MAREA: MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE

SPECIFIC CONTRACT N° 11 " IMPLICATIONS OF THE IMPLEMENTATION OF THE LANDING OBLIGATIONS PROVISIONS IN SMALL PELAGIC FISHERIES IN MEDITERRANEAN (LANDMED)"

LANDMED

D.1.4 FINAL REPORT

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Partners involved:
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October 17th 2014, revised February 23th 2015

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1. INTRODUCTION

The present document is the Deliverable D1.4 ("Draft Final Report") of the LANDMED Specific Contract, under the MAREA Framework. The completion of the Draft Final Report was fixed for the month 7 after the signature of the contract, on March 18th 2014.

This report describes all the activities carried out during LANDMED contract. A detailed synthesis of the results achieved is provided in the Executive Summary, included in this report. All the details on methodology and results are included in all the Deliverables of the Workpackages 2, 3, 4 and 5.

D2.1.1 - Summary on the distribution and the characteristics of the small pelagic fisheries in EU waters accompanied by related maps and tables
D2.1.2 - Summary of the technical characteristics of the gears exploiting small pelagics
D2.1.3 - Spatio temporal distribution of fishing effort, landings and landings per unit effort
D2.2.1 - Overview of the economic aspects related to small pelagic fisheries in EU waters
D2.3.1 - Summary of the current outcomes on the status of stock of small pelagics in Mediterranean
D2.3.2 - Overview of the provisions regulating small pelagic fisheries in EU Mediterranean waters
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D3.1.1 - Estimation and characterization of discards associated to the small pelagic fisheries
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D4.3.3 - Results of the Eastern Mediterranean case study
D5.1.1 - Evaluation of the importance of discards estimates for stock assessments and suggestions under the stock assessment point based on project output

According to the contractual terms, most of these Deliverables were presented in the previous months. For these documents we present now a revised version, following the comments of the Commission received after the Interim Report presentation.

The Draft Final Report with these 17 expected Deliverables, presented as standalone documents, are available in a specific folder of the MAREA website ,www.mareaproject.net: Marea/Specific Projects/Specific project 11 LANDMED/Draft Final report.

After the revision, made by the Commission, the draft Final report and 9 Deliverables amended following the suggestions made. The revised documents are available in a specific folder of the MAREA website, www.mareaproject.net: Marea/Specific Projects/Specific project 11 LANDMED/Draft Final report/Revised documents.

The same folder contains the datasets of the information collected and the input data used for the analyses of WP3 and WP4.

2. BACKGROUND

Partners/Subcontractors involved in the LANDMED Specific Contract.

MAREA PARTNER OR SUBCONTRACTOR NUMBER	SCIENTIFIC RESPONSIBLE	AFFILIATION
MAREA coordinator	**Maria Teresa Spedicato**	**COISPA**
2	**Paolo Sartor**	**CIBM**
5	**Giuseppe Lembo**	**COISPA**
6	**Konstantinos Tsagarakis**	**HCMR**
S3	**Jose María Bellido**	**IEO**
4	**Alessandro Lucchetti**	**CNR**
1	**Angelo Tursi**	**CONISMA**

RATIONALE

Discards consequent to fishing activity consist in the marine fauna brought onto the board and subsequently returned to the sea; they may constitute a large amount of the total catch (Alverson *et al.,* 1994; Hall, 1999). Otter trawling is undoubtedly the gear responsible for most of discards produced (Hall, 1999). Fisheries targeting small pelagics have in general low discard rates because the catch tend to be monospecific and the fish caught tend to be of a similar size. In any case, although, small pelagics discards are low as a percentage, the discarded quantities may still be high because the catch volumes can be very large.

Small pelagic fishes are a group of species living along the water column; most of the species are distributed close to the coast. The most important species present in Mediterranean waters are European sardine (*Sardina pilchardus*), European anchovy (*Engraulis encrasicolus*), Mediterranean horse mackerel (*Trachurus mediterraneus*), Atlantic horse mackerel (*Trachurus trachurus*), chub mackerel (*Scomber japonicus*) and Atlantic mackerel (*Scomber scombrus*) (Tugores *et al.,* 2011; Giannoulaki *et al*., 2013). Small pelagics are the main fishery resource of the Mediterranean in terms of volume of landings being approximately 35% of total annual landings (Lleonart, 2008).

Even though discarding of small pelagic fisheries in Mediterranean has been object of several studies, the knowledge is still scattered both in space and time (Kelleher, 2005).
Since 2002 discards are monitored in the EU Mediterranean, according to the EC Regulations N. 1543/2000, N. 1639/2001, N. 1581/2004 and N. 199/2008, which established the DCR (Data Collection Regulation) and subsequently the DCF (Data Collection Framework). Given the occurrence of derogations regarding some fisheries, not all the fishing systems have been regularly monitored. In addition, during DCR, discards were monitored every three years. Only from 2009, within the DCF, the monitoring has been performed on an annual basis.
The collected data are, however, only partially exploited, since are generally used for stock assessment purposes. For using such information to different aims it might be necessary to access to the source of data and possibly to realize them under different spatial/temporal aggregation and assumptions. Therefore, there is a need to perform a critical review of the existing information, including an accurate analysis of the estimates to properly assess the factors that lead to discarding.

Reduction or elimination of discards is one of the core aspects of the Ecosystem Approach for Fishery Management (Hilborn, 2011; Garcia *et al*., 2003).
Discards ban, or landing obligation, is one of the most important issues considered under the reform of the European Union Common Fisheries Policy (CFP). The CFP reform moves through an obligation for fishermen to land all the commercial species that they catch. Article 15(11) of the CFP states: "for the species subject to the landing obligation, 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 . The reform enables fishermen to play an active role in designing measures to avoid discards and to land all commercial species that are caught.
The Commission is proposing the landing obligation in different temporal steps: the first one concerns pelagic species (including the Mediterranean) and will be put in practice from 2015. The provisions on landing obligation are described by the Article 15 ("Landing obligation") of EU Regulation N. 1380/2013.

The same Article 15 foresees *de minimis* exemptions up to 5% of the total annual catches of the species subjected to landing obligation. Such exemption can be applied in the following situations:
- "where scientific evidence indicates that increases in selectivity are very difficult to achieve;" or
- "to avoid disproportionate costs of handling unwanted catches, for those fishing gears where unwanted catches per fishing gear do not represent more than a certain percentage, to be established in the plan, of total annual catch of that gear". Following joint STECF/ICES discussions, a number of scientific and technical issues were identified as having significant implications for implementation of the landing obligation requiring further analysis. These were:
(i) survival;
(ii) *de minimis* and quota flexibility;
(iii) catch estimation;
(iv) horizontal control, monitoring and enforcement; and
(v) considerations and support for development of discard plans.

Taking into account all these aspects, it is important to perform an assessment of the impacts of the implementation of these provisions on the small pelagic fisheries of the Mediterranean, and to explore a range of cases where the *de minimis* exemption can be applied. These evaluations shall be associated with an exhaustive description of the main characteristics of the small pelagic fisheries, in terms of fishing capacity, activities, landings, economic performance, as well as of discards and the factors producing them.

OBJECTIVES OF LANDMED

In the above described context, the LANDMED project (Specific Contract N. 11 under the framework of MAREA project) was developed, with these main objectives:

- Identification and description of the main small pelagic fisheries per Country and GSA;
- Quantify the number of vessels, catches, effort deployed and economic performance;
- To characterise the current fishing practices that lead to discarding (e.g. fishing area, seasonality, carrying capacity of the vessels, market factors);
- Explore the potential impacts of the *de minimis* exemption through worked examples assuming a range of (pre-agreed) interpretations;
- Identify a range of cases where the *de minimis* exemption could apply on the basis of the two conditionalities included in the Article 15 (i.e. improvements in selectivity are considered to be very "difficult" or "to avoid disproportionate costs of handling unwanted catches");
- Provide advice for the implementation of the provisions above from a stock assessment, practical and control point of view.

Besides supporting Regulation and control objectives, the results of this project can also contribute to highlight gaps and suggest improvements in the DCF, particularly as regards the discard monitoring.

OUTLINE OF THE STUDY

The target species of LANDMED are sardine, *S. pilchardus*, anchovy, *E. encrasicolus*, Atlantic mackerel, *T. trachurus*, Mediterranean horse mackerel, *T. mediterraneus*, e.g. small pelagic species subjected to a Minimum Size (EC Reg. N. 1967/2006) and thus included in the provisions of the Article 15 of the EU Reg. N. 1380/2013.
The fishing systems/segments involved in the study are mainly purse seine and pelagic trawl. The project was concentrated on EU Mediterranean fisheries, with definition at Country and, when possible, GSA spatial scale.

The project included the following main activities:
- Revision of the existing information coming from scientific papers, grey literature, outcomes of research and monitoring projects, reports of STECF, SGMED, EWG, etc.;
- Collection and analysis of data coming from DCR and DCF activities in the EU Mediterranean waters;
- Collection of additional information, by mean of questionnaires to fishermen and fishermen associations;
- Data analysis targeted to characterise small pelagic fisheries, to describe and quantify discards, to evaluate the role of the different factors influencing discard practices as well;
- Upgrade of the BEMTOOL model, design, parameterization and implementation of case studies;
- Data analysis and modelling targeted to estimate the impact of the provisions on the landing obligation;
- Analysis of model based simulations targeted to investigating a range of cases where the *de minimis* exemption could be applicable;
- Advices on the practical application of the landing obligation from the control and fishing practice point of view.

LANDMED was organised according to five inter-correlated workpackages.
WP1 = Project management and coordination.
WP2 = Identification and characterisation of the fisheries targeting small pelagics in the Mediterranean.
WP3 = Estimation and characterisation of the discards associated to the small pelagic fisheries and assessment of the main factors that lead to discarding.
WP4 = Assessment of the impacts due to the implementation of the landing obligations for the small pelagic fisheries in the Mediterranean.
WP5 = Synthesis and advices for the implementation of the provisions on landing obligation.

The LANDMED Work break structure (Workpackages and Tasks) with timetable of Deliverables and Reports is reported by the table below.

Timing and Work Break Structure of Project										
		Months							
WP / Task	WP and Task Description	1	2	3	4	5	6	7	8
WP1: Project management and coordination									
	Progress of the project								
	Project coordintation meetings	M1		M2			M3		
	Preliminary and Interim Reports		D1.1		D1.2	D1.3			
	Draft Final Report and Final Report							D1.4	D1.5
WP2: Identification and characterisation of the fisheries targeting small pelagics in Mediterranean									
Task 2.1	Collection and review of the existing fisheries information				D2.1.1 D2.1.2 D2.1.3				
Task 2.2	Collection and review of the existing economic information				D2.2.1				
Task 2.3	Review of the current status of the stocks of small pelagics in Mediterranean				D2.3.1 D2.3.2				
Task 2.4	Critical review of STECF/ICES reports on landing obligation and *the minimis* exemption		D2.4.1						
WP3: Estimation and characterisation of discards associated to the small pelagic fisheries and assessment of the main factors that lead to discarding									
Task 3.1	Estimation and characterisation of discards associated to the small pelagic fisheries				D3.1.1				
Task 3.2	Assessment of the main factors that lead to discarding				D3.2.1				
Task 3.3	Collection of the information on the carrying capacity of the vessels and market factors				D3.3.1 D3.3.2				
WP4: Assessment of the impacts due to the implementation of the landing obligations for the small pelagic fisheries in Mediterranean									
Task 4.1	Upgrade of BEMTOOL model and software							D4.1.1	
Task 4.2	Design of the case studies and model parameterization					D4.2.1			
Task. 4.3	Implementation per case study							D4.3.1 D4.3.2 D4.3.3	
WP5: Synhtesis and advices for the implementation of the provisions on landing obligation									
Task 5.1	Suggestions under the stock assessment point of view							D5.1.1	

The list of the Deliverables, with the reference Workpackage and the responsible person is reported below.

WP	Deliverable	Responsible	Delivery date (month)
WP1	D1.1 – First Preliminary Report	P. Sartor	2
WP1	D1.2 – Interim Report	P. Sartor	4
WP1	D1.3 – Second Preliminary Report	P. Sartor	5
WP1	D1.4 – Draft Final Report	P. Sartor	7
WP2	D2.1.1 - Summary on the distribution and the characteristics of the small pelagic fisheries in EU waters accompanied by related maps and tables	M. Gonzalez/ G. Basilone K. Tsagarakis	4
WP2	D2.1.2 - Summary of the technical characteristics of the gears exploiting small pelagics	M. Gonzalez/ G. Basilone K. Tsagarakis	4
WP2	D2.1.3 - Spatio temporal distribution of fishing effort, landings and landings per unit effort	M. Gonzalez/ G. Basilone K. Tsagarakis	4
WP2	D2.2.1 - Overview of the economic aspects related to small pelagic fisheries in EU waters	E. Sabatella/K. Tsagarakis	4
WP2	D2.3.1 - Summary of the current outcomes on the status of stock of small pelagics in Mediterranean	M. Giannoulaki/K. Tsagarakis	4
WP2	D2.3.2 - Overview of the provisions regulating small pelagic fisheries in EU Mediterranean waters	M. Giannoulaki/K. Tsagarakis	4
WP2	D2.4.1 Overview of the STECF/ICES reports on landing obligation and the *de minimis* exemption	A. Lucchetti/K. Tsagarakis	2
WP3	D3.1.1 - Estimation and characterization of discards associated to the small pelagic fisheries	A. Machias/T. Garcia/J.M.Bellido	4
WP3	D3.2.1 - Report on the assessment of the main factors that lead to discarding	P. Carpi/J.M. Bellido	4
WP3	D3.3.1 - Report on the carrying capacity of the vessels	G. Lembo/J.M. Bellido	4
WP3	D3.3.2 - Report on the price trends and marketing of anchovy, sardine mackerel and horse mackerel	G. Lembo/J.M. Bellido	4
WP4	D4.1.1 - Upgraded release of the BEMTOOL model, specifications and software	M.T. Facchini/I. Bitetto	7
WP4	D4.2.1 Design of the case studies and model parameterization	M. Gambino/I. Bitetto	5
WP4	D4.3.1. Results of the Western Mediterranean case study	A. Carbonell/I. Bitetto	7
WP4	D4.3.2. Results of the Central Mediterranean case study	P. Carpi/I. Bitetto	7
WP4	D4.3.3 Results of the Eastern Mediterranean case study	M. Giannoulaki/I. Bitetto	7
WP5	D5.1.1 Evaluation of the importance of discards estimates for stock assessments and suggestions under the stock assessment point based on project output.	M. Giannoulaki/M. Sbrana	7

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Commission Regulation (EC) No 1639/2001of 25 July 2001establishing the minimum and extended Community programmes for the collection of data in the fisheries sector and laying down detailed rules for the application of Council Regulation (EC) No 1543/2000

Commission Regulation (EC) N. 1581/2004 of 27 August 2004 amending Regulation (EC) N. 1639/2001 establishing the minimum and extended Community programmes for the collection of data in the fisheries sector and laying down detailed rules for the application of Council Regulation (EC) N. 1543/2000. Official Journal of the European Union L 289/6.

Council Regulation (EC) N. 1543/2000 of 29 June 2000 establishing a Community framework for the collection and management of the data needed to conduct the common fisheries policy Official Journal of the European Communities L 176/1.

Council Regulation (EC) N. 1967/2006 of 21 December 2006, concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, amending Regulation (EEC) N. 2847/93 and repealing Regulation (EC) N. 1626/94. Official Journal of the European Union L 409.

