

Case Study Report, Task 7.3

Synthesis and recommendations for Discard Mitigation Strategies by case study

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Case Study: Western Mediterranean

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1 What has been going on in this case study during the last 12 months?

1.1 Important changes in stock development, discard data and ecosystem

There have not been important changes in stock development, discard data and ecosystem in the western Mediterranean as a result of the LO.

1. There are different available reports from STECF ([stecf-med](#)) and GFCM (General Fisheries Commission for the Mediterranean; [gfcml](#)) meetings, which could be used to feed the western Mediterranean case study of the DiscardLess Atlas.

The GFCM is the main fishery management organization in the Mediterranean. Consisting of 23 Member countries along with the European Union, the GFCM's objectives are to promote the development, conservation, rational management and best utilization of living marine resources, as well as the sustainable development of aquaculture in the Mediterranean, Black Sea and connecting waters. The GFCM has the authority to adopt binding recommendations for fisheries conservation and management in its Convention Area and plays a critical role in fisheries governance in the Region. The GFCM has established 30 management areas in the Mediterranean based on political and statistical considerations rather than biological or economic factors.

Apart from the GFCM, the European Union, through the STECF, established in 2008 a working group specifically focused to the assessment of Mediterranean and Black Sea stocks (known as SG-MED up to 2011). The SG-MED was born as a request to the STECF to set up an operations work-programme to update the status of the main demersal stocks and evaluate the exploitation levels with respect to their biological and economic production potentials and the sustainability of the stocks by using both trawl surveys and commercial catch/landing data as collected through the Community Data Collection regulation N° 1543/2000 as well as other scientific information collected at national level.

Each year, the GFCM and the STECF assess the exploitation status of the main target stocks and the results of these assessments (both inputs and outputs) are publically available on their websites: i) GFCM (<http://www.fao.org/gfcm/reports/statutory-meetings/en/>); and ii) STECF (<https://stecf.jrc.ec.europa.eu/reports/medbs>). Apart from stock assessments, additional data and information relevant to fisheries management is also available. For instance, the STECF has set up a working group dealing specifically with the LO, which first meeting took place in October 2015 (<https://stecf.jrc.ec.europa.eu/ewg1514>).

2. The Mediterranean Advisory Council ([MEDAC](#)), is made up of European and national organizations representing the fisheries sector (including the industrial fleet, small-scale fisheries, the processing sector and trade unions) and other interest groups (such as environmental organizations, consumer groups and sports/recreational fishery associations) which operate in the Mediterranean

area in the framework of the CFP. Among other activities, the MEDAC has organized different meetings related with the LO (<http://en.med-ac.eu/events.php>).

3. Data and information gathered under different scientific projects could also be used to feed the Atlas. The [MEDISEH](#) (Mediterranean Sensitive Habitats) project, for instance, modelled the spatio-temporal distribution of the main demersal resources from the Mediterranean and will be very useful for the objectives of the DiscardLess' WP4. The [DISCATCH](#) project, by contrast, could be useful for WP3 since its main aim was to support the identification of viable solutions to address factors determining unwanted catches in trawl fisheries with a view to its reduction and eliminating discard.

4. Information on discards in the western Mediterranean case study was summarized in the Factsheets, (Appendix to Deliverable D1.1).

1.2 Important changes in terms of fisheries and stakeholders perception

Regarding stakeholders perception, fishermen are more "relaxed" than the last year (Bilbao workshop with stakeholders) as a result of the two years they have to "adapt" before sanctions for failing to comply with the LO take effect ([Fish-discard-ban-MEPs-delay-sanctions](#)). During this period illegal discarding action will not be classified as a serious infringement. Fishermen thinks these two years delay will help to demonstrate the unfeasibility of implementing the LO in the Mediterranean owing to the scattered distribution of ports and, more importantly, the lack of available infrastructures to process discards.

There is also (possibly local) "misinterpretations" of the regulation such as: i) damaged fish and very small-sized individuals of small pelagics in bottom trawls will be allowed to be discarded at sea; and ii) releasing the seine content before hauling on board (slipping) if the species mix is not "favourable" is tolerated (although there is still uncertainty on small pelagic fish survival rates).

