



DISCATCH: Pilot project Catch and discard composition including solutions for limitation and possible elimination of unwanted by-catches in trawl net fisheries in the Mediterranean

WP 1. Review and analysis of scientific papers and technical reports on discards quantities, composition, practices and mitigation tools in the Mediterranean

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- To **review the existing information** on fishery discards produced by demersal and pelagic trawls;
- To **identify factors** determining the catches of unwanted species;
- To report on **reasons for discarding**, linking them with fishers behaviour mainly through identifying the relevant policy objectives and/or economic incentives;
- To present **mitigation measures** associated with discarding, with special focus on gear selectivity, and discuss their effectiveness.

These are tackled in two deliverables/reports

- **D1.1.** Review on fishery discards from Mediterranean demersal and pelagic trawl fisheries with particular reference on processes adopted for sampling and analysis
- **D1.2.** Review on factors, reasons and mitigation measures associated with fishery discards from Mediterranean trawl fisheries

Structure of the presentation

1. Introduction

2. Methodology

3. Results of the review & Discussion

Discards

Projects on discards

Discards at fishery level

Discards at species level

Reasons for and factors affecting discarding

Natural conditions influence

Community influence

State (and regulation) influence

Market influence

Mitigation tools

Selectivity improvement

Spatio-temporal closures

Other mitigation tools

Landing obligation and fishers' perception

4. Conclusions

Discards: A complex issue...



- **Definitions :**
 - a. discards is the part of the total catch brought on board but then returned to the sea dead or alive for whatever reason
 - a. by-catch is considered as the incidental capture of non-target organisms (species and sizes).
- **Why do we study discards?** Discarding is considered globally among the most important issues for fisheries management;
 - waste of resources
 - source of uncertainty for fisheries scientists and decision makers
 - affecting biodiversity and community structure
- It involves economic, legal and biological considerations taking place during fishing operations. As a result, discards vary greatly geographically, seasonally, interannually as well as among the different fishing gears and the targeted assemblages.

1. Introduction



- Currently, in the EU the mitigation of discards is a major concern to conservation bodies and the wider public.
- Several measures have been adopted.

- The recently reformed CFP sets out a gradual elimination of discards by a landing obligation starting in 2015 (EU Reg. No 1380/2013).



- However, solutions to by-catch/discards need to be designed for specific fisheries and may differ among different regions.
- The first steps towards this direction is the understanding of the magnitude of discards and the reasons affecting discarding behavior.

1. Introduction

- Much progress has been made to fill gaps of knowledge during the recent years. However there are still needs to standardize practices in order to compare among fisheries, explore trends and test potential methods and tools aiming to mitigate discards/unwanted catches.
- On the other hand, several constraints are placed towards this direction
 - the **diversification** of the Mediterranean marine environment,
 - the **multi-species/multi-gear** nature of the Mediterranean fisheries along with the resulting differences in terms of catches, target species, sorting practices and composition of discards,
 - differences in **fishing intensity** which affect community composition and eventually landings and discards,
 - **economic and cultural** characteristics which regulate needs, demands and species prices.
- In the framework of WP1 of the DISCATCH project, we collected available published information on **trawl fishery** discards in the Mediterranean Sea

Information on trawl discards

We collected information concerning trawl fisheries discards in the Mediterranean Sea from scientific papers and grey literature, including technical reports. The information concerned three aspects:

1. information on monitoring and **research projects** which are either partly or exclusively related to fisheries discards.
 - scope,
 - time period,
 - season(s),
 - technical characteristics of the gears examined,
 - number of hauls or trips
 - The methodologies of each project.

Information on trawl discards

2. Information on discards **at the fishery level**. We focused on studies that examined % discards ratios (discards / total catch) for the whole community. Additional information for each fishery was collected
 - GSA /Country/Region
 - mesh size, shape
 - depth stratum
 - time series, season
 - target species or target category
3. Information for **species specific discards ratios**.
 - All the above information
 - L50 (Length at which 50% of fish are discarded)
 - Length range for discards and for landings

Factors affecting discarding & mitigation tools

- We collected information aiming to identify **reasons for and factors affecting discards**. Factors discussed are thus the ones identified in the Mediterranean Sea but placed in a broader context.
- For the purpose of this work we use the categorization by Eliassen and Christensen (2012) who classified factors which may function as drivers for discarding, into **four main categories**:
 - i. natural and structural conditions,
 - ii. community,
 - iii. state (and regulations) and
 - iv. market.
- Our review of the discards issue further summarizes **mitigation tools and management measures** aiming at the avoidance of unwanted catches, which are applied in the Mediterranean Sea.