Council Regulation (EC) N. 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries. Official Journal of the European Union L 60/1.

Council Regulation (EU) N. 1380/2013 of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) N. 1954/2003 and (EC) N. 1224/2009 and repealing Council Regulations (EC) N. 2371/2002 and (EC) N. 639/2004 and Council Decision 2004/585/EC. Official Journal of the European Union L 354/22.

Garcia S.M., Zerbi A., Aliaume C., Do Chi T. and G. Lasserre (2003). The ecosystem approach to fisheries. Issues, terminology, principles, institutional foundations, implementation and outlook. FAO Fisheries Technical Paper N. 443. FAO, p. 71.

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Tugores M.P., Giannoulaki M., Iglesias M., Bonanno A., Ticina V., Leonori I., Machias A., Tsagarakis K., Diaz N., Giráldez, A., Patti B., De Felice A., Basilone G. and V. Valavanis (2011). Habitat suitability modeling for sardine (*Sardina pilchardus*) in a highly diverse ecosystem: the Mediterranean Sea. Marine Ecology Progress Series, 443: 181-205.

3. ACTIVITIES CARRIED OUT, MAIN OUTCOMES AND PROBLEMS ENCOUNTERED

WORKPACKAGE 1. PROJECT MANAGEMENT AND COORDINATION

Main objectives

To ensure a smooth running of all the project activities and the successful accomplishment of the project goals; to monitor all the activities for ensuring the project outputs according to the decision taken and the time schedule.

Activities carried out

The progress of the works was monitored by the project Coordinator, assisted by the project Workpackage and Task leaders, with the collaboration of the MAREA Coordinator. Particular attention was devoted to the respect of the fixed deadlines and to answer of EU DGMARE requests occurred during the progress of the Contract. A request for data was delivered to National Authorities by the project coordinator.
According to the workplan of the contract, to the present date two meetings were held:

- The kick off meeting, fixed after the signature of the Contract, was realized in Brussels (March 24th – 25th, 2014);
- The second coordination meeting was held in Madrid (June 4th- 5th, 2014);
- The third coordination meeting was held in Rome (September 17th- 18th, 2014).

The minutes of the three meetings are annexed to this document.

The following reports have been produced:
- the First Preliminary Report (month 2), with the first evaluations derived from literature review and the expert knowledge in relation to the subjects of WP2 and WP3, together with a first evaluation on the possible application of the *"de minimis"* exemption. The report was supported by an Executive summary and by a discards summary table. At the same time, the Deliverable D2.4.1 ("Overview of the STECF/ICES reports on landing obligation and the *"de minimis"* exemption) was produced.

- the Interim Report (month 4), with all the results and the Deliverables of the WP2 and WP3.

- the Second Preliminary report (month 5), with the results of the knowledge-based hypotheses on the *de minimis* exemption and a description of the activities carried out so far for Workpackage 4. The Deliverable D4.2.1 ("Design of the case studies and model parameterization") was also produced.

- the Draft Final Report (month 7), with the description of the activities and the results achieved in the project, and with all Deliverables (for the Deliverables presented in the previous months a revised version was presented). Annexed to this Report there are the datasets of the information collected and the input data used for the analyses of WP3 and WP4.

The following deliverables have been produced:
D1.1 – First Preliminary Report (month 2)
D1.2 – Interim Report (month 4)
D1.3 – Second Preliminary Report (month 5)
D1.4 – Draft Final Report (month 7)

Problems encountered

No particular problems were encountered and there were not substantial deviations from the workplan.

WORKPACKAGE 2. IDENTIFICATION AND CHARACTERISATION OF THE FISHERIES TARGETING SMALL PELAGICS IN THE MEDITERRANEAN.

Main objectives

To perform a detailed description of the small pelagics fisheries, highlighting their characteristics in terms of fishing capacity and activity, technical features of the gears, landings, catch rates and economic performance.
To do an overview of the EU/national/local fishing provisions (including possible Management Plans) and to summarize the current knowledge on the status of the most important stocks.

Activities carried out

Task 2.1. Collection and review of the existing fisheries information.

To fulfil the needs of this task, a review of publications, grey literature, database and reports of other MAREA Specific contracts was held to retrieve the available information on the fleets and fisheries targeting small pelagic fish in the EU Mediterranean. In addition DCF and other data, when made available by national Authorities, were used.

Task 2.2. Collection and review of the existing economic information.

The available data of the economic performance of the fisheries targeting small pelagics in the Mediterranean Sea were collected and reviewed.
The work has been carried out first by identifying the fleet segments that target small pelagics in the EU Mediterranean countries. 25 segments have been identified. For each of them an economic analysis has been performed. The analysis at GSA level has been possible only for Italy. Each analysis was supported by a final paragraph on the issues related to the availability of data. The data collected and the indicators are presented following DCF and relevant STECF reports.

Task 2.3. Review of the current status of the stocks of small pelagics in Mediterranean.

The work was aimed to summarizing the population characteristics of the target species, covering mainly basic population features like growth parameters, length at first maturity, spawning period, abundance estimates from surveys along with a description of the potential nursery grounds of the target species. A synthesis of the stock assessments performed since 2008 either under the framework of the GFCM and the STECF stock assessment working groups was made as well. Finally the fisheries information in relation to small pelagics as cited in the existing management plans was summarised.
Similarly, we made a short description of the provisions regulating small pelagic fisheries at international, country and local level: Minimum Conservation Reference Sizes, quotas (if any), technical measures (on the gear characteristics), regulations of fishing capacity and/or fishing activity (e.g. seasonal closures, etc.) were taken into account.

Task 2.4. Critical review of the STECF/ICES reports on landing obligation and the "*de minimis*" exemption.

The information available on the landing obligation has been assessed through an accurate review of the literature produced in the Framework of STECF, ICES, RAC and other documents. By taking the information collected into account, the main issues relating to "landing obligation" have been identified and contextualized taking into account the characteristics of the EU Mediterranean small pelagic fisheries.
A number of scientific and technical issues were identified as having significant implications for implementation of the landing obligation requiring further analysis:
(i) survival;
(ii) «*de minimis*» exemption;
(iii) catch estimation;
(iv) control, monitoring and enforcement;
(v) considerations and support for development of discard plans.

The following deliverables were produced:
D2.1.1 - Summary on the distribution and the characteristics of the small pelagic fisheries in EU waters accompanied by related maps and tables (month 4).
D2.1.2 - Summary of the technical characteristics of the gears exploiting small pelagics (month 4).
D2.1.3 - Spatio-temporal distribution of fishing effort, landings and landings per unit effort (month 4).
D2.2.1 - Overview of the economic aspects related to small pelagic fisheries in EU waters (month 4).
D2.3.1 - Summary of the current outcomes on the status of stock of small pelagics in Mediterranean (month 4).
D2.3.2 - Overview of the provisions regulating small pelagic fisheries in EU Mediterranean waters (month 4).
D2.4.1 - Overview of the STECF/ICES reports on landing obligation and the "*de minimis*" exemption (month 2).

All of these documents were amended after the comments received from the Commission and presented as a revised version in the Draft Final Report.

Problems encountered
As concerns the fishery characteristics, the main problems were related to the data availability as well as on the level of the information, which did not allow for a perfectly homogeneous presentation of the data for all GSAs. Specifically, for some GSAs recent data were not available, so we had to rely on older data. For others, seasonal and spatial data were not available, thus we relied on the general knowledge as reported in the reviewed literature. As concerns the gears used, the information on the values of technical characteristics was not uniformly distributed in all GSAs.
As concerns the economic data, the information for Italy (available at GSA level) and Greece and Croatia (at country level) have been made available by the national authorities, after an official request issued by the project coordinator.

Data from Slovenia, France and Spain have also been requested to national authorities but the project has not received information in time for the preparation of this deliverable. Therefore, the primary source of information for these countries has been the 2013 Annual Economic Report on the EU Fishing Fleet (STECF 13-15).

As concerns stock assessment, at present for the EU Mediterranean small pelagic stocks there is information only for European sardine and European anchovy, for GSAs 1, 6, 7, 9, 17, 16, 17, 19, 20 and 22. No information is available for mackerels.

WORKPACKAGE 3. ESTIMATION AND CHARACTERISATION OF THE DISCARDS ASSOCIATED TO THE SMALL PELAGIC FISHERIES AND ASSESSMENT OF THE MAIN FACTORS THAT LEAD TO DISCARDING

Main objectives
To provide quali-quantitative estimates of the discards associated to the small pelagic fisheries in Mediterranean; to describe the species composition of the discarded catches and the discarding practices; to investigate the role of different factors influencing discarding practices. Special attention has been devoted to the discard of species (pelagic and demersal) subjected to Minimum Size, according to the Annex III of the Reg. N. 1967/2006 and therefore subject to the landing obligation as from 1 January 2015.

Activities carried out
Task 3.1 Estimation and characterisation of discards associated to the small pelagic fisheries.
The available data were analyzed in order to provide estimations of discard species composition and discard rates at Country/GSA/fishery level, covering practically the whole range of European Mediterranean waters. The work was organized, where possible, in four sections:

1- Evaluation of the spatial and year distribution of the sampling on-board commercial operations. Assessment of the representative sampling and possible bias;
2- Estimation of discard species composition and discard ratios on total and by target species (European sardine, European anchovy, Atlantic and Mediterranean horse mackerel) by GSA/fishery level;
3- Analysis of length distributions of landings and discards by species and GSA/fishery level;
4- Estimations of some size indicators of discarded small pelagic species.
Finally, for the target species of the LANDMED specific contract, the proportion and quantities of fish below the Minimum Conservation Reference Size was estimated, based on the length distribution of the catches.

Task 3.2. Assessment of the main factors that lead to discarding
The factors potentially affecting the quantities of discards on small pelagic fisheries were investigated in the three main basins of the Mediterranean: GSA 1, GSAs 17-18 and GSAs 20-22, for purse seine and pelagic trawl. The investigated candidate factors were: area, fishing depth, season, characteristics of the vessels (length, tonnage), typology of the gear, price of the target species. Statistical analyses (Generalized Linear Models – GLM, GLMM - and Generalized Additive Models, GAMs) were applied to explore the factors in affecting the quantities of the discards (kilos per species per fishing trip, as basic unit).

Task 3.3 Collection of the information on the carrying capacity of the vessels and market factors
This task is aimed at giving a focus on the current size/structure of the vessels, on the organization of the fishing operations and room onboard the fishing vessels. To this purpose questionnaires have been distributed to the vessels owners, fishermen cooperatives and associations to get their feedback. 105 stakeholders positively responded to the survey. In addition information on the fleets has been gathered by the official channels (at European and National levels).
The Task was also aimed to a qualitative description of the mechanisms governing the formation of prices, at the different levels of the supply chain, as well as the collection of time-series of the first-sale price. Information on price trend and marketing of anchovy, sardine, mackerel and horse mackerel, in Spain, France, Italy, Slovenia, Croatia, Greece, Malta and Cyprus were collated.
The information was mainly derived by consolidated and exhaustive volume and value data collected by EUMOFA and EUROSTAT, at all stages of the supply chain.

The following deliverables have been produced:
D3.1.1 - Estimation and characterization of discards associated to the small pelagic fisheries (month 4).
D3.2.1 - Report on the assessment of the main factors that lead to discarding (month 4).
D3.3.1 - Report on the carrying capacity of the vessels (month 4).
D3.3.2 - Report on the price trends and marketing of anchovy, sardine, mackerel and horse mackerel (month 4).

All of these documents were amended after the comments received from the Commission and presented as a revised version in the Draft Final Report.

Problems encountered
The high spatio-temporal variability is a typical characteristic of discards, both from a qualitative and quantitative point of view. Therefore, the currently available estimates, being produced from very short temporal datasets can be rather variable. An effort was made to produce as similar information as possible at different countries and GSAs, however, this was not always possible due to the heterogeneity of the existing information. For some GSAs, DCF data did not exist, thus alternative information based on past short studies was used, where available. For others, length data were limited and it was not possible to infer robust conclusions.
As concerns the assessment of the main factors that lead to discarding, the heterogeneity and the partial completeness of the data available, jointly with the complexity of the factors investigated, required more time to develop the analyses in order to obtain more robust results. Therefore, the Deliverable D3.2.1

("Report on the assessment of the main factors that lead to discarding") presented at month 4 was considered as preliminary and an update version of the document was presented at month 7.

WORKPACKAGE 4. ASSESSMENT OF THE IMPACTS DUE TO THE IMPLEMENTATION OF THE LANDING OBLIGATIONS FOR THE SMALL PELAGIC FISHERIES IN MEDITERRANEAN

Main objectives: to investigate the potential impacts of the implementation of the landing obligation and the effects of the "*de minimis"* exemption on the basis of the two conditionalities contained in the Art.15 of the EU Reg. N. 1380/2013. Several aspects were considered which may affect or may be influenced by the landing obligation, as those related to stocks and fisheries, the impact on biological metrics and indicators (e.g. SSB, critical size, etc.), the quantity and value of catches and other economic parameters.
A further objective of this WP is the upgrade of the BEMTOOL model.

Activities carried out

Task 4.1 Upgrade of BEMTOOL model and software

Taking into account the STECF recommendations from EWG 13-09 (STECF, 2013) an upgrade of the BEMTOOL model has been performed to simplifying installation procedures and associating uncertainty to the simulation results. In addition, although not specifically mentioned in the project, some components were upgraded to better model the economic implications of the implementation of the "landing obligation" provision of the new CFP.
In particular, the labour cost function has been generalized to take into account the costs due to the sorting process and the possibility to introduce additional fixed costs split in different years has been also implemented (to take into account the purchase of new equipment that can be paid for example in 3-5 years). The possibility to include a discard survival rate and an escape survival rate from the selectivity process have been analysed and implemented. The introduction of confidence intervals associated to the main output of BEMTOOL model has been also analyzed and implemented in the new software. These new options were tested and the finalization of the Deliverable D4.1.1 ("Upgraded release of the BEMTOOL model, specifications and software") is under completion. It will be delivered by month 8.

Task 4.2 Design of the case studies and model parameterization

The selection of the most relevant (in terms of production and profitability) fleet segments and stocks has been made and the most updated information on stock assessments from Task 2.3 has been used for the parameterization of the biological part of each case study. Only for Western Mediterranean (GSA 1) case study a stock assessment has been performed *ad hoc* for the parameterization of biological and pressure modules of BEMTOOL model for anchovy and sardine. Economic information from Task 2.2 has been used to parameterize the economic part of the model.
The discard modelling and the scenarios implementation used the LANDMED discard summary table as reference.

Task 4.3. Implementation per case study

Three case studies were selected as representative of the EU Mediterranean main small pelagic fisheries and according to the availability of data: the "Adriatic- central Mediterranean" (affecting all the countries of the GSAs 17 and 18), the "Western Mediterranean" (essentially affecting the GSA 1) and the "Eastern Mediterranean" (including the GSAs 20 and 22). The collection and organization of the relevant data to implement the analyses for these three case studies have been completed and the results are contained in the following deliverables:
D4.2.1 - Design of the case studies and model parameterization (month 5).
D4.3.1 - Results of the Western Mediterranean case study (month 7).
D4.3.2 - Results of the Central Mediterranean case study (month 7).

D4.3.3 - Results of the Eastern Mediterranean case study (month 7).

Problems encountered
The main difficulties encountered so far are represented, for some of selected fleet segments by the lack of some information or by outdated data, which are necessary for an accurate economic parameterization. When one or more observations were missing or not accurate, it was necessary to make assumptions on the basis of previous year data.
As already mentioned, the D411 will be finalized with a little delay (month 8 instead of month 7), because more time was spent for the finalization of the case studies.

