



MONITORING APPROACHES FOR ASSESSING THE PRESENCE OF MARINE LITTER IN BIOTA *INTRODUCTION*

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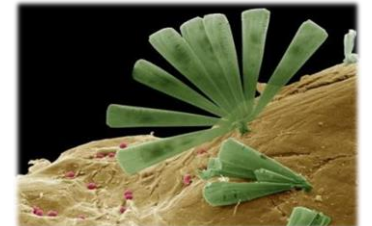


Mediterranean e-course on marine litter monitoring & mitigation

17 & 19 January 2023, 10.00 – 14.00 CET

ECOLOGICAL IMPACT OF MARINE LITTER

- **Habitat destruction**
- **Introduction and spread of invasive species**
- **Entanglement/entrapment**
- **Ingestion**
- **Transport of chemicals**



MARINE LITTER INGESTION: WORLDWIDE

Marine litter can be ingested **intentionally** (foraging techniques, colour, age stage) or **accidentally** (filter-feeding and secondary ingestion).

Ingestion may **directly cause mortality** or can affect animals by slower sub-lethal physical and chemical effects.

INCREASE OF NUMBER OF SPECIES WITH RECORDS OF INGESTION

SEA TURTLES

Kühn (2020) 7/7 (100%)

Laist (1997) 6/7 (86%)

↑ +14%

MARINE MAMMALS

Kühn (2020) 69/123 (56.1%)

Laist (1997) 26/115 (23 %)

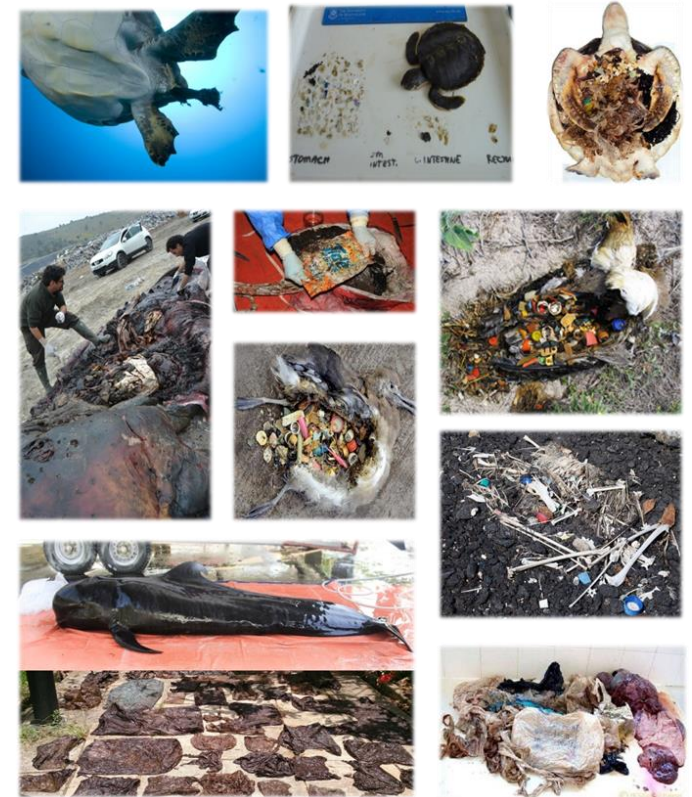
↑ +33.1%

SEABIRDS

Kühn (2020) 180/409 (44%)