3. Results and discussion

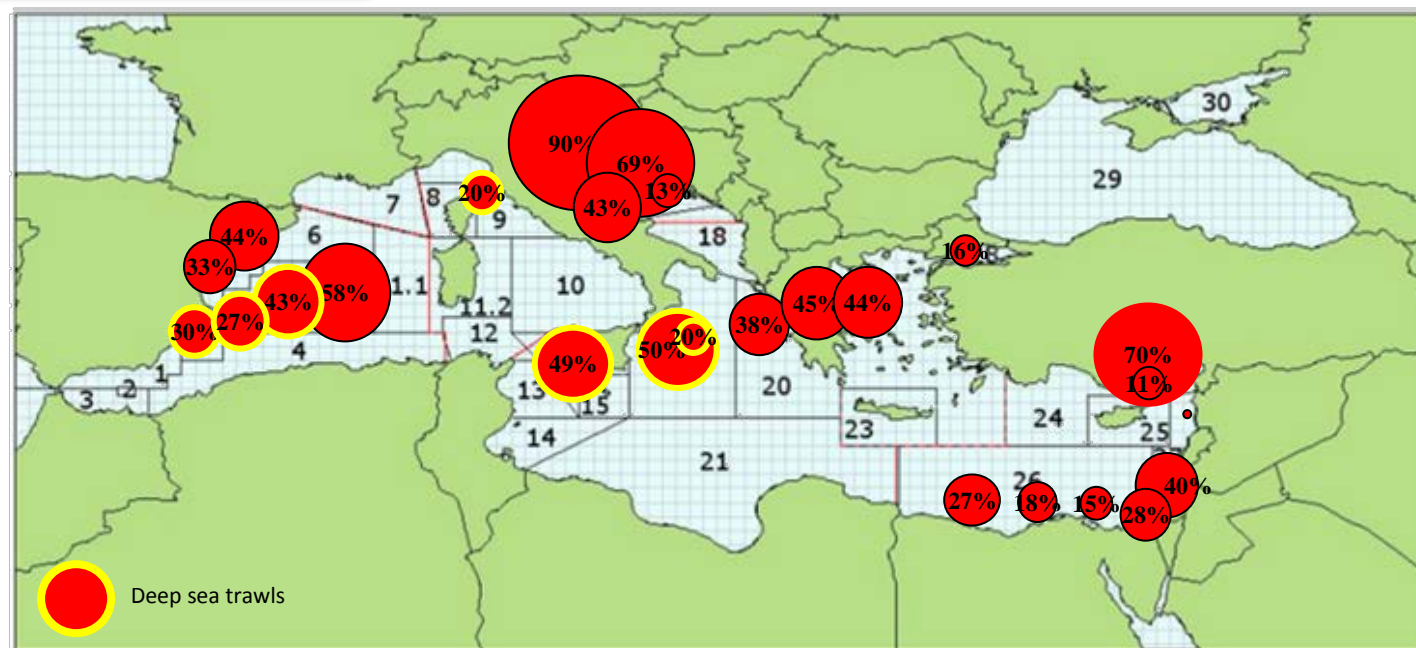
Projects on trawl discards in the MED

- The first projects started in the mid '90s and were EU funded, and included the cooperation of more than one EU countries
- Much progress has been made in recent years after (i) the establishment of the Ecosystem Approach to Fisheries as an integrated management approach, (ii) the implementation of the EU DCR/DCF.
- Efforts for standardization of sampling methodologies and analyses have been made. Still, differences are also obvious, e.g. in (a) sampling intensity, (b) target categories, (c) time periods, (d) sampling design and (e) raising methods.
- Additional parameters such as weather conditions, state of the discarded individuals which affect discarding could be included in the relevant protocols.

3. Results and discussion

Discards at the fishery level

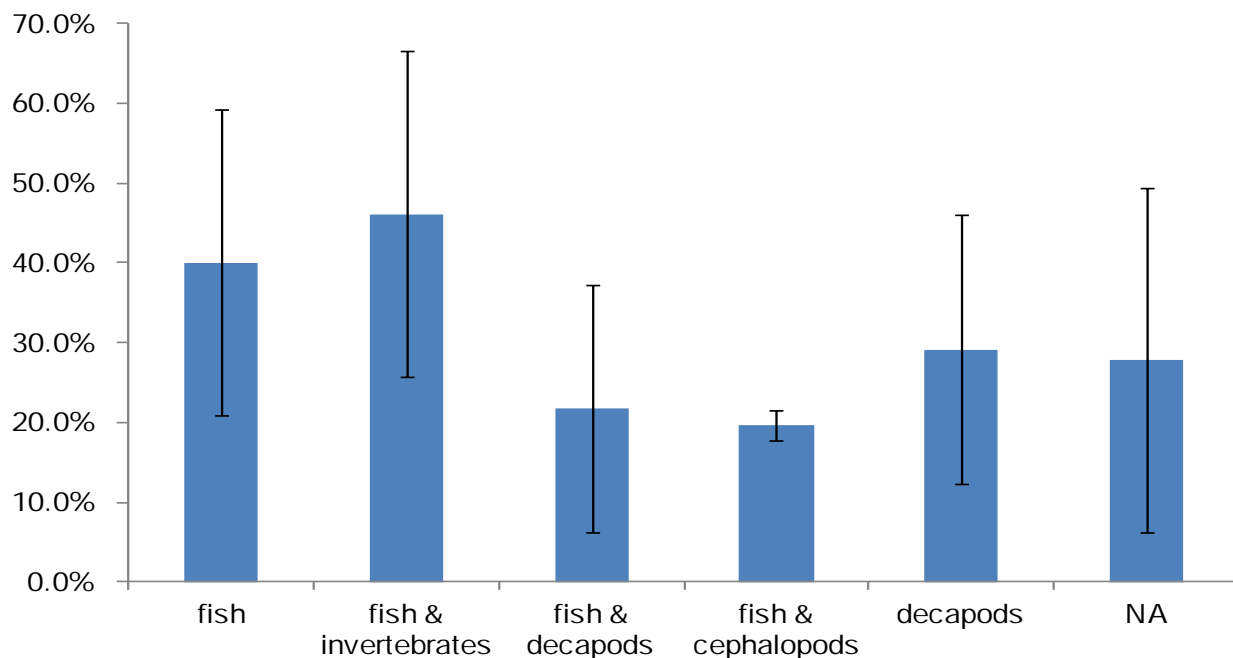
more than 190 records



- Most of this information comes from EU Med countries.
- The majority of these studies concern otter trawls, while few concern beam and rapido trawls which also operate in certain regions
- High range in discards ratios (usually 20-70%)
- Even within the same fishery or area the discards ratio can highly fluctuate seasonally and/or annually

3. Results and discussion

- Fishing operations and discarding practices can be categorized based on the target species/group.
- In a multi-species fishery like demersal trawling in the Mediterranean, definition of target species is not a straightforward process and fishers target a catch complex rather than one or two species
- In general fisheries targeting fish or mixed categories presented higher discards ratios compared to the ones targeting shrimps.