WORKPACKAGE 5. SYNTHESIS AND ADVICES FOR THE IMPLEMENTATION OF THE PROVISIONS ON LANDING OBLIGATION

Main objectives
To synthesize the results obtained in the previous WPs and to provide advices for the implementation of the provisions on landing obligation under a stock assessment point of view.

Activities carried out in the first four months and main outcomes produced
The outcomes of the WP2, WP3 and WP4 of the project were discussed in terms of impact of discards in small pelagic Mediterranean fisheries under the stock assessment point of view, together with the potential effect of the *de minimis* exemption. In addition, within this WP we aimed to:
- Identify possible data gaps related to discards knowledge in the Mediterranean small pelagic fisheries.
- Evaluate the socio-economic impact of the implementation of the landing obligations for the small pelagic fisheries in Mediterranean.

The following deliverable has been produced:
D5.1.1 Evaluation of the importance of discards estimates for stock assessments and suggestions under the stock assessment point based on project output (month 7).

Problems encountered
No particular problems were encountered.

4. DEVIATIONS FROM THE ORIGINAL WORKPLAN

The activities and the Deliverables of the LANDMED contract were realised in accordance with the workplan, respecting the established deadlines.
Regarding the Deliverable D3.2.1 ("Report on the assessment of the main factors that lead to discarding"), as stated before, data management and analysis was more time consuming than the expected. The version of this Document presented at month 4 was considered as preliminary and an update version of the document was presented at month 7.
Similarly, due to the need of first finalizing the case studies, the Deliverable D4.1.1 ("Upgraded release of the BEMTOOL model, specifications and software") will be ready by month 8 instead of month 7, before the project ending.

5. EXECUTIVE SUMMARY

Reduction or elimination of discards is one of the core aspects of the fishery management. Although small pelagics discards are low as a percentage, the discarded quantities may still be high because the catch volumes are very large.
Small pelagics are a group of species living in midwater or near the surface, mostly close to the coast. They are the main fishery resource of the Mediterranean in terms of volume of landings. The most important species present in Mediterranean waters are sardine (*Sardina pilchardus*), and anchovy (*Engraulis encrasicolus*), followed by mackerels (*Trachurus trachurus, T. mediterraneus, Scomber scombrus* and *S. colias*. Even though discarding of small pelagic fisheries in Mediterranean has been tackled by several studies, current knowledge is still scattered both in space and in time.
Discards are monitored in the EU Mediterranean since 2002, by means of DCR and DCF, but only since 2009 the monitoring is performed on an annual basis; the collected data are, moreover, only partially exploited.

Discards ban, or landing obligation, is one of the most important issues considered under the reform of the European Union Common Fisheries Policy (CFP). Under-sized fish cannot be sold for human consumption, but only for fish meal or pet food production. The Article 15 of the EU Regulation N. 1380/2013C proposed the landing obligation in different temporal steps: the first one concerns pelagic species, and will be put in practice from 2015. The same Article 15 foresees *de minimis* exemptions up to 5% of the total annual catches of the species subjected to landing obligation; they can be applied in the following situations:
- "where scientific evidence indicates that increases in selectivity are very difficult to achieve;" or
- "to avoid disproportionate costs of handling unwanted catches, for those fishing gears where unwanted catches per fishing gear do not represent more than a certain percentage, to be established in the plan, of total annual catch of that gear".

Following joint STECF/ICES discussions, a number of scientific and technical issues were identified as having significant implications for implementation of the landing obligation requiring further analysis. These were:
(i) survival;
(ii) *de minimis* and quota flexibility;
(iii) catch estimation;
(iv) horizontal control, monitoring and enforcement; and
(v) considerations and support for development of discard plans.

It was therefore important to assess the impacts of the implementation of these provisions and to explore a range of cases where the *de minimis* exemption can be applied.

Within this context, the LANDMED project (Specific Contract N. 11 under the framework of MAREA project) was carried out, with these main objectives:
- Identification and description of the main small pelagic fisheries per Country and GSA;
- Quantification of the number of vessels, catches, effort deployed and economic performance;
- Characterisation of the fishing practices that lead to discarding;
- Analysis of the potential impacts of the *de minimis* exemption through worked examples assuming a range of (pre-agreed) interpretations;
- Identification of a range of cases where the *de minimis* exemption could apply on the basis of the conditionalities included in the Article 15 (i.e. improvements in selectivity are considered to be very "difficult" or "to avoid disproportionate costs of handling unwanted catches");
- Provide advice for the implementation of the provisions above from a stock assessment, practical and control point of view.

The species object of LANDMED were sardine, anchovy and mackerels, e.g. the small pelagic species subjected in Mediterranean to a Minimum Size (EC Reg. N. 1967/2006) and thus included in the Article 15 of

the EU Reg. N. 1380/2013. The involved fishing gears were mainly purse seine and pelagic trawl. The project focused on EU Mediterranean fisheries, with definition at Country and, when possible, GSA spatial scale. LANDMED was structured into five inter-correlated Workpackages and included these main activities:

- Revision of the existing information from literature.;
- Revision of data coming from DCR and DCF activities in the EU Mediterranean waters;
- Collection of additional information, by mean of questionnaires to fishermen and fishermen associations;
- Data analysis targeted to characterise small pelagic fisheries, to describe and quantify discards, to evaluate the role of the different factors influencing discard practices as well;
- Upgrade of the BEMTOOL model, design, parameterization and implementation of case studies;
- Data analysis and modelling targeted to estimate the impact of the provisions on the landing obligation;
- Analysis of model based simulations targeted to investigate a range of cases where the *de minimis* exemption could be applicable;
- Advices on the application of the landing obligation from the control and fishing practice point of view.

LANDMED was signed on March 8th 2014; its duration was at maximum 8 months.
The main outcomes of the project are presented below.

IDENTIFICATION AND CHARACTERISATION OF THE EU MEDITERRANEAN SMALL PELAGIC FISHERIES

About 1200 vessels (with little differences according to the different data sources) are using purse seine and pelagic trawling in the EU Mediterranean Countries to exploit small pelagic species, mostly anchovy and sardine (Table 1). Also a fraction of polyvalent vessels is involved in this fishery and, finally, in Italy, namely in the GSAs 10 and 19, there are currently 55 small scale vessels using small driftnets exploiting mostly anchovy.
Purse seine is by far the mostly used fishing system and it is present in the fleets of all the countries. Midwater pelagic trawling is present only in some countries (mainly in Italy, also in France and Croatia) and it is represented by around the 18% of the vessels involved in small pelagic fisheries; in spite of the low contribution in number of vessels, this gear provides an important contribution in terms of landings.
As concerns the small scale vessels using small driftnets (in the GSAs 10 and 19), their contribution to the total landings of anchovy is negligible, but they are important factor for some local fisheries., The polyvalent multi-licence vessels, present in Italy and Greece, are mostly represented by small size units which can switch from other gears to purse seines. When using purse seine, these gears can target small pelagic species.
The most important areas in terms of number of vessels and landings of small pelagics are the Adriatic Sea (GSAs 17-18), the GSA 22 and also the GSAs 1, 6, 10, 16 and 20. In the Adriatic Sea and Gulf of Lions the resource is shared among different countries.

Small pelagic fisheries, even though they can be active all year round, are characterised by a strong seasonality, with the main fishing season in spring-summer period. Seasonal closures are applied in different countries (e.g. Spain, Italy, and Greece) in different periods of the year.
The fishing grounds of purse seine fleet extend in general along the continental shelf, from 50 to 200m depth; however, in some regions they can affect wide areas (as in GSA 17). In general the purse seiners and pelagic trawlers are used to fish in areas near their mooring ports, but the larger vessels (> 20 m LOA) can reach fishing grounds at more than 20 nautical miles from the coast, according to the resource abundance.

Anchovy constitutes the main target species due to its high economic value; sardine is an important support for the fisheries and in many GSAs is the most landed species (Figure 1).

Table 1. Current consistency (number of vessels per fishing system) of the fleets exploiting small pelagics in the EU Mediterranean waters. Summary of the available information.

COUNTRY	GSA	Purse seine vessels	Midwater pelagic trawlers	Small scale driftnetters	Polyvalent vessels with PS licence	Total	% contribution
SPAIN	1	91	-	-	-	91	6.5
	3	6	-	-	-	6	0.4
	5	7	-	-	-	7	0.5
	6	130	-	-	-	130	9.3
FRANCE	7	3	7	-	-	10	0.7
	8	-	-	-	-	0	0.0
ITALY	9	42	-	-	-	42	3.0
	10	95	-	26	-	121	8.7
	11	-	-	-	-	0	0.0
	16	31	15	-	67	113	8.1
	19	21	-	28	-	49	3.5
	17-18	44	131	-	-	175	12.6
MALTA	15	18				18	1.3
CROATIA	17	233	32	-	-	265	19.0
SLOVENIA	17	5	-	1	-	6	0.4
GREECE	20	40	-	-	9	49	3.5
	22	204	-	-	96	300	21.6
	23	7	-	-	3	10	0.7
CYPRUS	25	-	-	-	-	0	0.0
Total		**977**	**185**	**55**	**175**	**1392**	**100.0**

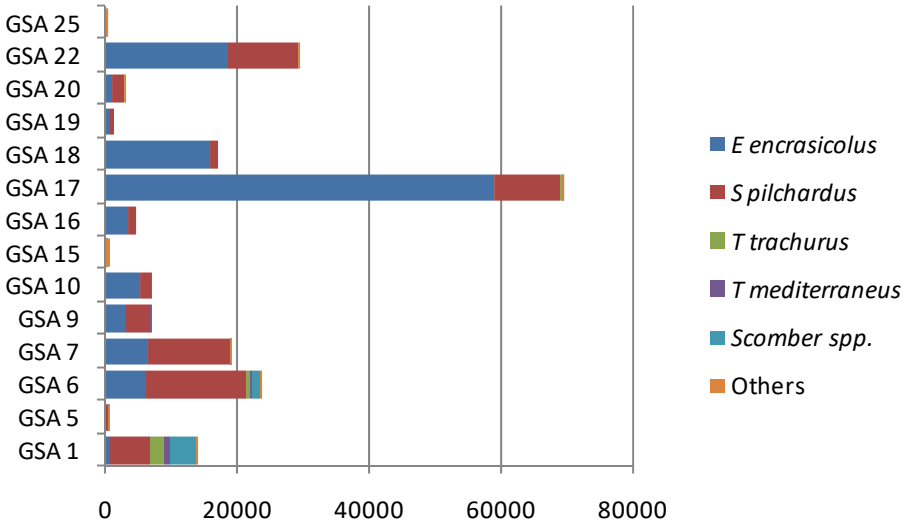

Fig. 1 - Species composition, for each GSA, of the landings of the small pelagics fisheries. Landings (tons):average of the landings from 2003 to 2012 by GSA.

Purse seine belongs to the "Surrounding nets" category. They include a mechanism by which the net is closed, as the lead line is drawn closed by the purse wire that runs through a series of rings at the bottom of the net. The main netting panel is usually made of twisted twine polyamide with a twine diameter of around 0.2-0.3 mm. The bunt, where the catch is collected at the end of fishing operations, is normally made of thicker material. The current legal mesh size (EU Regulation N. 1967/2006) is 14 mm, the maximum length of the net

800 m and the maximum drop 120 m; however shorter nets are used in several areas. The usual fishing operations take place during the night and include the use of light to attract fish. One or two motorized boats, the main and a secondary one, are generally used to encircle the aggregated fish with the net.
Pelagic trawling is a derivation of the most common bottom trawl net, adapted to fish in the water column and it is usually larger than a bottom trawl. A commercial pelagic trawl net can be towed by one or two vessels (pair trawling). In the pair trawls the horizontal opening is maintained by the distance between the two boats during towing operation. In single boat pelagic trawl the horizontal opening is maintained by towing the net by 2 or 4 doors. The minimum mesh size is 20 mm; sardine and anchovy must account for at least 80 % of the catch in live weight after sorting.

Finally, specially designed small driftnets (locally called "menaide") are used to target mainly anchovy in Italy and sardine in Slovenia. The twine thickness is always really thin, while mesh size is larger than 20 mm.

MAIN ECONOMIC ASPECTS

According to EUMOFA and EUROSTAT, small pelagics are the main fishery resource of the Mediterranean, in terms of volume of landings, being approximately 35% of total landings (the most recent estimates provide an approximate value of 280,000 tonnes per year of total landings).
According to the available data, the EU Mediterranean small pelagic fisheries involve about 7,800 fishermen on board of purse seiners and pelagic trawlers. These vessels operated on average 184 thousand days at sea. The gross value added (GVA) generated is equal to €114 million (average 2009-2012).
In this study twenty-five fleet segments have been analyzed, five of them are represented by pelagic trawlers and the rest by purse seiners. The highest values of GVA are reported by ESP PS 1218, ESP PS 1824, GR PS 12-18 and HRV PS2440. If we consider the gross value added per vessel, the more profitable segments are ITA GSA 16 PS 24-40, ITA GSA 18 PS 24-40, ITA GSA 16 PS 1824.
All the fleet segments analyzed resulted profitable in terms of, always positive for all the years, except the segment HRV PS 12-18. However the trend of profitability (measured as GVA) is negative for all the segments with the exception of pelagic trawlers in GSA 16 and GSA 17. Only for these three segments the GVA increased over the period 2009-2012; for the other segments the GVA decreased or remained stable.

A qualitative description of the mechanisms governing the formation of prices, at the different levels of the supply chain (first sale and retailers) was done. Information on price trend and marketing of anchovy, sardine, mackerels and horse mackerels was collated for Spain, France, Italy, Slovenia, Croatia, Greece, Malta and Cyprus. The information was mainly derived by the data collected by EUMOFA and EUROSTAT. The higher production of small pelagics is from the western side of the Mediterranean and from Italy and Croatia. In general, landings are more abundant from areas where the continental shelf is wide and rivers are present. There is a trend of growing first sale price of the main species, i.e. anchovy and sardine, from west to east. Spain, France and Italy are the main importers of sardine and anchovy.

For 2013, monthly trends of first sale price and retailer prices follow and analogous pattern. Italy and Spain are very similar with an increase from January to March and then with a decreasing until November, when the first sale prices shows a slight increase. In Greece first sale price decreases until May, then increases up to September, followed by a new slight decline until November and a relatively higher value in December. However, the spread between first sale and retailer prices shows some remarkable differences between countries (Italy, Spain and Greece), with a very similar pattern between Italy and Spain, but with a ratio much higher for Italy (on average 2.75 for Spain and 2.49 for Greece vs. 5.60 for Italy).

The results show that the retail prices are very inelastic and unable to conform to the more market first sale price fluctuations.

THE STATUS OF THE STOCKS OF SMALL PELAGICS

Population status

Anchovy and sardine stocks are highly variable in terms of their recruitment, abundance and distribution. In many areas of the Mediterranean, anchovy and sardine fishery is subjected to a high degree of exploitation, with most stocks exhibiting declining trends in terms of abundance. In GSAs 22, 20, 17, 15-16, 7, 6 and 1 anchovy and sardine stocks are regularly monitored by acoustic surveys.

Anchovy is known to spawn from May to September with a peak in June–July. Suitable anchovy spawning habitats are spatially restricted and separated from each other by deep, extremely oligotrophic basins. Size at first maturity for anchovy is from 7.5 to 11 cm TL according to the areas; the species is known to reach 3 to 4 years of age, but anchovy stocks are dominated by ages 0, 1 and 2.

