied whenever possible (**Tier 3**, only for cetaceans).

When monitoring is conducted in a systematically and in a long-term way, is useful to assess:

- The size and the status of populations
- Population distribution and movements
- The population habitat uses
- Changing overtime

This protocol represents a reduced and schematic version of **Resolution 6.13** edited in 2016 by ACCOBAMS. For further details you can download the complete version of the document: <https://accobams.org/documents-resolutions/guidelines/guidelines-for-comprehensive-population-estimates-and-distribution/>

### EQUIPMENT

#### 1. Platform

Dedicated vessels: e.g., inflatable boats, motorboats, research vessels

Opportunistic vessels: scheduled ferries or shipping company vessels used for citizen science or collaborative research.

#### 2. Observation tools

Binoculars: to spot animals on the surface from a distance (Figure 1a)

Compass: for orientation and route definition (Figure 1b)

GPS: to precisely record the position of sightings (Figure 1c)

SLR camera: with a zoom lens (80–200 mm or 100–300 mm, or equivalent) to focus on near and far animals, allowing them to be photographed for photo-identification (Figure 1d).





Figure 1 - Basic observation tools necessary for monitoring the species of interest.

## PROTOCOL

Monitoring at sea consists of visual surveys conducted through opportunistic (**Tier 1**) or systematic (**Tier 2**) surveys according to the monitoring approach adopted and the objectives of monitoring activities. On board, trained observers (able to recognize target species) are positioned at the bow or in elevated positions for a wider view. For Tier 1, just an observer is needed. For Tier 2 at least 2 observers are needed. See Figure 2 for observer positions on the boat.

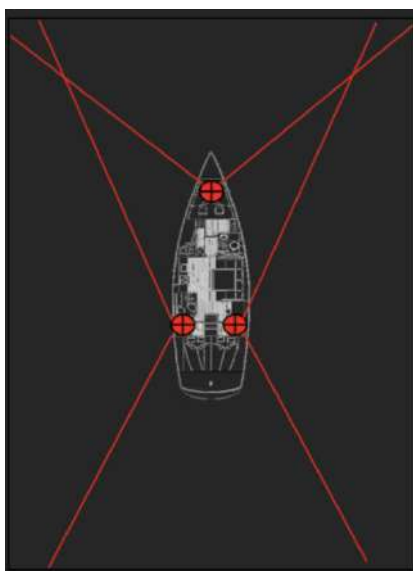


Figure 2 - Schematic example of the positioning of observers on the vessel. The position and the number of observers may vary depending on the type of vessel used for monitoring.

Starting the monitoring activity, the following data should be collected (**Annex 2 – Effort form**):



- Date and starting/end time of the survey
- Location coordinates the start and end of the transect (route traveled)
- Vessel details
- Environmental conditions (see **Annex 1**)

Once the animals are sighted, the following information should be recorded as reported also in **Annex 2** - Sighting form: date and time, location coordinates, depth, species, number of individuals and calves, as well as, if possible, observed behavior, images for the photo-identification purpose and interaction with human activities (see next Chapter, Interaction with human activity monitoring).

All the data recorded in the Effort and Sighting form during surveys, have to be reported in the dedicated database (**Annex 3**).

### **Tier 3 (Cetaceans):**

During sea monitoring, photo-identification (photo-ID) of cetaceans can be employed as a non-invasive technique for individual recognition. This method relies on the assumption that each individual within a population is unique and possesses distinct physical characteristics, **markers**, that allow reliable identification over time.

Application:

- Take a clear image of the dorsal and/or caudal fin depending on the species. Generally, for small-medium cetaceans (e.g., *Tursiops truncatus*, *Grampus griseus*) the photo-ID target is the dorsal fin; for large cetaceans (e.g., *Balaenoptera physalus*, *Physeter macrocephalus*) the target is the caudal fin.
- Frame the photograph perpendicular to the animal's body, ensuring the entire body is captured, and take multiple consecutive shots of both the right and left sides of the dorsal fin/dorsal and ventral sides of the caudal fin. To perform an accurate analysis, consider only photos with a quality rate of 1, 2 ( see **Annex 1**).
- Create a catalogue containing all recognized individuals using photo-identification techniques. Each individual in the catalogue must be assigned a unique code (e.g., *TT001* for *Tursiops truncatus* individual number 1). The catalogue should be updated as soon as possible after each survey. Newly collected photographs must be compared with the existing images in the catalogue to identify matches or new individuals. When applicable, replace older images with newer, higher-quality photographs of the same individual to ensure the catalogue remains accurate and up to date.

Distinguishing markers used for identification may include (see **Annex 1 for photographic examples**):

- Shape of the dorsal or caudal fin
- Pigmentation pattern
- Scars, patches, nicks, notches, and other distinctive markers.



## LAND-BASED MONITORING (Cetaceans and Mediterranean monk seal)

Land-based monitoring surveys provide a useful source of information on species presence, especially in areas where the sea can be observed from a vantage point (raised high above sea level, panoramic view of sea surface). This protocol was created during the SAMESEA project thanks to the collaboration of *Montenegro Dolphin Research (MDR)* and *Morigenos - Slovenian Marine Mammal Society*.

### EQUIPMENT

Depending on the equipment available, it is possible to monitor using only binoculars with a built-in compass (the observation range would be more limited), binoculars with a long-range reticle, or a theodolite.

#### Tier 1:

- Long-range reticle binoculars (25/40x100 magnification) + tripod stand (Figure 3a)
- Hand-held reticle binoculars (7x50 magnification) with built-in compass (Figure 3b)
- Watch (for timekeeping)
- Pencil
- Land observation form (**Annex 2**)
- Land sightings form (**Annex 2**)

#### Tier 2:

- Theodolite (Figure 3c)
- PC with Pythagoras software  
[https://www.researchgate.net/publication/239612037\\_Pythagoras\\_Theodolite\\_Cetacean\\_Tracking\\_User's\\_manual](https://www.researchgate.net/publication/239612037_Pythagoras_Theodolite_Cetacean_Tracking_User's_manual)

(a)



(b)



(c)



Figure 3 - Observation tools necessary for land monitoring of species of interest.



## PROTOCOL

To carry out land-monitoring, it is necessary to select a high observation point above sea level in advance to offer a panoramic view of the sea surface.

### **Tier 1:**

Using binoculars with a reticle and integrated compass can be a more accessible and economical approach. This approach involves several steps:

- Place the binoculars with long-range reticles on a tripod (the reticles must be level with the horizon)
- Complete the land observation form (**Annex 2**)
- Scan the observation area to ensure uniform coverage
- Once the animals have been sighted, keep your eyes trained on the target, determine the azimuth of the observation point from the binoculars, describe the observation point, and estimate the distance
- Complete the land sighting form (**Annex 2**)
- When the survey is complete, return to the observation form (**Annex 2**) and record the time the observation stopped

Information regarding the observation point's height, direction of observation, number of grids above the horizon, and magnification can be used later to map the animals' location. However, the accuracy of the determined position decreases as the distance from the observer increases; therefore, the estimated distance of the sighted animals must also be considered when analyzing the data.

### **Tier 2:**

A **theodolite**, a high-precision optical instrument, is used to observe and record the positions and movements of cetaceans and to detect the presence of human activities (e.g., vessels) within the survey area. By measuring horizontal and vertical angles, trusting on the identified elevation and azimuth during the set up. The theodolite allows for the detection and tracking of animals at long distances. These angular measurements can be converted into geographic coordinates, providing accurate spatial data on animal locations, behaviour, group cohesion, movements, and human presence at sea.

This monitoring approach using theodolite, involves several steps:

- Place the theodolite on a stable tripod at the selected observation point
- Ensure the instrument is precisely leveled using both horizontal and vertical leveling procedures before starting the survey, and check stability regularly during operations



Figure 4 - The horizontal leveling (A) and the vertical leveling (B) of the theodolite.



- Find your selected reference point and set your theodolite to it for accurate geographical coordinates
- Begin with a systematic and slow scan of the survey area, moving from left to right along the horizon and then back. Complete the land observation form (**Annex 2**)
- Continuous scanning is required throughout the survey, both when animals or vessels are present and when the area appears empty, since sightings may occur unexpectedly. Considering the demanding nature of the work, observers should rotate to maintain concentration and accuracy

When a cetacean group is sighted:

- Align the theodolite telescope's reticle with the center of the dolphin group
- Once the position is determined, read the horizontal and vertical angles to the laptop operator, who records them using Pythagoras software
- Each survey will provide the geographic coordinates of the group at that time and any other human presence. Additionally, you can record the accurate speed of dolphin groups which can help you to identify the behaviour.
- For each dolphin species observed, a serial group number (encounter number) must be assigned and used consistently throughout the survey
- Complete the land sighting form (**Annex 2**)
- The laptop operator uses Pythagoras to log:
  - The angle readings
  - Automatically computed geographic coordinates
  - Estimated object speed and direction
  - Additional contextual data (e.g., group cohesion, swimming direction, behavior, and presence of vessels)
- After each sighting, verify data accuracy by reading the animal's speed from the software to assess whether theodolite observer or laptop operator made errors in their reading estimates generated by Pythagoras with expected values, identifying potential errors in readings or instrument alignment

All the data recorded in the during surveys, have to be reported in the dedicated database (**Annex 3**).



## INTERACTION WITH HUMAN ACTIVITIES MONITORING (Cetaceans)

The aim is to record the interaction between cetaceans, fishing activity and marine traffic. The following protocols can be applied opportunistically during the at sea- and land based-monitoring of free-ranging animals. For the equipment, see the chapters *Monitoring at sea* and *Land based-monitoring*.

This protocol was created *ad hoc* during the SAMESEA project, with the collaboration of *Blue World Institute (BWI)* and *Montenegro Dolphin Research (MDR)*.

### PROTOCOL FOR INTERACTIONS WITH FISHING ACTIVITY

Interactions with fishing activities are assessed during at sea monitoring.

#### INTERACTION WITH TRAWLERS

##### Tier 1:

- Approaching the trawlers to approximately 200 m behind
- Stopping the boat and waiting for 5 minutes (as dolphins usually perform long dives while foraging behind trawlers). This is logged as “checking trawler” on the form (see Annex 2)
- If dolphins are present near the boat and clearly following the trawler, the sightings are logged as “trawler sightings” and the interaction can be recorded.

##### Tier 2:

- When animals are spotted near trawlers, the behavior of dolphins is logged as “active trawler follow” (ATF) or “passive trawler follow” (PTF):
  - ATF means dolphins are performing long dives, maintaining the position relative to the trawling boat, approximately where the trawl net is;
  - PTF means dolphins are following the trawling boat but not actively foraging (usually when they remain near the trawling boat between haul and re-deployment of the trawl net).

#### INTERACTION WITH PURSE SEINERS

- Approaching the purse seiners approximately 200 m in distance;
- Stopping the boat and waiting for 5 minutes. This is logged as “checking purse seiner”;
- If dolphins are present, photo-identification data collection begins, and the sightings are logged as “purse seiner sightings”;
- The behaviour of dolphins is logged as “purse seiner feeding” (PSF). PSF means that the animals are feeding around a purse seiner, clearly staying close to the fishing boat.

#### INTERACTIONS WITH AQUACULTURE

- Fish farms are checked by approaching to approximately 50 m, slowing down to approximately 8 knots and driving along the cages, looking for dolphins. This is logged as “checking fish farm”;
- If dolphins are present the sightings are logged as “fish farm sightings”.