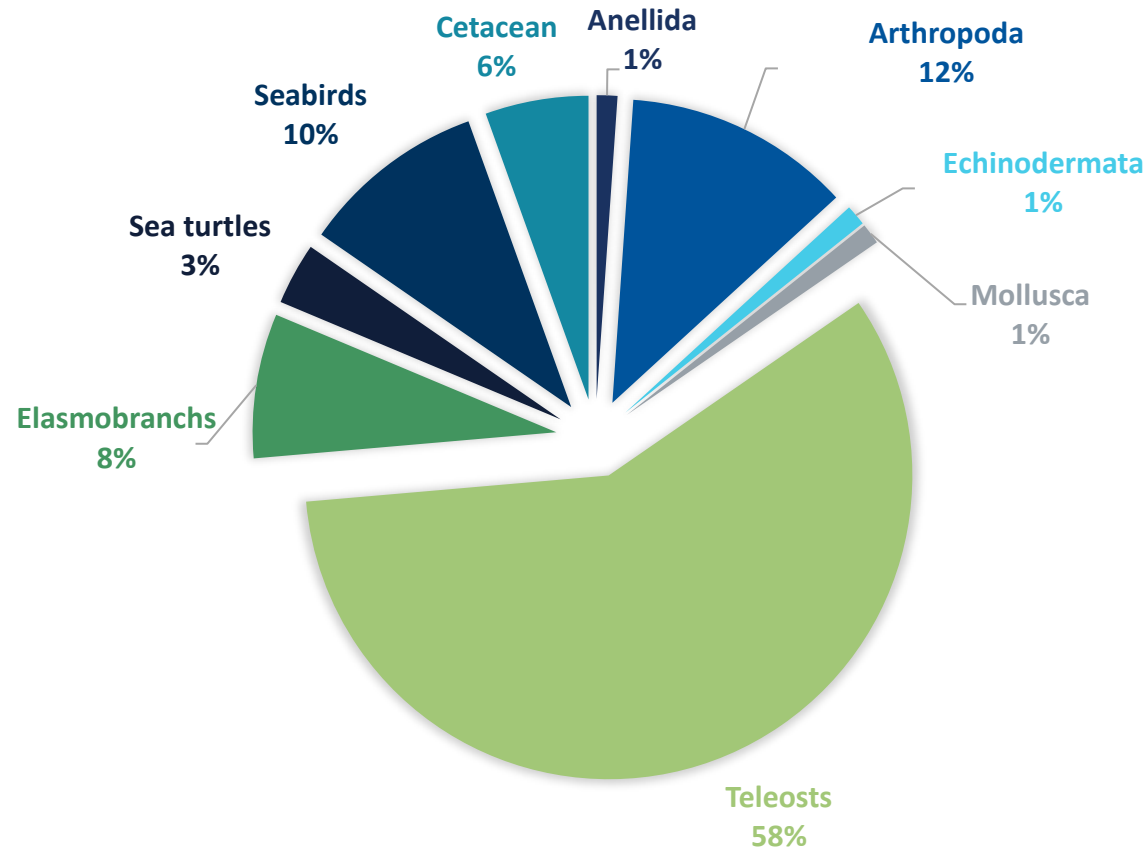
Laist (1997) 111/312 (36 %)