In Mediterranean the sardine reproduces during winter; spawning seems to be restricted to nearshore waters, the major spawning area have been identified in inshore waters with preferred spawning depths between 40 and 90 m. Thus summer populations of sardine are likely to be dominated by juveniles. Size at first maturity for sardine varies from 8 to 13 cm TL depending on the area. The Mediterranean European sardine is known to reach 5 to 6 years of age, but sardine stocks are dominated by ages 0, 1 and 2.

Summer is the spawning season of Mediterranean horse mackerel, whereas horse mackerel is known to spawn in winter. The length at first maturity for the first species was estimated between 14-16 cm TL, and 16-19 cm TL for the second.

Maps showing the nursery grounds of the four species, based on the results of the MEDISEH project, performed in the context of the EU MAREA framework, can be found under D2.3.1.

Stock assessment

Stock assessments are available only for anchovy and sardine stocks for GSAs 1, 6, 7, 9, 17, 15-16, 19, 20 and 22. Different methodologies are applied per GSA, but the majority of the assessments are based on analytical approaches, although with different degree. Based on the reference points agreed within STECF and GFCM working groups it seems that almost 70% of the currently assessed stocks are overexploited; for 11% the stock status remains unknown, due to lack of reliable stock assessment and only 17.6% of the stocks are considered exploited within safe biological limits. In most cases discards are ignored concerning the current stock assessments since their quantities are very low and have a minor impact on stock status.

Management plans

The existing management plans for small pelagic fisheries concern GSAs 1, 5, 6, 7, 9, 10, 15-16, 17, 18, 19, 20, 22 and 23, addressing mainly purse seiners, besides GSAs 7 and 17 where pelagic trawls are also considered. Concerning the Adriatic Sea a multiannual management plan for small pelagic fisheries with pelagic trawl and purse seine is in force. Targets for the small pelagic fishery are anchovy and sardine, round sardinella and chub mackerel for Malta (GSA 15).

The status of the stocks is taken into account and reference points are set in relation to stock status in the Greek Management Plan for purse seiners (GSAs 20, 22 and 23), in the Spanish Management Plan for purse seines (GSAs 1, 6 and 5), in the Adriatic multiannual management plan (GSAs 17 and 18) and in the other Italian GSAs (16 and 19). The Management Plan of the Italian GSAs also includes socioeconomic reference points. No reference points are included in the French and the Slovenian Management Plans. Concerning the Maltese Management Plan conservation targets are based on CPUE.

The Spanish Management Plan is the only one that sets daily (sardine) and weekly (anchovies) catch limits as well as a no take zone of anchovy juveniles in the main area of fry of this species in the Ebro delta, between Tarragona and Castellón (GSA 6).

Specific measures are foreseen by the Greek, the Spanish and the Italian Management Plans in terms of fishing capacity, fishing effort, catch management, temporal and spatial closures, and minimum landing size. The majority of the Management Plans does not specify special measures to mitigate unwanted catches. The Figure 2 and the Table 2 summarize the situation of the Management Plans for small pelagic fisheries in Mediterranean.

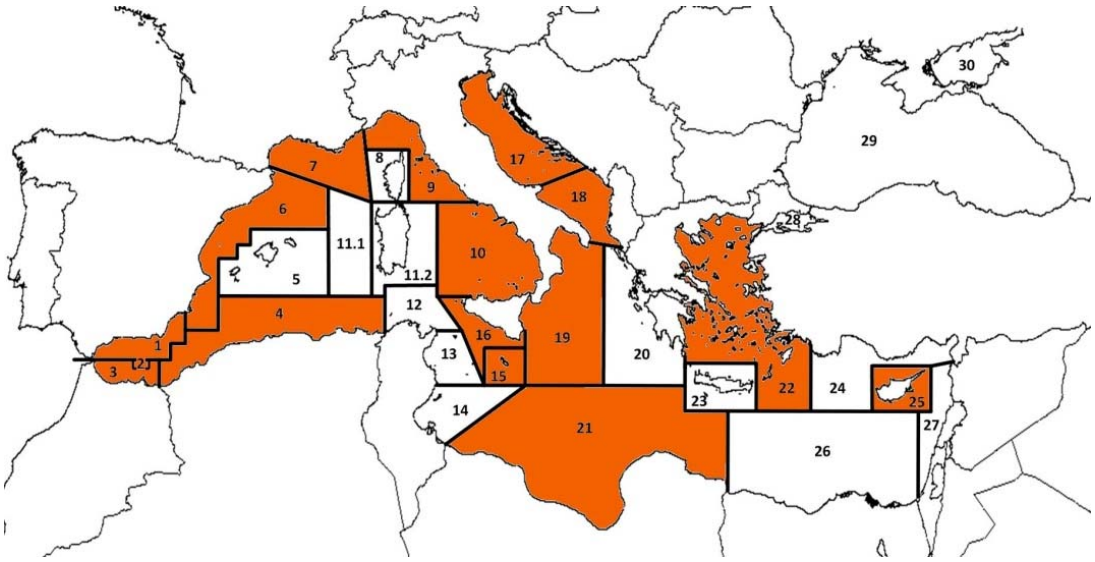

Figure 2. Map showing (in red) the Mediterranean GSAs where a Management Plan for small pelagic fisheries is implemented.

Table2. Summary of the main characteristics of the Management Plans for small pelagic fisheries in Mediterranean. PS =purse seine; OTM = pelagic trawl (single or paired)

Typology of Management Plan	Country	GSA	Year *	Gears	n. vessels **	Main target species
National	Spain	1-5-6	2012	PS	234	Anchovy, Sardine
National	France	7	2008	OTM	n.a.	Anchovy, Sardine
National	Italy	9	2011	PS	51	Anchovy, Sardine
National	Italy	10 (Calabria and Campania)	2011	PS	56	Anchovy, Sardine
National	Italy	10-16-19 (Sicily)	2011	PS, OTM	91	Anchovy, Sardine
National	Italy	17-18	2011	PS, OTM	202	Anchovy, Sardine
National	Malta	15	2013	PS	18	Mackerel, horse Mackerel
National	Slovenia	17	2012	All gears	5 PS	Anchovy, Sardine
National	Greece	20-22-23	2006	PS	290	Anchovy, Sardine
GFCM Multiannual MP	Italy, Croatia, Slovenia	17	2013	PS, OTM	n.a.	Anchovy, Sardine
GFCM Multiannual MP (transitional measures)	Italy, Montenegro, Albania	18	2013	PS, OTM	n.a.	Anchovy, Sardine

* last update of the Plan.
** as reported in the Plan.

REGULATIONS

In Mediterranean small pelagic fisheries, the international and national legislation act in a complementary way. The EC Regulation N. 1967/2006 contains rules on: protected habitats; minimum mesh and minimum sizes of marine organisms; characteristics of fishing gears (e.g. attachments to and rigging of trawl nets); minimum distances and depths for the use of fishing gears. The recent EC Regulation N. 1380/2013, Article 15, refers to landings obligation concerning discards and will be enforced at the beginning of 2015.
Moreover, recent GFCM recommendations (GFCM/37/2013/1 and GFCM/38/2014/1) further regulate the small pelagic fisheries in the Adriatic Sea taking into account the status of anchovy and sardine stocks.
Additionally, certain Members States apply national rules that are more stringent than the European Provisions mainly involving:

(a) technical measures e.g. luminous intensity features in the operation of purse seiners;
(b) temporal and spatial closures;
(d) spatially restricted fishing areas involving depth zones, breeding and spawning habitats;
(e) pelagic trawls are banned in Spain and Greece;
(f) maximum allowed landings, especially in Spain.

Only a small number of national legislation seems to take into account stock status (i.e. Spain) and foresees certain management measures based on predefined reference points.
Concerning the Adriatic Sea (GSA 17), the recent international GFCM legislation defines biomass based reference points and associated management measures.
Both international and national legislations still present gaps in terms of discards e.g. quantities, handling, reduction measures, fate.

DISCARDING

The available information on discards in the EU small pelagic Mediterranean fisheries is still rather scarce and scattered. Only a few years ago (in 2011), the discards of small pelagics started to be yearly monitored under the DCF context.
The available information shows that the gears targeting small pelagic fish (purse seines, pelagic trawls and small driftnets) are very selective in terms of species composition. The grand majority of catches concerns the target species, mainly anchovy and sardine. Total discards of the small pelagics fisheries are generally low (usually from negligible to up to 10% for purse seines and slightly higher for pelagic trawlers), while as concerns the target species they are much smaller; anchovy is seldom discarded in all GSAs while sardine discards can vary from almost zero to more than half the catch in limited cases.
The length frequency distributions of the catch imply that discards can comprise individuals below the Minimum Conservation Reference Size (MCRS). On the basis of the available information, including the length frequency distributions, for each country/GSA we estimated, whenever possible, the percentage of fish below MCRS and thus subjected to the landing obligation provisions. The values are generally lower than 5% of the total catch (Table 3). This is particularly evident for anchovy and also for sardine, the two target species of these fisheries. For anchovy the estimated discards were really negligible or almost absent. No substantial differences were detected among the two main gears exploiting small pelagic species, i.e. purse seine and pelagic trawl.

Existing information covered 10 out of 14 GSAs considered for purse seines, 3 out of 5 GSAs where pelagic trawls are present and both GSAs were the small scale driftnets operate.

The high spatio-temporal variability is a typical characteristic of discards in the EU small pelagic Mediterranean fisheries, both from a qualitative and quantitative point of view. The currently available estimates, being produced from very short temporal datasets are therefore rather variable. The continuation of the data collection and the increase of the sampling effort will allow obtaining more accurate and robust figures on discards in the near future

Table 3. Summary table on the estimations of discards in EU Mediterranean small pelagic fisheries. For each Country/GSA and fishery, where information on discards is available, data on average annual catch and discard (of species below the Minimum Conservation Reference size) of the target species and the most important species are reported. The source of the data used for the estimation is also shown.

	E. encrasicolus		***S. pilchardus***		***T. mediterraneus***		***T. trachurus***		***S. scombrus***		***S. colias***	
	Average annual catches (tons)	Discard rate (%)	Average annual catches (tons)	Discard rate (%)	Average annual catches (tons)	Discard rate (%)	Average annual catches (tons)	Discard rate (%)	Average annual catches (tons)	Discard rate (%)	Average annual catches (tons)	Discard rate (%)
SPAIN												
GSA 1 Purse seine[1]	585.8	0	6109.9	0.3	927.2	0.8	2323.7	0.3				
ITALY												
GSA 9 Purse seine[2]	4571.5	0	2124.3	0	12.7	0						
GSA 10 Purse seine[3]	5693.7	0.2	869.7	0.2			203.8	2.9				
GSA 10 Small scale driftnet[4]	62.5	0	4.5	100.0								
GSA 16 Purse seine[5]	2767.1	13.0	1260.4	0								
GSA 16 Pelagic trawl[5]	1048.4	21.0	457.4	0.8								
GSA 19 Purse seine[3]	384.7	0	165.9	10.8	^62.9	^0.0			"3.8	"0.0		
GSA 19 Small scale driftnet[3]	286.4	0	35.3	21.3								
GSA 18 Purse seine[6]	1881.0	0	57.0	0								
GSA 18 Pelagic trawl[6]	7599.0	0	1493.0	0.3								
GSA 17 Purse seine[6]	2460.0	0	487.0	0								
GSA 17 Pelagic trawl[6]	18468.0	< 0.01	7572.0	< 0.01								
SLOVENIA												
GSA 17 Purse seine[7]	94.1	< 0.1	61.2	0.0			2.8	0.0				
GREECE												
GSA 22 Purse seine[8]	17926.0	< 0.1	12570.0	0.1	^3033	^7.9			206.0	3.3	3571.4	0.2
GSA 20 Purse seine[8]	746.4	0	1343.0	4.0	^501.5	^5.7					384.5	0.2

[1] DCF Data, average years 2004-2011. The discard rate has been calculated with the length distribution data from observers on board (2004-2011).

[2] DCF Data, average years 2011-2012.

[3] DCF Data, average years 2011-2013.

[4] Few observations related to 2011 only.

[5] Data collected in a study project in 2000-2001: Kallianiotis et al (2002). The Purse Seine Landing Composition in eastern and central Mediterranean Sea. DG XIV 99-035 Final Report

[6] DCF Data, year 2011. Values of dicards refer to all specimens, no matter of MCRS.

[7] DCF Data, average years 2005-2012.

[8] DCF data and values estimated from sampling on board (mean annual values 2003, 2004, 2005, 2006, 2008) (Tsagarakis et al., 2012).

^ *Trachurus* spp.

" *Scomber* spp.

The variability of data also influenced the robustness of the results of the investigation on the factors affecting discarding. The mean depth of the bottom was identified as one of the factors that might influence the presence or absence of discard: in general at lower depths there are higher chances to have discard. Besides, the amount of discard seems to be influenced from the area of the catches, and from the amount of the commercial catch. No economic variable resulted to be influent, even if it is strongly believed that the price may play an important role on the discard. The reason of no significance of economic variables might rely in the resolution of the data used.

On the other hand, the main reason for discarding perceived by the stakeholders, is the low market value as indicated by 44% of the interviewed. For 21% there is not any reason for discarding and the discard is quite close to 0. Damaged fish is perceived as a first priority reason for discarding by 16% of stakeholders, though it seems that the two reasons (low market value and damaged fish) are to a certain extent correlated.

The overall results on the investigation on the factors affecting discarding are summarized in the Table 4. The information collected from questionnaires has been considered as well.

Table 5.1. Summary of the results of the analysis on the main factors that lead to discarding.

	Factor	GSA	Influence	Relevance for management	Source
Presence-Absence	Vessel	01, 17	Variable	Not relevant	GLM-GAM analysis using DCF data.
	Bathimetry	01,17	Higher probability of discard at lower depths	High	GLM-GAM analysis using DCF data.
	Year	17	Variable	Not relevant	GLM-GAM analysis using DCF data.
	Duration of the haul	17	The longer the haul, the lower the probability of having discard (controversial)	Not relevant	GLM-GAM analysis using DCF data.
	Market value	Italy, Spain, Greece	The lower the market value, the higher the probability of having discard.	High	Questionnaires
	Damaged fish	Italy, Spain, Greece	Damaged fish are often discarded.	Not relevant	Questionnaires
Abundance	Total catch	17, 20-22	Higher discard at intermediate-high catch levels	Low	GLM-GAM analysis using DCF data.
	Area	01, 20-22	Variable	High	GLM-GAM analysis using DCF data.
	Vessel	01	Variable	Not relevant	GLM-GAM analysis using DCF data.

Nevertheless, the complexity of factors affecting discard is far to be solved. This complexity also seems to be the reason for the limited effectiveness to explain more of the observed variance in our case. Despite the fact that GAMs explained a relatively low portion of the variance, they seem to be a suitable tool to model nonlinearities in discard studies.

EVALUATIONS ON THE APPLICABILITY OF THE LANDING OBLIGATION PROVISION AND THE "*DE MINIMIS*" EXEMPTION (ART. 15, EU REG. 1380/2013).

Most of the activities of the LANDMED project were targeted to assess the implications of the application of the "landing obligation" provisions, in particular those related to the *de minimis* exemptions.
The information gathered about fishing practices, landings, discards, economic aspects, carrying capacity of the vessels was reviewed accordingly. Such assessment was made also taking into account the discussions made in the framework of STECF, ICES and RAC about the implementation of the new provisions.