Important to note, dolphins may display various behaviors while near fish farms, in fact, most of the time they are not actively foraging in close vicinity to cages. Therefore, there is no clear definition in terms of distance to cages when a sighting is considered as “fish farm sighting”. Often the group is socializing or milling in an area up to a few hundred meters from a fish farm. Thus, the definition of “fish farm sighting” is left to researchers’ discretion based on overall overview of the current situation (basically, dolphins don’t need to be actively foraging but it is obvious that they are there because of the fish farm).

For all the mentioned categories of fishing, if **Tier 3** of *Monitoring at sea* protocol for cetaceans is applied, photo-identification data can be collected.

## PROTOCOL FOR INTERACTIONS WITH MARINE TRAFFIC

Potential interactions with marine traffic can be measured during vessel-based surveys or land-based surveys, which allows to minimize the potential impact on animal behavior.

The potential impact of marine traffic is assessed through immediate observable reactions in the swimming direction of focal groups, with binoculars both from land and at sea (**Tier 1**) and with theodolite from land (**Tier 2**).

Marine traffic interaction data are collected when a group of individual encounter vessel:

- Whenever the presence of vessels is recorded during a survey (see **Annex 1** for vessel categories), the observer records the vessel distance from the observation point.
- Every time a vessel is sighted in the same area of the group of individual, the observer records the vessel category, number and the distance from the focal group (range between 0–100 m; 101–400 m):
  - If the vessel is within 400 m (trigger) from the focal group **Immediate Directional Reaction** response is measured (only in the case of one boat; if there are more than one boat the reaction is not recorded due to the challenge of identifying the cause of the reaction).
  - The record of response should reflect the movement direction, not the behavioral state. The changes on the swimming direction are recorded as below:
    - Positive → focal group approaches the vessel
    - Negative → focal group moves away from the vessel
    - Neutral → no clear directional reaction
    - Undetermined → the observers couldn’t determined if directional changes took place

All the data recorded in the during surveys, have to be reported in the dedicated database (see **Annex 3, At sea monitoring database or Land based monitoring database**, according to the type of survey conducted ).



## CAVE AND BEACH MONITORING (Mediterranean monk seal)

The following protocol is based on the IUCN document “A comprehensive set of monitoring and research techniques for the study and conservation of *Monachus monachus* in the Mediterranean Sea” (Quintana Martín Montalvo & Muñoz Cañas, 2025). For further information, see the document at the following link: <https://portals.iucn.org/library/sites/library/files/documents/2025-006-En.pdf>

### EQUIPMENT

Cave surveys equipment:

- Torch or headlight
- Current and waves check before entering the water, especially if accessing any cave
- Appropriate footwear to avoid slipping
- Helmet, especially if planning to drill the walls/install equipment
- If monk seals are present or there are signs they could be in proximity, cancel the survey.

### PROTOCOL

#### *Tier 1 (Beach monitoring)*

Monitoring beaches within the range of the Mediterranean monk seal is important for detecting presence, studying behavior, and identifying potential threats. Although the species predominantly uses marine caves for resting and breeding, some individuals may occasionally haul out on open beaches, making these habitats relevant for conservation monitoring.

Effective monitoring requires preliminary considerations:

- Select appropriate equipment according to site characteristics, accessibility, and safety conditions
- Conduct a geomorphological assessment of the area before monitoring to ensure researcher safety and to minimize disturbance to any seals that may be present
- Identify key beaches within the species’ known range that are used for resting, breeding, or transit
- Ensure geographical representativeness by including sites with varying environmental features and accessibility levels
- Record the presence of any disturbances or potential threats, such as human activities, litter, or coastal development

Data Collection:

- Perform visual monitoring of the beach from a designated observation site (e.g., an elevated area suitable for a topographic survey) or from a vessel, to minimize disturbance
- Where conditions and resources permit, install camera traps to ensure continuous or periodic monitoring of the area of interest
- For each observation, record the following information (**Annex 3**):
  - Date, time, and environmental conditions
  - Location coordinates
  - Number of seals observed
  - Behavioral observations (e.g., resting, grooming, interactions, disturbance response)
- Establish a regular monitoring program based on seasonal variations and the known behavioral pattern of the species



- Prioritize monitoring during critical periods, such as the pupping season, relying primarily on indirect methods (e.g., camera traps, remote sensing) to avoid disturbance

### ***Tier 2 (Cave monitoring)***

Cave monitoring is essential for detecting the presence of the animals, identifying active caves, studying behavioral patterns and habitat use, and for the identification of individuals

The first phase of cave monitoring involves selecting the caves where the equipment will be placed, selecting the most suitable camera trap, and positioning them:

- Ensure that cave ceilings and walls are stable enough to safely support the camera traps
- Evaluate the morphological characteristics of each cave to determine the most suitable camera trap placement
- Ensure secure anchoring of the camera, allowing for easy access for maintenance, orientation adjustments, and replacement if necessary
- Position cameras to achieve maximum coverage of the cave's interior while protecting equipment from damage, humidity, and theft
- Choose appropriate camera trap lenses based on the cave's geometry and monitoring objectives
- For preliminary surveys and presence/absence detection, it is advisable to use a low-cost camera trap with basic functionalities
- Depending on the results, this may later be replaced by a higher-performance model capable of collecting more detailed data
- For active caves, continuous image and/or video recording is recommended
- For inactive caves, monitoring frequency can be determined based on previous data and site-specific knowledge
- During the breeding season, entry into the cave should be avoided or minimized. If seals are present inside or near the cave, all monitoring activities must be suspended

#### Recording and Documentation

- Maintain detailed records of camera trap placement and lens usage for each cave, ensuring consistency in monitoring strategies
- Regularly assess the effectiveness of each camera trap lens in each cave

#### Recording Mode and Settings

- If the camera trap is equipped with time-lapse and motion sensor functions, consider using both simultaneously to maximize the likelihood of image capture
- Continuous video recording may be employed where cave conditions permit and/or in high-activity sites, depending on the specific monitoring objectives

### ***Tier 3:***

**Photo-identification** is a non-invasive technique used to recognize individual animals based on their unique and distinctive natural features. This technique allows for the identification, monitoring, and tracking of



individual seals over time, contributing to population studies, behavioral monitoring, and conservation management. The application of this technique can lead to the creation of a *photoidentification catalogue* (**Annex 1, Figure 4**). To this end, it is necessary to acquire distinctive, high-quality images, ideally showing both the sides and the ventral area. It is also advisable to take additional photographs from other useful perspectives (dorsal region, head, or back)

#### First Identifications - *Captures*

- Examine available images and video recordings from camera traps (in caves or on beaches), boat-based surveys, or citizen science contributions for distinctive morphological characteristics of each individual
- Document identifying features such as ventral spot patterns, lateral pigmentation and markings, scars or wounds on the dorsal area, head, or other body parts
- For each newly identified individual, create an “Identity card” (**Annex 1, Figure 5**) that includes:
  - The best available images
  - Drawings or sketches of distinctive features (for rapid comparison across life stages)
  - Information on first and last sighting dates
  - Date of last profile update, when better-quality images become available

#### Re-identification - *Recaptures*

- Compare newly acquired images and recordings against the existing catalog to detect matches with known individuals
- Ensure that each cataloged seal is represented by enough high-quality images to allow reliable identification
- Record all re-sightings to confirm whether individuals remain present, alive, or have moved to other areas
- Remove from the catalog any individuals that are confirmed dead or have been missing for an extended period

During continuous monitoring, document any new scars or changes in physical appearance. Monitoring should be conducted year-round. If this is not feasible, prioritize breeding and molting seasons, when seals are more likely to be present and stationary.



## 2. SEA TURTLE NESTING MONITORING

This protocol is based on the document "*Guidelines for recovery, rescue, foster care, and management of sea turtles for rehabilitation and scientific manipulation*" (ISPRA, 2013) and "*Guidelines for the long term Monitoring programmes for marine turtles nesting beaches and standardized monitoring methods for nesting beaches, feeding and wintering areas*" (UNEP/MAP-SPA/RAC, 2017).

For further information please refer to the following links: [https://www.rac-spa.org/nfp13/documents/02\\_information\\_documents/wg\\_431\\_inf\\_4\\_eng.pdf](https://www.rac-spa.org/nfp13/documents/02_information_documents/wg_431_inf_4_eng.pdf) and <https://www.isprambiente.gov.it/it/pubblicazioni/manuali-e-linee-guida/linee-guida-per-il-recupero-soccorso-affidamento-e-gestione-delle-tartarughe-marine-ai-fini-della-riabilitazione-e-per-la-manipolazione-a-scopi-scientifici>

### EQUIPMENT

*Deposition monitoring of nesting females:*

Marking and biometric equipment:

- Marking kit (metal flipper tags, PIT tags, applicators, and disinfectant)
- Caliper and measuring board (for carapace length and width)
- Headlamps or flashlights with red filters (to minimize interference)

*Nest individuation materials:*

- Drone (when available)
- GPS device (or smartphone with GPS) for precise recording of the nest's location
- Measurement tape
- Disposable gloves

*Nest protection materials:*

- Anti predator horizontal net
- Wooden posts and rope/string/shade cloth or metal nets to delimit the nest boundaries
- Informative infographic

*Relocation:*

- Disposable gloves
- Pencil
- Polystyrene box
- Wet sand

*Pre hatching monitoring:*

- Data logger for sand parameters (temperature, humidity)

*Hatching monitoring and assistance:*

- Headlamps or flashlights with red filters
- Wooden posts and shade cloth for the corridor

For hatchling manipulation:

- Disposable gloves
- Caliper



- Balance (grams measuring)

#### *Post hatching nest inspection*

- Disposable gloves
- Camera

## PROTOCOL

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Monitoring sea turtle nesting is essential to document reproductive activity, reproductive female abundance, nest distribution and hatching success.

### Tier 1

In Tier 1 only nest individuation and post-hatching inspection of the nest is expected. No monitoring and assistance is done during incubation and hatching period.

#### ***Nest individuation***

The deposition period starts in mid-April and ends in middle-August (region depending). It is recommended to begin monitoring weekly starting in mid-April (advancing by 5 days the following year if activity occurs before this date), with daily checks from mid-May to mid-August. Monitoring should continue with weekly checks after mid-August, in the event of late-season nesting activity.

**Early morning surveys**, looking for female tracks and body pit (**see Annex 1**):

- The monitoring is conducted by **foot patrols** or using drones
- All recent tracks of adult female turtles from the previous night should be recorded, both of confirmed and failed attempts of nesting. The confirmed attempts of nesting are individuated by the body pit (depression in the sand created by the female movement during the digging of the nest) and the covering of the eggs chamber.
- Where possible, the causes of failed nesting attempts should also be documented, such as the presence of obstacles such as stones, roots, or excessively dry sand that cause the burrow to collapse
- When observing a turtle track, qualified personnel should:
  - Identify the track upstream
  - Follow the track from start to finish
  - Record trail events (false crawls, failed nesting attempts, nest, specifying whether it is a confirmed nest or an estimated/possible nest)
  - Record any evidence of nest predation and/or damage caused by human activity
  - Record the highest point of each trail, the center point of the egg chamber, and the estimated or accurate location of the nest's egg chamber using a GPS
  - Record the distance between the eggs chamber and the shoreline
  - At the end of each morning survey, the following parameters should be recorded: estimated total number of new nests laid (confirmed and estimated combined) that morning, the estimated total number of nests laid (confirmed and estimated combined) on each beach, evidence of predation or inappropriate human use of the beach

**Nocturnal surveys**, looking for nesting females; a drone with thermal monitoring camera can be used to facilitate the monitoring. When the female goes back to the sea after deposition, the tagging and biometric measurements can be conducted, always considering animal welfare.



