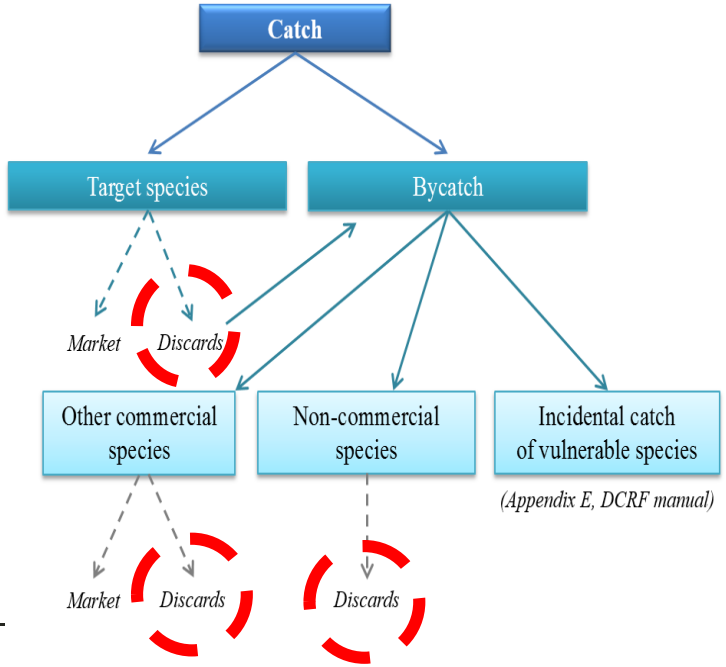
Monitoring discards in Mediterranean and Black Sea fisheries

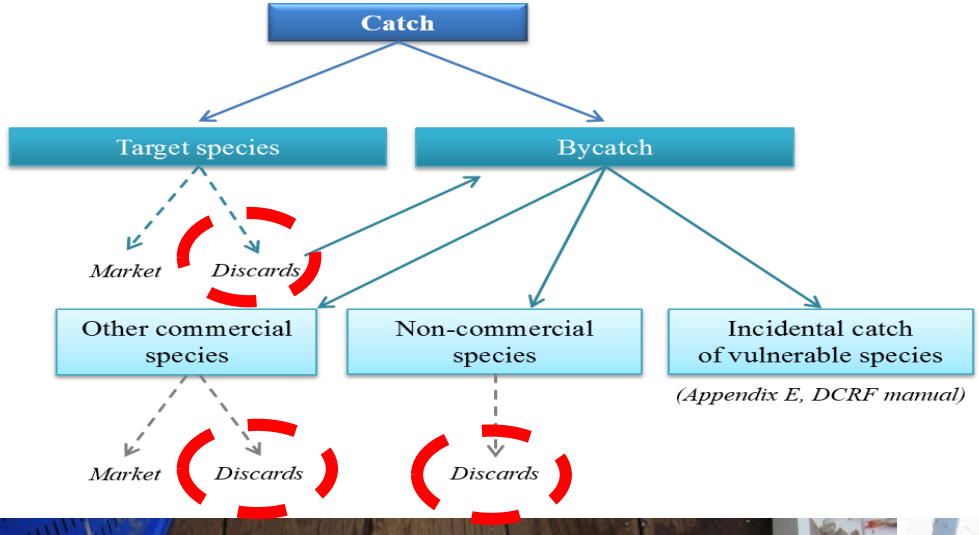
by
Paolo Carpentieri
Fishery Resources Monitoring Specialist
General Fisheries Commission for the Mediterranean (GFCM)

Collecting discards data

Catch is the amount of marine biological resources that are caught by the fishing gear and reach the deck of the fishing vessel. This includes individuals of the target species, which are usually kept on board and retained, as well as bycatch, which refers to species with or without commercial value that are not targeted by the fishery.



Source: http://www.fao.org/gfcm/data/dcrf/en/



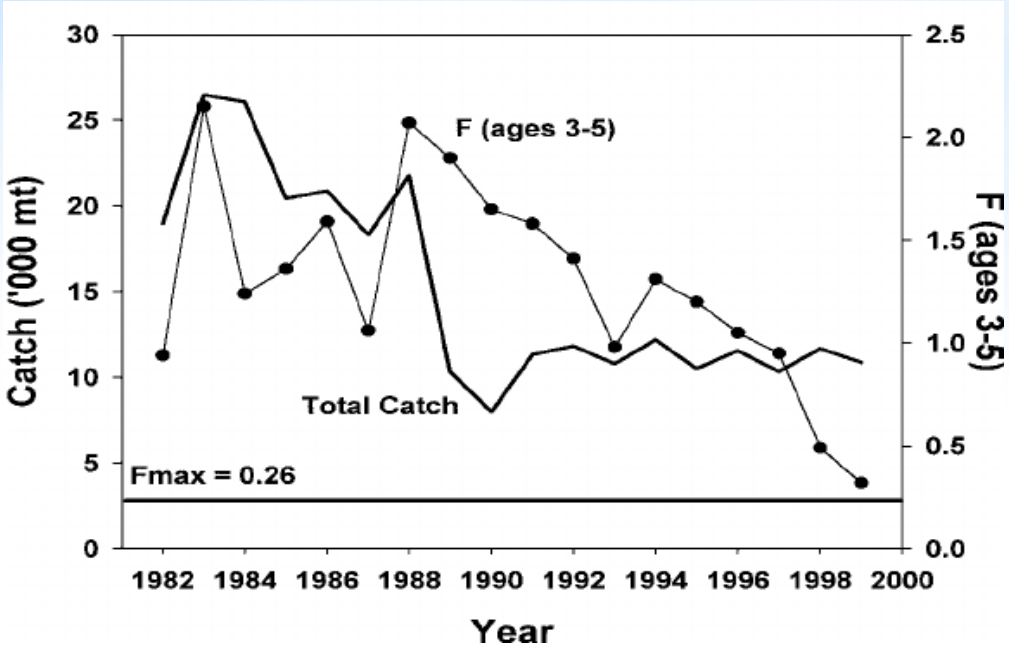
Discards is considered part of the catch that is not retained on board and is returned at sea, dead or alive. It may include target species or any other species (both commercial and non-commercial) discarded at sea

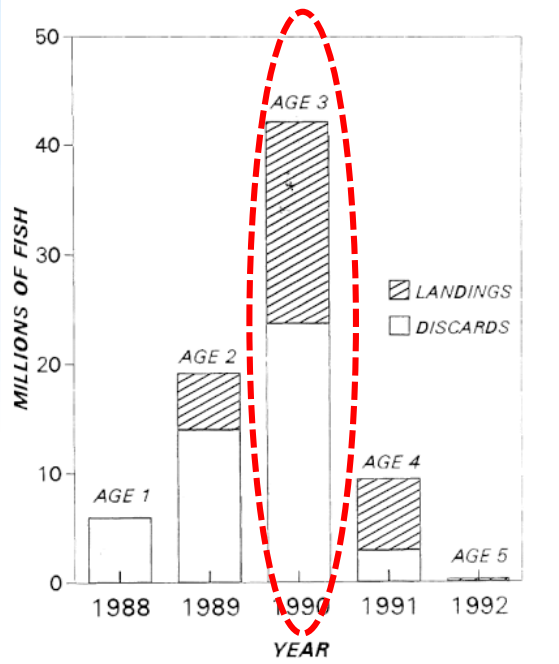
Collecting discards data

Discarding is a global issue. The most recent FAO estimate of **20 million tons**, if correct, is however about 25 percent of the reported annual yield from marine fisheries. Usually discarding constitutes a reduction of future harvesting opportunities and it might have negative consequences for the environment and ecosystem.