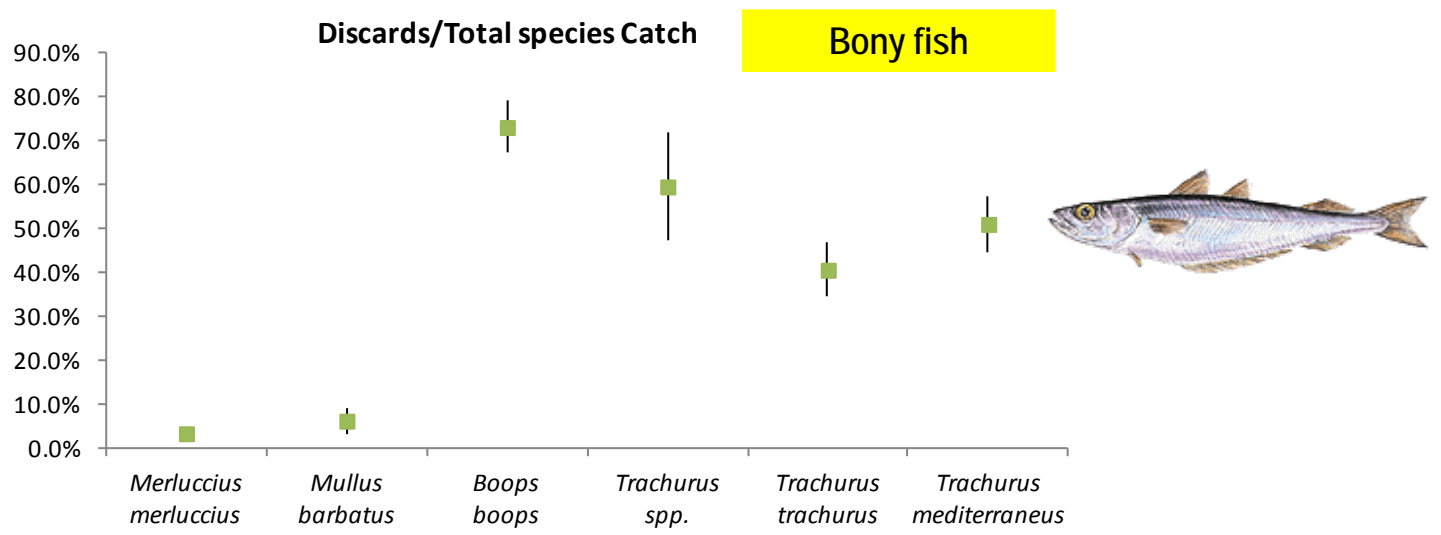
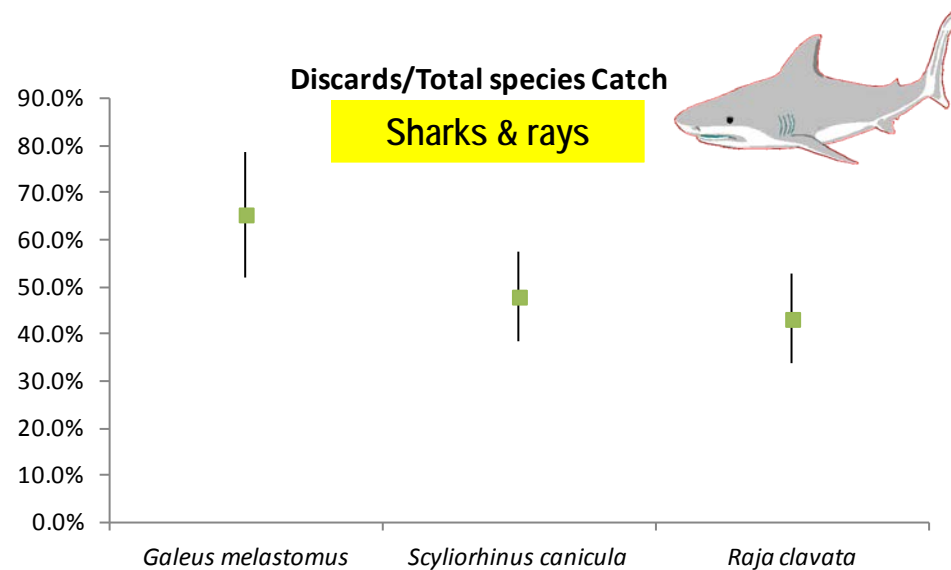
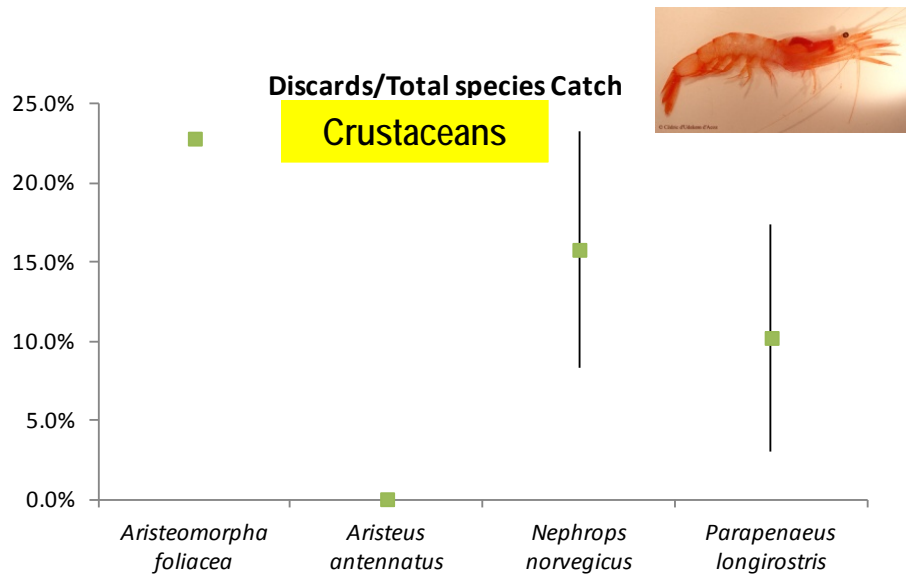
- However, even within the same target category, discards also change depending on other factors