1.3 Important changes in management

On the 1st January 2015, the LO for small and large pelagic fisheries was enforced in the Mediterranean. In practice, concerning large pelagic fish the European Commission (EC) adopted the delegated Regulation 98/2015 which establishes derogations from the landing obligation for the purpose of implementing Union's international obligations under the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries. As a result, large pelagic fisheries managed by ICCAT are no longer concerned by the landing obligation and ICCAT regulations should apply instead.

Concerning small pelagic fisheries (anchovy/sardine/mackerels/horse mackerels), the EC adopted the delegated Regulation 1392/2014 establishing a discard management plan for small pelagic fisheries in the Mediterranean. In the western Mediterranean area, the "de minimis" exception to the LO is applied

whenever the discards are <5% of yearly catches. This exception is generally met since there are very low discards in small pelagic fisheries (seiners or pelagic trawlers) on those species.

There are no important changes in terms of fisheries and stock status in the western Mediterranean in relation to the LO. Different management plans are in progress in this area ([WestMed MAP](#); [NWW-SWW MAPs](#)), but they are mainly focused on reducing fishing effort and improving the selectivity, whereas the LO is hardly mentioned.

2 The Year behind us: What has DiscardLess produced in this case study during the last 12 months?

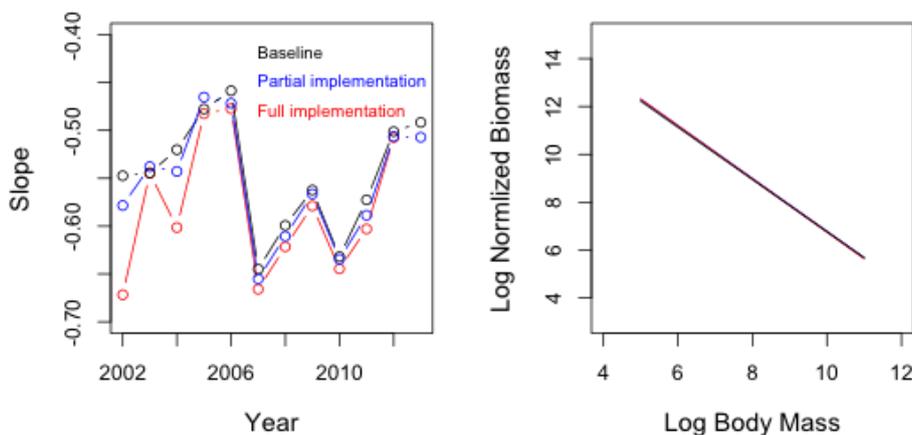
2.1 Impact assessment

2.1.1 ecosystem scale assessment

1. Factsheets from the Spanish study area (Balearic Islands and Gulf of Lions) were elaborated (Appendix to Deliverable D1.1). From a literature review focused on that study area, the document summarizes the causes of discarding, both the ecological and economic effects of discarding, and also the available methods for reducing discards. The factsheets also explain the discard sampling carried out in the area and provide data (tables and graphs) on landings and discards by métier and main species from the Balearic and Gulf of Lions areas.
2. A literature review on the impacts of discards on ecosystems from the western Mediterranean was elaborated (Appendix to Deliverable D1.1). This review showed that there is a clear lack of knowledge about the impacts of fishery discards on western Mediterranean ecosystems, with the only exception of impacts on seabird populations. Many works characterize quantitatively discard practices from different fisheries providing information on the number of species and their corresponding discard rates, which is a first insight on the effects of fishery exploitation on marine ecosystems. Most of these studies focus on bottom trawl fisheries, being very scarce those analyzing purse seine or small-scale fisheries.
3. Spanish landing and discard data were provided to WP 5-6. This dataset contains the landing and discards of the species affected by the LO in the Mediterranean (those species with minimum landing size) by individual size, trimester, fleet and landing harbour during 2004-2014.
4. IFREMER took negotiations with French national administrations to obtain the information needed for the development of the DiscardLess project, both the data to be provided to WP 5-6 and the fine-scale data required to feed the ISISFISH model.
5. IFREMER started the GALION project (<http://galion.amop.fr/>), a French fishery industry funded programme that will complement the DiscardLess project western mediterranean case study.