Studies on discards cover only a small proportion of the total fishing activity in the Mediterranean Sea, indicating a shortage of information. This issue, among others, has been acknowledged as an important constraint on performing reliable stock assessments.

Collecting discards data





Discarding rates are often not very well estimated or they are totally unknown. In such cases, discards may represent a major source of uncertainty about the real fishing mortality rates exerted on stocks. It became clear that there is the need for data on the catches of fish including those being discarded in order to enable a rational approach to finding means for improving the state of the stocks.

Reasons for discarding

Collecting discards data

There are number of reasons for discarding, they are mainly legislative and/or economic or just belong to fishing practices. In many instances, the individual reasons operate simultaneously. These reasons may be listed as follows: **economic** (e.g. low market prices), **legal** (e.g. minimum landing sizes), **environmental (**e.g. weather conditions affecting sorting practices), **technical** (e.g. vessel capacity), **biological** (e.g. poisonous fish, jellyfish), **and/or based on personal decisions**.

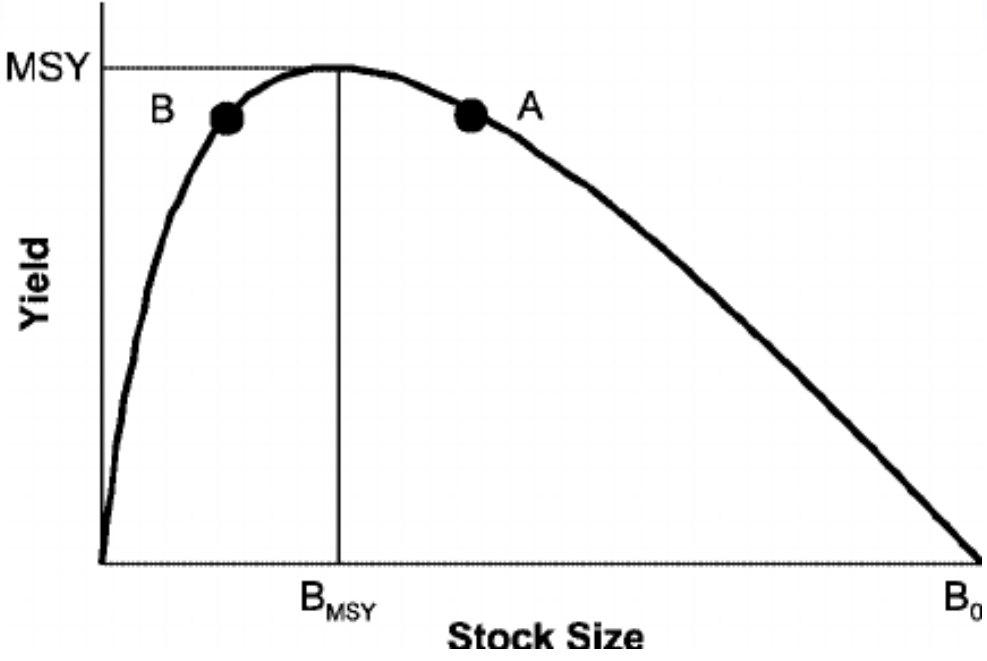
Moreover, the extent of discarding is dependent on a number of variables which include the **gear and fishing methods, the fishing ground, fishing season, depth, duration of the trip, duration of the haul, the market situation and fluctuation in the abundance of juvenile fish**.

Major Species		Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Blue Marlin		Good	Good	Fair	Low	Low	Low	Low	Low	Best	Best	Best	Best
Wite Marlin		Best	Best	Best	Best	Best	Best	Best	Best	Best	Best	Best	Best
Mahi-Mahi (Dorado)		Low	Fair	Fair	Good	Best	Best	Best	Best	Fair	Low	Low	Low
Barracuda		Fair	Fair	Good	Best	Best	Best	Best	Best	Best	Good	Fair	Fair
Yellowfin Tuna		Low	Fair	Good	Best	Best	Best	Best	Good	Fair	Low	Low	Low
Amberjack		Fair	Good	Best	Best	Best	Best	Best	Good	Fair	Low	Low	Low
Salfish		Fair	Fair	Good	Best	Best	Best	Best	Good	Good	Fair	Fair	Fair
Wahoo		Best	Good	Good	Good	Good	Good	Good	Fair	Low	Fair	Best	Best
Bonito		Low	Fair	Good	Best	Best	Best	Good	Fair	Fair	Low	Low	Low

Collecting discards data

Consequences of discarding

Discarded specimens are usually dead. Thus, catching and then discarding practices have consequences, as mentioned above, in stock assessments and fishery management. **The majority of specimens caught, and then discarded, are small and small specimens are sexually immature. That means reduction of future spawning stock biomass, which is at the moment one of the key parameters in fishery management**. Catching small fish reduces the growth potential of the stock and thus reduces the potential yield from a fishery with obvious economic consequences.



Collecting discards data

The importance of collecting information on discards

- Understanding discarding is of fundamental importance to clarify and avoid detrimental impacts of fishing activities on the environment, particularly when these activities overexploit marine resources.

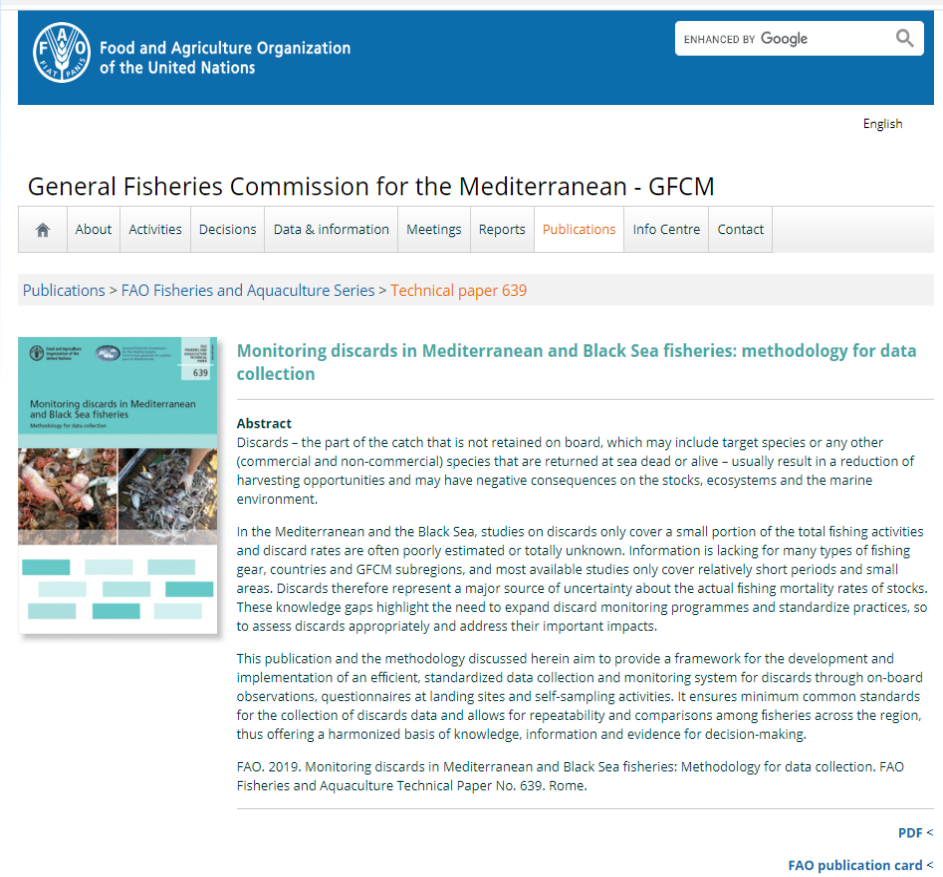
- Discarding is not always taken into consideration in fish stock assessments, even when it may account for a large proportion of fishing mortality, especially for younger individuals; this can lead to unrealistic and, in some cases, optimistic assessments.