- These surveys should be conducted during the main nesting period and should be stopped as soon as hatching activity begins, this activity should be carried out by small groups (1–2 people) per beach to minimize noise and disturbance:
  - Always maintain silence
  - During the pre-laying phase, maintain a minimum distance of 4 meters from the female
  - Only after egg-laying is complete, observers may approach from behind the turtle to avoid visual disturbance and place a marker in the nest, record the GPS location of the nest, photograph the top and sides of the female's head, take morphometric measurements, and record body mass where possible
  - The maximum number of people allowed on the beach during nesting is 10, although it is preferable to limit presence to the patrol group only (2 people)
  - Flashlights with a red filter may be used only after egg deposition, and exclusively to illuminate the nest area for documentation and measurements
  - Complete the nesting data form

Usually sea turtles come back 15 days after the first nesting, for a second nesting.

### ***Nest protection***

In Tier 1, the protection of the nest can be done by placing an anti predator horizontal net over the nest, covered by sand. The net should be removed after 42 days post nesting. The mesh size must not exceed 2 × 2 cm to prevent predators from accessing.

### ***Post hatching nest inspection***

Post hatching nest inspection is conducted to assess nest success. After a minimum of 72 hours after the emersion of the last hatchling and at most 10 days after first hatching (to ensure the contents are recognisable), the nest can be dug and the material is analyzed. The digging should be done during the freshest hours of the day, because still alive hatchlings can be present.

- Dig very gently the egg chamber, using hands covered by disposable gloves
- Record the depth of the superficial layer of eggs, the width and depth of egg room (See Annex 1)
- Prepare a squared and flat area on the beach, arrange in order the material found and count each:
  - Broken eggs: the final count should correspond to the emerged hatchlings
  - Not broken eggs in good status or with signs of deterioration (with or without embryo)
  - Pipped hatchlings (partially inside the egg)
  - Dead hatchlings during the climbing of the egg chamber
  - Hatchlings still alive climbing the egg chamber
- The sum of hatched eggs and not broken eggs give the total number of eggs laid; hatching success is assessed by calculating the proportion of hatched eggs compared to the total number of eggs laid
- When still alive hatchlings are found, it's important to let them reach the sea independently, in order to develop the right muscular strength and distention

## **Tier 2**

Tier 2 includes the phases illustrated in Tier 1 and:

### ***Nest protection***

In Tier 2 nest protection is ensured by placing the anti predator net over the nest room (see Tier 1) and by installing a fence.



- The fence should be 2x2 meter squared, more or less
- It's built using wooden posts inserted at least 10 cm deep into the sand, and shade cloth, that composes the lateral walls
- The fence should be equipped with a removable cover
- Pay attention not to enter in the fence perimeter during the building, to avoid the egg chamber crushing
- To promote public awareness, install an infographic explaining the presence of the nest and the monitoring activity conducted.

### ***Pre hatching monitoring***

Pre hatching monitoring can be conducted (not mandatory) to record sand parameter, weather and tidal trends. Outside the fence, the data loggers are posed at a depth of 30-50 cm. Through those instruments the temperature and the humidity of the sand is recorded at regular intervals. Those data allow to understand the incubation characteristics and predict hypotheses for the hatchling.

### ***Hatching monitoring and assistance***

Usually the hatchlings emerge during the night. Since the hatching period generally extends from approximately 42 to 70 days after laying (90 in late depositions), after the 42nd day, a nocturnal surveillance is conducted to assist the hatching. To avoid long period surveillance, the appearance of a cone-shaped sinking on the eggs room can be monitored. This is the sign that the eggs begin to open and the first hatchlings are starting to climb the eggs chamber. The emersion will begin after few hours:

- In anthropized beaches, the darkness should be guaranteed (you can previously discuss with beach resort owner the possibility to turn off the lights)
- Open the fence from the sea side
- Digging a corridor from the fence to the sea, depth enough to avoid the hatchlings to escape or create corridor walls with the same material of the fence
- Create an obstacle-free path
- When the first hatchlings emerge from the nest, start to monitor the hatchling direction and if they are disorientated, attracting them with lights with red filters towards the sea if is necessary
- Hatchlings must travel the distance to the sea completely independently, except in exceptional circumstances
- Monitor the beach because some hatchling can come back to the beach and disperse
- In some cases, the hatchlings can emerge during the day. In this case create a covered corridor to avoid dehydration

### **Tier 3**

Tier 3 includes all the phases of Tier 2, translocation and manipulation of the hatchlings for biometric measurements are planned.

### ***Relocation***

Once **nests** have been **identified**, those at risk of being submerged by wave motion must be **relocated**. This must be done within 2 hours of laying eggs. Only in cases of extreme risk should it be done within 12 hours. Alternatively, to avoid high mortality caused by egg movement, relocation should be done only after 25 days.

- The relocation site must have similar sand grain size as the original nest



- The new nest must be dug by hand
- Measure the depth of the first eggs layer, remove eggs without reversing their polarity, keeping them vertical (sign with a pencil an “x” on the upper side)
- Remove layer by layer, placing eggs in a container with  $\geq 5$  cm of sand from the original nest. Arrange eggs side by side, maintaining the original pattern. Measure the depth of the last layer
- Adjust and level the new nest so its depth matches the last layer of the original nest. Then transfer eggs into the new nest, maintaining depth, layers, and arrangement
- If the new nest is larger than the old, use sand from the original nest to reduce the perimeter, Do not add sand between eggs
- Once the transfer is complete, use sand from the original nest to fill the chamber once all eggs are transferred
- Finally, cover the nest with sand from adjacent areas around the new nest

### ***Hatchling biometric measurements***

Only authorized and experienced personnel can manipulate hatchlings. If the biometric data have to be collected, total length, carapace length, carapace width and weight have to be recorded. If possible, also the time of walking through the corridor should be taken.

If necessary, dehydrated hatchlings can be immersed in freshwater for some minutes, checking if they are breathing.



### 3. STRANDINGS MONITORING

#### DEAD CETACEANS STRANDING MONITORING

This protocol represents a reduced and schematic version of **Tier 1** of the *Best practice on cetacean post mortem investigation and tissue sampling*, edited in September 2019 by ACCOBAMS and ASCOBANS (**Basic morphometrics, external examination and basic tissue sampling**).

For further details and for **Tier 2** and **3** you can download the complete version of the document: <https://accobams.org/wp-content/uploads/2021/07/Best-practices-on-cetacean-post-mortem-investigation.pdf>

The protocols also contain the **Tier 1** of the *Framework for fishery interaction assessment*, created during the LIFE DELFI (Dolphin Experience: Lowering Fishing Interactions) project (LIFE18 NAT/IT/000942).

For further details and for **Tier 2** and **3** you can download the complete version of the document: [https://lifedelfi.eu/wp-content/uploads/2021/04/A3\\_Framework\\_Fishery\\_interaction-1.pdf](https://lifedelfi.eu/wp-content/uploads/2021/04/A3_Framework_Fishery_interaction-1.pdf)

#### EQUIPMENT

- Safety material: disposable gloves, disposable suit/sterilizable tissue suit, shoecovers/plastic boots
- Measuring tape
- Camera
- Morphometric data form
- Stranding data form
- Sampling material: scalpel/knife, clamp, plastic tubes/containers



**Who can do this?** Wide range of personnel who have basic training.

#### PROTOCOL

##### 1. Photographs and videos to collect:

- Video of the surrounding environment
- Position of the animal when found
- Total body, 4 sides: ventral, dorsal, right side, left side
- Dorsal fin, parallel-plane
- Cranial view
- Any potential external lesion or finding associated with human activity, with measure reference



Photos and videos can capture important details such as traces of predators/scavengers and any markings, scars or injuries which would disappear soon after death or following carcass removal (See Annex 1 for photographs examples, Figure 6).

**2. Stranding data (See Annex 1 for more details and explanations, Annex 2 for data collection form):**

- Identification code: it's important to identify the carcass with an ID (for example, could be the abbreviation of the species + serial number of stranding + year: TT01/25, first *Tursiops truncatus* stranded in 2025)
- Date and hour (if possible) of first signalment
- Place of stranding: location and municipality, if possible record also coordinates;
- Species: when not clear due to decomposition code sign Not Determined (ND), share photos with experts
- Age class determination: depending on total length and external features
- Sex identification: depending on distance between anal slit and genital slit, presence of mammary slits (sometimes present also in males)
- Decomposition condition code (DCC): according to DCC, more or less data can be collected (species, nutritional status, sex identification etc.)
- Nutritional status: according to convexity or concavity of dorsal muscles, assessed through cranial view

**3. Morphometric data collection (See Annex 2 for Morphometric measurement definition):**

Most of the measurements are linear, don't take the measurement placing directly the tape on the carcass, but in a straight line next to it, parallel to the longitudinal body axis, using a linear object perpendicular to the tape as reference for the body part.

**4. Fishery interaction assessment (See Annex 1 for more details):**

From an external examination, external signs and findings of interaction with fishing can be recorded. At this minimum level of investigation only the interaction can be confirmed, but not the interaction as the cause of death.

**5. Other categories of anthropic activities interaction (See Annex 1 for more details):**

Also impact with vessels and entanglement in marine litter (not related with fishery), can be recorded at this level of investigation. The interaction can't be assumed as the cause of death: more detailed post-mortem analysis should be executed to exclude natural pathologies and to understand the real impact of that lesions on the animal's health status.



## DEAD SEA TURTLES STRANDING MONITORING

The post-mortem examination protocol for sea turtle was adopted from the Adriatic IPA NetCet project, *Standard protocols for post-mortem examination of sea turtles*. The full version is available at this link: [https://www.blue-world.org/bw/wp-content/uploads/2017/05/NETCET\\_Standard-protocols-for-post-mortem-examination-of-sea-turtles.pdf](https://www.blue-world.org/bw/wp-content/uploads/2017/05/NETCET_Standard-protocols-for-post-mortem-examination-of-sea-turtles.pdf)

Originally this protocol was not structured in levels, but the multi-tiers approach can be adopted also in this case, according to the structure used for dead cetaceans. The **Tier 1** of the *Framework for fishery interaction assessment* of LIFE DELFI project, can be adopted also for sea turtles' specimens (see previous chapter).

### EQUIPMENT

- Safety material: disposable gloves, disposable suit/sterilizable tissue suit, shoecovers/plastic boots
- Measuring tape
- Camera
- Morphometric data form
- Stranding data form
- Sampling material: scalpel/knife, clamp, plastic tubes/containers



**Who can do this?** Wide range of personnel who have basic training.

### PROTOCOL

#### 6. Photographs and videos to collect:

- Video of the surrounding environment
- Position of the animal when found
- Total body: ventral and dorsal view
- Any potential external lesion or finding associated with human activity, with measure reference
- Presence of epifauna (e.g. barnacles), epiphytes (e.g. algae) or parasites (e.g. leeches)

Photos and videos can capture important details such as traces of predators/scavengers and any markings, scars or injuries which would disappear soon after death or following carcass removal (See Annex 1 for photographs examples).

