

Case Study Report, Task 7.3

Synthesis and recommendations for Discard Mitigation Strategies by case study

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Case Study: Eastern Mediterranean

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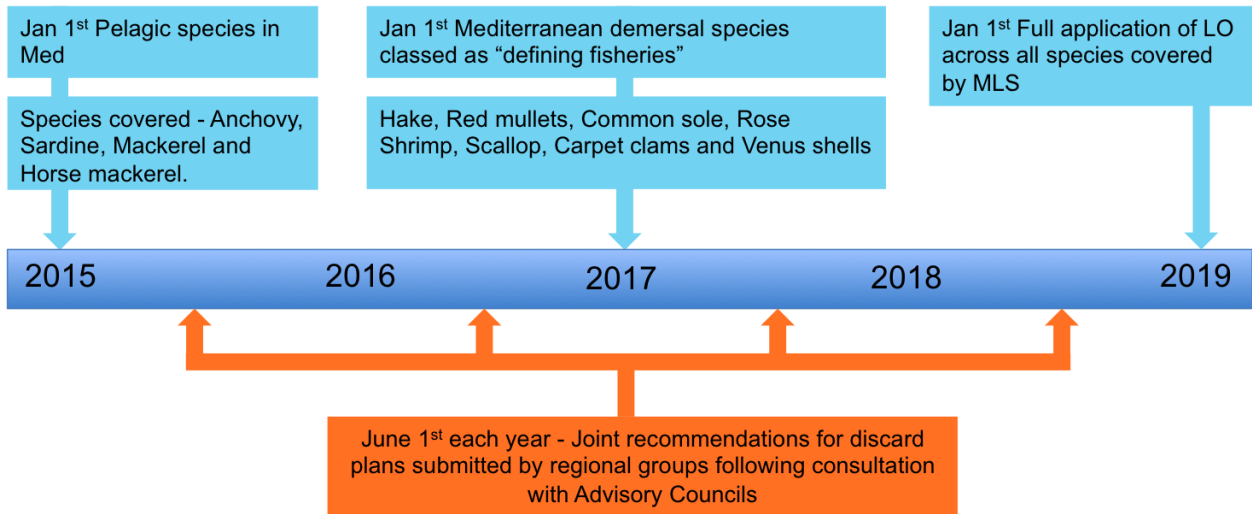
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1 What has been going on in this case study during the last 12 months?

The reformed Common Fisheries Policy (CFP), adopted in 2014 with the REGULATION (EU) No 1380/2013 and introduced the Landing Obligation (LO) (Article 15)¹.

The following figure depicts the timeline of the LO in the Mediterranean.



Source: DiscardLess Project, Deliverable 7.2.

If someone would like to summarise in a paragraph which species are subject to the LO in the Mediterranean, from approximately 17,000 species occurring in the Mediterranean Sea (of which 714 are fish species², 2,239 are crustaceans and 2,113 molluscs³), only up to 200 fish and shellfish species present commercial interest and are targeted by the fishing fleets⁴. The LO concerns 20 fish species, 4 crustaceans and 3 bivalve molluscs (as they have a minimum landing size in Annex I of [Council Regulation \(EC\) No.1967/2006](#)) and since 1st January 2015 it applies to small pelagics i.e. anchovy (*Engraulis encrasicolus*), sardine (*Sardina pilchardus*), mackerels (*Scomber* spp.), horse mackerels (*Trachurus* spp.). It also applies to a single large pelagic species, i.e. the bluefin tuna (*Thunnus thynnus*), as it is subject to a catch limit – quota. Currently (from 1st January 2017) it applies to the species that define a fishery, i.e. 4 species in the Eastern Mediterranean case

¹ See: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:354:0022:0061:EN:PDF>

² Dimarchopoulou D, Stergiou KI, Tsikliras AC (2017) Gap analysis on the biology of Mediterranean marine fishes. PLoS ONE 12(4): in press.

³ Coll M, Piroddi C, Steenbeek J, Kaschner K, Ben Rais Lasram F, et al. (2010) The Biodiversity of the Mediterranean Sea: Estimates, Patterns, and Threats. PLoS ONE 5(8): e11842. doi:10.1371/journal.pone.0011842

⁴ Stergiou KI, Somarakis S, Triantafyllou G, Tsiaras KP, Giannoulaki M, Petihakis G, Machias A, Tsikliras AC (2016) Trends in productivity and biomass yields in the Mediterranean Sea large marine ecosystem during climate change. Environmental Development 17 (Suppl. 1): 57-74.

study⁵. No later than 1st January 2019 the LO will apply to all other species in the fishery which have a minimum size in Reg.1967/2006.