Discards at the species level

- More than 900 records.
- Great differences are observed among species.
- In general, discarded fractions of the so considered target species (e.g., hake, red mullet, red shrimps) are usually very low or even negligible and comprise damaged or undersized specimens.
- Commercial by-catch is an important fraction of the catch but discards ratios of such species may fluctuate even more.

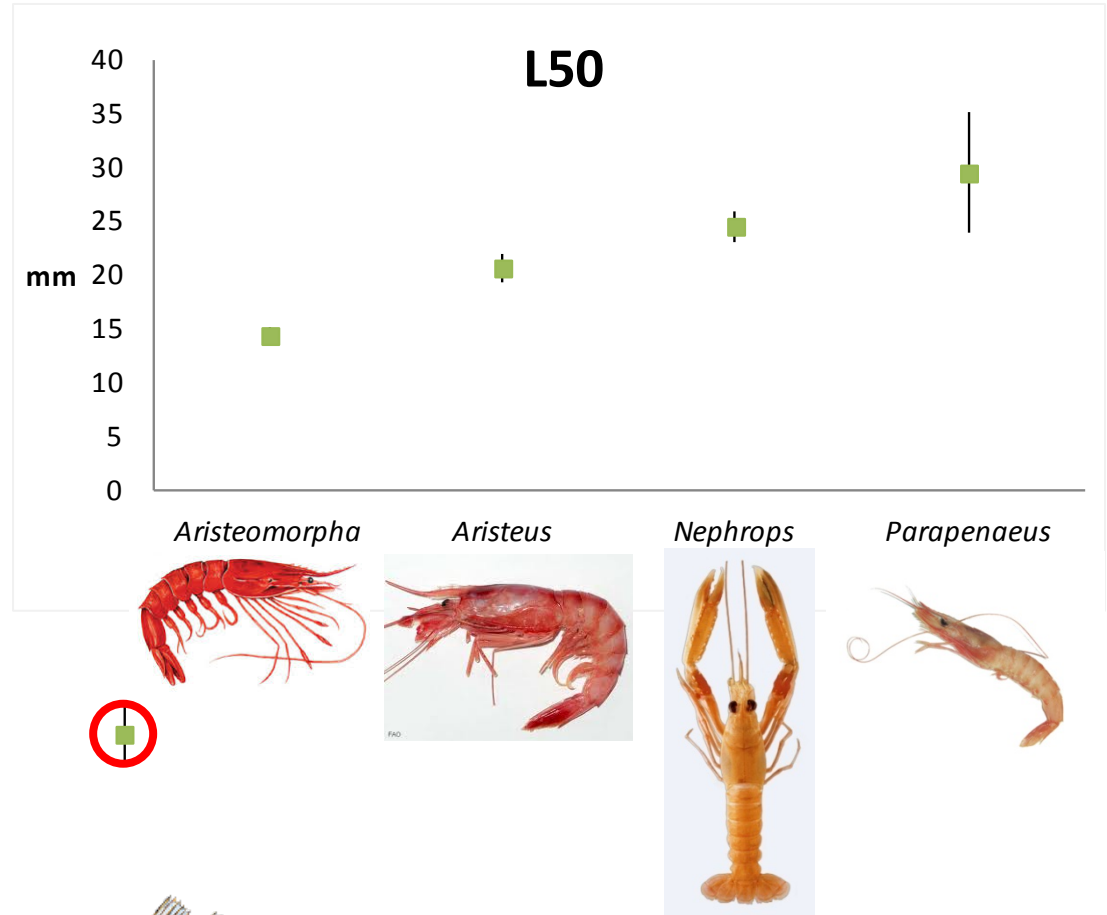
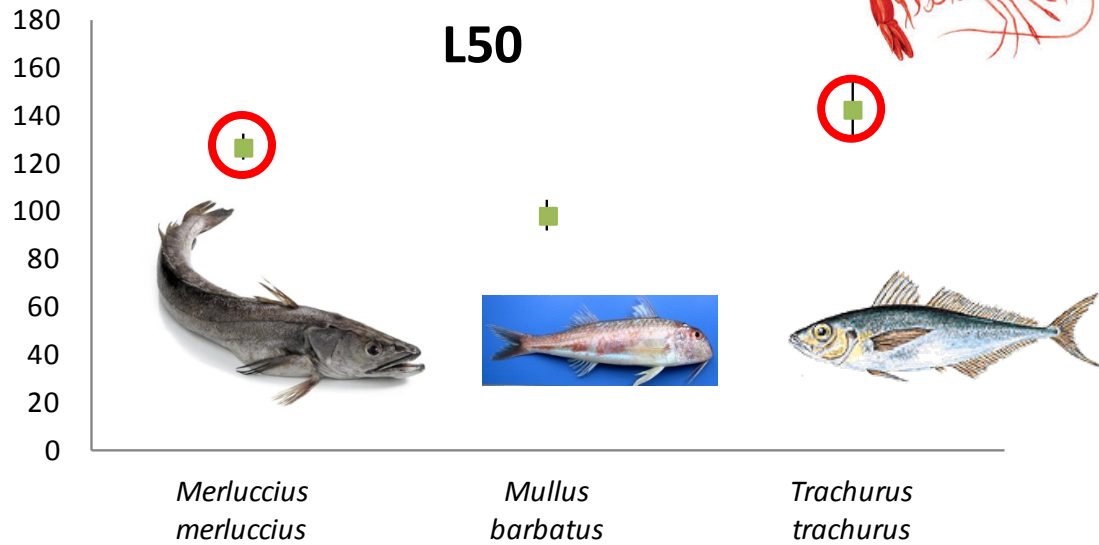
3. Results and discussion