#### 7. Stranding data (See Annex 1 for more details and explanations, Annex 2 for data collection form):

- Identification code: it's important to identify the carcass with an ID (for example, could be the abbreviation of the species + serial number of stranding + year: CC01/25, first *Caretta caretta* stranded in 2025)
- Date and hour (if possible) of first signalment



- Place of stranding: location and municipality, if possible record also coordinates;
- Species: see **Annex 1** for species difference, when not clear due to decomposition code sign Not Determined (ND), share photos with experts
- Age class determination: depending on curve carapace length
- Sex identification: depending on tail characteristics and cloaca position, at this level of investigation is evaluable only in adult specimen
- Presence of tags: indicate the position and the code(s)
- Decomposition condition code (DCC) (**Annex 1**): according to DCC, more or less data can be collected (species, nutritional status, sex identification etc.)
- Nutritional status: difficult to assess in Tier 1. A good idea of the body condition can be obtained by looking at the roundness of the neck, the depression of the eyes and of the axillary and inguinal regions, only in DCC 0 or 1. Also the convexity or concavity of plastron, through cranial view can be assessed.

**8. Morphometric data collection (See Annex 2 for Morphometric measurement definition):**

For linear measurements, use a measuring tape parallel to the longitudinal body axis, using a linear object perpendicular to the tape as reference for the body part.

**9. Fishery interaction assessment (See Annex 1 for more details):**

From an external examination, external signs and findings of interaction with fishing can be recorded. At this minimum level of investigation only the interaction can be confirmed, but not the interaction as the cause of death. The Tier 1 of the *Framework for fishery interaction assessment* of LIFE DELFI project can be applied also in sea turtles.

**10. Other categories of anthropic activities interaction (See Annex 1 for more details):**

Also impact with vessels and entanglement in marine litter (not related with fishery), can be recorded at this level of investigation. The interaction can't be assumed as the cause of death: more detailed post-mortem analysis should be executed to exclude natural pathologies and to understand the real impact of those lesions on the animal's health status.



## ANNEX 1

### 1. FREE-RANGING MONITORING

#### MONITORING AT SEA

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#### ENVIRONMENTAL CONDITIONS

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Sea state: Douglas scale (from 0 = calm to 9 = exceptionally rough seas) (Table 1). Another way to define the sea state is to follow the scale MMO JNCC&ACCOBAMS: G = glassy (like a mirror); S = slight (no/ few white caps); C = choppy (many white caps); R = rough (big waves, foam, spray).

Cloud cover: Okta scale (from 0 = clear sky to 8 = completely overcast) (Table 2).

Swell height: JNCC classes -> O = low (< 2m); M = medium (2-4m); L = large (> 4m) (House e Street, 2017).

Visibility: JNCC classes from poor to good -> P = poor (<1km); M = moderate (1-5 km); G = good (>5 km) (House e Street, 2017).












Sun reflection on the surface (Glare): JNCC classes -> WF = weak glare forward; SF = strong glare forward; VF = variable glare forward; WB = weak glare behind, SB = strong glare behind; VB = variable glare behind (House e Street, 2017).



Table 1: Douglas Sea scale.

State of the sea		
Degree	Wave height (m)	Description
0	0	Calm (glassy)
1	0-0.1	Calm (rippled)
2	0.1-0.5	Smooth (wavelets)
3	0.5-1.25	Slight
4	1.25-2.5	Moderate
5	2.5-4	Rough
6	4-6	Very rough
7	6-9	High
8	9-14	Very high
9	> 14	Phenomenal

Table 2: Okta scale for sky coverage assessment.

Sky Cover (oktas)	Sym- bol	Name	Abbr.
0		Sky Clear	SKC
1		Few* Clouds	FEW*
2			
3		Scattered	SCT
4			
5		Broken	BKN
6			
7			
8		Overcast	OVC
(9)		Sky Obscured	
(/)		Not Measured	



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### BEHAVIOUR

Definition of behavioural state according to Shane et al., 1986:

- Travelling: dolphins are involved in persistent directional movement at speeds greater than resting; may involve purposing at faster speeds.
- Socialising: dolphins are involved in physical interactions ranging from chasing to body contact, such as rubbing and touching or copulation between dolphins. Aerial behavior such as breaching is frequently observed.
- Milling: dolphins show frequent changes in direction that sometimes appear as a transitional behaviour between other behavioural states and is sometimes associated with feeding, socialising or play. During milling, they generally keep the group cohesion similar with similar distance between individuals.
- Feeding: dolphins are involved in any effort to capture and consume prey as evidenced by chasing fish on the surface, coordinated deep diving with loud exhalations but without contact between individuals, and rapid circle swimming; prey is sometimes observed in the mouth and frequently observed during the foraging bout. The sea surface is generally choppy and shows a different pattern than the rest of the surface.
- Resting: dolphins are engaged in very slow movements as a tight group, occasionally stationary, and lack the active components of the other behaviours described. The group is generally clustered.
- Diving: dolphins stay in similar locations and spend more time under the surface than on the surface. You may see the tail on the surface before the long dives. There is no directional movement. The speed is lower than traveling.
- Other: behaviour not defined

### PHOTO IDENTIFICATION OF SMALL CETACEANS

For individual recognition through photo-identification, it is necessary to take into account the quality rate of the photos taken (Table 3). This should be 1 or 2 (see the definition in Table 3 and the photographic examples in Figure 1).

*Table 3 - Quality rate criteria (source: Akkaya Baş et al., 2018)*

Quality rate	Criteria
1	Good quality: dorsal fin is focused, perpendicular to the camera and the entire fin is in the frame
2	Medium quality: dorsal fin is focused with a satisfactory angle and the entire fin is in the frame
3	Bad quality: dorsal fin is out of focus and/or the entire fin is not in the frame
4	No info: doesn't hold any photo-identification value



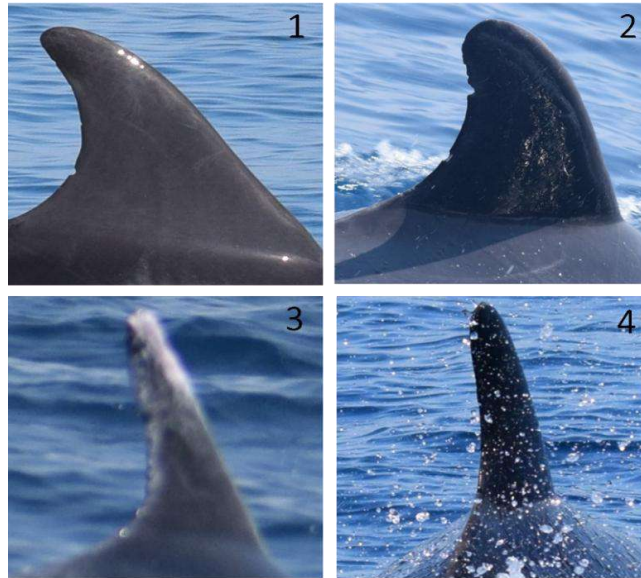


Figure 1 - Example of photos related to the quality rate table.

In addition to the photo quality, it is important to check the distinctiveness of the dorsal fin (Figure 2).



Examples of **markers/distinctiveness** for the individual recognition are reported in Figure 2.

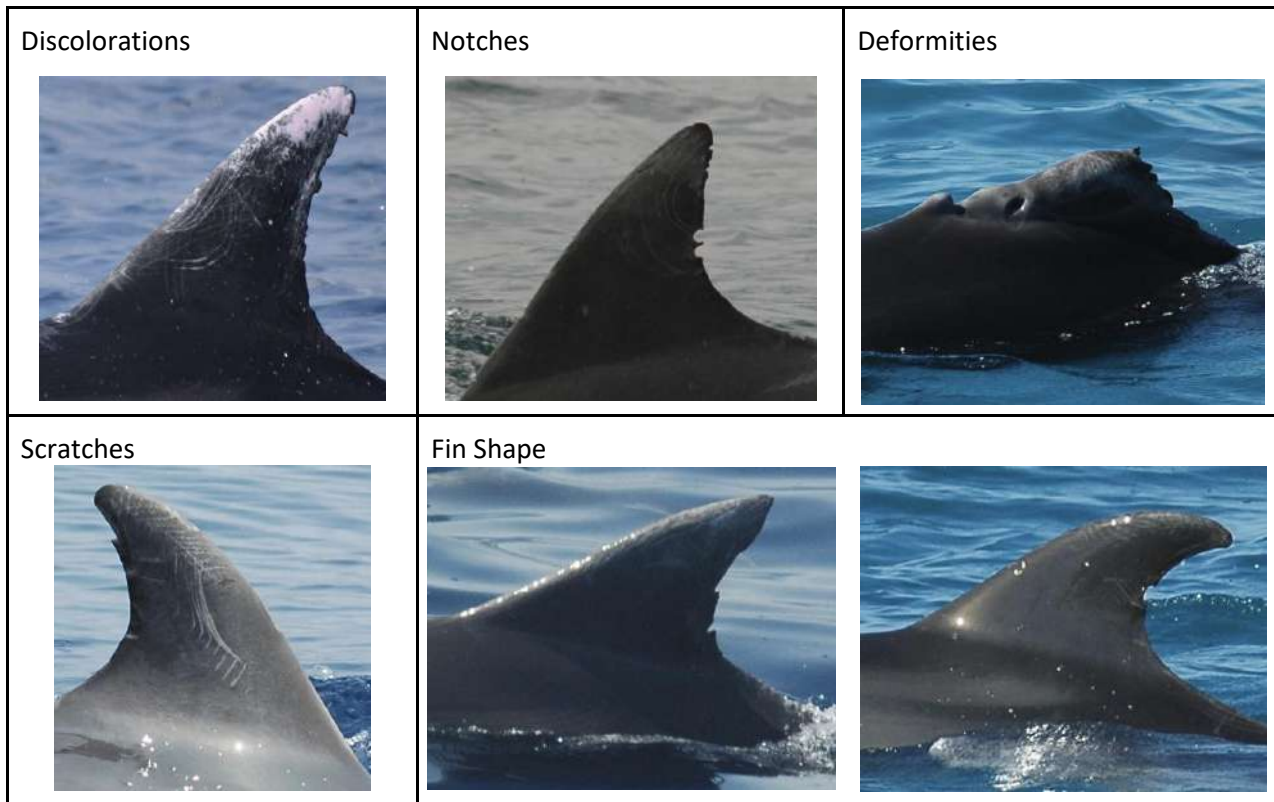


Figure 2 - Photographic examples of markers for individual recognition



**INTERACTION WITH HUMAN ACTIVITY MONITORING***Table 4 - Quality rate criteria (source: Akkaya Baş et al., 2018)*

Dimension	> 12 m or < 12 m
Type	sailing boat
	motor boat (ferries, cruise, tourist boat, recreational boat etc)
	cargo ships
	fishing vessel (trawlers, purse-seines, small scale fishery)



**CAVE AND BEACH MONITORING (Mediterranean monk seal)**

**PHOTO-IDENTIFICATION**

Code N°/View	Stage	Location/s	Additional Info
Name	Gender	Additional Info	Captures/Recaptures