1.1 Important changes in stock development, discard data and ecosystem

For Greece, the following data have been presented in the MEDAC proposal for joint recommendations on discards management plans for species defining the fisheries⁶:

Greek demersal fisheries are characterised by high diversity, both in terms of catch composition and the structure of the sector. The fisheries are typically multispecies, with a large variety of fishing gears being employed to exploit the stocks. Although catches are composed of more than 100 commercial species, their bulk comprise 5 to 8 species, including hake, red mullets, and shrimps. Generally, fishing vessels exploiting the demersal stocks can be classified in two major fleet categories: (a) bottom trawlers and (b) artisanal or small-scale coastal vessels that mainly fish by means of various types of gillnets and longlines (Table 1).

Past studies have shown that discards vary among areas and seasons and the reason for discarding commercially important species is due to the size of the fish (undersized) and/or its condition (damaged individuals). Discards of the most important species are higher in the case of bottom trawlers but they are generally remaining at low levels (less than 5% of the total catch, in terms of weight, in most cases – Table 2).

The Greek bottom trawl fishery has multi-species characteristics and similarly to all Mediterranean demersal trawl fisheries, captures more than 100 commercial species. However, according to the records of the Greek Statistical Service, few of them such as red mullets, hake and shrimps compose the main bulk of landings.

Table 1. Greek annual catches and type of fishing activities in 2014

TARGET SPECIES			
	Hake	Red Mullet	Rose Shrimp
CATCHES			
Annual Total Landings* (tns)	2430	1915	2282
Landing Ports	1000+	1000+	236

⁵ Species with a minimum landing size in the Mediterranean that are subject to the landing obligation from January 1, 2017, pursuant to art. 15 point 1b:

- All the geographical areas: hake (*Merluccius merluccius*) - red mullets (*Mullus* spp.)
- GSA 17- GSA 18: hake (*Merluccius merluccius*) - red mullets (*Mullus* spp.) - common sole (*Solea solea*)
- GSAs 15, 16, 19, 20, 22, 23, 25: hake (*Merluccius merluccius*) - red mullets (*Mullus* spp.) - deep rose shrimp (*Parapenaeus longirostris*).

⁶ See MEDAC Ref.: 190/2016 of June 8, 2016: http://en.med-ac.eu/files/documentazione_pareri lettere/2016/06/190_medac_ir_lo_demersal_8june.pdf Accessed on 20/7/2016.

Type of fishing activities			
	Trawlers		
Number of fishing vessels	265	265	265
Landing Ports	236 (134**)	236 (127**)	236 (80**)
	Gillnets		
Number of fishing fleet	8032 (14806***)	8032 (14806***)	8032 (14806***)
Landing Ports	1000+	1000+	100
	Longlines		
Number of fishing fleet	8989 (14806***)		
Landing Ports	1000+		

Source: MEDAC Ref.: 190/2016 of June 8, 2016

** Landing ports where there were OTB landings reported through ERS during 2014-2015

*** Total number of vessels using passive gear

Table 2. Greek landings and discards 2014.

Gear	Species	Discards (t)	Landings (t)	% Discards
Bottom otter trawl	<i>Mullus barbatus</i>	16.259	972.800	1.64
Purse seine	<i>Mullus barbatus</i>	0	0.088	0
Set gillnet	<i>Mullus barbatus</i>	17.604	994.864	1.74
Trammel net*	<i>Mullus barbatus</i>	17.321	365.921	4.52
Bottom otter trawl	<i>Merluccius merluccius</i>	106.461	1,840.775	5.47
Set gillnet*	<i>Merluccius merluccius</i>	17.023	804.015	2.07
Set longlines*	<i>Merluccius merluccius</i>	0	235.964	0
Trammel net*	<i>Merluccius merluccius</i>	8.377	86.295	8.85
Bottom otter trawl	<i>Parapenaeus longirostris</i>	152.769	2,346.145	6.11

Source: MEDAC Ref.: 190/2016 of June 8, 2016

* estimated annual values based on 9 months data collection for Set gillnets, Trammel nets, Set longlines

De minimis exemption

Where feasibility is not achieved, the alternatives to de minimis are only the disposal of discards as "special waste", with additional costs for businesses, or collection by bio-energy or bio gas producers free of charge, or at best for the production of fish meal with an uninviting contribution of just 0.05-0.10 euro/kg.