Considerations on the carrying capacity of the vessels
Questionnaires have been distributed to the vessels owners, fishermen cooperatives and associations to get their feedback on the current size/structure of the vessels, on the organization of the fishing operations and room onboard the fishing vessels
The percentage of number vessels below a length of 24 m overall length is accounting for 80% of the fleet in number and 48% for capacity. Thus the whole basin is characterized by small-medium size fleets targeting small pelagics. The operational features of this fleet are characterised, in general, by daily trips with the main activity onboard concentrated in few hours if compared with other kind of fisheries.

The results from 105 questionnaires and interviews distributed to several stakeholders highlighted that for the majority (86%) the target species was anchovy, followed by sardine. In order of priority the second target species was sardine (74%), followed by anchovy (5%), but for 10% of stakeholders there is only one priority species, which is anchovy. About 19% of stakeholders, regardless of the vessel LOA, perceive an amount of discards that is 0, while the major part (28%) approximately evaluate the amount of discards between 1 and 2%. Only 5% of stakeholders perceive the amount of discards larger than 10% and maximum 15% of the landings.

The first priority reason for discarding that the stakeholders perceive is the low market value which has been indicated by 44% of the interviews.

Regarding the presence of **infrastructure onboard** for managing the discard, the vessels with LOA lower than 6 m, very few in the fleets, have no facilities onboard; those in the LOA 6-12 m have a small dry storage capacity and none cold store and/or freezing capacity. The vessels 12-18 m LOA have a higher dry storage capacity and a better cold storage capacity. In the fleet segment 18-24 m the dry storage capacity increases in all the areas, but still the cold storage capacity is not a feature indicated by the interviewed stakeholders, though the percentage of equipped vessels increases, from 50 to 90%. This kind of vessels also handle a larger catch, variable country by country, and estimated approximately at 1-2 tons.

About 85% of stakeholder highlighted that the compliance with the regulation on the landing obligation will imply extra-costs.

Regarding the presence of structures producing pet food or fish meal, most part of stakeholders (between 79 and 93%) declared that there is no infrastructure in the vicinity of their port. A similar situation was also pointed out for the presence of infrastructure for storaging/freezing unwanted fishery catches. The higher presence was declared by Italian stakeholder (35%).

Most of stakeholder highlighted that the compliance with the landing obligation will imply extra-costs.

Considerations on the applicability of the "*de minimis*" exemption to the landing obligation provision (art. 15, EU Reg. 1380/2013).

The aspects related to the application of the "landing obligation" provision of the new CFP have been assessed through an accurate review of the literature produced in the framework of STECF, ICES and RAC. The main issues related to the "landing obligation" provision have been identified and contextualized taking into account the characteristics of the Mediterranean small pelagic fisheries.

This work allowed formulating a series of knowledge-based hypotheses on the applicability of the landing obligation provisions and of the *de minimis* exemptions.

(i) "Survival" issue.

According to the Regulation (EU) N. 1380/2013, fishermen should be allowed to continue discarding the species with, according to the best available scientific data, a high survival rate when released into the sea.

Although *ad hoc* survival studies have not yet been performed in EU Mediterranean small pelagic fisheries, anchovies, sardines, mackerels and horse mackerels (the main targets of this fisheries and highly sensitive species) have a really low possibility to survive to the whole fishing process (towing, catching, catch hauling, transferring into tanks with salt water and ice, sorting and finally throwing to sea). Therefore the possibility to survive of the specimens caught is really low. In consideration of this, the exemption to the landing obligation based on the "high survival rates" (article 15 par. 4 Regulation (EU) N. 1380/2013), cannot be applied for the small pelagic fisheries in the Mediterranean Sea.

(ii) De minimis exemptions

The Art. 15 of the EU Reg. N. 1380/2013 foresees also *de minimis* exemptions up to 5% of the total annual catches of the species subjected to landing obligation; it can be applied in the following situations:

- "*where scientific evidence indicates that increases in selectivity are very difficult to achieve;*" or
- *"to avoid disproportionate costs of handling unwanted catches, for those fishing gears where unwanted catches per fishing gear do not represent more than a certain percentage, to be established in the plan, of total annual catch of that gear".*

"For a transitional period of four years, the percentage of the total annual catches referred to in this point shall increase:

(i) by two percentage points in the first two years of application of the landing obligation; and

(ii) by one percentage point in the subsequent two years".

"Selectivity" issue"

Pelagic trawls and light purse seines can be defined as highly "species-selective" fishing gears. In consideration of the gear behaviour the catch of demersal species is negligible; both purse seine and pelagic trawl groundrope rarely moves close to the bottom.

The EC Reg. N. 1967/2006 fixes the minimum mesh openings for pelagic-trawl (20 mm) and purse seine (14 mm). These gears show high species-selectivity but low size-selectivity. The use of small meshes is mainly adopted to avoid the enmeshment and gilling, catching processes that usually damage fish in trawled gears. The use of larger meshes in the mid-water trawl codend has been tested in Adriatic Sea, but the results obtained were not promising. If large meshes are used in the codend of pelagic trawl, there could be the possibility that the fish entering the codend can be gilled or enmeshed, losing its commercial interest. Furthermore, being the meshes of the codend obstructed by the enmeshed fish, there is an actual risk of codend explosion due to the water pressure.

Therefore, the fishing practices and the technical properties of the purse seining and pelagic trawling make unfeasible a selectivity improvement (e.g. increase of mesh opening, sorting grids etc.). Thus, the *de minimis* exemption based on selectivity could be applied because the increases in selectivity are very difficult to achieve, independently from the meaning that it is possible to assign to "*very difficult*" issue.

"Disproportionate costs of handling unwanted catches" issue

As reported before, the majority of the about 1200 vessels operating the small pelagic fisheries in the EU Mediterranean Sea are of small-medium size, being below the overall length of 24 m. The operational

features of this fleet are characterised, in general, by daily trip with the main activity onboard concentrated in few hours if compared with other kind of fisheries.
Regarding the presence of infrastructures onboard for managing the possible discards, the majority of vessels have reduced facilities onboard. The fishermen interviewed during LANDMED project highlighted problems related to the logistic of discards both on board and once they are landed. A well-defined logistic and management network adapted to each area and type of industry does not exist at present. Only a network interconnecting different needs (from fishermen, industry, etc.) could efficiently determine and deliver specific amounts discard required by a given transformation. Use of discards for other than human direct consumption requires the support of research technologies and industry and thus specific developing plans and management.
Even though the stakeholders declared that discards are negligible in the majority of cases, it is reasonable to suppose that the landing obligation, even of small quantities of discard, could imply some additional costs. At present, however, it is not possible to estimate the order of magnitude of these costs, because any quantification has been made.
Changes to the on board procedures would be necessary, to gather the specimens considered as discard, store them and finally land the discards, foreseen some infrastructure costs as discards cannot follow the chain of human product. Moreover if the landed discards will pose sanitary problems, or they will be considered as special waste, the costs for discards disposal will further increase.
In consideration of the aspects discussed above, it seems reasonable to affirm that the *de minimis* exemption in small pelagic fisheries could be applied also for the “disproportionate costs of handling unwanted catches”.

General considerations on the "*de minimis*" exemption

In agreement with the STECF/ICES comments, the analyses made in the LANDMED project also highlighted that the Art. 15 on 5% *de minimis* seems not very clear in putting in practice this provision.

Despite it is not applicable in the current Mediterranean situation of small pelagic fisheries, the concept of “*very difficult*” for the increase in selectivity is fairly vague, as well as the concept of “*disproportionate costs of handling unwanted catches*”, because it is not clear which is the limit of the current revenue/break even revenue (CR/BER) ratio that should not be overcome in relation to the current situation. In addition, it is not clear if the "total annual catches" to which the 5% exemption is referred, are related to a single species or to all the species caught. This is a crucial point for the Mediterranean small pelagic fisheries mainly considering that two species, namely anchovy and sardine, usually account for more than 90% of the whole catch. It seems that, given the characteristics of the small pelagics fisheries, the fishery itself should be considered for setting the exemption percentage, instead of the single species. In any case, and whatever was the reference quantity considered for the calculation of 5% or 7%, the problem rises in transferring and partitioning such an amount among vessels before the fishing season, i.e. one year for the following, in a regime which is not catch-regulated. It seems that the percentage of the exemption should be applied to the whole small pelagics fisheries and not on a by vessel or fleet segment basis.

SUGGESTIONS ON THE DESIRABLE LEVEL OF "DE MINIMIS" EXEMPTION

The results of the investigations performed during the LANDMED Specific Contract, even with some constraints due to the limited or scattered available data, evidenced that, for most of the EU Mediterranean small pelagic fisheries, discard of specimens under MCRS is in many cases lower than 5% of the total catch; only for a few GSA suchs discard percentage is slightly higher than 5%. Therefore, in order to put in practice the article 15 - EU Reg. N. 1380/2013**, it was suggested a percentage of *de minimis* exemption corresponding to 5% for the whole EU Mediterranean small pelagic fisheries.**
However, taking into account the variability of the discard phenomenon, and the unpredictability of most of the factors that lead to discarding, together with the some uncertainty of the estimate, we can suggest a

more flexible approach for the **first year applying a percentage of *de minimis* exemption of 7%, and of 6% in the second year** of the implementation of the landing obligation provisions.
This percentage could be refined in the following years according to the availability of longer more robust data on discards.
However, at present, the EU Mediterranean small pelagic fisheries are not managed by quotas, thus a different paradigm should be applied. A close monitoring of catches year by year is thus needed for evaluating the occurrence of the conditionalities to set the *de minimis* exemption taking into consideration the availability of historical series of catch data for the two main target species (anchovy and sardine). The setting of working rules possibly agreed with stakeholders is also advisable.
Anyhow, in agreement with the STECF/ICES comments, the analyses made in the LANDMED highlighted that the Art. 15 on 5% *de minimis* seems not very clear in putting in practice this provision.
As a general consideration, the 5% *de minimis* exemption seems to be more appropriate and designed to fisheries where a management based on Total Allowable Catch (TAC) is set. In the Mediterranean context it seems that the possibility of setting the *de minimis* exemption might be only applicable on a retrospective "reference" time, such as the catches obtained in the previous year/years and the related percentage of discards. It should be however evidenced that, in the Mediterranean, data on discards of small pelagics fisheries are rather recent and variable, given the characteristics of the discarding practices. However, in a system based on technical management measures the compliance can be only verified "a posteriori", through monitoring of catches.

COMMENTS AND ADVICES REGARDING THE IMPLEMENTATION OF THE LANDING OBLIGATION FROM MONITORING AND CONTROL POINT OF VIEW.

As a general matter, the effective implementation of any new fisheries rule will not be achieved in a single step, but require an incremental process in which the lines of communication between the managers, the fishers and the enforcers remain open. In particular, the effective implementation of the landing obligation provisions mainly depends on the ability of controlling, monitoring and enforcing this rule.
The EU Reg. 1380/2013, at the Article 15.8 states: "*Member States shall ensure detailed and accurate documentation of all fishing trips and adequate capacity and means for the purpose of monitoring compliance with the obligation to land all catches, inter alia such means as observers, CCTV and other. In doing so, Member States shall respect the principle of efficiency and proportionality*".
Presently, in the EU Mediterranean the monitoring and control of small pelagic fisheries mostly focus on:

- monitoring of the vessels position through VMS data (for the vessels >15 m Overall Length);
- harbor inspection of the catch to verify compliance between fishing logbook, landing declaration and the number of fish boxes landed;
- harbor inspection of fish size to verify compliance with the Minimum Conservation Reference Size provisions (EC Reg. 1967/2006);
- harbor inspection on the mesh size of the nets (of the codend for pelagic trawls and of the bunt for purse seines) to verify compliance with the minimum mesh size provision (EC Reg. 1967/2006).

The on-shore inspection can be considered as a good approach for preventing the selling and the marketing of fish below the MCRS. The strict control of the entire market chain ("from the sheep to the shop") strongly discourages the demand of fish below minimum size. Therefore it is essential to intensify on deck inspections, also considering that this is the most cost-effective procedure.
The on-shore control doesn't prevent from discarding practice at sea. Current legal requirement (EC Reg. 1224/2009) obliges fishermen to record discards in EU logbooks when the species discard is higher than 50 kg. Therefore, the paper and electronic logbooks are the basis of self-reported catch records.
The entries of discards in the logbook are an important basis for the estimation of the ratios of unavoidable by-catches in the implementation of the landing obligation. The accurate recording of discards will contribute to:

- Improving the accuracy of scientific evaluation and catch advice, thereby making it possible to address the management needs of the stocks in a more precise way.
- Permitting a sounder management of stocks by computing the otherwise missing discards data.
- Permitting an analysis of the catch composition, an important element for promoting selectivity and identifying choke species for some fisheries.
- Improving stock management through the use of more complete data sets.

However, there is no evidence about the validation of the data recorded, ensuring that these are not in contrast with the conditionality of "*detailed and accurate documentation*" of the Article 15.8. The risk of self-reported catch records is to underestimate the actual discards. This is the main reason for implementing at-sea inspections.

The implementation of the landing obligation provisions (with the *de minimis* exemption) requires putting in force of a specific control and inspection programme: the importance of at-sea controls shall increase, in order to monitor fishermen compliance with this rule. It is expected that the landing obligation provision will significantly change the current control system, from the current high level of on-shore monitoring, to a system with an important at-sea monitoring.
The monitoring at-sea should involve the examination of vessels' documents (e.g. fishing licences, authorizations, logbook if any etc.), characteristics of the fishing gear, catch retained on board, size spectra of the species caught. On the other hand, the higher costs of the at sea control should be taken into account, developing cost effective control strategies.
For the effective enforcement of the landing obligation, it is important to dispose of information on fishing effort, landing and fishing practices (mainly related to discarding) of the concerned fisheries. Thus the collection of scientific data onboard the fishing vessels is very important. Such knowledge is essential also to verify, year by year, if the conditionalities on the landings obligation are met.

As concerns the inspectors working procedures on board, some simple rules should be set.
Once the inspection team begins the activity on board, the most important issue is that discard must be clearly recognized from the marketable catch. When the codend is hauled and emptied on the deck, the catch is sorted usually by species and size. Therefore the catches that are retained and those that the fishermen decide to discard are sorted just after the hauling phase. In this phase the fish directed to the market and the fish which is considered as discard must be clearly separated. The market chain starts directly on board when the fish is stored in fish boxes. Thus the discard must be stored in boxes or containers that clearly report an external marking as "discard". Otherwise fish which is discarded can be stored in boxes having a different color. Alternatively the marketable catch and the discarded one should be clearly stored in a different space on board, when available. The final goal is that the inspectors should be able to immediately identify discard and marketable catch just after boarding the vessel.

Successively, the accurate recording of discards should be verified. In order to meet this objective, the at-sea inspections should be carried to monitor the compliance with the requirements of the recording of discards in logbooks by masters of fishing vessels. By checking the logbook two first questions can raise: "Did the fisherman reports discards? Did he correctly record discards?"
The check between data on discards recorded during the inspections and those reported on the log-books could help to identify fisheries, areas, periods, and possibly vessels, with high level/risk for discarding and also to identify situations that deserve attention for misreporting of discard.
This risk analysis, based on a systematic cross-check of all relevant data, aims at concentrating inspection activities where the risk of illegal behavior is highest, as requested by the EC Reg. No 1224/2009. This aims is to create a toolbox for inspectors indicating where discards are expected in a determined fishery, following a risk analysis based*, inter alia*, in fishing gears, area and catch composition. The vessels which never record discards or report low quantity of discard, and whose activities indicate a high possibility of discarding (according to the risk analysis), should be identified as target vessels.