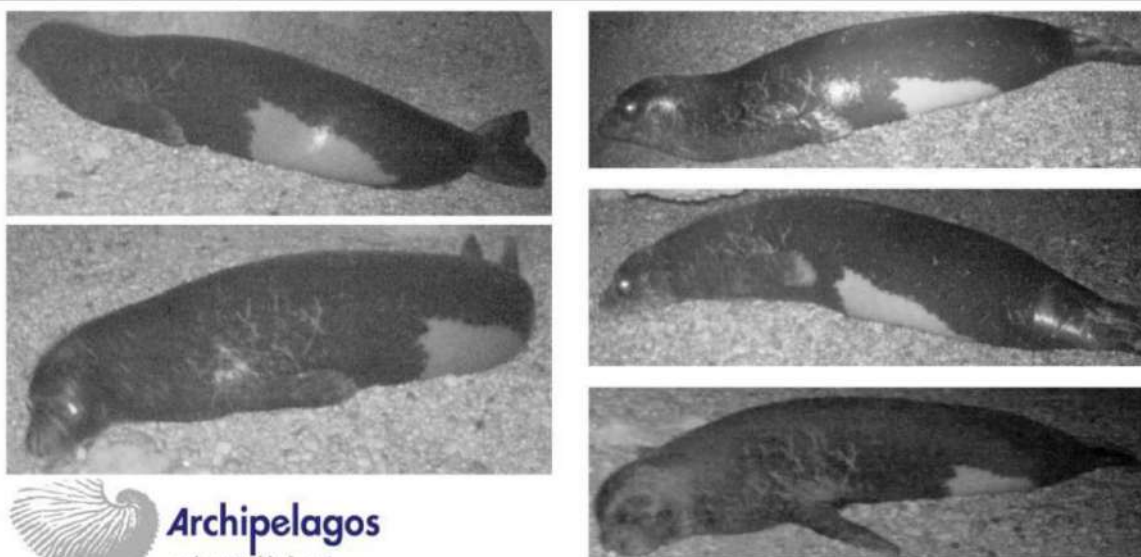


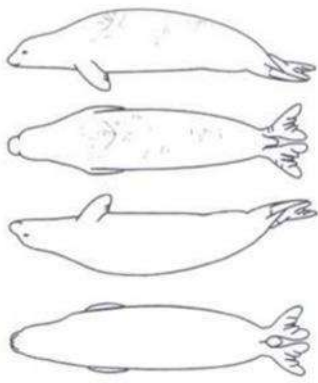


Figure 4 – Example of catalogue for photo-identification of Mediterranean monk seal.



**ODTÜ  
METU**





**SEAL ID CARD**

Name : KITE

Region sighted : Antalya

Sex : male

Stage at first sight : sub adult male

Cave used : uca

ID features : kite shape on dorsal

Reference photo : uca\_r\_01060007




Figure 5 – Example of Identity Card (ID-card) for photo-identified individuals of Mediterranean monk seal.



## 2. SEA TURTLE NESTING MONITORING



Figure 6 – Example of nesting female tracks.



Figure 7 – Example of nesting female tracks.





*Figure 8 – Example of nesting female tracks.*



*Figure 9 – Example of body pit.*





Figure 10 – Example of protective fence.



Figure 11 – Hatchling observed with red light.





Figure 12 – Example of the disposition of the biological material after inspection post-hatching.



Figure 13 – Hatchling biometric measurement (Straight Carapace Length).



### 3. STRANDINGS MONITORING

#### DEAD CETACEANS STRANDING MONITORING

#### PHOTOGRAPHS TO COLLECT



Figure 14 - Photographs to collect: a) original position of the animal (when discovered); b,c,d) total body of all sides of the animal (dorsal, ventral, both lateral sides); e) dorsal fin to compare with photoidentification catalogues; f,g) any findings associated to human activity interaction or lesion (with measurement reference); h) cranial view of the carcass, to assess nutritional condition (see below)



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**SPECIES IDENTIFICATION**

In this paragraph, the external features of the three species of small dolphins present in the Mediterranean Sea are illustrated.

**Bottlenose dolphin (*Tursiops truncatus*):** up to 3.5 m long, with a robust head and short, stocky beak. It is dark grey on the back, lighter on the sides, and robust in size. Bottlenose dolphin presents very robust teeth.



**Striped dolphin (*Stenella coeruleoalba*):** up to 2 m in length, it is the most common dolphin in the Mediterranean. Its back is dark gray/black, with black stripes from the eyes to the pectoral fins, and its sides feature a distinctive white/light gray "flame" pattern. Beak is longer and teeth are smaller and finer than the bottlenose dolphin ones (very useful detail to assess when the carcass present DCC 4 or 5).



**Common dolphin (*Delphinus delphis*):** up to 2 m, similar to the striped dolphin but with a more elongated beak and different pigmentation on the sides, characterized by an "hourglass" shaped pattern with a creamy yellow coloration in the portion closest to the head and grey on the rear part.



**AGE CLASS DETERMINATION**

The age class determination is based on the body total length measurement, as in the following Table. Calves (newborn and pup) can be identified also by typical external features (see Images below).



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Table 5 - Standard protocol for post-mortem examination on cetaceans. IPA Adriatic Cross-Border Cooperation Programme, University of Padua (NetCet project) (from Mazzariol, S., & Centelleghes, C. 2007).

Species	Tot. length birth (cm)	Tot. length pup (cm)	Tot. length 1 year (cm)	Tot. length 2 years (cm)	Tot. length weaning (cm)	Tot. length adult (m)
<i>Stenella coeruleoalba</i>	93-100	100	166	180	170	2.2-2.6
<i>Tursiops truncatus</i>	117	100-130	170-200	170-225	225	2,2-3 cost. 2,5-6 pel.
<i>Grampus griseus</i>	110-150	120-160				3-4
<i>Delphinus delphis</i>	80-90	80-100			110-120	2,3-2,5
<i>Ziphius cavirostris</i>	270	200-300				6,7-7

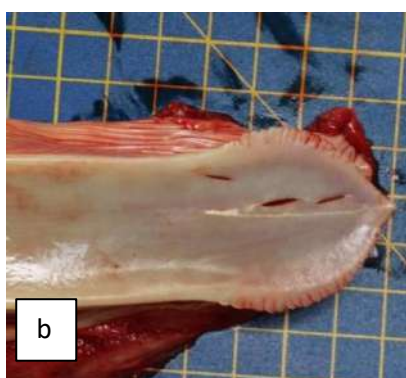


Figure 15 - a) fetal folds; b) marginal papillae on the tongue; c) absence of teeth; d) whiskers.



## SEX IDENTIFICATION

To determine the sex, the distance between the anus and the genital slit have to be checked (the distance is bigger in males). The presence of mammary slits can be assessed, but in rare cases, they are present also in males.

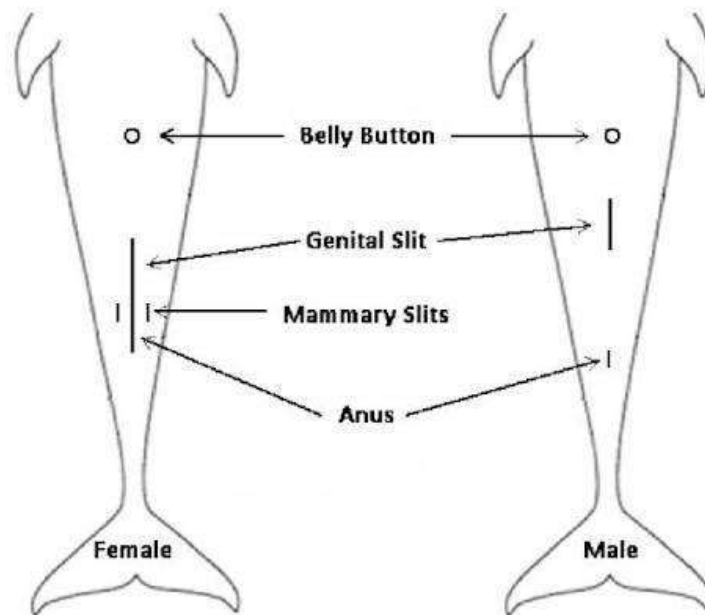


Figure 16 – Sex identification of cetaceans.

## ESTIMATING WEIGHT

When the carcass cannot be weighted, an estimation can be calculated, applying the following logarithmic formula. The Decomposition Condition Code of the carcass should be considered.



Table 6 – Logarithmic formula for weight estimation

Family	Sex	a	b
Myticetes	M	-7.347	2.329
	F	-7.503	2.347
Odontocetes	M	-8.702	2.382
	F	-9.003	2.432

$$\log_e M_{media} = a + b \log_e L_{max}$$

### DECOMPOSITION CONDITION CODE (DCC)

#### CODE 1: Extremely fresh carcass, just dead

Characteristics: Usually live stranded and died/ euthanized cases or those stranded right after death; exhibiting no post mortem changes (e.g. no bloating or sloughing of skin); fresh smell; clear, glassy eyes; blubber firm and white; muscles firm, dark red, well-defined; viscera intact and well-defined; GIT contains no to little gas (unless pathologic); brain firm with no discolouration, surface features distinct, easily removed intact.

DCC1:



Figure 17 – CODE 1: Extremely fresh carcass, just dead.

#### CODE 2: Fresh carcass

Characteristics: Normal appearance, fresh smell, minimal drying and wrinkling of skin, eyes and mucous membranes; carcass not bloated, tongue and penis not protruded; blubber firm and white, occasionally tinged with blood.



DCC2:

*Figure 18 – CODE 2: Fresh carcass***CODE 3: Moderate decomposition.**

Characteristics: Bloating evident, with tongue and penis often distended; skin cracked and started sloughing; characteristic (mild) odour can be expected; mucous membranes dry, eyes sunken. Blubber blood-tinged and oily; muscles are softer and poorly defined; gut segments contain gas; brain has soft consistency. Organs are largely intact, still distinguishable and can be easily removed and assessed, although colour is more uniform throughout thoracic and abdominal cavity and consistency, particularly kidneys and pancreas is soft and increasingly friable.

DCC3:

*Figure 19 – CODE 3: Moderate decomposition.***CODE 4: Advanced decomposition**

Characteristics: Carcass may be intact, but collapsed; skin sloughing; epidermis may be largely missing, exposing underlying blubber. Strong odour; blubber soft, often with pockets of gas and pooled oil; muscles nearly liquefied and easily torn, effortless separation from the bones; blood thin and black; viscera often identifiable but friable, easily torn, and difficult to dissect; gut gas-filled; brain liquified, dark red, containing gas pockets, with decreased consistency.



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DCC4:¶



Figure 20 – CODE 4: Advanced decomposition.

**CODE 5: Mummified or skeletal remains**

Characteristics: Skin may be draped over skeletal remains; any remaining tissues are desiccated. Organs partially or totally disappeared, or if present not completely identifiable.

DCC5:¶



Figure 21 – CODE 5: Mummified or skeletal remains.

**NUTRITIONAL STATUS**

The nutritional status is assessed in Tier 1 visualizing laterally and frontally the convexity or concavity of dorsal muscles. If the profile of muscles doesn't appear convex, the nutritional status is not good.