This applies in particular to islands areas (Balearic Islands, Corsica, Greece - Ionian-Aegean Crete-, the Croatian islands, Cyprus and Malta), in these areas the costs indicated are supplemented significantly by transport costs to continental areas with the facilities to receive the discarded product. In these areas, the only alternative to de minimis exemption is free collection by incinerator companies and bio-gas disposal. In light of the above, these areas fall into the category of possible exemption from the landing obligation

according to art. 15 paragraph 5 letter c of the basic Regulation, except for local solutions (use of discards in aquaculture system).

Moreover, the MEDAC report highlights the following facts:

- Trawler fishery in Mediterranean sea is a mixed fishery financially depending on several species;
- Program working on selectivity in Europe showed that it is hard to find a gear that doesn't imply too many commercial losses for the fishermen, but still, selectivity programs are ongoing (REJEMCELEC, DISCARDLESS...) with the aim to test new and existing gears;
- It will be difficult to improve selectivity in a short-term period;
- There are no real structures for now that could handle unwanted catches, also even if some structures could handle those unwanted catches, prices won't cover the cost of handling those catches by fishermen or other infrastructures;
- Studies conducted in Mediterranean area showed that landings of unwanted catches are quite low and widespread along the coast line and that those aspects hamper the interest and development of such structures;
- De minimis exemptions can provide the flexibility to the fishermen to adapt their behaviour to such new regulation frame and will ease the implementation of the landing obligation, particularly during the first years;
- the implementation of measures to increase selectivity, such as the sorting grids, will require additional amount of time in order to benefit from the EMFF provisions (National Operational Programs).

Table 3. De Minimis Exemption – Central-Eastern Mediterranean Sea (CY,GR,IT,MT). The numbers refer to the % of the total annual catches of these species by vessels using bottom trawls and gillnets.

	2017		2018		2019	
	Trawlers	Gillnets	Trawlers	Gillnets	Trawlers	Gillnets
Hake**	5+2	1	5+2	1	5+1	1
Red Mullet	5+2	1	5+2	1	5+1	1
Rose shrimp	5+2	NA	5+2	NA	5+1	NA

**Longlines 0 de minimis

*Members States will proceed to define the level of their respective de minimis percentage according to their national level of reported discards

Source: MEDAC Ref.: 190/2016 of June 8, 2016

The above MEDAC recommendation has been adopted by the European Commission on 20.10.2016 with the Commission Delegated Regulation C(2016) 6606 final⁷, establishing a discard plan for certain demersal fisheries in the Mediterranean Sea.

Regarding Monitoring and Control, the proposed measures for monitoring the exemption in Greece would be:

o VMS installed on all active vessels more than 12 m in length.

o All quantities of fish caught and discarded species must be recorded in logbooks.

- *A feasibility study for monitoring the quantity of the undersized specimens as well as their final destination will be established based on a risk analysis. This plan will be designed in order to monitor and deterring the entering of undersized fish to the human food chain and will be carried out by our National Fisheries Data Collection Programme.*
- *The usual control procedures will be followed as the controls on landings currently in place under Regulations 1224/09 and 404/2011.*

MEDAC therefore, on the basis of the work carried out in the recent past in the context of the opinion for a joint recommendation on the landing obligation for small pelagics, and with reference to requests for cooperation received from Member States concerned, hereby **proposed an opinion for a joint recommendation for the start, as of 1st January 2017, of the LO for certain demersal target species, divided into three main areas:**

- Western Mediterranean Sea (FR, IT, SP) red mullet and hake;
- Adriatic Sea (HR, IT, SI) red mullet, hake and common sole;
- **Central-Eastern Mediterranean Sea (CY, GR, IT, MT) red mullet, hake and deep rose shrimp.**

As for the **small pelagics**, in accordance with Art 18 of the Basic Regulation, the proposed delegated act is based on the joint recommendations (JR) developed and submitted to the Commission by the Member States concerned, namely Italy, France, Spain, Slovenia, Croatia, Greece and Malta⁸. According to this Communication, in the Aegean Sea and Crete Island⁹, by way of derogation from Article 15(1) of Regulation (EU) No 1380/2013, the following quantities may be discarded in the Aegean Sea and Crete

⁷ See: <http://ec.europa.eu/transparency/regdoc/rep/3/2016/EN/C-2016-6606-F1-EN-MAIN-PART-1.PDF>

⁸ See: [http://www.europarl.europa.eu/meetdocs/2014_2019/documents/pech/dv/com_adl\(2014\)07550_/com_adl\(2014\)07550_en.pdf](http://www.europarl.europa.eu/meetdocs/2014_2019/documents/pech/dv/com_adl(2014)07550_/com_adl(2014)07550_en.pdf)

⁹ 'Aegean Sea and Crete Island' means GFCM Geographical Sub-Area 22 and 23

Island, up to 3% of the total annual catches of species subject to minimum sizes in the small pelagic purse seines fisheries set out in point 5 of the Annex¹⁰.