Differences among species



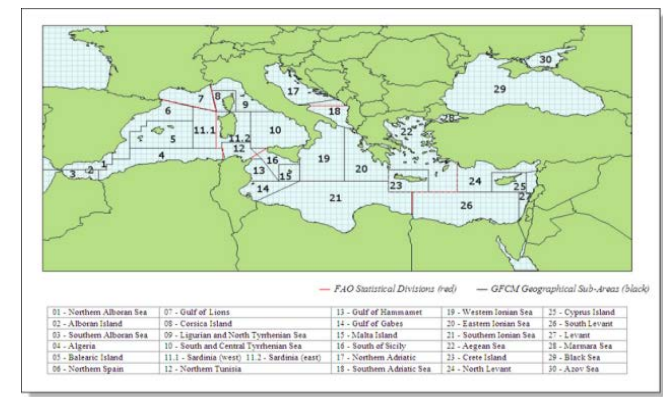
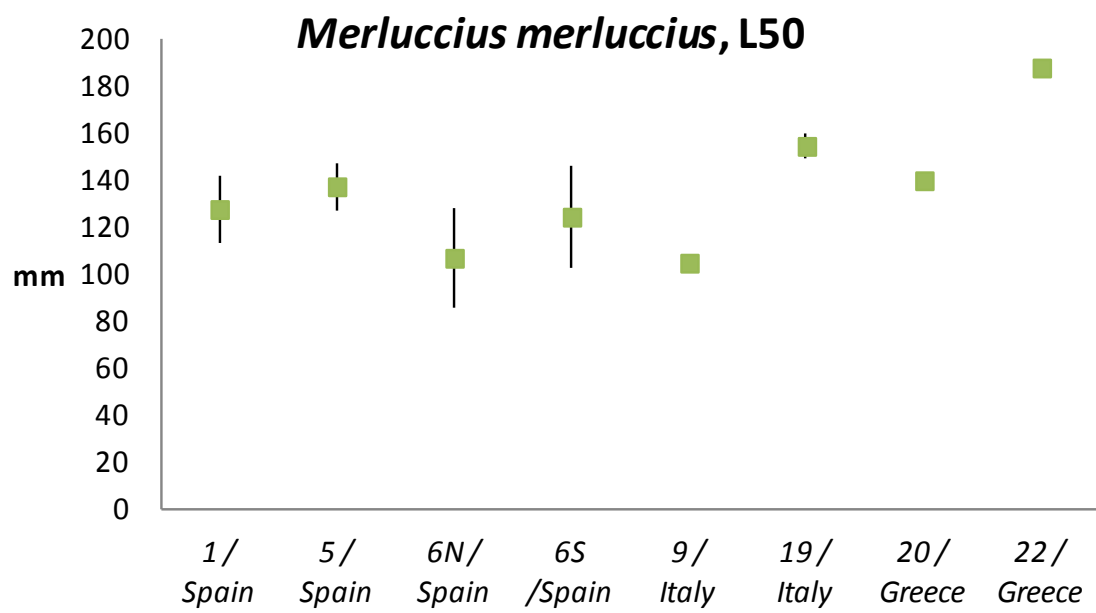
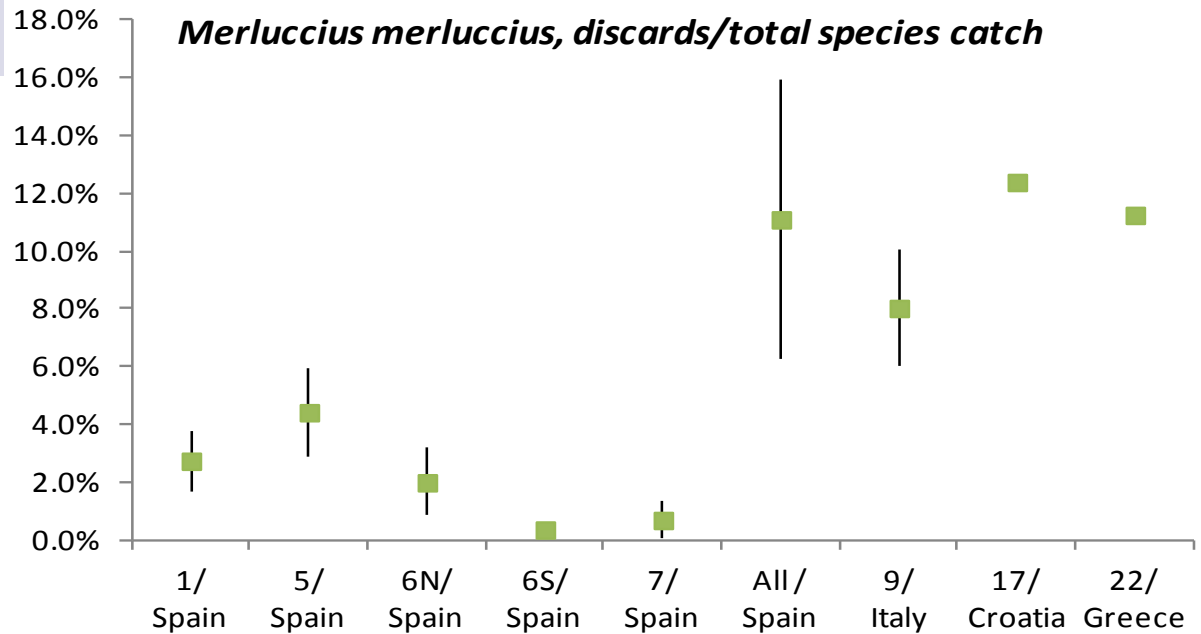
3. Results and discussion