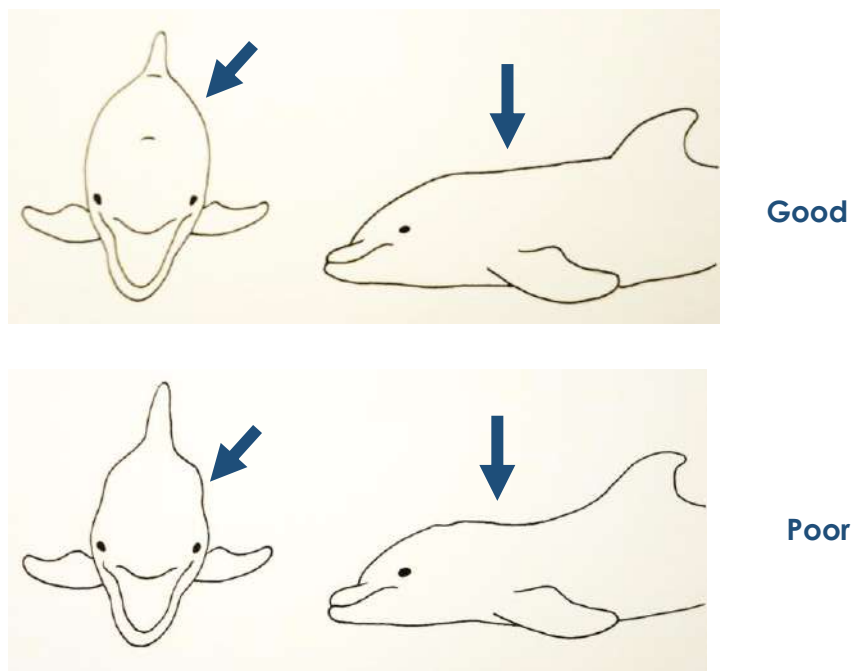


Figure 22 – Assessment of nutritional status

### BLUBBER THICKNESS MEASUREMENT



Figure 23 - a) blubber and skin; b) how to measure the thickness of blubber.

### FISHERY INTERACTION

External examination data allows for the collection of information on the life history of the stranded animal(s), including external signs and findings of interaction with fishing. Interaction with fishing activities can only be hypothesized with positive evidence and the absence of external findings does not support the absence of interaction.



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At this level of examination, if the accidental capture is not reported by fishermen, Tier 1 examiner may assume only the entanglement. If at least one finding is recorded, the fishery interaction is confirmed but the cause of death cannot be determined.

Table 7 – Assessment of fishery interaction

CATEGORIES	FINDINGS
Findings that confirm the interaction with the fishery	fishing interaction in the animal history
	presence of fishing gear (differentiate passive and active fishing gear)



**OTHER CATEGORIES OF ANTHROPIC ACTIVITIES INTERACTION**



Figure 24 - Impact with vessels

**SEA TURTLES STRANDING MONITORING**

**PHOTOGRAPHS TO COLLECT**



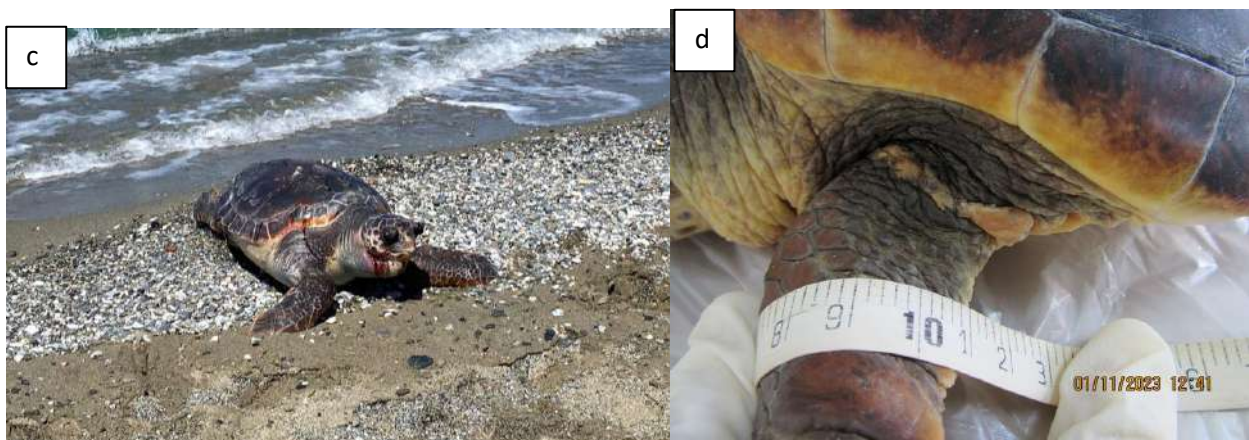


Figure 25 - Photographs to collect: a,b) total body (dorsal and ventral view); c) original position of the animal (when discovered) d) any lesions or findings associated with human activity interaction or lesion (with measurement reference).

### Presence of tags

Always check the presence of metal tags on anterior and posterior flippers. If they are present, record the code and the rescue center/association that tagged the animal.



Figure 26 - Metal tag on anterior flipper

### SPECIES IDENTIFICATION

In this paragraph, the external features of the three species of sea turtles present in the Mediterranean Sea are illustrated. The identification species is determined by the number of coastal, inframarginal and prefrontal scutes (for Cheloniidae). *Dermochelys coriacea* present unique features: no scutes on carapace and plastron, blackish pigmentation.



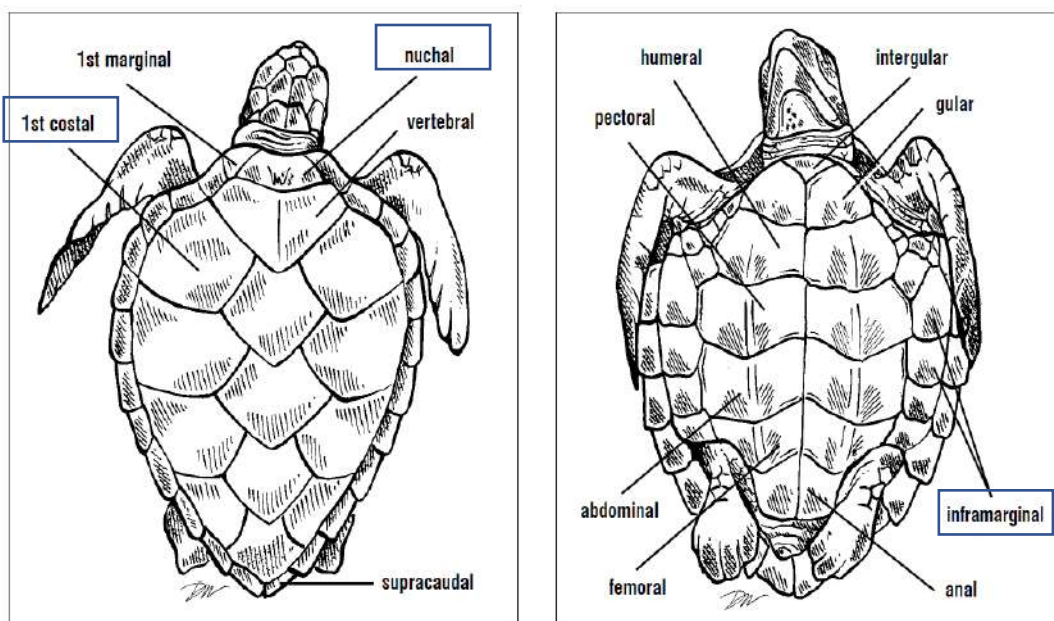


Figure 27 - Scutes of carapace and plastron, *The Anatomy of Sea Turtles The Anatomy of Sea Turtles*, Jeanette Wyneken, 2001.

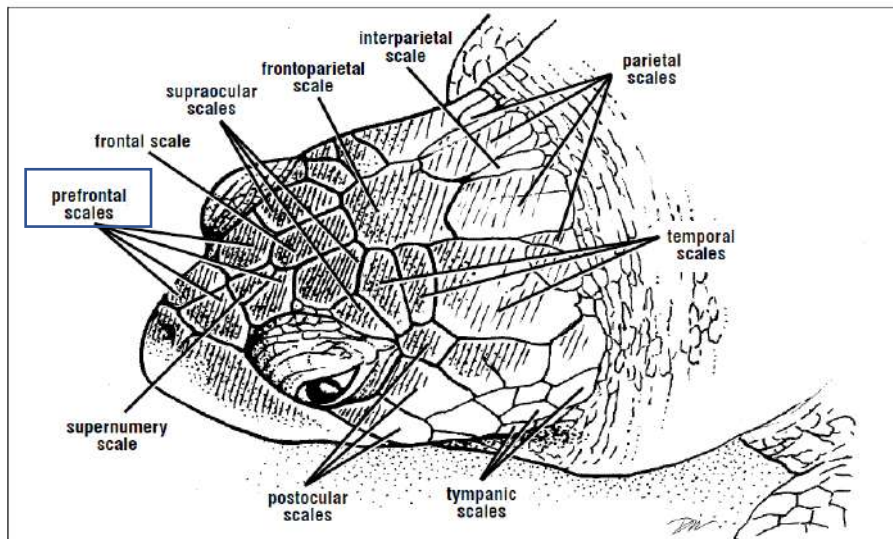


Figure 28 - Scutes of the head, *The Anatomy of Sea Turtles The Anatomy of Sea Turtles*, Jeanette Wyneken, 2001.



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Figure 29 - External differences between the 3 sea turtle species present in the Mediterranean Sea – NetCet project.

**EPIFAUNA ASSESSEMENT**

The presence, the surface coverage and the species identification of epibionts (barnacles) and epiphytes (algae) present on the carcass surface can suggest important information about the health status of the animal. Always take photos of the total body and the details of the epifauna. If possible, sample the epifauna (70 % alcohol).



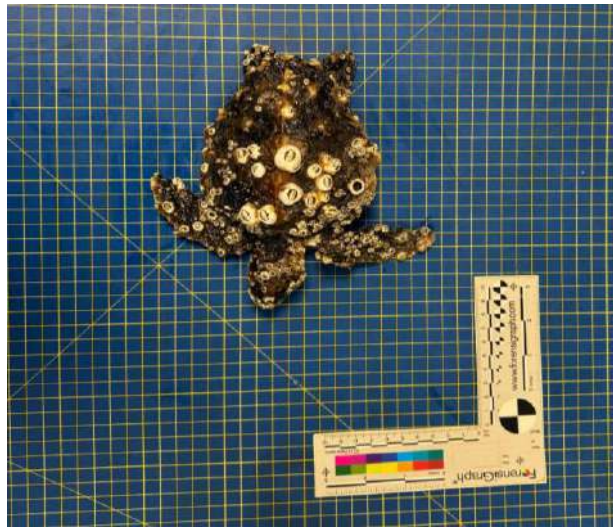


*Figure 30 - Epiphytes (algae)*



*Figure 31 - Epibionts*





Figures 32 – Epibionts (barnacles).

## AGE CLASS DETERMINATION

The age class determination is based on Curve Carapace Length (CCL), as follow:

- YOUNG (21-40cm)
- SUB-ADULT (41-65 cm)
- ADULT > 65 cm

See Annex 3 for morphometric measurement details.

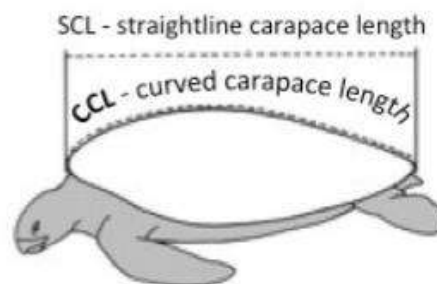


Figure 33 - CCL, NetCet project

## SEX IDENTIFICATION



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The sex in Tier 1 can only be assessed in adult specimens, because the sexual dimorphism is clear only in sexually mature animals. To determine the sex at Tier 1, the length of tail and the position of cloaca have to be assessed.