The Greek Administration (DGSF) is planning to conduct pilot studies to increase selectivity of all fishing gears with the involvement of the fishermen within 2 years from the approval of the management plan. It envisages allowing preferential access to fishing grounds of the more selective fishing gears (Art.7 of the Basic Regulation).

1.2 Important changes in terms of fisheries and stakeholders perception

- Individual fishers knowledge of the LO or its implementation is still quite limited and the majority of them, when provided an explanation, express a very negative opinion towards it. Fishers in Eastern Mediterranean feel that the LO is tailored for the quota system in Atlantic and North Sea fisheries and that it does not account for fishery management issues in the Mediterranean. Having participated in numerous national or MEDAC meetings, fishers representatives have good knowledge about the LO and its implementation process. The overall attitude of industry representatives towards the LO, as expressed in the MEDAC proposal for a JR, is one of concern about economic costs, a short implementation timescale and difficulties in improving selectivity.
- National administrations consider exemptions as a mean of adapting to the LO. Exemptions are a possibility provided for in Article 15; from a legal perspective, approval of exemptions mean that the LO is applied. According to some local authorities, it seems that the EU has realized that the LO creates implementation difficulties in the Mediterranean.
- NGOs support the LO implementation. NGO representatives consider that the industry, with the support of national administrations, prioritised exemptions over avoidance of unwanted catches through more selective gears.
- Scientists express concerns for the new CFP and the LO in the Mediterranean^{11, 12, 13}. For many scientists the CFP was designed based on characteristics and needs of the Atlantic and North Sea fisheries, not considering the peculiarities of the Mediterranean fisheries¹⁴. The main differentiation of the Mediterranean fisheries are:
 1. The Mediterranean EU fisheries production represents about 10,5% of the total fisheries production of the EU. However, this production derives from the 46% of the EU fishing

¹⁰

See:

[http://www.europarl.europa.eu/meetdocs/2014_2019/documents/pech/dv/com_adl\(2014\)07550\(par2\)/com_adl\(2014\)07550\(par2\)_en.pdf](http://www.europarl.europa.eu/meetdocs/2014_2019/documents/pech/dv/com_adl(2014)07550(par2)/com_adl(2014)07550(par2)_en.pdf)

¹¹ Bellido, J., Santos, M., Pennino, M., Valeiras, X., Pierce, G., 2011. Fishery discards and bycatch: solutions for an ecosystem approach to fisheries management? *Hydrobiologia* 670 (1), 317-333. DOI 10.1007/s10750-011-0721-5

¹² Sarda, F., Coll, M., Heymans, J.J., Stergiou, K.I., 2015. Overlooked impacts and challenges of the new European impacts and challenges of the new European discard ban. *Fish and Fisheries* 16, 17-180.

¹³ Damalas, D., 2015. Mission impossible: discard management plans for the EU Mediterranean fisheries under the reformed Common Fisheries Policy. *Fisheries Research* 165, 96-99.

¹⁴ Machias A., Stergiou K. and Tsagarakis K., 2017. New Common Fisheries Policy: Obligatory landing of discards. *Fishing News*, Vol. 417, pp. 60-68.

- vessels and more than 50% of the EU fishers. This is due to the fact that more than 80% of the Mediterranean fisheries fleet are less than 12 m LOA¹⁵.
2. The Mediterranean has an extensive coast line (more than 16.000 Km in Greece alone). This means, in combination with the above fleet characteristics and the market, that every spot in the coastline is a potential landing site. On the contrary in the Atlantic, there are defined places for landing fish and markets. This fact has as a result, in the Mediterranean the logistics of gathering the discards from numerous places difficult and with a high cost.
 3. The Mediterranean has a small fisheries production but a rich biodiversity (catches are composed of numerous species many of which are not edible). These species are mainly of small size, with small life duration and usual high commercial values¹⁶ (Vassilopoulou et al., 2007). On the contrary, in North Europe are targeted relatively fewer species and their larger sizes, as fisheries management is through Total Allowable Catches (TACs) or fishing opportunities, i.e. catch limits (expressed in tonnes or numbers) that are set for most commercial fish stocks. TACs are shared between EU countries in the form of national quotas. Quotas promote high grading which is a practice of selectively harvesting fish (i.e. the larger ones) so that only the best quality fish are brought ashore.
 4. In the Mediterranean there is a big differentiation in the types of the various fishing vessels, activities and metiers. This often results in acute competition between fishers and between fisheries activities.
 5. The larger fisheries production in the Atlantic and the North Sea is due to the fact that the waters there are mesotrophic and the continental shelf is extended. On the contrary in the Mediterranean the waters are in general oligotrophic and the continental shelf is limited¹⁴.
 6. Despite the fact that in the EU Member States the participation of the fisheries in the GDP ranges between 0.01-0.2% without having a distinct differentiation between North Europe and the Mediterranean, many scientists consider that the socioeconomic importance of fisheries is higher in Greece and perhaps in the Mediterranean¹².
 7. In the Mediterranean, fisheries management is done with technical measures (prohibition of using certain fishing gears in some areas, depths and seasons closures (e.g. in Greece), minimum conservation size) that often do not have a sound scientific basis¹⁷.