- Adopting effective measures to reduce it represent essential steps towards minimizing the impacts of fisheries on vulnerable species, discards, and more generally on marine ecosystems, as well as towards ensuring a sustainable fishery sector.

- Data collection has never been standardised in the Mediterranean and Black sea; therefore, it is very difficult to compare quantitative data and understand impact

- Need to expand monitoring programmes and standardize practices in order to compare fisheries

Collecting discards data



Food and Agriculture Organization of the United Nations

ENHANCED BY Google

English

General Fisheries Commission for the Mediterranean - GFCM

About | Activities | Decisions | Data & information | Meetings | Reports | Publications | Info Centre | Contact

Publications > FAO Fisheries and Aquaculture Series > Technical paper 639

Monitoring discards in Mediterranean and Black Sea fisheries: methodology for data collection

Abstract

Discards – the part of the catch that is not retained on board, which may include target species or any other (commercial and non-commercial) species that are returned at sea dead or alive – usually result in a reduction of harvesting opportunities and may have negative consequences on the stocks, ecosystems and the marine environment.

In the Mediterranean and the Black Sea, studies on discards only cover a small portion of the total fishing activities and discard rates are often poorly estimated or totally unknown. Information is lacking for many types of fishing gear, countries and GFCM subregions, and most available studies only cover relatively short periods and small areas. Discards therefore represent a major source of uncertainty about the actual fishing mortality rates of stocks. These knowledge gaps highlight the need to expand discard monitoring programmes and standardize practices, so to assess discards appropriately and address their important impacts.

This publication and the methodology discussed herein aim to provide a framework for the development and implementation of an efficient, standardized data collection and monitoring system for discards through on-board observations, questionnaires at landing sites and self-sampling activities. It ensures minimum common standards for the collection of discards data and allows for repeatability and comparisons among fisheries across the region, thus offering a harmonized basis of knowledge, information and evidence for decision-making.

FAO. 2019. Monitoring discards in Mediterranean and Black Sea fisheries: Methodology for data collection. FAO Fisheries and Aquaculture Technical Paper No. 639. Rome.

PDF <

FAO publication card <

To address this issue and better understand the discards behavior, we should take advantages of the following publication…..

FAO. 2019. Monitoring discards in Mediterranean and Black Sea fisheries: Methodology for data collection. FAO Fisheries and Aquaculture Technical Paper No. 639. Rome

http://www.fao.org/gfcm/publications/series/technical-paper/639/en/

Collecting discards data

The main objective of these guidelines is to develop and implement an efficient and harmonized discard monitoring system in Mediterranean and Black Sea areas, namely by:

- providing a minimum set of standards for the collection of discards data,
- standardizing the data to be collected, including the forms to be used;
- specifying minimum standards for the development of a data collection programme in countries without a discard monitoring programme.

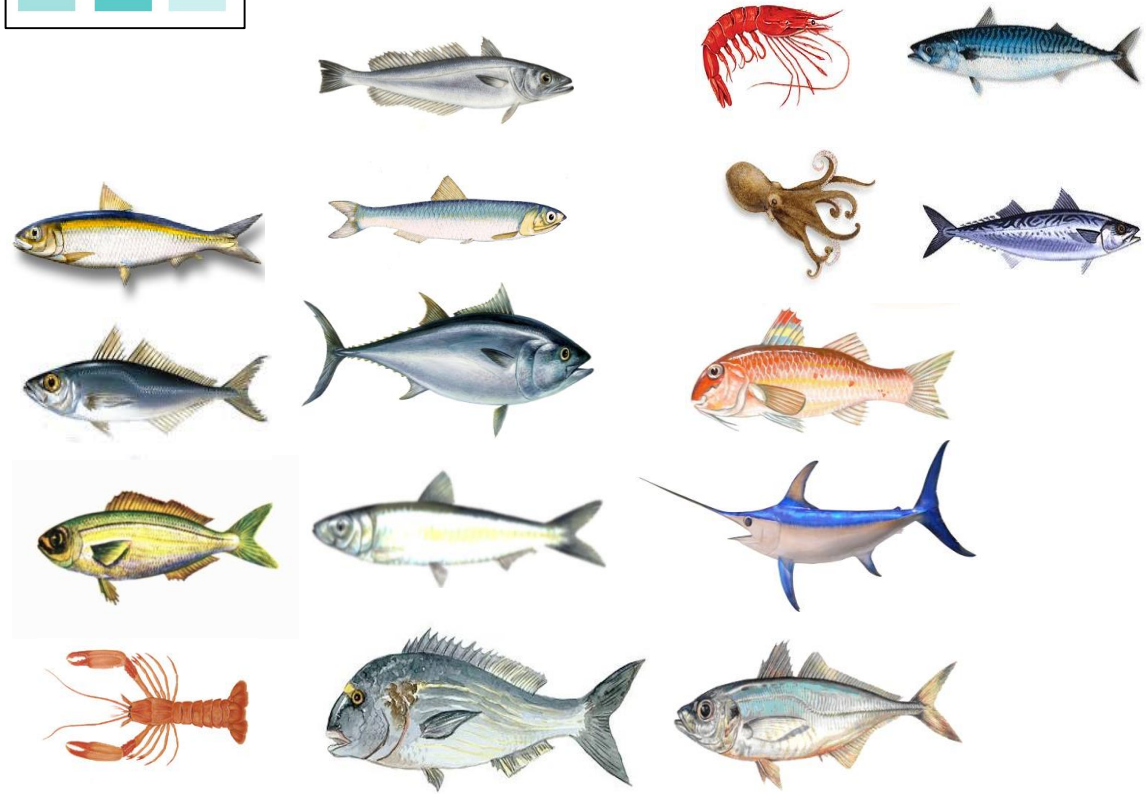
Collecting discards data

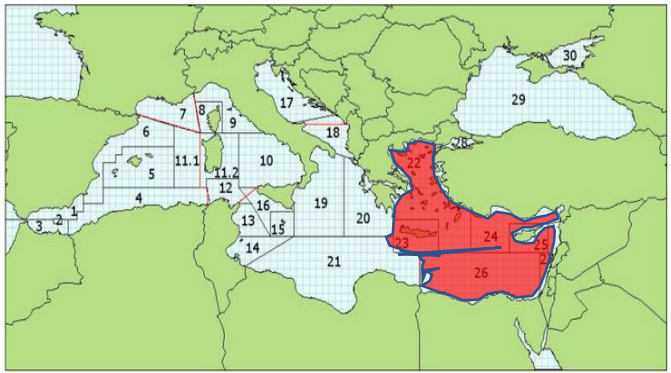
Contents

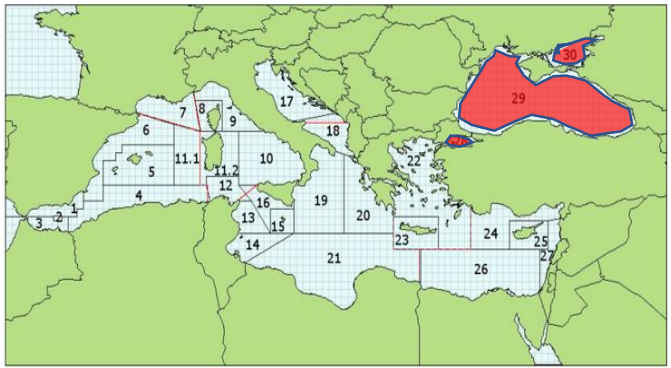
http://www.fao.org/gfcm/publications/series/technical-paper/639/en/