This methodology (recording of discards and cross checking of data) can be considered as the prior phase for the development of a medium-term control enforcement. The second step to detect noncompliance with the landing obligations could involve the implementation of more sophisticated tools, such as Remote Electronic Monitoring systems (REM) or observers.
Control observers on board, at least for a first year of investigation, can provide a monitoring of fishing operations even if this activity is decidedly expensive. Therefore it could be developed by means of a sampling approach.
The use of REM approaches, such as the CCTV (Closed-Circuit television), provides continuous coverage and highly resolved information, but their use in terms of assessment of catches is dependent on the nature of the fishery and the species assemblage of the catch. The use of on board cameras might be very useful in case of the "slipping" practice, when the CCTV can provide good information on the quantity and quality of discards. The purpose and use of the CCTV system should be established before use (assess the reasons for using equipment and how appropriate it is, establish the person or organization that is legally responsible for the scheme, establish the location of cameras etc.). On the other hand the use of cameras mounted on a vessel raises a series of relevant ethical and privacy issues.

Another fundamental aspect for the success of the landing obligation provision should be to ensure an effective stakeholder involvement in this process; if stakeholders are not involved in the definition of the reasonable inspection procedures, any change to the present situation will be considered as a top down imposition and often this is not the most effective solution. The principle is that it is better to have a plan that everybody agrees with, than to have a plan that the majority does not accept.
This aspect is particularly important in the case of fisheries shared between fleets of more Member States. As concern the Mediterranean small pelagic fisheries this is case, for example, of GA17 (Italy, Croatia and Slovenia) and GSA 7 (France and Spain). Therefore, an effective and responsible involvement of the stakeholders in the monitoring and control process should contribute to minimize any possible conflict.

The European Fisheries Control Agency (EFCA) has the mandate to coordinate the implementation of the fishery control along the EU Member State fisheries and assisting Member States to develop simple and cost efficient methods for fishery monitoring and control.
As concerns the landing obligation provisions of the EC Reg. 1380/2013, at present the EFCA has not provided specific practical recommendations about their implementation, even because this issue, as mentioned before, is not in the mandate of the Agency.
However, EFCA is developing a project to coordinate the implementation of the obligation of recording discards, set out in article 14.4 of the Control Regulation (EC Reg. 1224/2011). This project has been initiated by controlling the compliance of the legislation in force requiring the recording of discards in the fishing logbook, compiling and analysing inspection data.
The current project proposes to focus on compliance with the requirements for accurate recording of discards in the Baltic Sea, Western Waters pelagic and Mediterranean Sea (Adriatic) areas. The final product should provide a mapping of discards as well as a toolbox for inspectors indicating the risk factors associated with discards in those areas and the suitable control tools to be used in each case.

Last October 20th 2014 the Commission Delegated Regulation (EU) No 1392/2014 was published, establishing a discard plan for certain small pelagic fisheries in the Mediterranean Sea, specifying the details for implementing the landing obligation, as provided for in Art. 15 of the EU Reg. 1380/2013.
The *de minimis* exemptions, by way of derogation from Article 15(1) of Regulation (EU) No 1380/2013, have been defined. In the Mediterranean Sea, from 1 January 2015, the following quantities of the catches of species which are subject to minimum sizes in the small pelagic fisheries may be discarded:

- in the western Mediterranean Sea, up to 5 % of the total annual catches of species(*) subject to minimum sizes in the small pelagic mid-water trawl and purse seines fisheries;
- in the northern Adriatic Sea, up to 5 % of the total annual catches of species (*) subject to minimum sizes in the small pelagic mid-water trawl and purse seines fisheries;

- in the southern Adriatic and Ionian Sea: (i) up to 3 % of the total annual catches of species(*) subject to minimum sizes in the small pelagic purse seines fisheries; and (ii) up to 7 % in 2015 and 2016 and up to 6 % in 2017 of the total annual catches of species (*) subject to minimum sizes in the small pelagic mid-water trawl fisheries;
- in the Malta Island and South of Sicily: (i) up to 3 % of the total annual catches of species (*) subject to minimum sizes in the small pelagic purse seines fisheries; and (ii) up to 7 % in 2015 and 2016 and up to 6 % in 2017 of the total annual catches of species (*) subject to minimum sizes in the small pelagic mid-water trawl fisheries;
- in the Aegean Sea and Crete Island, up to 3 % of the total annual catches of species (*) subject to minimum sizes in the small pelagic purse seines fisheries.

(*) Anchovy, sardine, mackerel and horse mackerel.

This provision shall apply from 1 January 2015 until 31 December 2017.
Following the EU Delegate regulation, every Member State shall prepare specific Plans to put in practice the monitoring and control on the landing obligation provisions. It can be thus important that specific guidelines are agreed at regional level in order to standardize the interpretation of aspects that might be prone to different interpretations, as for example the basis for computing the *de minimis* exemption (e.g. fisheries or GSA, etc..) and how to implement the monitoring aimed at verifying that the fixed percentage is not overcome (e.g. vessel, fishery or GSA level), especially in situations where shared fisheries occur. These guidelines, preferably agreed with stakeholders should also include the aspects related to the role of the control actions.

ASSESSMENT OF THE IMPACTS DUE TO THE IMPLEMENTATION OF THE LANDING OBLIGATIONS IN THE SMALL PELAGIC FISHERIES IN MEDITERRANEAN.

This assessment was performed according to three case studies:
- Case Study 1. Western Mediterranean: Anchovy and sardine in GSA 1.
- Case Study 2. Central Mediterranean: Anchovy and sardine in GSA 17-18.
- Case Study 3. Eastern Mediterranean: Anchovy and sardine in GSA 22.

In order to assess the impacts due to the implementation of the landing obligation in the small pelagic fisheries in Mediterranean, two approaches have been implemented, both mainly aimed at testing the conditionality “to avoid disproportionate cost of handling unwanted catches”.
The first approach was finalized to provide a preliminary outcome on the conditionality “to avoid disproportionate cost of handling unwanted catches” to be delivered in the second preliminary report and thus in advance in respect to the completion of the WP4 work. This first approach should therefore be considered as a preliminary exploration only from an economic point of view to delineate a first appraisal of the effects on the fleet segments in the current situation.
The second one was based on the application of the bioeconomic simulation model and aimed at evaluating more comprehensively the effects of the landing obligation also from a biological and pressure point of view in the medium term (2021). This second approach had also the purpose of validating the first one.

The first approach essentially evaluated the economic effects according to the following three scenarios:
- 1) *Status quo* revenue;
- 2) Break even revenue (CR/BER=1).
- 2) Revenue where variable costs begin to exceed revenue (CR/BER<1).

The outcome of this exercise was the percentage of increase in variable costs that each fleet segment could sustain in the current situation without deteriorating its economic performance.

The second approach was carried out using BEMTOOL model, based on three scenarios for the evaluation of the consequences of landing obligation:

- *Status quo: null* discard for all fleet segments;
- Assumption of 3% discards for all the fleet segments: labour costs increasing (due to the sorting process) and fixed costs not increasing;
- Assumption of 10% discards for all the fleet segments: labour costs increasing and fixed costs increasing for purchasing new equipment from 2015 to 2018.

This second approach allowed to evaluate, for the different assumptions on discarding, also the consequences on the SSB, on mean length in the catch and on the yield by fleet and by stock.

According to the results on discard rate estimation (less than 2%, as in GSAs 1,9, 10, 17, 18 and 22), it seems that for many fisheries the facilities on board to sort/handle/storage the discards would not be needed. The he outcomes of this exercise are nevertheless useful in providing a first reference indication when the the minims exemption is in force.

The scenarios for the three case studies have been planned in order to provide an evaluation of the consequences of a possible increase of the discard in the future, in particular for the level equal to 10%, but also to take into account a possible observation error in the discard data, and/or the high variability and unpredictability of the discarding practices.

According to the scenario of a 3% of discard caught, the discard should be handled on board but not landed (and then would produce an increase only in the labour costs without any storing costs), while according to scenario with 10% of discard, an increase in the labour costs onboard but also an increase in new equipment and storing costs would be produced. These two scenarios, corresponding to two different levels of increasing in costs, have been compared with the current situation, characterized to negligible discard and, thus, no additional costs, in order to provide an idea of the consequences of the application of landing obligation on the profitability of the small pelagic fisheries explored in LANDMED.

It is important to consider that for the three scenarios it has been assumed that a decrease in profit would produce a possible reaction by the fishermen based on the decommissioning or the reduction of fishing days with the aim of reducing the total costs. Taking into account such assumption, the consequences on the SSB, on mean length in the catch and on the yield by fleet and by stock have been evaluated.

The results showed that in most of the cases the fleets analyzed cannot sustain an increase in costs without deteriorating their economic performance. In fact, for the Italian fleet segments analysed the leeway represented by the positive difference existing between current or status quo revenues and break even revenues is quite small (around 5%) or null; on the other hand, all the Greek purse seine segments and the Spanish purse seine 18-24 m show negative ratios in 2012. Only the Spanish purse seine fleet segments 06-12 m and 12-18 m could sustain larger increases in costs without being in a loss making situation, thus indicating that these two segments are profitable.

Generally, the effects of discard at 3% and at 10% scenario 2 and 3) on the long term profitability of the Spanish fleets result less important than the effects on the short term profitability, as a consequence of the adaptive mechanism of fleets that produce, over time, a reduction in the number of vessels. The analysis of the short term profitability highlights a state of economic efficiency for most of Adriatic fleets analyzed, showing ratios between current revenue and break-even revenue greater or very close to 1.

In the simulation exercise, the hypothesized changes in labour and fixed costs produce almost equivalent effects for both Greek fleet segments analyzed in the Eastern Mediterranean case study. In fact, slightly increases in operating costs are enough to heavily affect the profitability of the already compromised Greek small pelagic fishing sector.

The performed case studies showed a more marked improvement in SSB in case of fisheries with a small average profitability; indeed, the simulations showed that the costs due to the handling and storing of the

discard would produce a decrease in profit and a consequent decrease in effort (in terms of fishing days and number of vessels) that would benefit the SSB. In case of fisheries with high profitability the increase in the operational costs could not lead to decrease in profits and then to a decrease in effort, not allowing an improvement of SSB of the affected stock respect to the status quo scenario.
Considering that the simulations were aimed at exploring the conditionality "to avoid disproportionate costs of handling unwanted catches", the effects on SSB of the discard survivability (scenario 3% of discard) have not been taken into account, being the survivability a negligible aspect for small pelagic stocks (Deliverable 2.4.1). Also the effect on the SSB of improvements in selectivity has not taken into account, being the change in selectivity considered not feasible for the fisheries considered (Deliverable 2.4.1).
The consequences in terms of spawning stock biomass, mean length in the catch and yield by fleet segment have been discussed more in details in deliverable 4.3.1 (Western Mediterranean case study results) and 4.3.2 (Central Mediterranean case study results) giving more insights on such issues and providing more specific scientific advices.

UPGRADE TOOL FOR BIOECONOMIC MODELING: BEMTOOL

New functionalities were implemented in the BEMTOOL model with a more friendly installation procedure and the creation of a completely new and more intuitive graphical user-friendly interface in R language. In the new version the following novel functionalities have been implemented:

- introduction of discard survival rate and escape survival rate from the selectivity process;
- introduction of costs due to landing obligations;
- introduction of new relationships between fishing effort and fishing mortality;
- introduction of uncertainty in recruitment to produce confidence intervals.

FINAL REMARKS

The outcomes of the LANDMED specific Contract allowed producing a global overview on the EU Mediterranean small pelagic fisheries. A sufficiently exhaustive picture on the main characteristics of the fisheries, regarding fishing capacity, effort and behaviour, composition of landings and discards and economic aspects was produced. All available information was critically reviewed, often under different spatial/temporal aggregation and assumptions. The results obtained were useful to support the comments and suggestions on the applicability of the landings provision and to evaluate the feasibility of the *de minimis* exemption and its possible extent.
In spite of this, the work of LANDMED allowed evidencing some gaps/incompleteness in the available information, which can have affected the robustness of some results. The gathered information, in particular the one on discards and socioeconomic aspects, is rather heterogeneous, both from qualitative and quantitative point of view: it was not possible to cover uniformly all the Countries and GSAs. In this consideration we have to take into account that only a few years ago (in 2011), the discards of small pelagics started to be yearly monitored under the DCF context.
In any case, during all the tasks of the project, the maximum effort to gather all the possible integrative information was done and, when possible, also some assumptions were discussed, in order to provide the more reliable results possible.
On the basis of the critical review made during LANDMED, it is has been possible to suggests some improvements in the collection of the information. The most important are the following:

- The monitoring of biological and socio-economic aspects, of the small pelagic fisheries is essential. It is important to fully implement the DCF protocols in all EU Mediterranean GSAs.

- To properly detect the space/time variability of discarding, it is needed an intense sampling effort, higher that currently adopted. Therefore it would be necessary to design a more appropriate sampling, devoting particular attention to the information recorded directly on board.
- Besides to continue the monitoring of the stocks, it would be important to increase the number of the stocks to be assessed, including also other small pelagic species.
- It is recommended to take into higher consideration both in the stock assessment and in the management plan elaboration the issues related to discarding.
- The small pelagic stocks are in most cases shared by fisheries present in neighbour GSAs or in the same GSA there are several fisheries interacting in the exploitation of the same stock. Therefore it would be important to take into account the regional dimension for the implementation of multiannual management plans.
- Finally, the current regulation framework should also be improved, by taking more into account the issues related to discards (e.g. monitoring, control, handling, reduction measures, and fate).

ANNEX I – KICK-OFF MEETING REPORT

KICK-OFF MEETING REPORT

EUROPEAN COMMISSION, DGMARE, RUE JOSEPH II, 99, BRUSSELS
(MARCH 24TH-25TH, 2014)

LIST OF PARTICIPANTS

Name	Affiliation	Country	
Maria Teresa Spedicato	COISPA, Bari	Italy	
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Jose Maria Bellido	IEO, Murcia	Spain	
Maria Gonzalez	IEO, Malaga	Spain	
Marianna Giannoulaki	HCMR, Heraklion	Greece	
Konstantinos Tsagarakis	HCMR, Athens	Greece	
Massimo Virgili	CNR- ISMAR, Ancona	Italy	
Piera Carpi	CNR- ISMAR, Ancona	Italy	
Bernardo Patti	CNR-IAMC, Capo Granitola	Italy	
Gualtiero Basilone	CNR-IAMC, Capo Granitola	Italy	
Monica Gambino	CONISMA, Roma	Italy	
Xavier Vazquez	EU DGMARE, Brussels	Belgium	-
Silvia Scalco	EU DGMARE, Brussels	Belgium	-
Amanda Perez	EU DGMARE, Brussels	Belgium	-
Mirko Marcolin	EU DGMARE, Brussels	Belgium	-

The meeting was chaired by the coordinator of the project, Paolo Sartor.