Many scientists believe that for the same reasons the LO is rather irrational for the Med (see Machias et al., 2017). They believe that the discards LO will not affect the quantities fished as in the Med there are no quotas (with the exception of BFT and from now on for swordfish). Moreover, dietary habits in the Med, are different compared to North Europe and small (even undersize fish) is considered as a delicacy (gourmet). It is well known that there is an illegal

¹⁵ Machias A., Tsagarakis, K. and Matsaganis, M. 2016. Greek fisheries and the economic crisis: structural analogies. *Ethics in Science and Environmental Politics* 16, 19-23.

¹⁶ Vassilopoulou, V., Machias, A., Tsagarakis, K., 2007. By-catch and discards in multi-species fisheries and their impact in the Hellenic waters. In *State of Hellenic Fisheries (SoHelFi)*, pp. 251-260. Ed. By Papaconstyantinou, C., Zenetos, A., Vassilopoulou, V., Tserpes, G. HCMR Publications Athens.

¹⁷ Stergiou, K.I., Christou, E.D., Georgopoulos, D., Zenetos, A., Souvermezoglou, C., 1997. The Hellenic seas: physics, chemistry, biology and fisheries. *Oceanography marine biology: an annual review*, 35: 415-538.

market of fish below MLS. With the previous CFP it was considered illegal to have on board undersized fish (in order to prohibit to enter in the markets), an enforcement measure that is well adapted to the characteristics of the Med fisheries. There are fears that the discards LO will further increase this illegal market of undersized fish as now it will be allowed to the vessels to have the undersized fish on board (Machias et al., 2017).

1.3 Important changes in management

Three High Level Groups (HLGs) of EU Member States were established in 2015 as a response to the regionalisation (stipulated in Art. 18 of the new reformed CFP), to develop regional management measures in the Mediterranean: the PESCAMED group (France, Italy & Spain); the Adriatica group (Croatia, Italy & Slovenia); and the **SudEstMed** group (Cyprus, Greece, Italy and Malta). The HLGs make Joint Recommendations (JRs) for discard plans following consultation with MEDAC.

The Mediterranean pelagic discard plan was largely based on MEDAC proposals rather than on a JR from the HLGs. Similarly, in 2016 the 3 HLGs endorsed the MEDAC proposal for a JR in its entirety (MEDAC Ref.: 190/2016, June 8, 2016). This reflects a much higher level of devolution of competence to the advisory council than is the case in other regions. However, the MEDAC position on the JR was not unanimous as two member organizations were dissatisfied that the proposal did not contain clear mechanisms for reducing unwanted catches, nor for discouraging their possible illegal commercialization and because *de minimis* percentages were not based on data.

The first SudEstMed meeting, held in Brussels on April 26 2016, identified the target species characterising the fisheries in the Southeastern Mediterranean Sea as a starting point for a discards joint management plan¹⁸. In this meeting, each Member State announced the intention to adopt management measures that may affect the selectivity of the gears, the space-time closures of sensitive maritime areas for certain fish stocks, the reduction of mortality and fishing effort. The HLG based on scientific advice and reports, identified that rose shrimp (*Parapenaeus longirostris*), red mullet (*Mullus barbatus*), surmullet (striped red mullet; *Mullus surmuletus*¹⁹) and hake (*Merluccius merluccius*) in the Ionian Sea are the target species which define fisheries in the area⁴.

Soon after the first **SudEstMed** meeting, **MEDAC** prepared a proposal of **joint recommendations on discards management plans for species defining the fisheries**²⁰ submitted to Member States and EU as it is foreseen in Article 18 of the Basic Regulation. Article 15 envisages the gradual introduction of the LO for all catches, according to a clearly identified schedule. According to MEDAC, the LO for small pelagic fish species caught with purse seine and pelagic trawl nets is

¹⁸ See letter 07818/5-5-2016 of Riccardo Rigillo, Director General for Maritime Fisheries and Aquaculture at the Italian Ministry of Agriculture to MEDAC: http://www.med-ac.eu/files/do_documento_piani/lettera/2016/05/167_000_mpsaf_piano_scuri_sudestmed.pdf Accessed on 19/7/2016.