Selection of species and biological sampling

"Countries are requested to collect biological information for all the species identified in all GFCM sub regions where their fisheries take place"

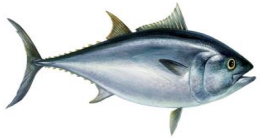
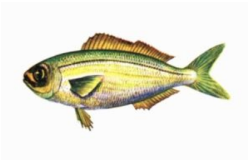








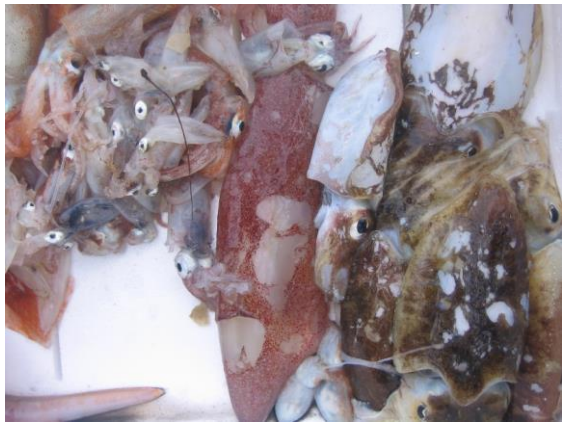


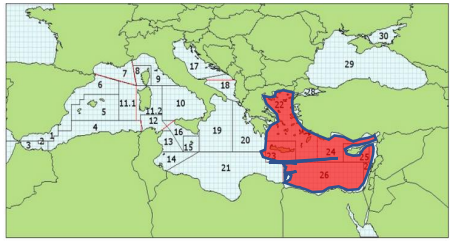
Do I have to collect discards and biological data for all the species in the region?