The main objective of GALION is to use the knowledge of the distribution of trawl fisheries catches of the Gulf of Lions to limit discards of commercial species and enable a more sustainable exploitation. This project will also seek to better know the distribution of sensitive benthic habitats of the Gulf of Lions in order to prevent further benthic ecosystem degradation by effort displacement. Within this local project, which co-funds a PhD student, an ISISFISH model of the exploited fish and fishery dynamics will be calibrated and will serve to test different discard mitigation strategies on both the stock sustainability (return to MSY) and the fishery middle term viability.

6. Size spectra (SS) modeling has been developed to comparatively investigate the community dynamics of different demersal ecosystems of the Spanish Western Mediterranean Sea (Balearic Islands, Mediterranean Iberian Peninsula and Alboran Sea). The SS modeling will be used to explore the ecological consequences of the three scenarios defined within Discardless: i) Baseline: biomass of all the commercial species above the L_{50} ; ii) Partial implementation: biomass of all the commercial species independently of the size; and iii) Full implementation: biomass of all the fish species of the community. Preliminary results for the Balearic Islands showed that the SS will not change significantly among these three different scenarios. This would be due to the fact that Mediterranean bottom trawl catches are mainly constituted by juveniles and small-sized species with a very low contribution of large individuals. Figures below show that there are some small differences in the annual estimates (left), while there is not any difference among the mean spectra since the three SS overlap (right). These preliminary results were presented to WP1 meeting at Boulogne.



7. The Ecopath model from the Balearic Islands is ready (manuscript in preparation) and works to have the dynamic model Ecosym are in progress. The model describes the three domains (pelagic, demersal and benthic) and the trophic structure and biomass flows from 50 to 800 meters depth. The model is composed of 55 functional groups, including primary producers, detritus, sea snow and discards. A total of 5 groups of fisheries were included: bottom trawl, small-scale, purse-sine, bottom long-line and surface long-line. The following information has been used for model construction: i) 1691 research papers; ii) 3 databases (24 bottom trawl surveys, sampling on board fishing vessels and

daily sales bills); and iii) reports from two stock assessment working groups: GFCM and ICCAT. According to the model trophic flows, discards are exclusively consumed by turtles, Audouin seagulls and other seabirds.

2.1.2 Fishery scale assessment

1. A workshop involving both French and Spanish stakeholders was held during the kick-off in Bilbao. Stakeholders perception will be followed during the four years of project. The meeting revealed a general opposition to the LO, which is seen as being tailored for Atlantic fisheries but not applicable to the Mediterranean. According to stakeholders, the measure goes against the efforts done during the last decades to reduce the commercialization of small-sized fish. It should be taken advantage of the LO for a general decrease of discards, not only for species with landing size. Management of discards on land will generate a lot of problems. There are no infrastructures to process them, especially in small, fragmented areas such as the Balearic Islands (many small ports along the coast, volumes small to sustain discard treatment industries). General belief is that such infrastructures (ensilage or other processes) would not be economically viable in the Mediterranean due to low and variable volumes, unadapted harbour infrastructure and high transportation costs. The only possible outcome would therefore be wasting non-commercial landings which cost would be supported by the fishermen themselves.

2. A literature review on the socioeconomic impacts of discards in the western Mediterranean was elaborated (Appendix to Deliverable D2.1). This review showed that little attention has been paid to Mediterranean fisheries. Most Mediterranean discards are driven by market factors (low or non-commercial value of discarded species or high consumers' demand for small sizes) rather than regulatory issues (MLS). In this context, it is feared that the LO may have a little impact on Mediterranean fisheries. There are several gaps of knowledge regarding discards in the Mediterranean Sea. At present research in the Mediterranean regarding discards' management focus in the characterization and evaluation stage. It is necessary to move from a descriptive to more analytic studies, aiming to disentangle incentives and factors affecting discarding, as well as to carry out socioeconomic evaluations of the LO.