**Female:** short tail and the cloacal opening (vent) is located roughly half way between the tip of the tail and the plastron's anal scute;

**Male:** long tail with the cloacal opening near the tip, and strongly curved claws on the second digit.

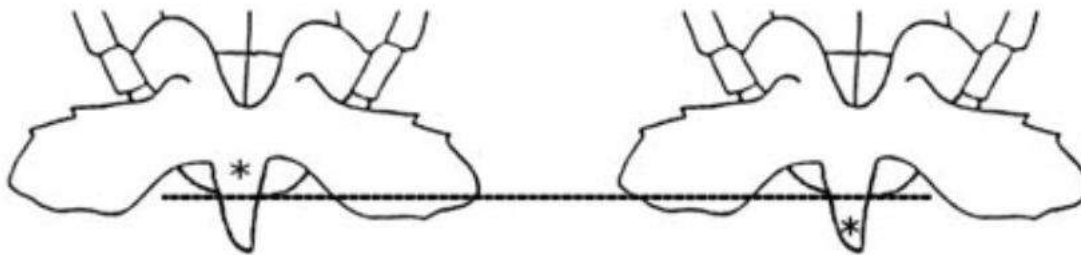


Figure 34 - Position of the cloaca compared to the carapace, ventral view



Figure 35 - tail and cloaca, ventral view

## DECOMPOSITION CONDITION CODE (DCC)

**Code 0:** Alive or just died (< 2 hours post mortem).

**Code 1:** Fresh carcass (< 24 hours post mortem). Normal appearance, usually with little scavenger damage, fresh smell, minimal eyes drying, eyes clear, carcass not bloated.

**Code 2:** Moderate decomposition. Bloated carcass with characteristic mild odour. Head: integral



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or with partial loss of skin; eye: sunken or liquefied; tail: present or absent; limbs: integral; carapace and plastron: integral.

**Code 3:** Advanced decomposition. Collapsed carcass with strong odour. Head: complete loss of skin; eye: liquefied tail absent; limbs: partially exposed skeleton; carapace and plastron: partial or total loss of skin.

Subgroup "a": distinguishable internal organs.

Subgroup "b": liquefied internal organs.

**Code 4:** Mummified carcass or partial carcass. Incomplete carcass; skull: visible; carapace: broken with separation of parts.

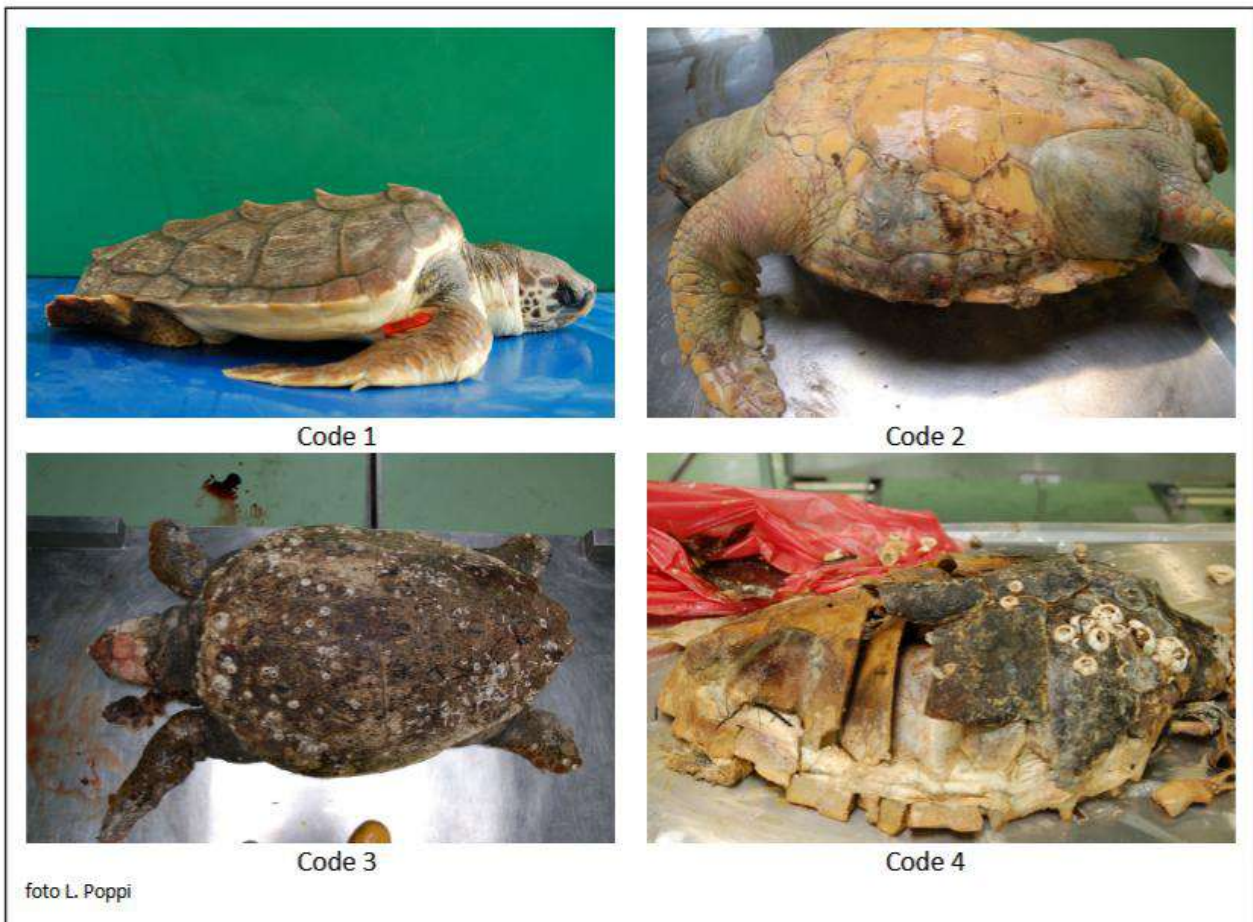


Figure 36 - Decomposition codes for sea turtles

**FISHERY INTERACTION**

External examination data allows for the collection of information on the life history of the stranded animal(s), including external signs and findings of interaction with fishing. Interaction with fishing activities can only be hypothesized with positive evidence and the absence of external findings does not support the absence of interaction.



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At this level of examination, if the accidental capture is not reported by fishermen, Tier 1 examiner may assume only the entanglement. If at least one finding is recorded, the fishery interaction is confirmed but the cause of death cannot be determined.

Table 8 – Assessment of fishery interaction

CATEGORIES	FINDINGS
Findings that confirm the interaction with the fishery	fishing interaction in the animal history
	presence of fishing gear (differentiate passive and active fishing gear)



Figure 37 - Sea turtles entangled in fishing net.





Figure 38 - Line from cloaca



Figure 39 - Line from ramphoteca

## OTHER CATEGORIES OF ANTHROPIC ACTIVITIES INTERACTION





Figure 40 - Carapace fracture due to boat collision



Figure 41 - Lesions associated to Impact with vessels (propeller)





*Figure 42 - Entanglement in marine litter not associated with fishing activity*



## SPECIES RECOGNITION

- Species of the SAMESEA project

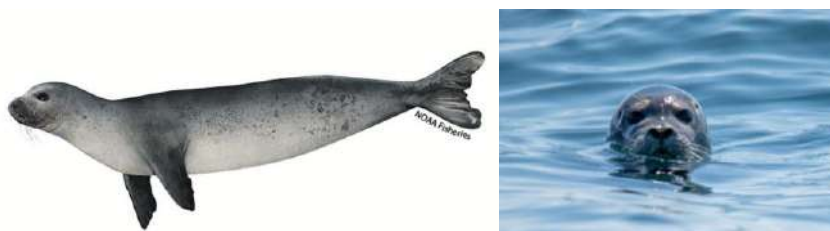
**Common bottlenose dolphin** (*Tursiops truncatus*): up to 3.5 m long, with a robust head and short, stocky beak. It is dark gray on the back, lighter on the sides, and robust in size. It is a mostly coastal species, found within a depth of 100-200 m, but it can also be found in deeper waters.



**Loggerhead sea turtle** (*Caretta caretta*): It is the most abundant sea turtle species in the Mediterranean. It has a large head with powerful jaws. The upper carapace is slightly heart-shaped and reddish-brown in adults and subadults, while the lower plastron is generally light yellowish. The neck and flippers are usually dull brown to reddish-brown on the upper side and medium or pale yellow on the sides and belly.



**Mediterranean monk seal** (*Monachus monachus*): Cylindrical body tapering at the ends, up to 2.5 meters long, round head with large, front-facing eyes, flattened muzzle with long whiskers (vibrissae) above the upper lip. It has two hind fins and two pectoral fins. Its fur is short, gray on the back and light on the abdomen, possibly with spots or streaks. Adult males and pups have black fur with a distinctive white spot on the abdomen.



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- Other possible species regularly sighted as they are present in the Mediterranean Sea

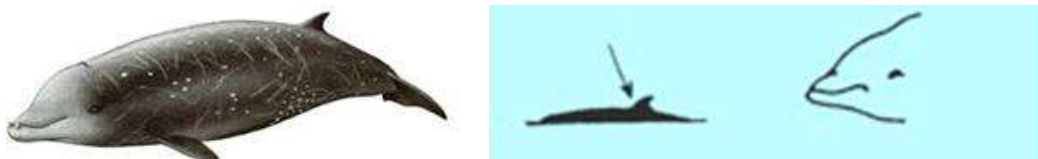
**Fin whale** (*Balaenoptera physalus*): up to 24 m long, dark gray-black back, white belly, and right jaw. The dorsal fin is small, sickle-shaped, and set back. Its puffer fin is vertical and high. It is the only baleen whale regularly present in the Mediterranean Sea.



**Sperm whale** (*Physeter macrocephalus*): up to 15 m long, with a square head and a gray/brownish color. The dorsal fin is recessed with a serrated profile from the dorsal fin to the tail. Its blow is low and oblique, slanting to the left. At the beginning of deep dives, it raises its tail and remains out of the water for up to 20 minutes. It is often encountered in the 1,000-meter depth range.



**Goose-beaked whale** (*Ziphius cavirostris*): up to about 7 m in length, small head, short beak, gray to brown color with white circular and "scar" markings. The dorsal fin is small and falcate. Males have two protruding teeth from the lower jaw.

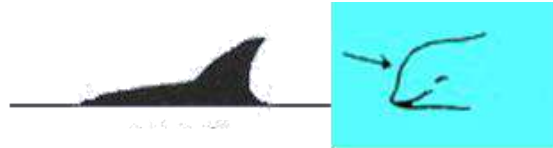


**Pilot whales** (*Globicephala melas*): up to 6 m in length, they are so named for their distinctive globe-shaped heads. They have a black back, a distinctive white anchor-shaped belly, a broad, arched, and curved dorsal fin, and long pectoral fins.



## SAMESEA

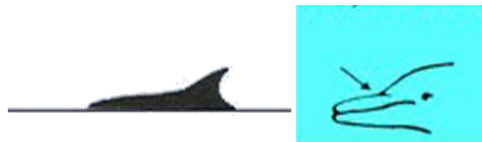
**Risso's dolphins** (*Grampus griseus*): up to 4 m in length. It is characterized by the absence of a rostrum, a uniform gray-brown back in newborns and pups, which becomes gray and dotted with white scratches in adults. The dorsal fin is high and falcate. It is most common at depths greater than 400 m. It is often observed motionless on the surface of the water, resembling a floating log.