Start data collection based on the concept of priority species



Priority species for the Eastern Mediterranean



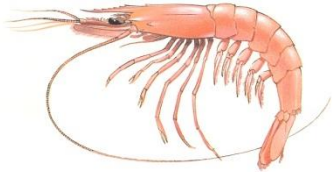
ROUND SARDINELLA

SARDINE

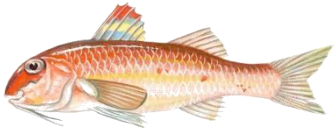
ANCHOVY

DOLPHINFISH

HAKE



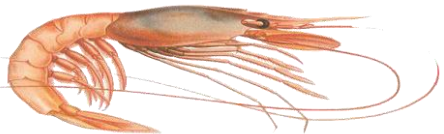
PINK SHRIMP



RED MULLET

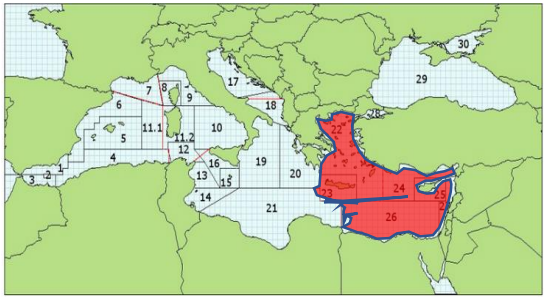
RED SHRIMP

EEL



BLUE and RED SHRIMP

Priority species for the Eastern Mediterranean

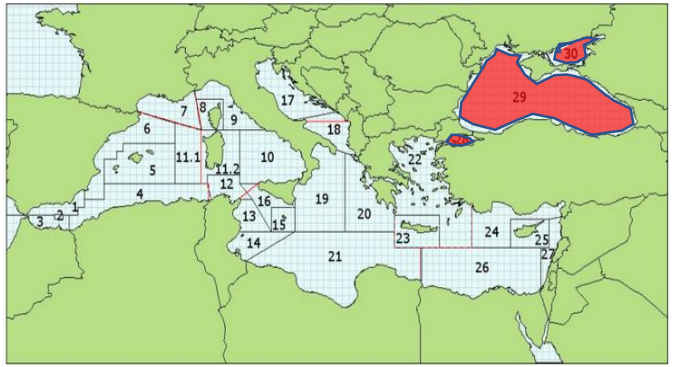


Lagocephalus sceleratus
Silver-cheeked toadfish

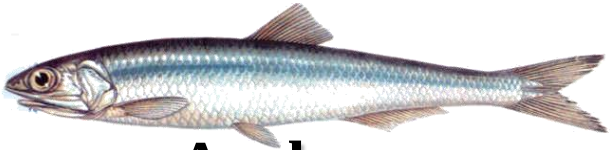
Pterois miles
Lionfish

Saurida lessepsianus
Lessepsian lizardfish

Priority species for the Black Sea

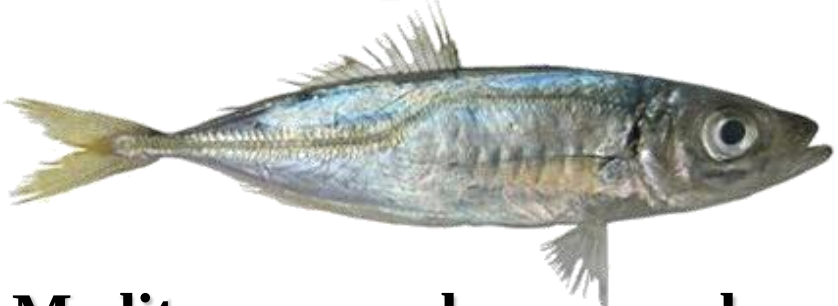


Dogfish

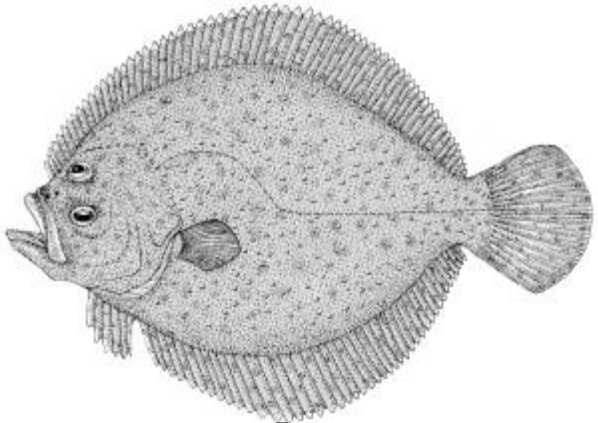


Anchovy

Sprat



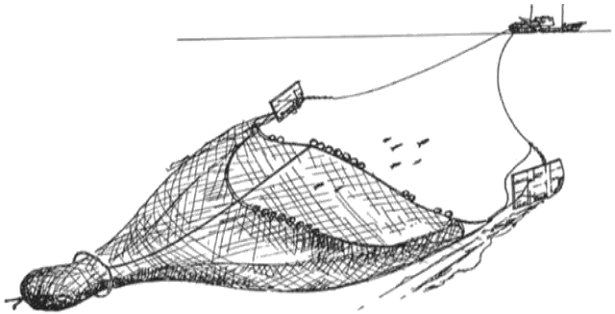
Mediterranean horse mackerel



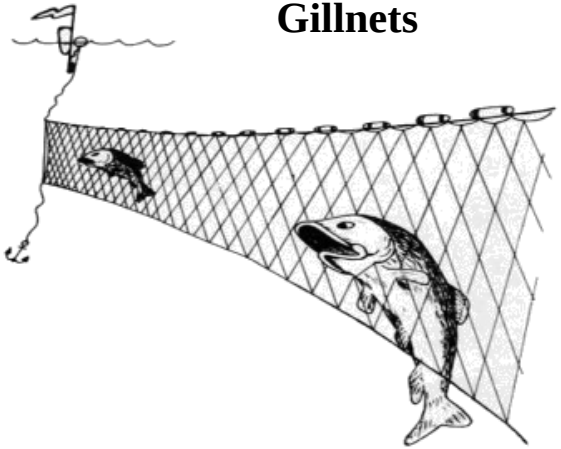
Turbot

Collecting discards data

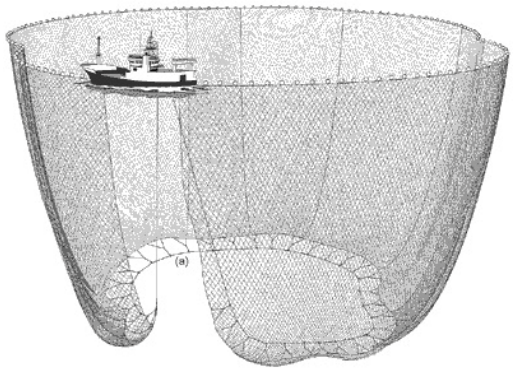
Demersal trawl



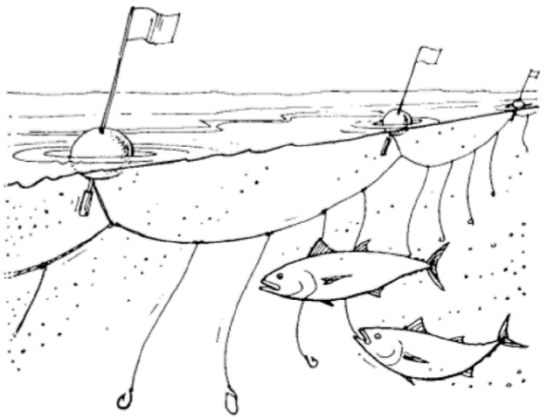
Gillnets



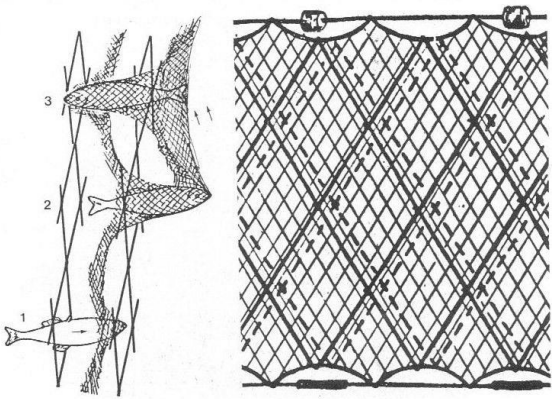
Purse seine



Longliners



Trammel net



Collecting discards data

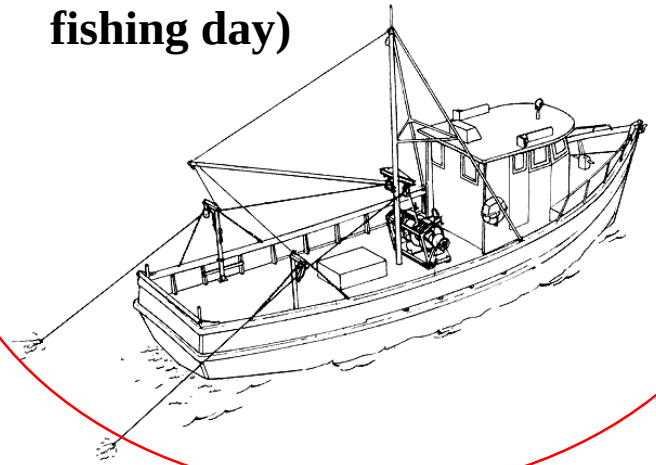
By single fishing operation and for different fishing activities

Pots and traps

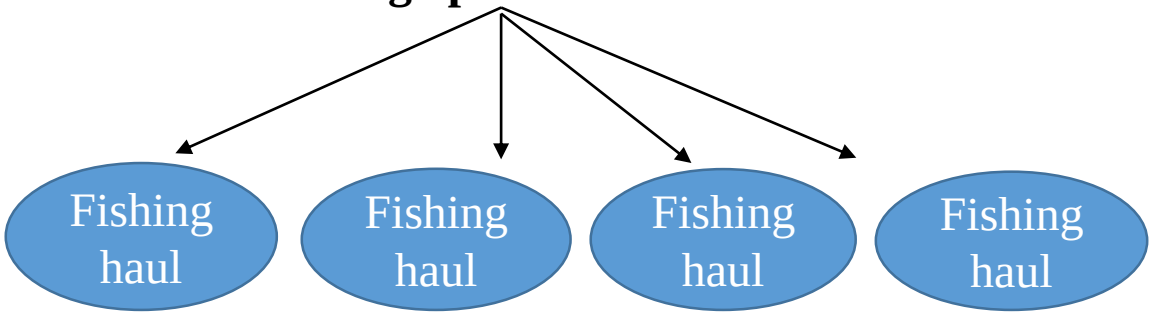
Setting a net

Fishing haul

During a single fishing trip (i.e. fishing day)



Fishing operations

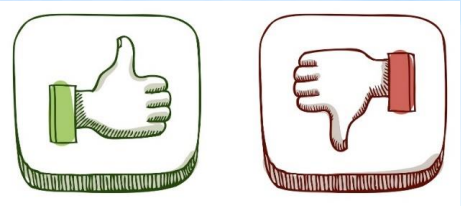


Collecting discards data

1 - First, discards can be sampled through at-sea monitoring of commercial catches (by observers on board).

One of the most accurate methods to estimate discards is to place observers on board a representative selection of fishing vessels so that they can record landing information and collect samples from the discards

Collecting discards data



Observers on board

Advantages

Observers may be used for more reasons than merely collecting discards data (on commercial or vulnerable species); in general, they are asked to collect **a wide range of information on fishing operations** (fishing area, duration of the trip, sorting behaviour, number of hauls, gear, catch composition, vulnerable species etc.).

Disadvantages

Observer programmes are an excellent way to collect data, but the **presence of an observer may influence fishers' behaviour** (change in fishing practices, fishing grounds, handling individuals).

On board poses many difficulties in addition to those associated with working on an unstable platform. When on board commercial vessels, **observers have to work with minimum interference with the daily work of the crew** and often, they have very limited time to obtain their information.

Misidentification can cause many problems, such as inaccurate recording of a species; it is therefore important that observers are able to identify the species caught (both discard fraction and commercial ones).

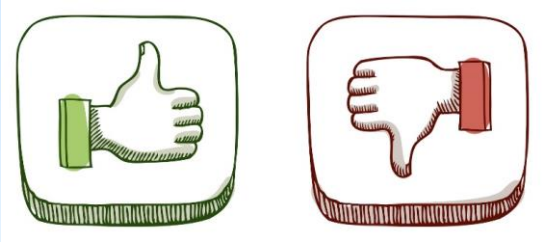
Collecting discards data

2 - The second approach is to conduct direct dialogues with fishers (by questionnaires), collecting also perspectives on the discard issue, which is meant to complement the onboard observations data analyses, and to provide an integrated approach toward management.

Discard information could be also gathered by individual questionnaire-based interviews following a standardized sampling protocol with fishers from different ports/landing places. The questionnaire will be designed to collect information relating to vessels, fishing gears, fishing practices, location of main fishing grounds, main target species, estimation of catches, and species composition of discards.

Collecting discards data

Questionnaires



Advantages

Fishers are an important source of information to improve knowledge on discards that **they better reflect the situation at sea**. The "**face-to-face" questionnaire-based interviewing method is more reliable** than a mere distribution of questionnaires to be filled in by the fishers. This approach enables to gather views on discards to complement observations on board

Disadvantages

Questionnaire contents and phraseology should be fully understandable to fishers in order to avoid ambiguous information. These surveys should always be carried out by interviewers so that interviews are complete and questionnaires more likely to be filled in properly. Interviewers should provide primary quality controls. Although direct interviews are **more time-consuming**, this approach should be privileged in any survey. Efficiency is also expected to be higher since fishers gain experience in answering questions.