(in lengths as well)



3. Results and discussion

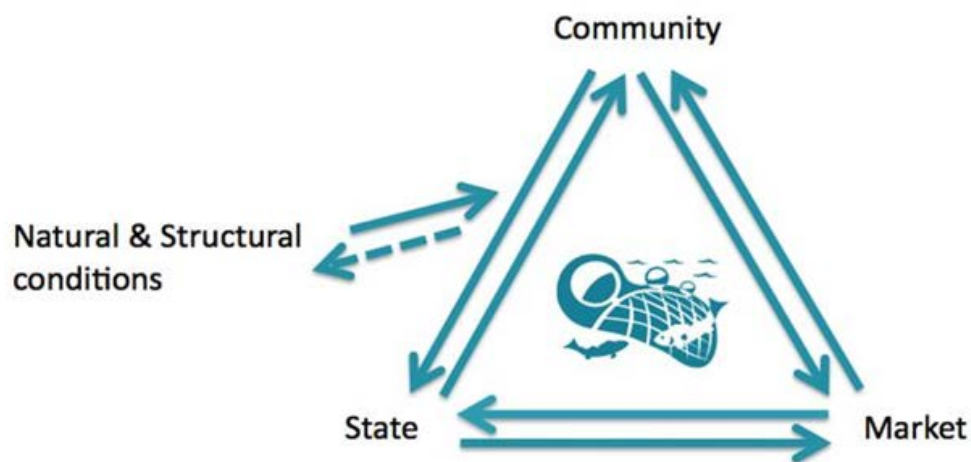
Differences among areas



3. Results and discussion

Reasons for discarding and factors affecting discards

- Several associations of discarded quantities and/or discards ratios with factors that can be included in the aforementioned categories have been reported for the Mediterranean trawl fisheries
- These factors often have a synergistic effect which may not be straightforward to disentangle
- The natural conditions are very dynamic, but external to the individual fisher as well as to the remaining ones (State, Community and Market), even though in the medium and long term can influence them



(from: Eliassen and Christensen, 2012)

3. Results and discussion

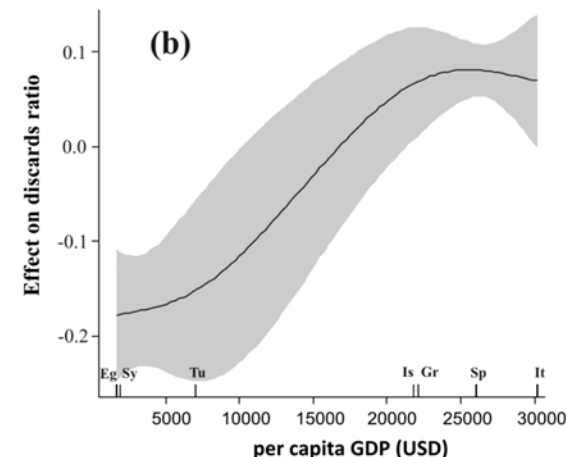
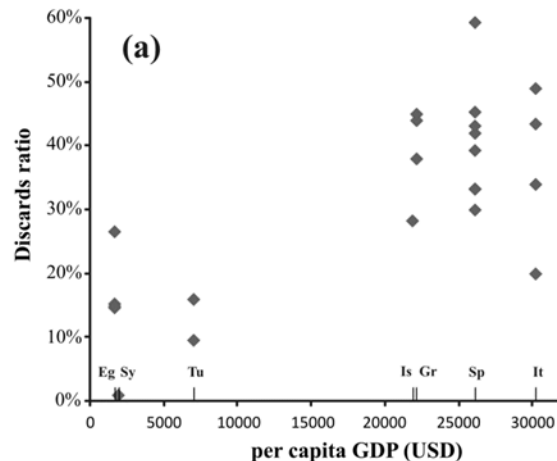
Natural and structural conditions influence

- **Catch composition.**
- **Fishing depth** has been greatly related to patterns in discarding, obviously due to varying catch composition and the relative biomass of the species.
- Associations of discards with **landed quantities** (increased **productivity**?) have been also reported.
- The **availability of resources**, has been shown to affect fluctuations of market demands and associate discarding practices in several cases.
- **Life cycles of species** may have a seasonal or regional effect on discarding.
- **Biological invasions** may affect discarding, especially in the Eastern basin.