THE EXPECTATIONS OF DG MARE

Xavier Vazquez recalled the participants about the expectations of DGMARE in this project; he stressed on the importance for the Commission to have in the due time the outcomes of the LANDMED project. According to the new CFP provisions there are several deadlines for the Commission “vis à vis” the co-legislators. At present Member States did not produce yet any "discard plan" for the Mediterranean. It seems that in the Adriatic, Italy, Slovenia and Croatia are working together to propose a sub-regional discard plan.
Therefore, DGMARE expects a quick reaction from LANDMED in producing the Deliverables according the agreed timeline. The first Deliverable, e.g. the First Preliminary Report (expected for month 2 of the project, e.g. by May 18th), is very important: it shall provide first information of the small pelagic fisheries and discards characterization, as well as a first evaluation on the *de minimis* exemption through worked examples based on expert knowledge. The accomplishment of the first deliverable is therefore fundamental for the future progress of LANDMED.
X. Vazquez recalled to the participants of LANDMED to be pragmatic in drafting the first preliminary report, especially by focusing the outcome on the definition of fisheries and on the possible impact and characterization of discards, as well as on a first evaluation of the applicability of the *de minimis* exception.
It was also clarified that the approach to be followed for the evaluation of the applicability of the *de minimis* exemptions is by fisheries and not by species. This implies that non pelagic species subject to Minimum Conservation Reference Size (MCRS) caught by fisheries targeting small pelagics should be also considered.
Synergies with other ongoing projects (e.g. DISCATCH, SEDAF), which contain aspects related to those of LANDMED, should be explored.

OVERVIEW OF THE MAREA FRAMEWORK

Maria Teresa Spedicato presented an overview of the MAREA framework, describing its structure, the involved staff, and its functioning (including the web site). She briefly showed the outcomes of the specific finished Contacts and the objectives of those in progress.
M. T. Spedicato recalled that MAREA is a service framework; all the specific contracts come from specific requests of DGMARE; therefore the outcomes of the projects belong to the European Commission and any use should be specifically authorized by DGMARE. The respect of the deadlines and confidentiality are key aspects also for the MAREA activities.

OVERVIEW OF LANDMED PROJECT

Paolo Sartor presented a summary of the purpose and the main activities of the project LANDMED.
"The main objective of the project to assess the main implications of the implementation of the landing obligations, including the de minimis *provisions in the concerned small pelagic fisheries in the Mediterranean"*
The workpackages and the tasks of the project were recalled, as well as their responsible persons.

WP1	P. Sartor	CIBM
WP2	K. Tsagarakis	HCMR
WP3	J.M: Bellido	IEO
WP4	I. Bitetto	COISPA
WP5	M. Sbrana	CIBM
Task 2.1 (part)	M. Gonzalez, G. Basilone	IEO, CNR-IAMC
Task 2.2	E. Sabatella	CONISMA
Task 2.3	M. Giannoulaki	HCMR
Task 3.4	A. Lucchetti	CNR-ISMAR
Task 3.1)	A. Machias, T. Garcia	HCMR, IEO
Task 3.2	J. M. Bellido, P. Carpi	IEO, CNR ISMAR
Task 3.3	G. Lembo	COISPA
Task 4.1	M. T. Facchini	COISPA
Task 4.2 (part)	I. Bitetto, M. Gambino	COISPA, CONISMA
Sub Task 4.3.1	A. Carbonell	IEO
Sub Task 4.3.2	P. Carpi	CNR-ISMAR
Sub. Task. 4.3.3	M. Giannoulaki	HCMR
Task 5.1	M. Giannoulaki	HCMR

According to the LANDMED contract, the starting date of the project has been fixed on **March 18th 2014**; the duration shall not exceed 8 months.
The working plan is very tight; therefore it is recommended to all the participants to strictly follow the timing of the project.
P. Sartor informed that on Friday March 21st the coordinator of MAREA written to the Commission an official request of the DCF data to be used in the LANDMED project.

THE LANDMED WORKPLAN: OBJECTIVES, DATA AVAILABILITY, METHODOLOGY OF WORK, PROBLEMS, POSSIBLE SOLUTIONS

Konstantinos Tsagarakis presented the general structure of the Workpackage 2: "Identification and characterisation of the fisheries targeting small pelagics in the Mediterranean". This WP is composed by the following tasks:

Task 2.1. Collection and review of the existing fisheries information.

Task 2.2. Collection and review of the existing economic information.
Task 2.3. Review of the current status of the stocks of small pelagics in Mediterranean.
Task 2.4. Critical review of the STECF/ICES reports on landing obligation and the *de minimis* exemption.

In order to guarantee an efficient work organization, for each GSA a contact person was identified, coordinating the activity of review of the existing information (see the Annex).
Marianna Giannoulaki explained the work to do for the Task 2.2, providing also a brief overview of available knowledge on the stock status of small pelagics in Mediterranean.

Silvia Scalco recalled the importance to take into account the information from the existing management plans of small pelagics.

M.T. Spedicato suggested also checking the information related to selectivity and exploitation pattern from the assessment reports (if present) or from literature.

Monica Gambino presented the workplan of Task 2.3.

Massimo Virgili briefly presented the workplan of Task 2.4.

X. Vazquez recalled on the importance to perform the review of Task 2.4 taking into account the context of the Mediterranean small pelagic fisheries; he stressed that all the work of LANDMED has to be concentrated on these fisheries, taking into account that survivability is a negligible aspect for small pelagics, while "choke" species and quotas are irrelevant for the Mediterranean context. Therefore, the definition of the fisheries is a crucial aspect.

M. T. Spedicato suggested to consider also to the reports of RAC, she uploaded on the MAREA ftp the STECF reports as well as the report from Pelagic RAC in the specific project folder (respectively Specific Project 11 LANDMED/STECF Report and Specific Project 11 LANDMED/useful document and paper).

The deadline of **April 20th** was established to send an advanced draft of Task 2.4 to all the partners for their revision. The Deliverable with the outcomes of Task 2.4 has to be completed by month 2.

Jose Maria Bellido presented the general structure of the Workpackage 3: “Estimation and characterisation of the discards associated to the small pelagic fisheries and assessment of the main factors that lead to discarding”. This WP is composed by the following tasks:

Task 3.1 Estimation and characterisation of discards associated to the small pelagic fisheries.
Task 3.2. Assessment of the main factors that lead to discarding.
Task 3.3 Collection of the information on the carrying capacity of the vessels and market factors.

Piera Carpi briefly presented the workplan of Task 3.2. It was suggested to include the recruitment in the investigation of the explaining factors by means of Generalized Linear Models or Generalized Additive Models (GLM/GAM) methodologies.

Pino Lembo briefly presented the workplan of Task 3.3. A relevant part of the needed information will be obtained by means of targeted questionnaires directed to fishermen, fishermen association and Local Authorities. A draft of the questionnaires will be distributed by the **first week of April** and will be translated in Spanish, Italian and Greek. P. Lembo also asked to all the partners to indicate the main landing places, for each GSA; that can be the candidate sites where infrastructures to manage discards can be implemented. The distribution of the questionnaires will be concentrated in these ports.

M. T. Spedicato did a presentation of the general workplan of WP4: "Assessment of the impacts due to the implementation of the landing obligations for the small pelagic fisheries in Mediterranean". This WP is composed by the following tasks:

Task 4.1 Upgrade of BEMTOOL model and software.
Task 4.2 Design of the case studies and model parameterization.
Task 4.3. Implementation per case study

M. T. Spedicato described also the conceptual modules of BEMTOOL, with particular attention to the possible outcomes related to the simulation of discarding consequences. To this purpose size at discarding (as an L50 of a reverse ogive or a knife edge value) should be available, as well as landing and discard (if any) volumes.

X. Vazquez recalled on the importance to provide a detailed description of the fishing practices related to discarding, in particular to show if sorting of the catch (on board/ashore) is an usual procedure or not.

M. Gambino provided a brief description of the workplan of task. 4.2; she showed the data needed by BEMTOOL model, and the main socio-economic outputs.

Maria Teresa Facchini presented the work which will be done in LANDMED to upgrading the BEMTOOL model. Several actions have been foreseen, e.g. to simplify the installation, to make the BEMTOOL GUI easier to use, to introduce the uncertainty in the results, to include additional functions. Most of the upgrade issues follow the STECF recommendations.

The activities of the Task 4.3 will be performed according to selected case studies.
At least one case study has been identified for main area:
GSA 6 for western Mediterranean;
GSA 17-18 for central Mediterranean;
GSA 22 (Greek side) for eastern Mediterranean.

Another candidate case study is GSA 16; the inclusion of this area as an additional case study will be verified shortly.

DEFINITION OF THE CONTENTS OF THE FIRST PRELIMINARY REPORT

As stated in the contract, the first Preliminary Report will contain first evaluations derived from literature review and the expert knowledge in relation to the subjects of WP2 and WP3. First evaluations based on worked examples on the possible application of the *de minimis* exemption will be also delivered.
A common discussion was held to define the content of this report, a document to be delivered by next May 18th.
This report will be very pragmatic and will be focused exclusively on these main issues:

- Identification of the fisheries
- Characterisation of the fisheries
- Characterisation of the discards
- First evaluation on the applicability of the *de minimis* exemption

This report will contain the outcomes of the review of the available information, including that coming from recently finished MAREA projects (e.g. the info on nursery areas from MEDISEH).

The structure of the first Preliminary Report, with the indication of the work to do (with the contact persons and deadlines), agreed during the meeting, is reported in the Annex I to this report. It was agreed that **by the end of April 2014** the contact persons of each GSA shall send the texts for the preparation of the report,

following the agreed workplan, to the coordinator (P. Sartor). This will allow finalizing the report in the due time.

Moreover, the list of the issues needed by the BEMTOOL model is reported in the Annex II.

MAIN AGREED DEADLINES FOR THE NEXT FUTURE

First week of April: draft of the questionnaires sent by the coordinator of Task 3.3 (P. Lembo) to all the partners.

April 20th: draft of the deliverable of the Task 2.4 ("Critical review of the STECF/ICES reports on landing obligation and the *de minimis* exemption") sent by A. Lucchetti and M. Virgili to all the partners.

End of April: texts for the first preliminary report sent by the contact persons of each GSA to P. Sartor.

May 18th: completion of the First Preliminary report.

SECOND PLENARY MEETING

It was decided that the second plenary meeting, devoted to discuss on the progress of the project and to prepare the Interim Report, will be provisionally held in Madrid: it will last two days, in the week from June 3rd to 6th 2014.

ANNEX II – SECOND MEETING REPORT

2ND MEETING REPORT

INSTITUTO ESPAÑOL DE OCEANOGRAFIA, CORAZON DE MARIA 8, MADRID
(JUNE 4TH-5TH, 2014)

LIST OF PARTICIPANTS

Name	Affiliation	Country
Maria Teresa Spedicato	COISPA, Bari	Italy
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Jose Maria Bellido	IEO, Murcia	Spain
Maria Gonzalez	IEO, Malaga	Spain
Mario Sbrana	CIBM, Livorno	Italy
Konstantinos Tsagarakis	HCMR, Athens	Greece
Ana Carbonell	IEO Palma de Mallorca	Spain
Ana Giraldez	IEO, Malaga	Spain
Mariano Garcia	IEO Madrid	Spain
Maria Teresa Garcia	IEO Malaga	Spain
Begoña Santos	IEO Madrid	Spain
Evelina Sabatella	CONISMA, Roma	Italy
Alessandro Lucchetti	CNR- ISMAR, Ancona	Italy
Piera Carpi	CNR- ISMAR, Ancona	Italy

The meeting was chaired by the coordinator of the project, Paolo Sartor.

The status of the works of the LANDMED Project: achievements performed to the present, next deadlines, various issues emerged in the first period of the project

The meeting started with a common discussion on the status of the works of the project.
Primarily, the comments of the Commission on the 1st Preliminary Report and the Deliverable 2.4.1, received on June 4th, were deeply discussed. For each request of clarification, specific answers and integrations were identified. In particular, it was decided to revise in the very near future the summary table on discards, to produce more homogeneous information.
At the same time, in the first days of the week of June 9th, the National correspondents for DCF of France, Spain and Greece will be contacted to request data (in particular socio economic data) on small pelagic fisheries, given that results from an official data call to be issued by DGMARE were not still received. This will allow obtaining useful information for several tasks of LANDMED and also to verify the data on production and economic parameters.

All these aspects will be therefore discussed during the meeting organised by the Commission in Brussels next June 11th.

OVERVIEW OF THE ACTIVITIES PLANNED FOR THE NEXT FUTURE: PREPARATION OF THE INTERIM REPORT AND OF THE DELIVERABLES EXPECTED FOR MONTH 4. REVISION OF THE WORK DONE SO FAR AND PLANNING FOR ITS FINALISATION.

P. Sartor presented a table summarising the status of the completion of the Deliverables expected by month 4 (July 17th). Most of the Deliverables of WP2 are in advanced status of progress, while those of WP3 are in the initial phase of preparation.

A common discussion was done to identify a common structure of the deliverables.
As for D.2.4.1, each Deliverable will be prepared as a standalone document, with its own Summary, Methodology, Results, Conclusions and a short Abstract.

The contents of each Deliverable were also discussed taking into account the comments received from the Commission with the letter of June 4th.

Work Package 2- Identification and characterisation of the fisheries targeting small pelagics in the Mediterranean (Konstantinos Tsagarakis).

D2.1.1 - Summary on the distribution and the characteristics of the small pelagic fisheries in EU waters accompanied by related maps and tables (resp. Gonzalez/Basilone).
It is in an advanced state of progress, most of the information available has already been presented in the 1st Interim Report; only little integrations are needed. A map with the main ports for the small pelagic fisheries will be added.

D2.1.2 - Summary of the technical characteristics of the gears exploiting small pelagics (resp. Gonzalez/Basilone).
It is in an advanced state of progress, most of the information available has already been presented in the 1st Interim Report; only little integrations are needed. A table summarising the main technical characteristics of the gears (purse seine, pelagic trawl (single ad pair) and small driftnets will be added.

D2.1.3 - Spatio temporal distribution of fishing effort, landings and landings per unit effort (resp. Gonzalez/Basilone).
The information presented in the 1st Interim Report will be updated and increased. As much as possible, data (possibly on table or graphs) of temporal evolution of fishing effort (fishing days by year or month) at GSA level will be included. Information from the MAREA STOCKMED project will be used regarding spatial allocation. M. Sbrana (the responsible of the STOCKMED task on fishing grounds) will prepare example maps of fishing grounds for small pelagic fisheries and will sent them to the persons in charge of D2.1.3.

D2.2.1 - Overview of the economic aspects related to small pelagic fisheries in EU waters (resp. Sabatella).
It is in advanced state of progress, most of the available information has already been presented in the 1st Interim Report. This document will however be revised trying to present the information in an homogeneous scale (at temporal, country/GSA level). To this purpose, at the beginning of the week of June 9th, the national correspondents for DCF of Spain, France and Greece will be contacted to request socio economic data. Any effort will be done to provide data also by fleet segment other than global values.
Finally, a check for the consistency of economic data (in particular total landings) presented in different section of the LANDMED reports will be done.

D2.3.1 - Summary of the current outcomes on the status of stock of small pelagics in Mediterranean (resp. Giannoulaki).

It is in advanced state of progress, most of the information available has already been presented in the 1st Interim Report. The current document will be integrated with the information on *Trachurus* species and with the summary of the existing national management plans on small pelagic fisheries. It will be done a check to assure the inclusion of the most recent version of the management plans.
M. Sbrana and P. Sartor will prepare a summary of the Italian management plans and they will send it to M. Giannoulaki.

D2.3.2 - Overview of the provisions regulating small pelagic fisheries in EU Mediterranean waters (resp. Giannoulaki).
It is in advanced state of progress, most of the information available has already been presented in the 1st Interim Report. The document will be however revised, according to the comments of the Commission (in order to inform where management based on quota exists and on the provisions based on minimum size).
This document will be also integrated adding information on provisions for Slovenia and Croatia.

WP3 - Estimation and characterisation of the discards associated to the small pelagic fisheries and assessment of the main factors that lead to discarding (Jose Mª Bellido).