↑ +8 %



MARINE LITTER INGESTION: MEDITERRANEAN SEA

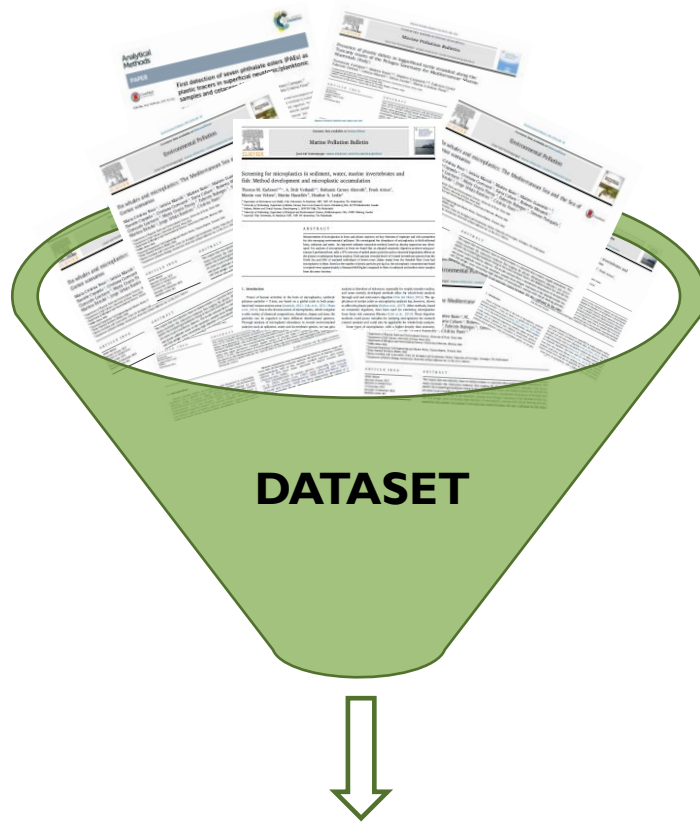
SPECIES WITH RECORDS OF
MARINE LITTER INGESTION



Marine litter ingestion in Mediterranean organisms has been **reported since 1988**, coming from studies on the **feeding ecology** of Mediterranean species.

In **recent years**, the detection of **marine litter** in the **stomach and intestinal tracts** has been the **main goal of most studies** in this area with a clear increase in the number of scientific papers published.

MARINE LITTER INGESTION: MEDITERRANEAN SEA



**Only occurrence (%) of
marine litter ingestion**

Despite the **increase** in the **number of studies** in recent years, the **information on the impact** between marine litter and Mediterranean biota remains **underestimated**.