3. Results and discussion

Community influence

- **Haul duration** may affect fish condition and selectivity
- **Trip duration** may lead to discarding when the catch exceeds storage capacity
- The **captains' vigilance over the crew** sorting the catch
- The **general view of discard** and **nutritional habits of the community**
 - the level of familiarization of the consumer with some species
 - the wealth of a community (wealthier societies seem to discard more)



3. Results and discussion

State (and regulations) influence

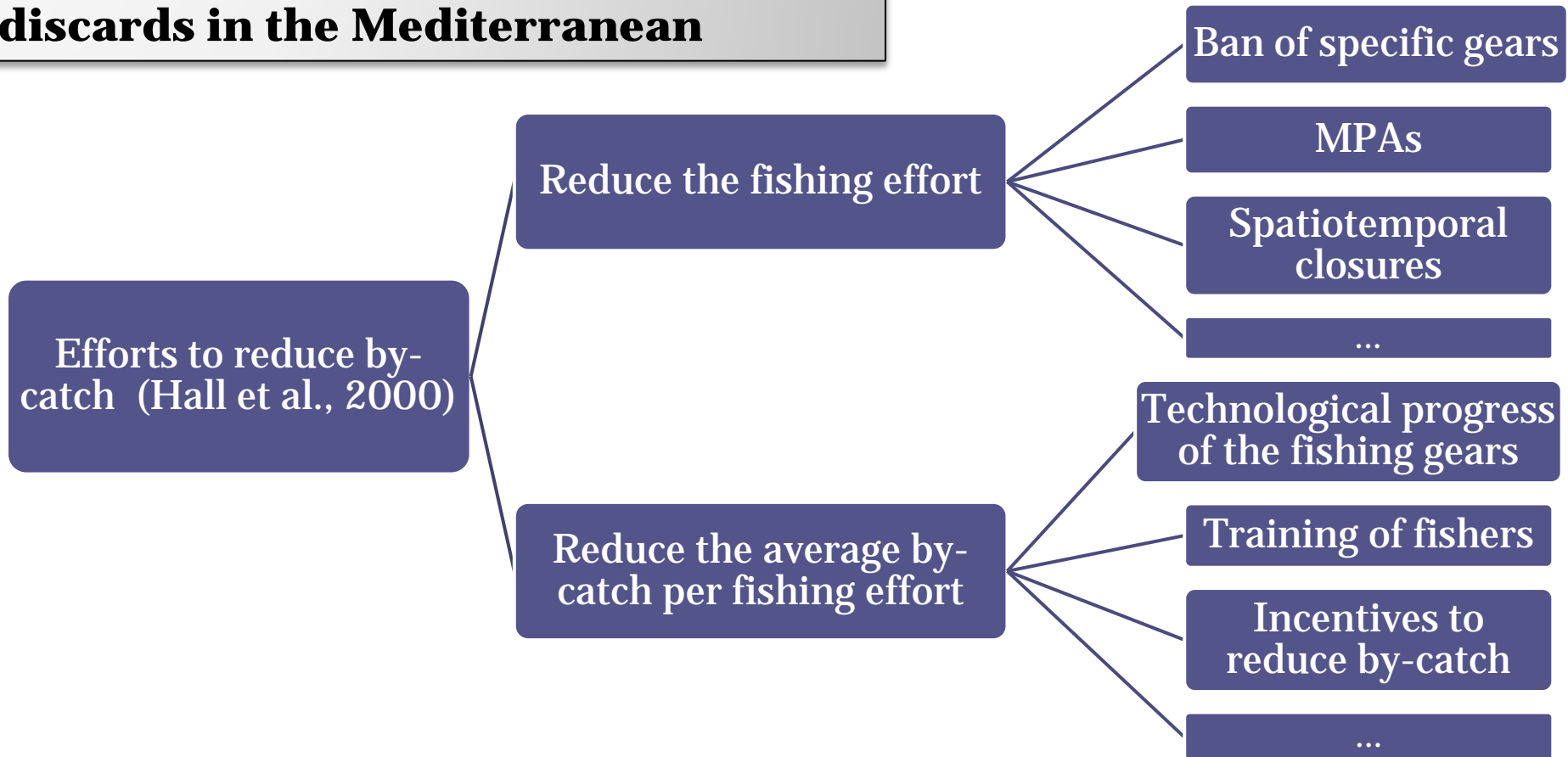
- Technical measures (e.g. gear mesh size and shape)
 - Minimum Landing Sizes
 - No overquota discards are observed in trawl fisheries, in contrast to the Atlantic
 - Level of control and enforcement (low compliance in the MED)
- ➔ The fast-growing, smaller, and highly diverse fish fauna together with the existence of local markets for small fish and the low probability of prosecution (weak enforcement) for retaining undersized fish resulting in low compliance by fishers may be the reasons why **a tendency to retain most of the catch** exists in the area.

Market influence

- It seems that market demands rather than fish size (legal reason) determines what is discarded in Mediterranean fisheries
- Low economic value has been proved to be the main reason for discarding. Discards of this category include species of low or no commercial value as well as damaged and/or small sized individuals of commercial species.
- It should be noted though that market values are dynamics and may change substantially in time.
- Investments in technology (fishing gear and vessel equipment, storage capacity), number of employees (sorting capacity of the crew) may sometimes affect discarding practices

3. Results and discussion

Mitigation tools for by-catch and discards in the Mediterranean



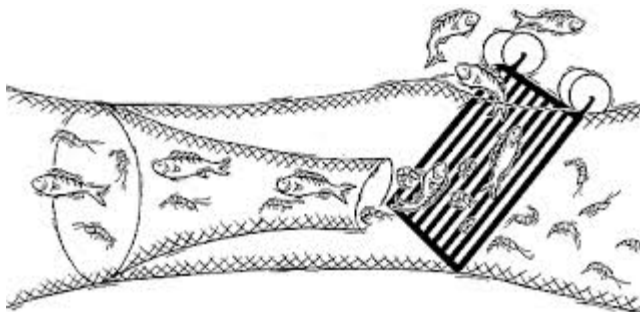
Hall & Mainprize (2005):

- (i) dissemination and adoption of successful technologies,
- (ii) engaging the fishers in finding appropriate solutions
- (iii) understanding the trade-offs between benefits/costs of mitigation approaches