**Striped dolphin** (*Stenella coeruleoalba*): up to 2 m in length, it is the most common dolphin in the Mediterranean. Its back is dark gray/black, with black stripes from the eyes to the pectoral fins, and its sides feature a distinctive white/light gray "flame" pattern. Its preferred bathymetric range is from 200 to 1,000 m deep.



**Common dolphin** (*Delphinus delphis*): up to 2 m, similar to the stenella but with a more elongated beak and different pigmentation on the sides, characterized by an "hourglass" shaped pattern with a creamy yellow coloration in the portion closest to the head and grey on the rear part.



**Green sea turtles** (*Chelonia mydas*): This species can reach up to 1.5 meters and weigh 190 kg. Its armor is olive-brown, with yellow or marbled streaks and spots. Its distinguishing features include a non-hooked bill, a single prefrontal plate, and four pairs of costal scutes on the carapace. The male is differentiated from the female by its more robust tail (wider and longer) and longer forelimb claws.



AT SEA - EFFORT/SIGHTING FORM

EFFORT\*

Date (dd/mm/yy): Location (name): N. observer:
Start time (hh:mm): End time (hh:mm):
Start Latitude: Start Longitude:
End Latitude: End Longitude:

WEATHER CONDITION\*

Sea state: glassy slight choppy rough Swell height: low medium large
Visibility: poor moderate good Cloud cover:

SIGHTING RECORD\*

Sighting number:

Start time (hh:mm): End time (hh:mm): Total time:
Start Latitude: Start Longitude:
End Latitude: End Longitude:
Depth:
Species: Adult: Calves: Newborn: Total:
Photos: yes no
Behavior: feeding resting travelling socializing milling
Note:

INTERACTION WITH HUMAN ACTIVITIES\*

Interaction recorded: yes no

Type of interaction: fishing activity marine traffic

Description of interactions (e.g.: sign if it's TRAWLER-PURSE SEINER-FISH FARM SIGHTING; BEHAVIUOR related to trawler or purse seiners; record vessel presence when the distance from the dolphins is less than 400 m; IMMEDIATE DIRECTIONAL REACTION)

Horizontal lines for text input

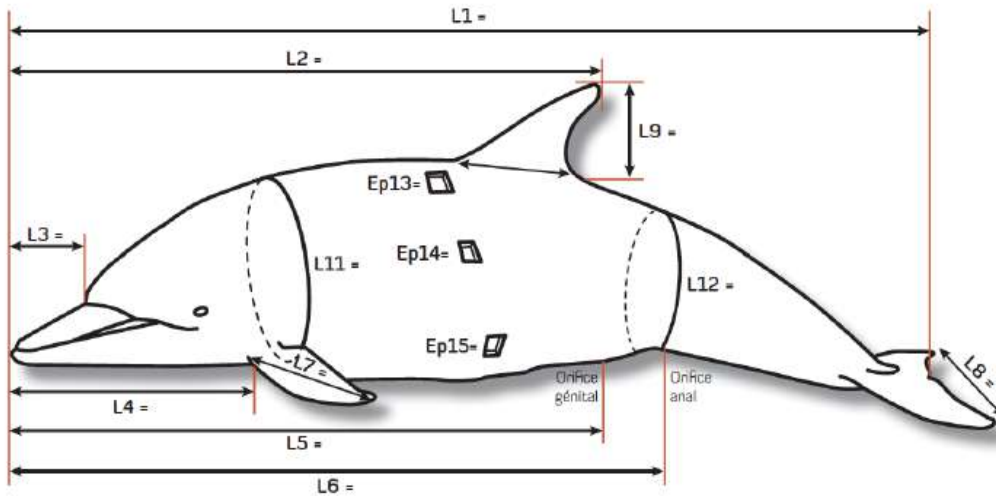




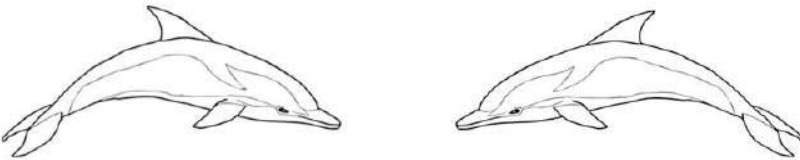
**DEAD CETACEANS STRANDING FORM**

**MORPHOMETRIC MEASURES**

(Please, take more measures as possible. **MOST OF THEM ARE LINEAR!** Use a caliber or a measuring tape in a straight line next to the carcass, parallel to the longitudinal body axis + a linear object perpendicular to the tape as reference to the body)



Morphometric measures		cm
L1	Total length, snout to notch	
L2	Snout to apex of dorsal fin	
L3	Length of rostrum	
L4	Snout to flipper	
L5	Snout to genital orifice	
L6	Snout to anal orifice	
L7	Maximum width of flipper	
L8	Width of fluke	
L9	Height of dorsal fin	
L10	Circumference at leading edge of dorsal fin	
L11	Circumference at axilla	
L12	Circumference at anal orifice	
Ep 13	Thickness of dorsal blubber (not mandatory) (See Annex 1)	
Ep 14	Thickness of lateral blubber (not mandatory) (See Annex 1)	
Ep 15	Thickness of ventral blubber (not mandatory) (See Annex 1)	

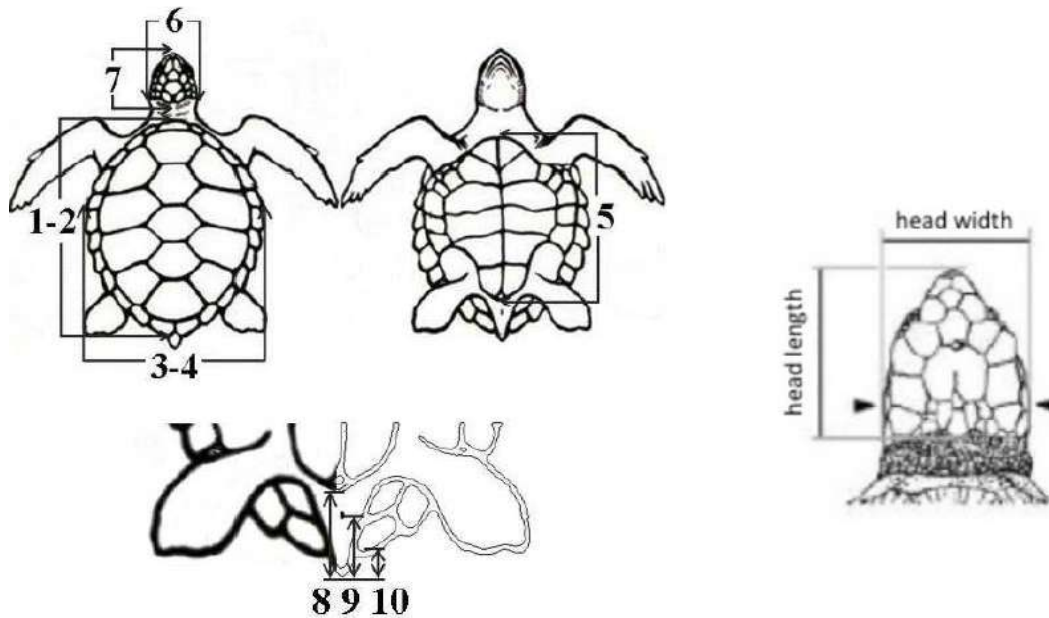
STRANDING DATA - CETACEAN ID _____	
Date and hour of first discovery	
Location	
Coordinates	
State of first discovery	<ul style="list-style-type: none"> <li>• Alive</li> <li>• Dead: Decomposition condition code _____</li> </ul>
Modality of discovery	<ul style="list-style-type: none"> <li>• Stranding</li> <li>• At sea</li> <li>• Bycatch (type of gear _____)</li> </ul>
Species (if the identification is not sure, write ND=Not Determined)	
Total length (cm)	
Estimated age	<input type="checkbox"/> New born <input type="checkbox"/> Calf <input type="checkbox"/> Juvenile <input type="checkbox"/> Adult <input type="checkbox"/> ND
Sex determination	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> ND
Weight (kg) estimated <input type="checkbox"/> measured <input type="checkbox"/>	
Nutritional status	
Interaction with human activities	<ul style="list-style-type: none"> <li>• Fishing activity: Bycatch reported by fishermen <input type="checkbox"/> Presence of fishing gear <input type="checkbox"/></li> <li>• Impact with vessels</li> <li>• Entanglement in marine litter not associated to fishing activity</li> </ul>
Drawn on the image any lesion or finding associated to human activity interaction recorded	
Carcass collected for post-mortem examination	<ul style="list-style-type: none"> <li>• yes</li> <li>• no</li> <li>• disposed</li> </ul>
Notes:	

**SEA TURTLES STRANDING FORM**

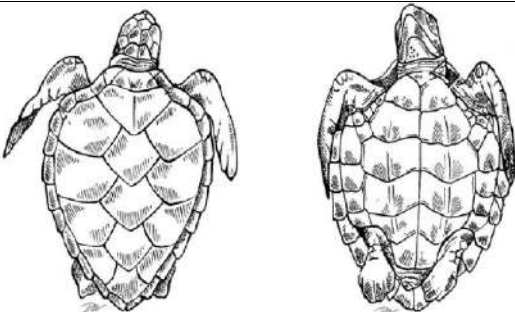
**MORPHOMETRIC MEASURES**

(Please, take more measures as possible)

For linear measurements use a calibre or a measuring tape in a straight line next to the carcass, parallel to the longitudinal body axis + a linear object perpendicular to the tape as reference to the body.



n.	Description	cm
1	CCL (Curve Carapace Length)	
2	SCL (Straight Carapace Length)	
3	CCW (Curve Carapace Width), at the widest point	
4	SCW (Straight Carapace Width), at the widest point	
5	Plastron length	
6	Head width, at the widest point	
7	Head length, from nostrils to occipital bone	
8	End of plastron – tip of the tail	
9	Cloaca – tip of the tail	
10	Carapace – tip of the tail (could be a negative number, for example -2)	

STRANDING DATA - SEA TURTLE ID ____	
Date and hour of first discovery	
Location	
Coordinates	
State of first discovery	<input type="checkbox"/> Alive <input type="checkbox"/> Dead: Decomposition condition code ____
Modality of discovery	<input type="checkbox"/> Stranding <input type="checkbox"/> At sea <input type="checkbox"/> Bycatch (type of gear _____)
Species (if the identification is not sure, write ND=Not Determined)	
CCL (cm)	
Estimated age	<input type="checkbox"/> Juvenile <input type="checkbox"/> Sub-adult <input type="checkbox"/> Adult
Sex determination	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> ND
Weight (kg)	<input type="checkbox"/> estimated <input type="checkbox"/> measured _____ kg
Tags	<input type="checkbox"/> no <input type="checkbox"/> yes    Position: _____    Code: _____
Epibionts or epiphytes	<input type="checkbox"/> no <input type="checkbox"/> yes    Species: _____    Surface coverage (%): ____
Interaction with human activities	<ul style="list-style-type: none"> <li>• Fishing activity:               <ul style="list-style-type: none"> <li>Bycatch reported by fishermen <input type="checkbox"/></li> <li>Presence of fishing gear <input type="checkbox"/></li> </ul> </li> <li>• Impact with vessels</li> <li>• Entanglement in marine litter not associated to fishing activity</li> </ul>
Drawn on the image any lesion or finding associated to human activity interaction recorded	
Carcass collected	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> disposed
Notes:	



