It is **not possible** to make **comparisons** among **different studies** on the **amount and types of ingested litter**.

This is mainly due to the **lack of standardized methods and protocols** for monitoring and sampling techniques in relation to the size of marine litter.

MARINE DEBRIS INGESTION: MEDITERRANEAN SEA



The Marine Strategy Framework Directive defines Criteria 3 of Descriptor 10:

D10.C3 as “The **amount of litter and micro-litter ingested** by marine animals is at **a level** that **does not adversely affect the health of the species concerned**”

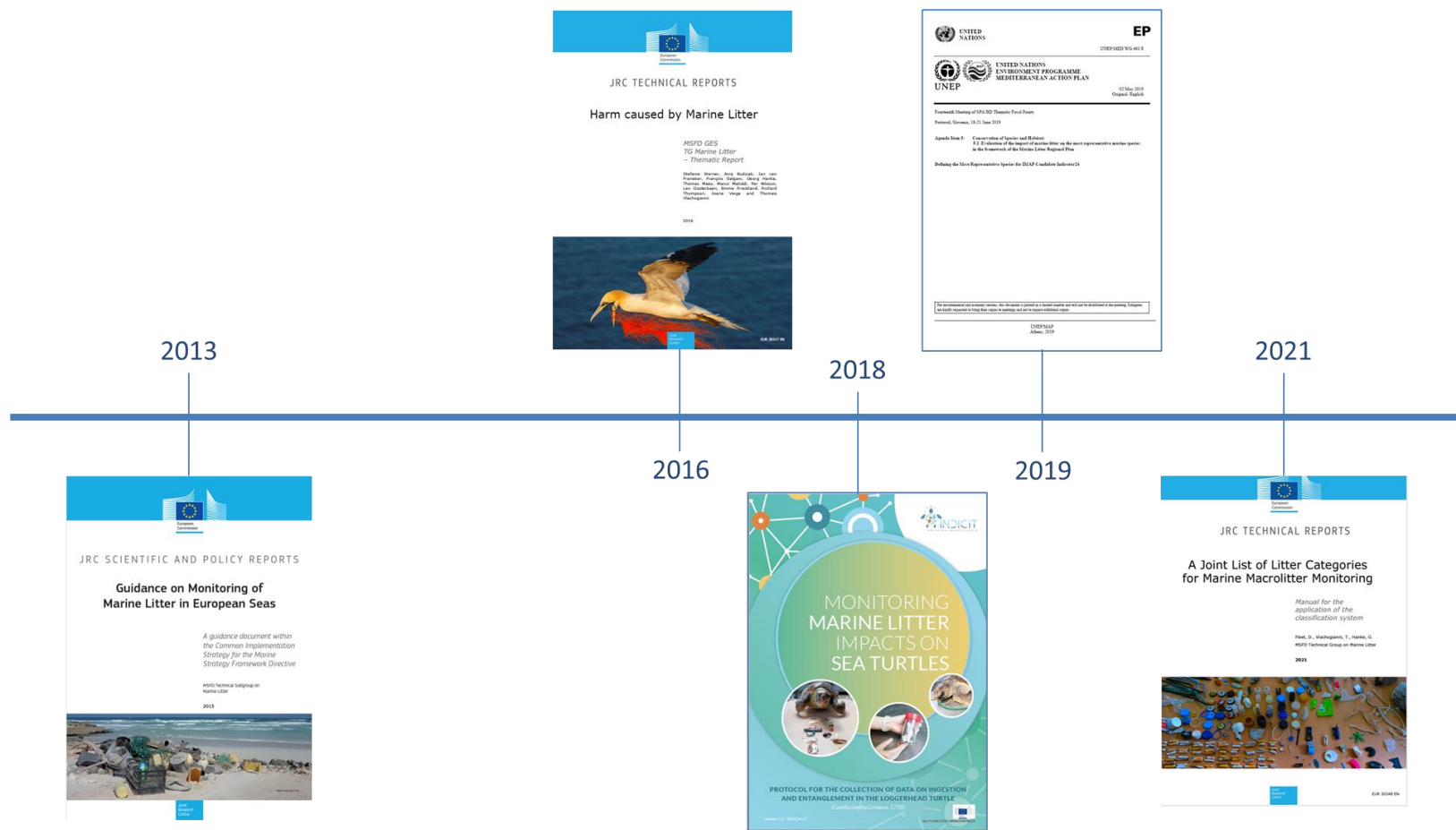
D10.C4 as “the **number of individuals** of each species which are **adversely affected due to litter**, such as by entanglement, other **types of injury or mortality, or health effects.**”