3. Results and discussion

Trawl selectivity improvement

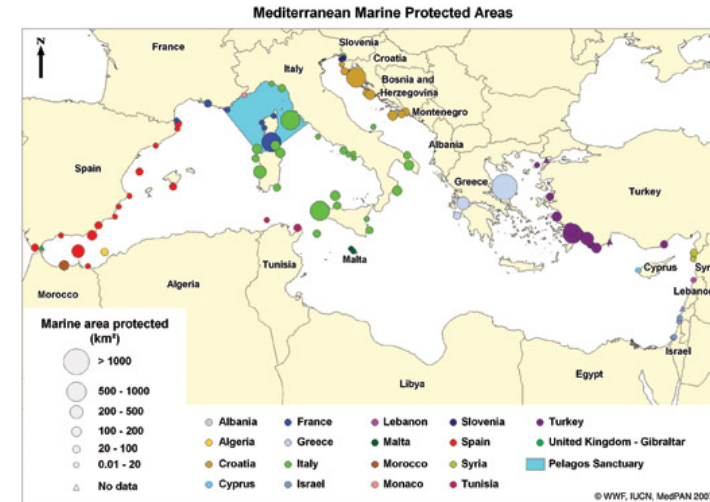
- Numerous studies have explored fishing selectivity topic, analyzing the effect of **mesh size and shape in the cod-end**
- Recent studies reveal that the use of 40 mm square-mesh codend results in a 50% retention length (L50) similar to that of the 50 mm diamond-mesh codend, but with a steeper selection range (SR) in Italian mixed bottom trawl fisheries (Sala et al. 2015)
- Following the 2010's change of size or geometry in trawl net an improvement can be expected in the resource conservation state and reduction of discards in the EU Mediterranean trawl fisheries, at least for some species
- Other technical improvements: increasing **cod-end circumference**, use of **sorting grids** and other **BRDs**



3. Results and discussion

Spatio-temporal closures

- More than 90 **MPAs** are established in the Mediterranean.
- Several **spatial closures** are imposed for one or more gears.
- Prohibitions to fish over sensitive habitats.
- **Temporal closures** (e.g., trawl fishery closures in the Spanish, Italian, Greek and Turkish waters during summer).
- The designation of spatio-temporal closures in the GFCM area is not always based on scientific criteria and they often try to satisfy social demands. A more targeted one, based on scientific results is needed.
- In addition it should be followed by an analysis of the impacts of reallocating the effort eliminated from the MPA to other areas.
- The establishment of MPAs should be followed by strong surveillance.



3. Results and discussion

Other mitigation tools

- **Minimum Landing Sizes** mainly aim to discourage fishing in areas with high portions of juvenile fish. MLS are defined for several species in EU countries (EC Regulation No 1967/2006) while additional or alternative MLSs are defined in EU and non-EU countries respectively

However, the danger of increasing discarding through focusing heavily on regulating MLS is recognized.

- **Awareness campaigns** and **recommendations** by NGOs, governmental organizations and GFCM aim to increase avoidance of by-catch and discards



3. Results and discussion

Discards ban and existing knowledge on fishers' perception

- A gradual elimination of discards is included in the new EU CFP.
- SWOT analysis in Spain (interviews with stakeholders; Bellido et al., 2014).

SWOT Analysis



- no incentives to land unwanted catches, although penalties are not still clear.
- Landing high volumes of marine debris can generate an important environmental pollution in land.
- The new regulation may lead to increase in illegal marketing of fish below the minimum size.

➔ A diverse set of traditional management measures used to limit fishing mortality, correctly implemented and associated with innovative monitor, control and enforcement program are likely to be more effective than a discards ban.

4. Conclusions

- Trawling produces the bulk of discards in the Mediterranean, thus the majority of discards studies have focused on trawl fisheries.
- These studies follow some common specifications and share methodologies which to an extent allow comparisons.
- Methodologies for sampling and analyses should be further developed and standardized, taking into account fishery specific needs.
- Important gaps of knowledge are identified especially as concerns non EU countries
- Several characteristics of the fisheries in the Mediterranean sea affect discarding patterns:
 - *(i)* trawl fishing is essentially multispecies and targets rather a catch complex than one or two species
 - *(ii)* there is a great diversity of species in the catch including the commercial by-catch which may constitute an important commercial fraction and are partly retained according to market demands,
 - *(iii)* there are no overquota discards and MLS is the only management measure directly affecting discarding behavior.

4. Conclusions

- The level of discarding of MLS-regulated species, such as hake is lower in relation to other EU regions; this may be a consequence of a lack of MLS-compliance, and the absence of over-quota discards
- Species composition, population characteristics, operation depth, season and fishing gear used are few of the factors influencing trawl discards.
- The effect of both market and regulatory drivers is also crucial in determining discarding practices, but fishers' responses to market demands may be more important than legal provisions particularly in the Mediterranean, where countries appeared to invest little in regulation enforcement as compared to other EU regions.
- The latter is reflected in sizes of discards with species of higher commercial value (hake), having lower retention sizes than species of lower commercial value (horse mackerel) despite the fact that they may have larger MLS and maximum length

4. Conclusions

- Decision to discard is usually a complex outcome of several factors which is difficult to disentangle, especially in multi-species fisheries like the Mediterranean trawling
- Market seems to be the most influential factor which determines what is discarded or not, often in contrast to legal constraints.
- Mitigation tools of discards in the Mediterranean trawl fisheries mainly include (i) technical specifications aiming at the selectivity improvement and (ii) measures aiming to reduce unwanted catches, such as spatio-temporal closures.
- However a set of other measures, mainly aiming to provide incentives to reduce discards are available in the world fisheries but currently they have low or no application in the Mediterranean management system
- Enforcement of regulations should be promoted not only by strict inspection but also for incentives to reduce discards such as selective licensing and eliminating subsidies for fisheries known to generate high discards quantities

Thank you for your attention

Any questions and comments are welcome!