¹⁹ The SudEstMed meeting used the term “red mullet” to describe two distinct species, namely *Mullus barbatus* and *M. surmuletus*.

²⁰ See ref in footnote 6

already in force and the next deadline is the 1st January 2017 "**for species defining the fisheries**". The identification of these species proved very complicated and was resolved thanks to the Member States whose General Directors of the relevant Ministries prepared letters to communicate the target species which identify the fisheries.

2 The Year behind us (2016-2017): What has DiscardLess produced in this case study during the last 12 months?

2.1 Impact assessment

2.1.1 Ecosystem scale

Discard mitigation strategies scenarios and parameterisation of operational models

For the **Ecosystem approach**, using ECOPATH with ECOSIM, the ecosystem base model (ECOPATH) of the Thermaikos Gulf (Eastern Mediterranean) has been prepared and balanced. One ECOPATH model has been prepared for each of the scenarios with the same functional groups and fisheries dataset. The initial parameterization was kept the same in all models.

Therefore there are three base models for Thermaikos Gulf for (1) 'business as usual', (2) 'full implementation' and (3) 'partial implementation' scenarios. The preliminary results of the 'business as usual' base model show that the trophic status of Thermaikos Gulf is comparable with that of the NE Aegean Sea (Tsagarakis et al. 2010), and higher compared to the Ionian Sea (Moutopoulos et al. 2013).

The ECOSIM runs are in progress and expected to end within 6 months.

Once we have the updated software from the ECOPATH developers group, we will rerun the models and compare the findings between the two approaches.

Estimating the outcome of selected scenarios

According to the preliminary results of the ECOPATH models, when totally excluding discards ('full implementation' base model), flows to exports and total system throughput are decreased, but total biomass, trophic efficiency and trophic level were less impacted. The partial implementation scenario remains to be evaluated. A full evaluation of all scenarios is in progress.

2.1.2 Fishery scale

Development of some MEFISTO runs

For the Bio-economic approaches, the bioeconomic model MEFISTO is used to examine the three implementation scenarios to simulate bioeconomic fisheries indicators. The scenarios are the same as in the ecosystem assessment ('business as usual', 'partial implementation' and 'full implementation' scenario). The model will run based on the most recent economic and fleet data that emerged from the 2014 and 2015 fisheries data collection program. The fisheries and economic data have been successfully collected during the past year for Thermaikos Gulf and the northern Aegean Sea fisheries.

Interviews with fishermen, Fishermen Associations, Scientists and Managers

The following meetings held during the 2nd year of the project:

- **22-24 March 2016.** Meeting with HCMR personnel (NAYS).
- **14 September 2016.** Meeting at the GDSF (Athens, Greece) with (General Director of GDSF a key Policy Maker for the implementation of the LO in Greece. The meeting was organised in cooperation with UBO. The purpose of the meeting was to review developments in East Med and in the Mediterranean for the LO.
- **14 September 2016.** Meeting at NAYS office (Athens, Greece) with the NGO ISea (see <http://isea.com.gr/en/>). The meeting was organised in cooperation with UBO that she also attended the meeting. ISea is quite active working with fisheries and sea related matters. They also have an interest to disseminate the new regulations by following up their application, as well as to record problems and socio-economic effects that may arise.
- **17-21 September 2016.** Face to face meetings with 10 fishermen from trawlers and 2 coastal fishermen. UBO organized these meetings for WP 2.5 and the results will be analysed in WP2.
- **27 September 2016.** Meeting with the NGO WWF in Athens (Greece)..
- **7-8 October 2016.** NAYS presented the DiscardLess project on October 8, 2016 in the 16th Panhellenic Conference of Ichthyologists (250 people registered). More than 60 people attended the session that the DiscardLess project was presented, attracting the interest of the industry, scientists and Managers for the project's results.
- **19 December 2016.** Meeting with the President and CEO of OKAA in Athens (in charge of 10 major landing sites in Greece. (NAYS).
- **23 January 2017.** Meeting with the Fisheries Control Directorate of the Security and Policing Branch of the Hellenic Coast Guard Headquarters (Ministry of Shipping and Island Policy) (NAYS)