The Integrated Monitoring and Assessment Guidance defines the indicator for Ecological Objective 10 on marine litter (EO10) (known as Candidate Indicator 24) as “**Trends in the amount of litter ingested by or entangling marine organisms**, focusing on selected **mammals, marine birds, and marine turtles**”.



Plastic Busters CAP

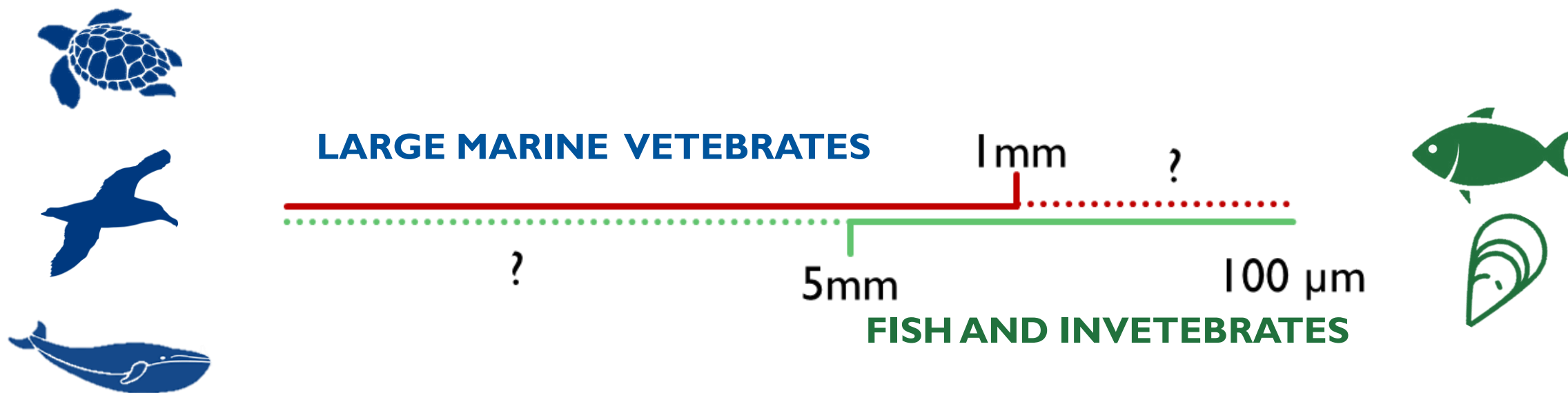
ASSESSING THE PRESENCE OF MARINE LITTER IN BIOTA



2022



ASSESSING THE PRESENCE OF MARINE LITTER IN BIOTA





Plastic Busters CAP

MONITORING APPROACHES FOR ASSESSING THE PRESENCE OF MARINE LITTER IN BIOTA *LARGE MARINE VERTEBRATES*