2.2 Avoiding unwanted catches

2.2.1 gear technology

1. A presentation entitled "*Improving selectivity of bottom trawl fishery in the western Mediterranean*" was presented to the workshop with stakeholders during the kick-off meeting (Bilbao, 21-23 April 2015). The main contents of this presentation were: i) general characteristics of the bottom trawl fishery in the western Mediterranean and its main regulations; ii) SWOT developed by

García-Rivera et al. (2015)¹ in relation to the implementation of the discards ban in this fishery; and iii) available scientific knowledge to improve the selectivity and reduce the impact of the western Mediterranean bottom trawl fishery through gear modifications (e.g. increasing mesh size in the cod-end, changing mesh geometry in the cod-end, incorporating square mesh panels and sorting grids, doors not contacting the seabed) and changes in fishing strategy (e.g. mapping of nursery areas for spatio-temporal closures).

2. A manuscript entitled *“Improving the ecological efficiency of the bottom trawl fishery in the western Mediterranean: it's about time!”* has been prepared by IEO and is currently under review. This work analyzes different measures to mitigate the direct and indirect impact of the bottom trawl fishery in the western Mediterranean, through three experiments and different technical measures: i) changing vessel operation routine and the mesh shape in the cod-end; ii) using more hydrodynamic bottom-doors, lighter gear and 40 mm square mesh in the cod-end; and iii) using mid-water doors not contacting the seabed and 40 mm square mesh in the cod-end. It is shown that all these measures can reduce discards, the impact of bottom trawling on the seabed and the emission of CO₂ into the atmosphere. These outcomes allowing the improvement of the ecological efficiency of this fishery have other direct positive consequences in the short term, as the reduction of its operation costs and hence the improvement of the economic efficiency. Reductions in the weekly activity would also improve the life conditions of the crew, an important aspect taking into account the difficulties of the fishing sector to offer attractive jobs for young people in coastal communities during the last decade, a key objective of the future Common Fisheries Policy.

3. A manuscript entitled *“A comparative analysis of the bottom trawl fleet catches in the western Mediterranean with three different mesh types in the cod-end”* has been prepared by IEO. This study compares catches and size composition, both from landings and discards, obtained by the three different cod-ends (40 mm diamond mesh, 50 mm diamond mesh and 40 mm square mesh) currently used by the commercial trawl fleet. The most selective mesh type was the 40 mm square mesh, followed by the 50 mm diamond mesh; by contrast, the selectivity of the 40 mm diamond mesh was very poor. The work shows the potential benefits of the Council Regulation (EC) N^o1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean. This EC established a change from the traditional 40 mm diamond to 40 mm square mesh cod-end, which resulted in a reduction of the discarded fraction and an improvement of the exploitation pattern. Results, however, varied depending on the different species. In fact, most target species still have a length of first capture lower than their length of first maturity and, in some of them, even lower than their minimum conservation size. This calls for further additional improvements.

¹ García-Rivera S., J.L. Sánchez Lizaso and J.M. Bellido, 2015. A quantitative and qualitative assessment of the discard ban in European Mediterranean waters. *Marine Policy*, 53: 149-158.

4. A very recent review of French and international selectivity studies was made available and will be soon translated to English.