D3.1.1 - Estimation and characterization of discards associated to the small pelagic fisheries (resp. Machias/Garcia).
As recalled by the Commission, the information on discards is the crucial aspect of the project; therefore it has been recommended to produce the most homogeneous, updated and consistent information.
This deliverable is in advanced state of progress, according to the information included in the 1st Interim Report; it will be however revised and updated.
J.M. Bellido presented an example of data from Spain: he recalled that the information on discards is available only for GSA 1.
As concerns the estimation of the size at which 50% of the specimens are discarded, it is important to associate this value with standard deviation or confidence intervals.

D3.2.1 - Report on the assessment of the main factors that lead to discarding (resp. Bellido/Carpi)
A planning of the analysis to be performed (e.g. GAM or similar) was done.
The work of preparation of the model (GAM/GLM) evaluating the influence of several factors in leading discards is in progress.
It will be possible to present a draft of this Deliverable on the due time, even though it could be integrated and updated by the end of the project. The results of the model (possible factors leading to discards, if any) will be included in a specific column of the summary table on discards, as requested by the Commission.

D3.3.1 - Report on the carrying capacity of the vessels (resp. Lembo)
P. Lembo presented the status of the collection of information by means of questionnaires: this activity has been completed for Greece (with data already entered in the database) and it is in advanced progress for Italy and Spain. Next June 16th has been fixed as deadline to send all the questionnaires to P. Lembo.
A discussion on the possible "destination" of the discards was made. Suggestion of industries for pet food to be contacted for interview has been made.

D3.3.2 - Report on the price trends and marketing of anchovy, sardine mackerel and horse mackerel (resp. Lembo)
The work, mainly on desk basis, is in an advanced state of progress.

THE ACTIVITIES OF THE SECOND PHASE OF THE PROJECT (WP4)

The meeting continued with a common discussion chaired by I. Bitetto, the responsible of WP4 ("Assessment of the impacts due to the implementation of the landing obligation for the small pelagic fisheries in Mediterranean), targeted to organise the works of this WP and the completion of the Tasks, expected by months 5 and 7.

Task 4.1 Upgrade of BEMTOOL model and software (resp. Facchini).
The work is in an advanced status of progress. I. Bitetto presented an overview of the BEMTOOL model with regard to the possible implementation of new functions.

Task 4.2 Design of the case studies and model parameterization (resp. Bitetto/Gambino).
A common discussion was made to check all the data needed for the parameterization of the model.
It was recalled the importance to dispose of the economic data for the largest possible number of GSAs and Countries.
The best way to model possible changes in population structure due to changes in selectivity was discussed; because a change in selectivity seems not feasible for the fisheries considered in LANDMED, it was decided to adopt a simplified approach in the model.
For the selection of the fleet segment to be included in each case study it was proposed to base the choice on the most relevant in terms of production and in terms of profitability.

Task 4.3. Implementation per case study.
P. Carpi presented a first overview of the data collected for the case study "Adriatic - central Mediterranean" (affecting all the countries of the GSAs 17 and 18).
Several aspects related to availability of data and the choice of the relevant fleet segments to be included in the case study have been discussed.
The other two case studies will concern "Western Mediterranean" (essentially the GSA 1) and "Eastern Mediterranean" (essentially the GSAs 20 and 22),

MAIN AGREED DEADLINES FOR THE NEXT FUTURE

June 10th: sending of request of DCF data to national correspondents of Spain, France and Greece.

June 10th: first revision of the preliminary summary table on the discards of small pelagic species, to be finalized after the meeting with the Commission.

June 16th: completion of the interviews of the Task 3.3.

July 7th: completion of the draft version of the deliverables D2.1.1, D2.1.2, D2.1.3, D2.2.1,.D2.3.1, D2.3.2, D3.1.1, D3.2.1, D3.3.1, D3.3.2, which will be sent, by every Deliverable responsible to P. Sartor by this date.

July 17th: completion of the 2nd Interim report and of the Deliverables above mentioned.

THIRD PLENARY MEETING

It was decided that the third plenary meeting, devoted to discuss on the progress of the project and to prepare the Draft Final Report, will be held in the week from September 15th to 19th 2014, most probably in the days 18th and 19th. Candidate place is Rome.

ANNEX III – THIRD MEETING REPORT

3RD MEETING REPORT

CNR - P.LE ALDO MORO, ROMA, ITALY
(SEPTEMBER 17TH-18TH, 2014)

LIST OF PARTICIPANTS

Name	Affiliation	Country
Maria Teresa Spedicato	COISPA, Bari	Italy
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Evelina Sabatella	CONISMA, Roma	Italy
Monica Gambino	CONISMA, Roma	Italy
Alessandro Lucchetti	CNR- ISMAR, Ancona	Italy
Piera Carpi	CNR- ISMAR, Ancona	Italy
Bernardo Patti	CNR- IAMC, C. Granitola	Italy
Gualtiero Basilone	CNR- IAMC, C. Granitola	Italy
Xavier Vazquez	EC DGMARE, Bruxelles	Belgium

The meeting was chaired by the coordinator of the project, Paolo Sartor.

THE STATUS OF THE WORKS OF THE LANDMED PROJECT: ACHIEVEMENTS PERFORMED TO THE PRESENT, NEXT DEADLINES, VARIOUS ISSUES EMERGED IN THE FIRST PERIOD OF THE PROJECT

P. Sartor presented a summary of the status of the works. The main achievements performed to the present are:

- Mid May 2014 (month 2)
1st Preliminary Report (identification and characterisation of the fisheries and discards, first evaluations on the applicability of the *de minimis* exemption). This report was accompanied by an Executive Summary and a Summary Table on discards (percentage of discards due to specimens below MCRS, by country and GSA).
Draft of **Deliverable 2.4.1** ("Overview of the STECF/ICES reports on landing obligation and the *de minimis exemption*").

- May – July 2014
Requests (data call) to the national DCF correspondents of Italy, Spain, Greece, France, Croatia.
Distribution of questionnaires and interviews to fishermen and stakeholders for information on carrying capacity of vessels and discard management.
The 1st Preliminary report and the Deliverable 2.4.1. were revised after the suggestions of DGMARE.

- Mid July 2014 (month 4)
Interim Report with all the results and Deliverables of WP2 and WP3.

D2.1.1 - Summary on the distribution and the characteristics of the small pelagic fisheries in EU waters accompanied by related maps and tables.
D2.1.2 - Summary of the technical characteristics of the gears exploiting small pelagics.
D2.1.3 - Spatio-temporal distribution of fishing effort, landings and landings per unit effort.
D2.2.1 - Overview of the economic aspects related to small pelagic fisheries in EU waters.
D2.3.1 - Summary of the current outcomes on the status of stock of small pelagics in Mediterranean.
D2.3.2 - Overview of the provisions regulating small pelagic fisheries in EU Mediterranean waters.
D2.4.1 - Overview of the STECF/ICES reports on landing obligation and the *de minimis* exemption.
D3.1.1 - Estimation and characterization of discards associated to the small pelagic fisheries.
D3.2.1 - Report on the assessment of the main factors that lead to discarding (preliminary version).
D3.3.1 - Report on the carrying capacity of the vessels.
D3.3.2 - Report on the price trends and marketing of anchovy, sardine mackerel and horse mackerel.

- Mid August 2014 (month 5)
2nd Preliminary Report with the results of the knowledge-based hypotheses on the *de minimis* exemption.
Deliverable D4.2.1 ("Design of the case studies and model parameterization").

- End August 2014 (month 5)
The Interim Report **was accepted** by the Commission.
DGMARE sent **a series of comments** for the revision of the first 10 Deliverables and suggestions for the preparation of the Draft Interim Report.

- **NEXT DEADLINES**
October 17th 2014: DRAFT Final Report with all the Deliverables.
November 17th 2014: Final Report.

The status of the completion of the Deliverables, updated to September 15th is shown by the table at the end of this document.

X. Vazquez (DGMARE) informed that the Commission has revised also the 2nd Preliminary Report and the Deliverable D4.2.1; the comments will be sent shortly.
Vazquez recalled the importance to follow the comments made by the Commission for the revision of the Deliverables already completed and in the remaining works, for the preparation of the draft Final Report.
He invited to take into account all the possible sources in order to provide as much as possible information and to do, when possible, some assumptions, based on the existing knowledge, for the areas where the data available are scarce. He suggested to consider the recent document of MEDAC, as well as the communications of the Member States on the *de minimis* exemption.

COMMON DISCUSSION ON THE REVISION OF THE DELIVERABLES ALREADY PRESENTED. POSSIBLE CRITICISMS, PROPOSED SOLUTIONS.

On the basis of the comments received by DGMARE, the persons in charge of each Task showed the proposed solutions for the integration of the text of each Deliverable.
Particular attention will be devoted to increase the information for some areas (e.g. France, GSA 7) or to increase the information on socioeconomics.

As concerns the Deliverable D3.2.1 ("Report on the assessment of the main factors that lead to discarding", at present available in a preliminary version), P. Carpi showed a review of the results already included in the

draft report. Besides, the progresses in the Generalized Additive Model (GAM) analysis for GSA 17 and GSAs 20-22 case studies have been summarized.
For the Adriatic case study it was shown that it is really difficult, given the data available, to perform the analysis at a species level: the paucity of the data, in fact, does not allow the model to properly find a dependency between the dependent variable (the discard) and the independent variables. Also, it was proposed to improve the models already presented in the draft report including the average weekly/monthly price of anchovy and sardine as independent economic variable.
For the Aegean and Ionian case study, no progresses have been done so far, but the attempt to model the discard at a species level is foresee as well.
A. Carbonell presented the preliminary results of the Spanish (GSA 1) case study. Also in this case it has been suggested to include economic variables in the model, if possible.

COMMON DISCUSSION TARGETED TO THE PREPARATION OF THE REMAINING DELIVERABLES, EXPECTED BY MONTH 7. FOR EACH DELIVERABLE: PRESENTATION OF THE STATUS OF THE WORKS, PRELIMINARY RESULTS, POSSIBLE PROBLEMS. ON THE REVISION OF THE DELIVERABLES ALREADY PRESENTED. POSSIBLE CRITICISMS, PROPOSED SOLUTIONS.

The Task 4.1, coordinated by Maria Teresa Facchini, is aimed to the upgrade of BEMTOOL model both according to the specific objectives of LANDMED project and according to the suggestions of STECF EWG.
I. Bitetto presented the new functionalities of the new version of BEMTOOL model:

- introduction of discard and escape survival rate;
- introduction of costs due to landing obligations;
- introduction of new relationships between fishing effort and fishing mortality;
- introduction of uncertainty in recruitment to produce confidence intervals;
- creation of a completely new and more intuitive graphical user-friendly interface in R language.

I. Bitetto and M. Gambino presented the state of the work on the three deliverables concerning the implementation of the three case studies (D4.3.1. Results of the Western Mediterranean case study; D4.3.2. Results of the Central Mediterranean case study; D4.3.3 Results of the Eastern Mediterranean case study).
I. Bitetto presented for the Central Mediterranean case study (Adriatic Sea) the final settings of the case study, showing the quality of the fitting of landing by fleet segment. I. Bitetto and M. Gambino showed the preliminary results of the three scenarios implemented for Adriatic Sea:

- Status quo: null discard for all fleet segments, recruitment, mortalities, effort and economic variables equal to 2012;
- Discard of 5% for all the fleet segments: labour costs increased of a 5 % and increase in fixed cost for new equipment from 2015 to 2018.
- Discard of 10% for all the fleet segments: labour costs increased of 10 % and increase in fixed cost for new equipment from 2015 to 2018.

Nevertheless, from the discussion and the comments of X. Vazquez it was decided to change the scenarios for the deliverables as follows. The reasons for those changes are twofold:
First, the sorting costs (either at sea or ashore) are independent of the percentage of discards but related with the quantities to be sorted and secondly, if the *de minimis* exception is applied, there will be a percentage of "legal discards" and a percentage of discards to be landed for non-human consumption. Therefore it will be necessary to solve dichotomy after dichotomy (as a decisional tree) to define which quantities could be legally discarded and which quantities need to be landed for the non-human consumption circuit:

- Status quo: null discard for all fleet segments, recruitment, mortalities, effort and economic variables equal to 2012;

- Discard of 3% for all the fleet segments: labour costs increased of a fixed % and fixed costs do not increase; (*)
- Discard of 10% for all the fleet segments: labour costs increased of fixed % and increase in fixed cost for new equipment from 2015 to 2018.

Moreover, X. Vazquez asked to make the model able to adapt to the future scenarios of landing obligation, which could require the implementation of additional components.

(*) 3% it was an example. As indicated in the Joint recommendation presented by MS as well as in the recommendation for the use of the *de minimis* exemption made by the MEDAC, the % change from fishery to fishery. Those percentages vary from 3 to 7% (pending on the fishery) and therefore simulations shall taking into account those % and not a fixed %.

For the Eastern Mediterranean case study (GSA 22), I. Bitetto showed the preliminary results, obtained with DCF data until 2008. Nevertheless these data are already 6 years old and the group agreed to make an attempt in using landings and economic data available from sources different from DCF to perform the simulations until 2012 as well as the agreed scenarios. However, the way to use this data and their consistency with DCF data will be further discussed following the exploratory analysis of all available data.
For the Western Mediterranean case study (GSA 1), a revision of the input data is needed in order to quickly parameterize the case study and produced the required results on time. The new input data are expected to be provided by next September 23th.

M. Sbrana, as coordinator of WP5, presented the plan of the works of the Deliverable D5.1.1 ("Evaluation of the importance of discards estimates for stock assessments and suggestions under the stock assessment point based on project output"). This Deliverable is based on the results of the Workpackages 2, 3, and 4; thus it is important to have the full outcomes of these WPs as soon as possible. It was decided that this Deliverable will also contain a general discussion of the results obtained from the entire project.

REMINDER OF THE MAIN DECISIONS AGREED/THINGS TO DO FOR THE REVISION OF THE DELIVERABLES AND THE PREPARATION OF THE DRAFT FINAL REPORT

To follow the suggestions of DGMARE, in particular:

- To provide more details in the Chapter Introduction and Material and Methods of each Deliverable.
- To include a detailed list of all the documents used for the preparation of each Deliverable. The text should include more references, in particular for the more "descriptive" Deliverables. In cases where the source of the comment derives from the experience of the authors, it is suggested to include "personal communication".
- To comment the available data, evidencing gaps or suggesting improvements in the DCF protocols.
- To include for each Deliverable a discussion section. This could focus on the main findings, suggesting possible explanations and identifying new areas where more information is needed
- To try, as much as possible, to increase the information presented, searching all the possible data sources. To exploit more the data dissemination tool of the JRC (http://datacollection.irc.ec.europa.eu/dd/med/graphs), the MEDAC and similar documents.
- To try to make assumptions, when possible, on the basis of the existing knowledge, for the areas where the data available are scarce. For example, it has been suggested to try to do some assumptions for GSA 6, taking advantage of the data collected in GSA 1.

It was decided, at the end of the concerned deliverables, to include an Excel file with the collected data (e.g. those from the questionnaires/interviews or the statistics on landings, prices, the economic parameters, etc.) or the data used for the analyses (e.g. those used for the GAM models of for the case studies).

A further attempt of request of DCF data to the national correspondents of France, Spain and Slovenia will be made at the beginning of the week of September 22th.

AGREED INTERNAL DEADLINES FOR THE NEXT FUTURE

September 23th: Revision of the input data of the Spanish case study (D4.3.1).

October 10th: Sending to the coordinator of the draft texts of all the Deliverables, for their final revision.