2.2 Avoiding unwanted catch

2.2.1 gear technology

In Greece, HCMR recently accomplished the project EPILEXIS (see <http://epilexis.hcmr.gr/>). NAYS informed the project partners for the results of this project through the compilation of a fact sheet. EPILEXIS project, implemented by HCMR (Greece), studied changes in technical measures in the bottom trawl fishery with the aim to propose the best management measure based on environmental and socio-economic aspects. To improve the selectivity of the bottom trawl and to reduce the mortality of juveniles of commercial species and the quantity of discarded fish in the Mediterranean, the European Regulation of 2006 (EC 1967/2006) stated that the mesh size of codend of otter trawls should be 40 mm square (40 S) or in specific cases 50 mm diamond (50D). Also, the General Fisheries Commission of the Mediterranean (General Fisheries Commission for the Mediterranean-GFCM)

proposed in 2010 the introduction of such change (GFCM 2010). It was therefore necessary to implement this project in order to:

- 1) Take a scientifically informed decision on the codend mesh size and advise the Ministry.
- 2) Explore biological and economic consequences of their implementation and
- 3) Disseminate the information widely and contribute to the consultation with all relevant stakeholders in order to get wider acceptance of the new gear through consensus and not enforcement.

In Greece, there was no thorough study of the selectivity of the mesh size of the trawl codend, so it could not be said which of the two meshes, 40mm square or 50mm diamond is suitable for both the trawl fishery sustainability and the environment. This, without justification decision, resulted in not persuading fishermen for their effectiveness, but also to the feeling that the measures were taken unnecessarily. Comparison of the selectivity of the 40 mm square and 50 mm diamond mesh as well as with that of the previously used 40 mm diamond mesh in the codend was necessary under these circumstances. Therefore, EPILEXIS studied the improvement of the bottom trawl selectivity and evaluated of biological and economic aspects of this improvement.

Results

In most cases, commercial catch was not significantly altered. The ratio of discards/commercial catch is reduced from 0.57 (40D), to 0.49 (40S) and 0.51 (50D). Discards reduced significantly in the mesh size of codend with 40S and 50D for the total catch, rose shrimp (*Parapenaeus longirostris*) and Norway lobster (*Nephrops norvegicus*). Hake (*Merluccius merluccius*) had less discards for mesh size of codend of 40S. The largest percent of escapees (as weight) was always in the mesh size of 40S, with the exception of *Mullus surmuletus* (striped red mullet) that had the higher % of escapees in the mesh size of 50D.

Square mesh size of 40S had the best selectivity curve, shifted to larger lengths and larger L50. Diamond 40D mesh size has the lower selectivity, Diamond 50D mesh size withholds more young fish compared to 40S and allows escapees of larger size, especially for striped red mullet. The square 40S mesh size allows the escapees of a significant part of young hake. Despite that, the largest part of the hake catch is below the minimum landing size of 20 cm in the codend.

L50 values were larger than Minimum Landing Size (MLS) in striped red mullet, red mullet and Norway lobster for the square 40S mesh size. Values for hake were much smaller than MLS for all mesh sizes.

Results showed that square mesh size has the better selectivity and reduces discards. The mean value of the catches was though not statistically significant among the 3 types of trawl codend studied.

2.2.2 fishing strategies

The "fishers' story"

NAYS made contributions to D4.1 “Initial avoidance manuals by case study including tactical, strategic and gear based approaches agreed by scientists and fishers” that was due by Month 18.

The “scientists’ story”

NAYS made contributions to this Deliverable by sending the current perceptions to the WP Leader.

The “managers’ story”

NAYS made contributions to this Deliverable by sending the current developments to the WP Leader.

2.3 Policy outreach

A series of skype calls and exchanges of e-mails and reports with WP7 leaders and Mediterranean partners led to the drafting of *D7.2-Guidelines for landing obligation implantation in the Mediterranean based on D7.4.1 (Due: M24)*. The results of this Mediterranean Policy Brief were presented to the Mediterranean Workshop organised in the Annual meeting in Rome (March 10, 2017). Following the feedback received, the *Deliverable 7.2: Year 2 of the Landing Obligation: key issues in Mediterranean fisheries. DiscardLess Policy Brief Number 2* is now ready²¹.

The first draft was translated also in Greek (in total 9 pages) in order to allow the Greek fishermen to express their opinion in their own language.

NAYS attended the 16th Hellenic Ichthyological Conference that was held in Kavala, Greece (6-9 October 2016) and presented the DiscardLess project²². There was also cooperation with Agrocampus to include the Eastern Mediterranean data into the DiscardLess Atlas.