2.3 fishing strategies

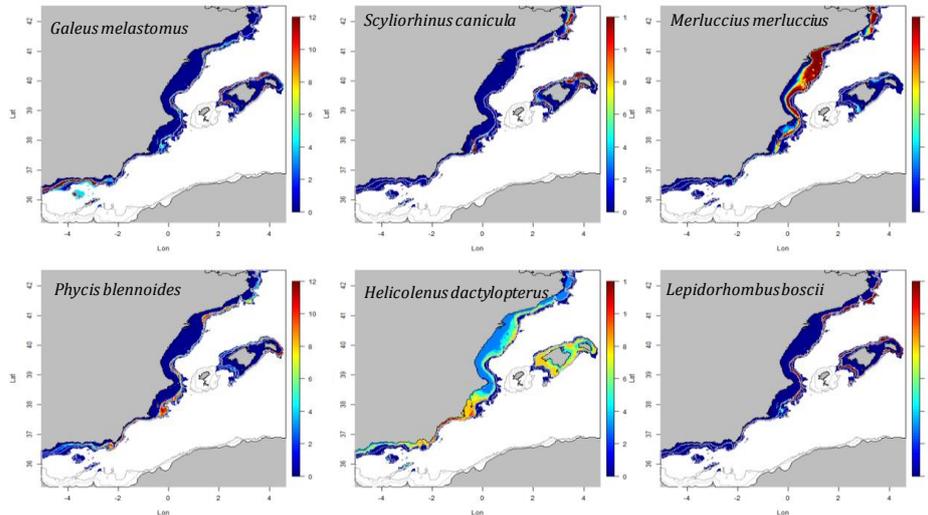
1. *"The Fishers story"*: According to the main aim of this task, practices used by fishermen to reduce unwanted catches were discussed during the kick-off in Bilbao. Additional contacts has also been maintained with some stakeholders, namely from the Balearic Islands. In response to the question *What can be the strategies to reduce discards?* all stakeholders agreed on the measures to apply: 1) improvement of selectivity and 2) use of spatio-temporal closures for effort control (always using scientific criteria). According to them, the change in mesh size (diamond to square²) was an important step, but its use is not general in the Mediterranean and efforts should be done to generalize its application. Stakeholders agreed that progresses should also be done to improve gear selectivity, not only to reduce discards but also to improve the fishing exploitation scheme (reductions in fuel consumption). Fishermen really appreciated the idea of sharing its day-by-day knowledge with scientific analysis to help designing management scenarios using information on the spatio-temporal distribution of resources.

2. *"The Scientists story"*: Fisheries independent and dependent data was gathered to create maps showing zones of high discard likelihood in space and time. Regarding the independent data, information from the MEDITS surveys, which are carried out in both study areas (Gulf of Lions and Balearic Islands), is being used. In the case of dependent data, information from onboard sampling, together with VMS data, are used. We are taking advantage of the analysis done within previous projects in the study area, such as the MEDISEH project (mareaproject.net; [PLoS ONE 10\(3\): e0119590](https://doi.org/10.1371/journal.pone.0119590)) or other studies ([PLoS ONE 7\(5\): e37907](https://doi.org/10.1371/journal.pone.0137907); [Progress in Oceanography 130: 188-204](https://doi.org/10.1016/j.pocean.2014.05.004)). The maps below show the distribution of young of the year for different target species from the Spanish Mediterranean.

3. The GALION project will provide a better understanding of the spatiotemporal distribution of the target species, especially hake, aiming to the avoidance of areas where discards are potentially important in the Gulf of Lions. Multi-annual and seasonal recurrent discard hotspots will be mapped based on the French observers on board sampling programme (OBSMER), funded by the Data Collection Framework (EC, 199/2008). Similarly recurrent discard hotspots will be identified from fishery independent scientific survey data (MEDITS). Landing data will be crossed with VMS observations to spatialise landings and highlight important fishing areas for each species under LO.

² This change in the geometry of mesh cod-end was introduced by the Council Regulation (EC) N° 1967/2006. However, the regulation contemplates the exception of using a 50 mm diamond mesh cod-end whenever a duly substantiated request is presented showing that its selectivity is equivalent or higher than that of the 40 mm square. This is the case in some areas of the Spanish coast, though there is no scientific information on the selectivity of the 50 mm diamond mesh cod-end in the western Mediterranean.

Spatial planning software (MARXAN) will be used to generate avoidance areas aiming to 1) reduce discard, 2) lessen impact on catches 3) avoid effort displacement on sensitive benthic seabeds.



2.4 Policy outreach

1. A meeting was held with WP7 leaders in Boulogne-sur-Mer to talk about the guidelines for the Mediterranean, which have to be presented next year in Rome (*D7.2-Guidelines for landing obligation implantation in the Mediterranean based on D7.4.1, Due: M24*). The WP7 leaders will provide a template with the main issues to be dealt with in these guidelines. Once the guidelines from the Baltic Sea are available they will be used as a sort of pilot.

1. Different information sources (e.g. STECF and GFCM reports) have been provided to feed the western Mediterranean case study of the ATLAS. Data gathered under different scientific projects (e.g. [MEDISEH](#), [DISCATCH](#)) will also be provided.