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LARGE MARINE VERTEBRATES



FIRST NOTES ON THE DISCOVERY SITE

1. CONTACT

Name, contact (phone, mail) and institution of the observer(s) (data collector).

2. ON THE SITE

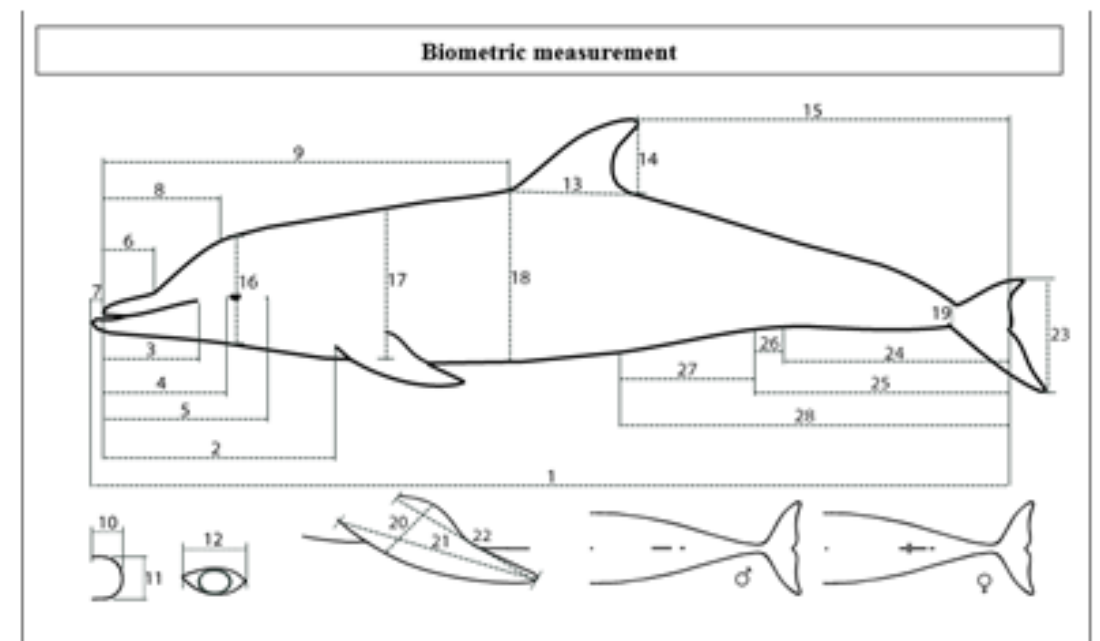
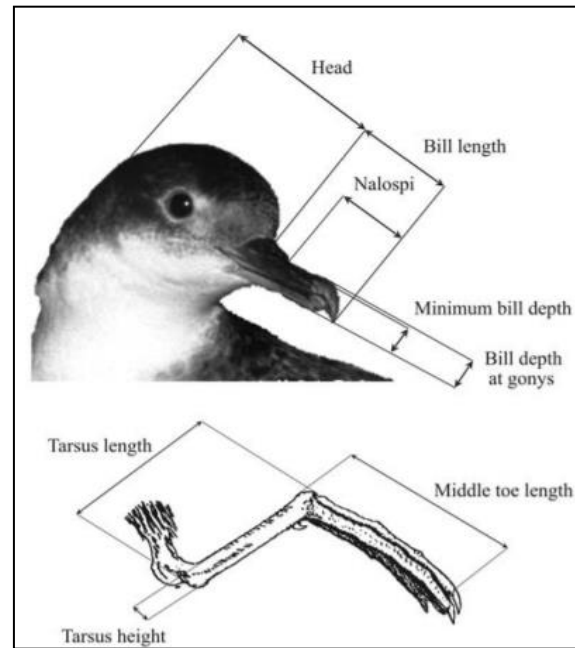
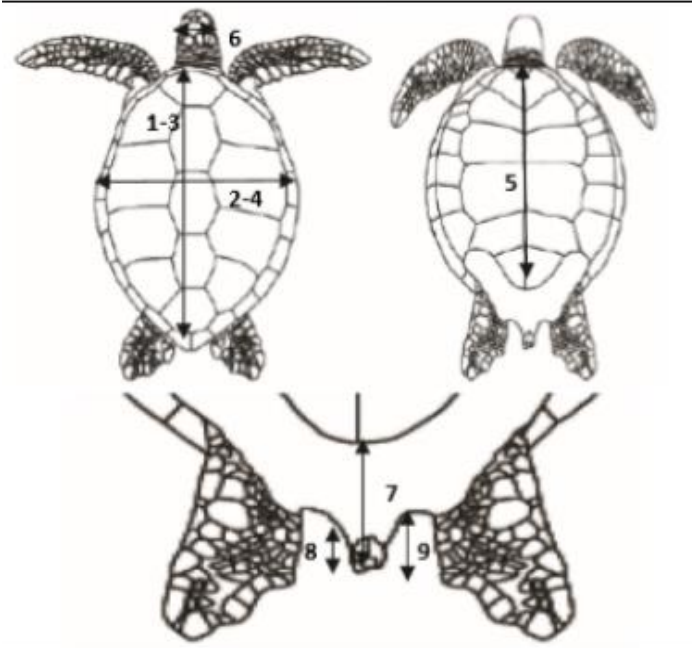
Note the date of discovery (dd/mm/yyyy), the location of discovery and the coordinates if available (X,Y: in decimal degrees, or specify the coordinate system);