2.4 Summary:

During the second year, NAYS participated actively mainly in WP1, WP2, WP3, WP4, WP7 and WP8. Consultations made with key stakeholders (Ministry, the fishing industry, the scientific community) in order to have their perception for the LO and their concerns for the Eastern Mediterranean case study (notably Greece) were recorded. In general, the fisheries industry is still not well informed for the LO and is not convinced at all of the benefits of the LO. They agree for more selectivity and for tools that will assist them to reduce their costs and discards if possible.

In parallel, data collection for the models to be used is continuing and these efforts will continue in year 3, when most activities are previewed to start in these WPs as well as on the other WPs.

²¹ <http://www.discardless.eu/media/results/deliverable-7-2.pdf>

²² Argyrou I, Iordanidou K, Triantafyllidis G, Tsikliras A (2016). DiscardLess – Strategies for the gradual elimination of discards in European fisheries. *Proceedings of the Hellenic Ichthyological Conference* **16**: 485-488

3 The Year ahead of us (2017-2018): What do we expect for the next year?

3.1 WP1 (ecosystem scale assessment) & WP2 (Fishery scale assessment)

We will run all scenarios with ECOSIM and MEFISTO, estimate the outcome of the selected scenarios and analyse the ecosystem, fisheries and economic indicators derived from the models. We expect to have all scenarios evaluated by the end of 2017.

The results will be published perhaps together with the western Mediterranean Case study.

3.2 WP3 (gear technology)

- We will continue the work for WP3, trying to bring the results of the existing solutions (mainly from the Manual of selective fishing gears) to the Greek fishermen and interested stakeholders.

3.3 WP4 (fishing strategies)

- We will continue the work for WP4 trying to adopt the ideas developed in the Eastern Mediterranean case study.
- We will further exploit the feasibility to use catches of species below the minimum conservation reference size to purposes other than direct human consumption, including fish meal, fish oil, pet food, food additives, pharmaceuticals and cosmetics in Greece.

3.4 WP7 (Framing and implementing the discard policy)

- We will continue the efforts to understand the incentives for the fishermen provided in other countries to land discards.
- We will monitor progress in the remaining case studies as well as progress in WP5 and WP6 and keep informed the fishery community and Ministry people for technological improvements and solutions that could be adopted in the Eastern Mediterranean area to reduce discards or to utilise them.
- In general, we will try to see the feasibility of the following items under Regulation 1380/2013 (as discussed with colleagues from the MINOUW project):

Article 15(11) of the CFP 1380/2013 states that *“the use of catches of species below the minimum conservation reference size shall be restricted to purposes other than direct human consumption, including fish meal, fish oil, pet food, food additives, pharmaceuticals and cosmetics”*; in addition, point 30 (introduction of the CFP 1380/2013) states that *“The destination of landings of catches of fish under the minimum conservation reference size should be limited and should exclude sale for human consumption”*.

Questions:

1. Should fish meal, fish oil, pet food, food additives, pharmaceuticals and cosmetics be considered as direct human consumption?
2. If the negative case and considering that article 2.5(b) states that “where necessary, make the best use of unwanted catches, without creating a market for such of those catches that are below the minimum conservation reference size”, could fishers cover the landing costs (without generating financial gains)?

The above questions were replied by DG MARE (Ref. Ares(2015)4278639 - 14/10/2015) as follows:

....please note that the examples given in Article 15(11) and to which you refer, indicate the types of uses the legislator envisaged for fish below minimum conservation reference sizes (i.e. fish meal, fish oil, pet food, food additives, pharmaceuticals and cosmetics). From these it is clear that these types of uses ("industrial uses") are accepted but should not be considered as for direct human consumption.

On your second question, the CFP suggests that unwanted catches below minimum conservation reference size should not be comparable (in terms of destination and value) to catches of marketable fish, so as to avoid the creation of parallel markets for undersize fish. This would equate to an economic incentive to target such catches. It was certainly not the intention of the legislator to create obstacles for fishermen to find uses for unwanted catches, but rather that lucrative markets for such fish do not emerge. In this sense it is perfectly reasonable for fishermen to cover their landing costs for the handling of such catches.

Therefore, we will continue to investigate the LO under the above spectrum in cooperation with the Central Market and Fishery Organizations SA (<http://www.okaa.gr>) that controls 11 fish landing sites in Greece (Piraeus, Thessaloniki, Kavala, Patra, Chalkida, Chios, Alexandroupoli, Kalymnos, Preveza, Chania and soon in Volos).

3.5 WP8 (Bringing results to users)

We will continue the cooperation with Agrocampus to include the Eastern Mediterranean data into the DiscardLess Atlas as well as with AlphaFilm for dissemination material from the Eastern Mediterranean Case Study.

The project will be presented to national conferences that will be held in the following year.