2.5 Summary:

Most of the work done during the first year project was related to reviewing available literature on ecosystem and socioeconomic impacts of discards on western Mediterranean fisheries. The ecosystem review showed that there is a clear lack of knowledge about the impacts of fishery discards on our case study area, with the only exception of impacts on seabird populations. The socioeconomic review also showed that little attention has been paid to Mediterranean fisheries, where discards are driven by market factors rather than by regulatory issues (e.g. MLS). In this context, the LO may have a little impact on Mediterranean fisheries.

Stakeholders showed a good willingness to cooperate with the project, attending the workshop held during the kick-off meeting. This meeting revealed a general opposition of stakeholders to the LO. According to stakeholders, discard reductions (all species, not only those with MLS) should be achieved by improving the gear selectivity and avoiding recruitment areas rather than by the LO. These are precisely the two main strategies of discard reductions that will be investigated in our CS.

3 The Year ahead of us: What do we expect for the next year?

3.1 Impact assessments

1. Progresses on the calibration of the Ecopath and ISISFISH models used in the case study. Simulations of the different scenarios are foreseen for month 36.
2. Modelling the three different scenarios using size-spectra analysis of ecosystems from the Spanish Mediterranean: Balearic Islands, Iberian Peninsula and Alboran Sea.
3. Update the western Mediter factsheets with French data from the Gulf of Lions .
4. IFREMER will provide data on landings and discard from the Gulf of Lions to WP 5-6.
5. Analysis and maps of sensitive benthic habitats distribution in the Gulf of Lions, based on environmental predictors and species functional traits. Two independent strategies to evaluate potential and observed benthic sensitivity will be used to produced risk maps where trawling pressure should not be increased.
6. Update stakeholders perception of the LO from meetings with both for French and Spanish stakeholders.
7. Analysis of economic impacts on the Balearic Islands trawl fishery simulating the three different scenarios by means of the bio-economic model MEFISTO.

3.2 Avoiding unwanted catches

8. Contribution to the gear selectivity manual and translation to the three languages used in the area (French, Spanish and Catalan).
9. Preparation of a manuscript comparing catches (catch composition, discards and landings) of the western Mediterranean bottom trawl fishery using different twine thickness in the 40 mm square mesh cod-end: i) 3 mm, which is established by the Council Regulation (EC) N°1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean; and ii) 5 mm. This information has been compiled during the Spanish national project "*Mejora de la selectividad de los artes de arrastre en el Mediterráneo español*" (TORZAL), funded by Fundación

Biodiversidad (reference: 20124302). This project was carried out in collaboration with the Confederación Española de Pesca (CEPESCA) during 2014.

10. Preparation of a manuscript assessing the bottom trawl selectivity through the introduction of panels of un-knotted *Dyneema* 54 mm square mesh and 1.2 mm twine thickness attached to the extension piece of the nets: i) a single trapezoidal panel (7.4x4.0x12.0 m) of approximately 68.4 m² in the two-panel net used in the continental shelf (targeting fish and cephalopods); and ii) ten panels in the four-panel net used in the middle slope (targeting decapod crustaceans), four panels of 6.7x8.7, 6.6x6.0, 4.4x4.0 and 3.3x2.7 m (~124.69 m²) in the upper plan, and three panels of 6.7x2.4, 6.6x0.8 and 1.7x0.4 m (~43.9 m²) in both lateral plans. This information has been compiled during the “*Pilot Project on catch and discard composition including solutions for limitation and possible elimination of unwanted by-catches in trawl net fisheries in the Mediterranean*” (DISCATCH), funded by the DG MARE European Commission (Contract N^o MARE/2012/24 Lot 2) and developed during 2014.

11. Spatiotemporal distribution of juveniles hotspots from the main demersal stocks (MEDITS data). Two different approaches will be used: i) a general map at broad scale covering the entire study area (GSA5,6,7); and ii) maps at short spatial scales for each focused area (Gulf of Lions and Balearic Islands). These last maps are intended to be used for fishermen as tools to avoid areas with high abundance of recruits in order to reduce discards.

3.3 Policy outreach

12. Elaboration of guidelines for LO implantation in the Mediterranean, to be presented in Rome next year.

13. Check and update the information currently available in the ATLAS from both the French and Spanish side.