3. ON THE INDIVIDUAL

Species identification



BIOMETRIC MEASUREMENTS



Several **basic** and **optional biometric measure** should be performed (precision 0.01 cm), as well as the **weight** (precision 0.01 kg).

DESCRIPTION OF THE ANIMAL'S BODY CONDITIONS

8. Note the conservation status or decomposition level according to these 5 levels



Level 1- Alive



Level 2- Fresh

Dead recently, turtle in good condition



Level 3- Partial

Internal organs still in good conditions.
Autolysis. Bad smell.
Colour changes in skin.



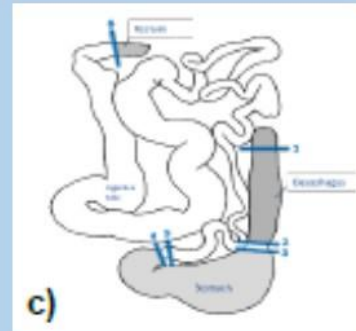
Level 4- Advanced



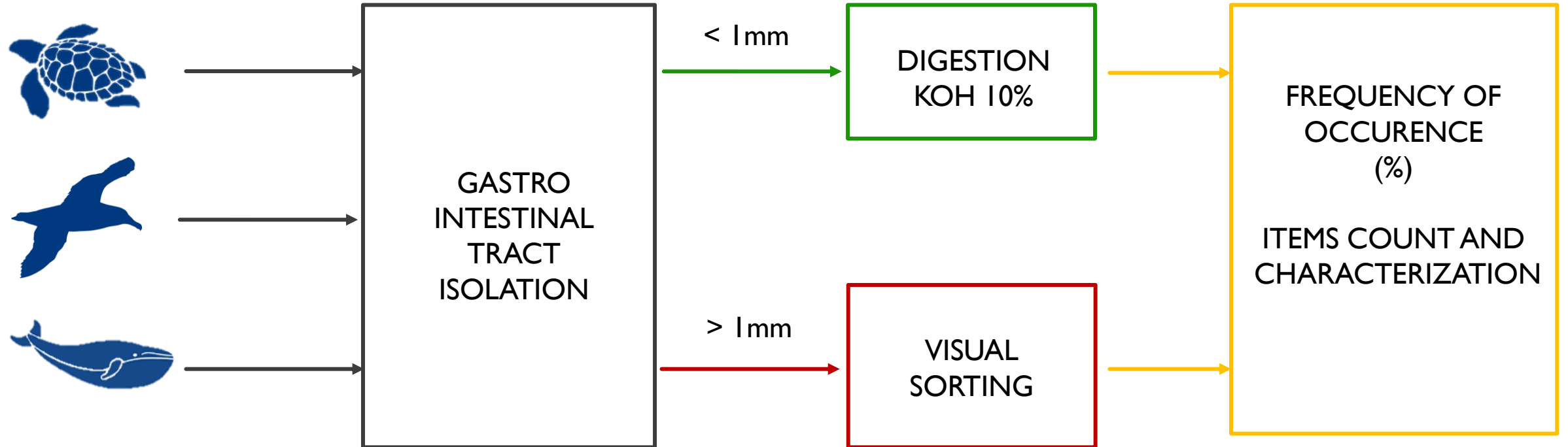
Level 4- Mummified

EXTRACTION OF THE GASTROINTESTINAL TRACT

Remove the entire GI and place it on the examination surface. Isolate the different portions of GI (oesophagus, stomach, intestines) by strangling and cutting between the 2 clamps (see the blue solid lines in Figure 1) the gastro-oesophageal sphincter and the pyloric sphincter.



GASTROINTESTINAL TRACT ANALYSIS



Each GI section should be opened using a scissor and all the material need to be collected. Subsequently the content should be cleaned with current and abundant tap water to remove the liquid portion and passed in a 1mm mesh sieve. You can add an additional sieve (i.e. 100um) for small microplastic analysis.

MACRO AND MICROLITTER COUNT AND CHARACTERIZATION

TYPE	CODE	DESCRIPTION
Industrial Plastic	IND PLA	Industrial plastic granules usually cylindrical but also sometimes oval, spherical or cubical shapes.
Use sheet	USE SHE	Remains of sheet, e.g. from bag, cling-foil, agricultural sheets, rubbish bags..
Use thread	USE THR	Threadlike materials, e.g. pieces of nylon wire, net-fragments, woven clothing...
Use foam	USE FOA	All foamed plastics e.g. polystyrene foam, foamed soft rubber (as in mattress filling)
Use fragment	USE FRAG	Fragments, broken pieces of thicker type plastics, can be a bit flexible, but not like sheet like materials
Other use plastics	USE POTH	Any other plastic type of plastics, including elastics, dense rubber, cigarette filters, balloon pieces, soft airgun bullets... Specify in the column "Notes".
Litter other than plastic	OTHER	All non-plastic rubbish and pollutant
Natural food	FOO	Natural food for sea turtles (e.g., pieces of crabs, jellyfish, algae...)
Natural no food	NFO	Anything natural, but which cannot be considered as normal nutritious food for sea turtle (stone, wood, pumice, etc.)

Record:

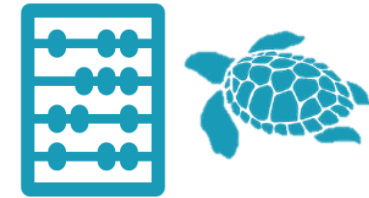
- For all categories: the dry mass (grams, precision 0.01 g) of each category
- For litter categories only: number of fragments and items in each category.
- For the plastic litter categories only: total number of plastic fragments per colour category.
- Analyse at least 10% of the detected items by FTIR or Raman spectroscopy if is possible.



COLLECTION OF DATA

For each species:

- **Frequency of occurrence (%) of ingested macro and microlitter for each species**, calculated as the percentage of the individuals examined with ingested litter.
- **Abundance (N) of litter items ingested per individual** (average number of items/individual) for each species, calculated as a total and per category.
- **Total dry weight (g) of the detected waste expressed on grams** (precision: second decimal place). This weight refers to each single category found in a specific organ (or faeces) of the specimen.



Thank you

شكرا

Merci

Grazie

“ For a litter FREE Mediterranean