Collecting discards data

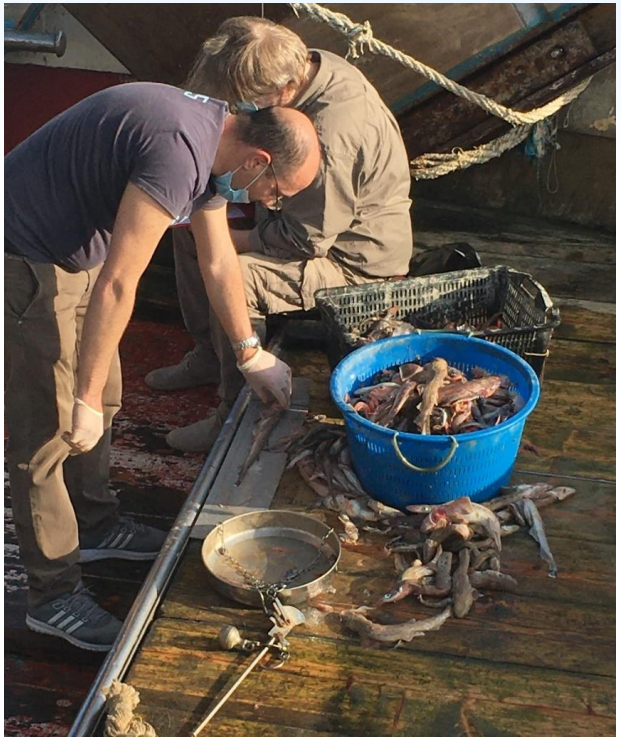
3 - The third one (by self-sampling) was intended to test a method for fishers to sample their own discards in order that discard surveys could be made more representative of the whole fleet segment without having to have too many observers.

The method rely on the fishers taking a random sample of the total catch, dividing it into retained and discarded fish.

For each trip and/or fishing operation, the captain and the crew will be asked to collect and store samples (e.g. boxes) of discarded fish, paying particular attention to their representativeness. These samples should be labelled and stored in the fish hold of the vessel.

Collecting discards data

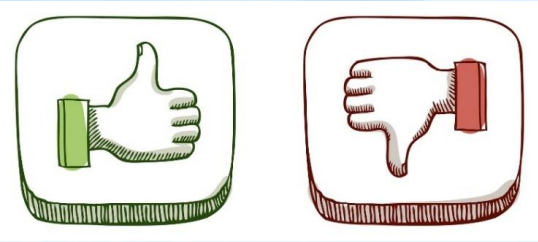
3 - The third one (by self-sampling) was intended to test a method for fishers to sample their own discards in order that discard surveys could be made more representative of the whole fleet segment without having to have too many observers.



These samples should be labelled and stored in the fish hold of the vessel. The discarded fish samples should then be packed and returned to the shore (i.e. landing site) where observers can collect information on the composition of the discarded fraction (e.g. volume and length-frequency distributions) and fill in the appropriate template on discard data reporting

Collecting discards data

Self-sampling



Advantages

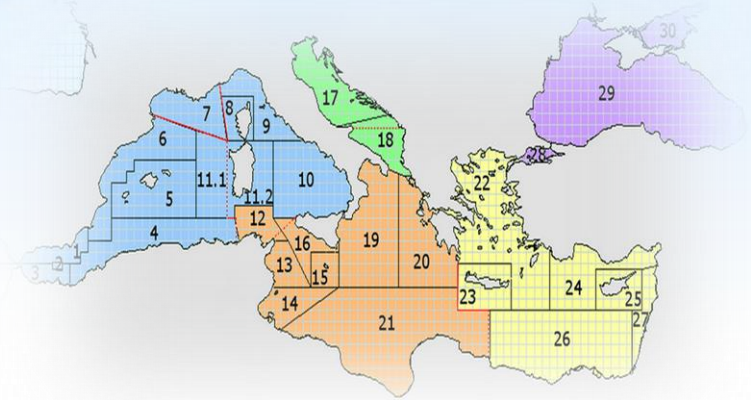
At-sea sampling of commercial fisheries catches carried out by observers can be a relatively expensive exercise, both in costs and human resources. As a result of the self-sampling approach, **a larger number of trips can be sampled at a lower cost** (there is no need to involve many observers). Self-sampling activities may complement studies and scientific surveys conducted by observers on board, providing a cost-effective alternative. Furthermore, self-sampling is the only sampling method for certain vessels such as very small or unsafe vessels.

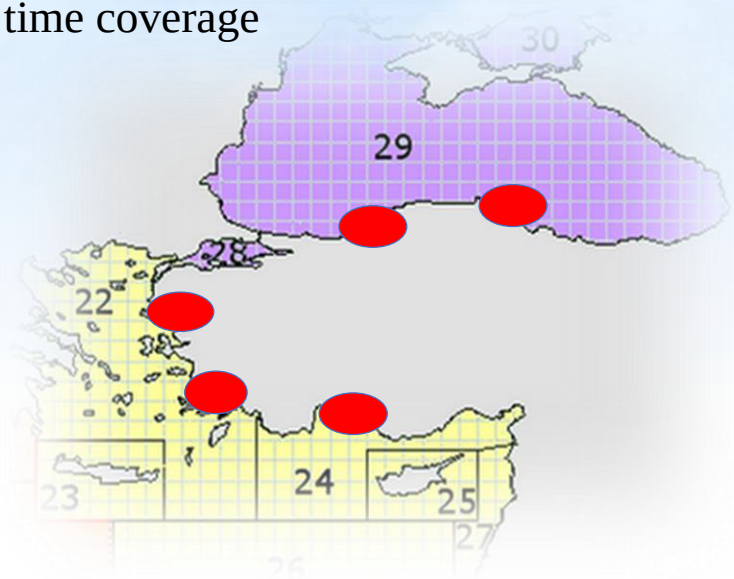
Disadvantages

Potential problems with this method are related to **the representativeness of the sample**. Some scientists and/or managers consider that data provided by fishers may not be rigorously collected and may therefore be biased. To avoid these problems, regular training sessions for fishers should be conducted in order to guarantee the accuracy and reliability of data collection. It is recommended to cross-check data obtained through the self-sampling approach with data collected by observers on board. Communication, feedback, incentives and shared motivation are essential for good cooperation.

Collecting discards data

Pay attention to a complete fleet, space and time coverage





Regardless of the selected data source(s), a discard monitoring programme should be designed taking into account the spatial (e.g. GSA) and temporal (e.g. quarter of the year) variabilities in order to identify seasonal and geographical differences in the volume (weight) and demographic structure (length) of both the discarded and landed fractions for different fleet segments.

On board observation

On board observation

4.a) On board observation - *Vessel characteristics*		
Name of data collector(s)		
Date		
Id. Fishing trip		
Country		
GSA		
		Notes
Vessel name*		
Fleet segment		
Total length of the vessel		
Power (kW)		
Gross Tonnage (GT)		
Port of departure		
Port of arrival		

Gear specifications					
	1st gear	**2nd gear**	**3rd gear**	**4th gear**	**Notes**
Gear type					
Net length (m)					
Mesh size (codend - mm)					
Number of hooks					
Bait					
Number of lines					
Number of pots/traps					
Soak time (the time during which the fishing gear is actively in the water)					
Others					

On board observation

4.b) Fishing trip data			
Date			
Id. Fishing trip			
			Notes
Total number of fishing operations			
Fishing hours			
Number of fishing operations sampled			
General information on the catch composition			**Notes**
Total landing (kg)			
Main commercial species in the landing fraction			
Discard (kg and percentage), in the catch composition	kg	%	**Notes**
Main species in the discarded fraction			
Catch of vulnerable species (Y/N)			
Catch of non-indigenous species (Y/N)			
Marine litter (Y/N)			
Macrobenthos (Y/N)			

Landing (kg)

Discards (kg/%)

Vulnerable species (Yes/No)

Litter (Yes/No)

Macrobenthos (Yes/No)

On board observation

Catch

Sorting

Retained fraction

Discarded fraction

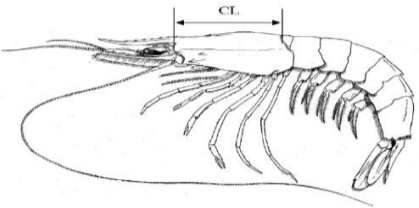
On board observation

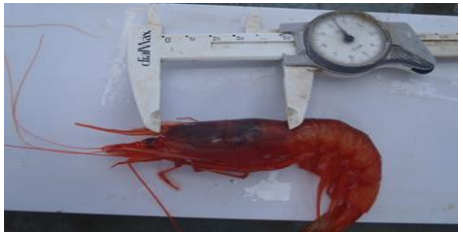
7.a) Length data (fish, elasmobranchs and cephalopods)			
Species			
Date		ID fishing trip	
Source of data		ID fishing operation	
	Retained fraction*		Discarded fraction*
Length (cm)	Subsample (Y/N)		Subsample (Y/N)
0			
0.5			
1			
1.5			
2			
2.5			
3			
3.5			
4			
4.5			
5			
5.5			
6			
6.5			
7			
7.5			
8			
8.5			
9			
9.5			
0			

Length measures

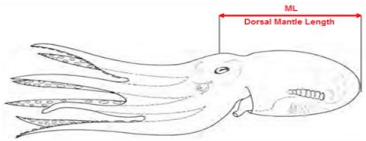
Total length

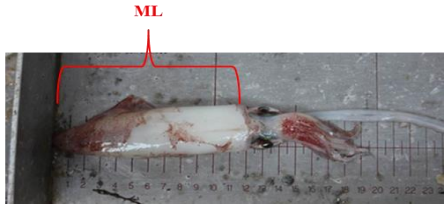
Carapax length





Mantle length



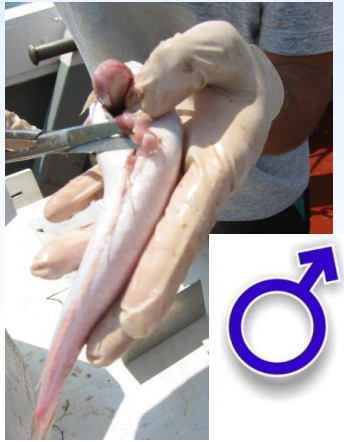


On board observation

Sex and maturity

8.a) Sex and maturity data (bony fish)			
Species		Retained or Discarded	
Date		ID fishing trip	
Source of data		ID fishing operation	

Bony fish																	
TL (cm)	Male							TL (cm)	Female							LT (cm)	Undetermined
	1	2			3	4			1	2			3	4			
	1	2a	2b	2c	3	4a	4b		1	2a	2b	2c	3	4a	4b		
0								0								0	
0.5								0.5								0.5	
1								1								1	
1.5								1.5								1.5	
2								2								2	
2.5								2.5								2.5	
3								3								3	
3.5								3.5								3.5	
4								4								4	
4.5								4.5								4.5	
5								5								5	
5.5								5.5								5.5	
6								6								6	
6.5								6.5								6.5	
7								7								7	
7.5								7.5								7.5	
8								8								8	
8.5								8.5								8.5	
9								9								9	
9.5								9.5								9.5	
0								0								0	

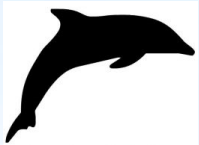


On board observation

Vulnerable species caught				
	Species 1	**Species 2**	**Species 3**	**Notes**
Group of vulnerable species				
Family*				
Genus*				
Species				
Picture (Y/N)*				
Total number of individual(s) caught				
Total weight of individual(s) caught (kg)				
Condition at capture*				
alive				
dead				
almost dead				
not known				
Condition at release*				
alive				
dead				
almost dead				
not known				

Vulnerable species

On board observation

Group of vulnerable species	Family	Species	Common name
Cetaceans 	Balaenopteridae	*Balaenoptera acutorostrata*	Common minke whale
		Balaenoptera borealis	Sei whale
		Balaenoptera physalus	Fin whale
		Megaptera novaeangliae	Humpback whale
	Balenidae	*Eubalaena glacialis*	North Atlantic right whale
	Physeteridae	*Physeter macrocephalus*	Sperm whale
		Kogia sima	Dwarf sperm whale
	Phocoenidae	*Phocoena phocoena*	Harbour porpoise
	Delphinidae	*Steno bredanensis*	Rough-toothed dolphin
		Grampus griseus	Risso's dolphin
		Tursiops truncatus	Common bottlenose dolphin
		Stenella coeruleoalba	Striped dolphin
		Delphinus delphis	Common dolphin
		Pseudorca crassidens	False killer whale
		Globicephala melas	Long-finned pilot whale
		Orcinus orca	Killer whale
	Ziphiidae	*Ziphius cavirostris*	Cuvier's beaked whale
		Mesoplodon densirostris	Blainville's beaked whale
Seals	Phocidae	*Monachus monachus*	Mediterranean monk seal

Total weight

Total weight
and
Individual
weight
(on board/lab)

Otolith collection

Stomach data

On board observation

Non –indigenous species

11) Data on non-indigenous species	
Source of data	
Date	
Id. Fishing trip	
Id. Fishing operation	
Gear type	
Species (latin name)*	
Common name	
Commercial (Y/N)	
Total number of individuals caught	
Total weight (kg) of individuals caught	
Percentage of individuals discarded (%)	
Notes	

Marine litter

On board observation

Marine litter

12) Data on marine macro-litter		
Date		
Id. Fishing trip		
Id. Fishing operation		
Total quantity of marine litter (kg)		
Percentage (%) of marine litter in the catch		
Marine litter composition*	**kg**	**Notes**
Plastic		
Rubber		
Fishing gears		
Metal		
Glass		
Ceramic		
Cloth		
Wood processed		
Other (please specify)		
Comments		

On board observation

Macrobenthos

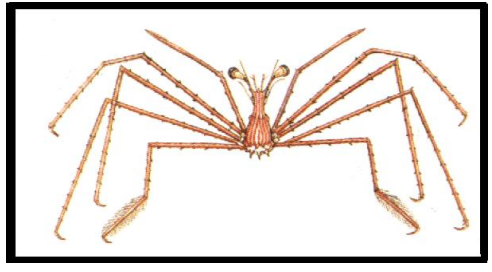
Holothuria tubulosa

Echinus acutus

Scaphander lignarius

Astropecten irregularis pentacantus

Latreillia elegans

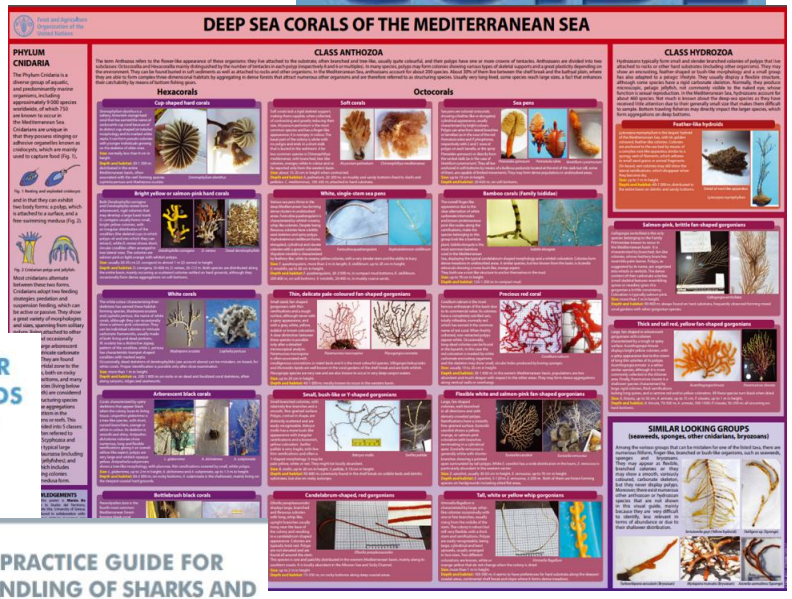


On board observation

13) Data on marine macrobenthos				
Source of data				
Date				
Id. Fishing trip				
Id. Fishing operation				
				Notes
Total quantity of macroinvertebrates (estimation in kg)				
Percentage of macroinvertebrates in the total catch (%)				
Composition by species*				
Species	**Family/Genus/Order/Taxa/ Morphological group**	**Total weight (kg)**	**Total number**	**Picture (Y/N)***

Macrobenthos

Identification guides



Questionnaire

Questionnaire: general information on fishing vessel and discards

6.a) Questionnaire on general information on discards		
Interviewer		
Date		
Port		
Id. Questionnaire		
Vessel characteristic		
Name of the vessel:	Fleet segment:	
Vessel length (m):	kW:	GT:
Gear characteristic		
Gear(s):	Mesh size:	
Length:	Number of pots and traps:	
Number of net(s):	Others:	
Number of hook(s)		
Fishing behaviour		
Number of fishing days (during one year):		
Main Target species:		
Main target species by season: Winter:	Spring:	
Summer:	Autumn:	

Questionnaire: general information on fishing vessel and discards

Discard? (y/n)	
Discard estimates (%) vs total catch by year:	
Is there a seasonality for discard (y/n)?	
Main discarded species by season: Winter: Summer:	 Spring: Autumn:
Reason(s) for discarding	*Species*
Low commercial value	
Small size specimens	
Poor condition	
Forbidden by law	
Others	

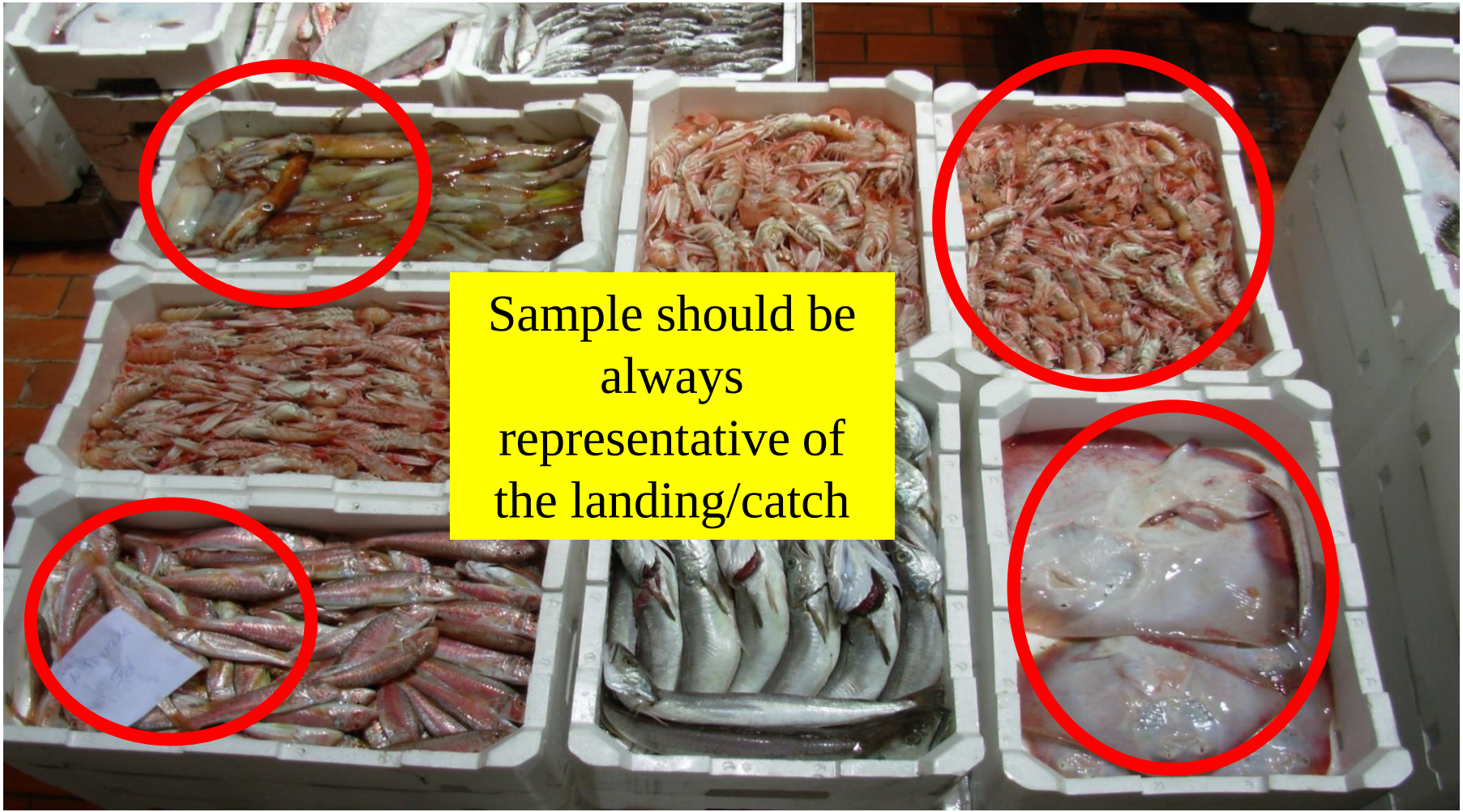
Self-sampling

Self-sampling

The retained fish should be counted, and the volume of all the components should be estimated. The discarded fish should be bagged and returned to the shore (i.e. landing place, market etc.) where observer can then take information on the composition of the discards fraction (e.g. volume and length-frequency distributions of the fraction). Thereafter, a discard rate by species can be obtained, from the counts of fish in the sample, and then raise to the total activity of that day.

5.a) Self-sampling data: vessel characteristics and catch data					
Country					
GSA					
Date					
Identification number of the fishing trip					
Fleet segment					
					Notes
Vessel name*					
Port of departure					
Port of arrival					
Total length of the vessel					
Power (kW)					
Gross Tonnage (GT)					
Total number of fishing operations					
Number of fishing operations sampled					
Gear specifications					**Notes**
	1st gear	**2nd gear**	**3rd gear**	**4th gear**	
Gear type					
Net length (m)					
Mesh size (codend - mm)					
Number of hooks					
Bait					
Number of lines					
Number of pots/traps					
Soak time (the time during which the fishing gear is actively in the water)					
Others					
General information on the catch composition					**Notes**
Total landing (kg)					
Main commercial species in the landing fraction					
Discard (kg and percentage), in the catch composition	kg		%		**Notes**
Main species in the discarded fraction					
Catch of vulnerable species (Y/N)					
Catch of non-indigenous species (Y/N)					

***Self-sampling:* general information on vessel characteristics and discards**


Sample should be always representative of the landing/catch





MANY THANKS
FOR YOUR ATTENTION