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THE OPERATIONAL UNITS APPROACH FOR FISHERIES MANAGEMENT IN THE MEDITERRANEAN SEA

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THE OPERATIONAL UNITS APPROACH FOR FISHERIES MANAGEMENT IN THE MEDITERRANEAN SEA

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PREPARATION OF THIS DOCUMENT

This document was commissioned by the Sub-Committee on Statistics and Information (SCSI) of the GFCM Scientific Advisory Committee (SAC). It aims at providing an historical overview of, and background information on, the development and application of the concept of Operational Units (OUs) in the context of the Mediterranean fisheries. It reviews the outcomes of related meetings and activities carried out under the guidance of the SAC, mainly on the basis of pilot analysis and testing implemented by the FAO/GFCM Subregional projects, especially COPEMED, ADRIAMED and MedFisis.

Emphasis is put on the role of the OUs for the purpose of monitoring fishing effort in each of the GFCM Geographical Sub-Areas (GSAs). The document highlights the need for sound data collection and analysis.

The document was prepared by Paolo Accadia from the Istituto Ricerche Economiche per la Pesca e l'Acquacoltura (IREPA) (Italy) and Ramón Franquesa from the Gabinete de Economía del Mar de la Universidad de Barcelona (GEM) (Spain) with further editing provided by Matthew Camilleri, Coordinator of the SCSI.

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ABSTRACT

This document gives an overview of the discussions on the concept of Operational Units which was first conceived in 2000 and its development to date. The approach of categorizing fishing fleets into homogenous groups, or Operational Units, to implement effort control fisheries management, as requested by the General Fisheries Commission for the Mediterranean, has been evaluated by a good number of workshops, meetings and pilot studies, the conclusions of which are summarized in this document.

Progress related to the agreement reached on the multidisciplinary criteria to define Operational Units is reported together with outstanding uncertainties on the definition and use of the approach in certain cases. The data requirements and structure of four data compilation tables are also described in detail.

CONTENTS

1. THE CONCEPT AND ITS ORIGIN

In the light of a preliminary study commissioned by the General Fisheries Commission for the Mediterranean in 2000 (Camilleri, Coppola and De Leiva Moreno, 2000) and a series of supplementary studies and technical meetings, the following definition of an Operational Unit (OU) was proposed by the Scientific Advisory Committee (SAC) and endorsed by the GFCM in 2001:

"*For the sake of managing fishing effort within a Management Unit, an Operational Unit is the group of fishing vessels practising the same type of fishing operation, targeting the same species or group of species and having a similar economic structure. The grouping of fishing vessels may be subject to change over time and depends on the management objective to be reached*".

As declared during the Sub-Committee for Statistics and Information (SCSI) meeting in Ancona in April 2001, "the need to define OUs originates from the fact that stock assessment deals, by definition, with stocks whose management in turn deals with fishing (vessels and/or fishermen). In this respect, one should therefore focus on unifying the object to be analysed."

The identification of a group of vessels involved in the same fishery does not provide enough detail to support the fishery management process. Fishery managers need to adopt a multidisciplinary approach in their actions, which also takes into account social and economic aspects. Likewise, the OUs need to be defined by a multidisciplinary approach and should be identified by maximizing as much as possible the level of homogeneity within each group of vessels. According to the OU definition, the homogeneity should be reached with respect to "species or group of species" targeted, "type of fishing operation" practised, and "similar economic structure" presented.

The association of a homogeneous group of vessels from an economic point of view to a specific stock and *vice versa* is possible where this kind of reciprocal relation exists; generally, in the Mediterranean it is not so. Mediterranean fisheries are multispecies and multigear in nature, with most vessels operating with several fishing gears and most of which usually catch a variety of species. This complexity represents one of the most general features of Mediterranean fisheries, and the management system must take this into account. The complexity cannot be eliminated, but the OU approach could reduce it by identifying homogeneous groups of vessels from biological, economic and social points of view.

The identification of the OUs in such a context is not a trivial operation. The difficulties in defining and identifying OUs in the Mediterranean have been highlighted in discussions on its definition since the introduction of the OU concept in 1999. As expanded in the following sections of this document, a number of meetings and workshops were organized and papers were presented on the definition and use of the OU in the Mediterranean in the last five years.

Despite the agreement reached on this definition, some different interpretations related to its practical application were pending since it does not give a clear indication on how to systematically list and analytically process OUs. In this document, different approaches on the identification and description of OUs are laid out, together with some conclusions on the interpretation, of the definition and the related OU data structure.

2. THE EVOLUTION (HISTORY): FROM THEORY TO PRACTICE

A historical overview of the development and application of the OU concept to Mediterranean fisheries can be made summarizing the sub-regional and regional pilot studies, meetings and projects. The following paragraphs describe the most relevant contributions made to the evolution of the OU concept and to the definition of the OU data structure useful for management purposes.

Some of these contributions describe the efforts necessary to form consensus on the activities of OUs and fleet segmentations, as well as on the OU implementation strategies. Other activities

provide a description of the various methodologies followed in collecting OU data for their use in fisheries management in different sub-regions. Some specific meetings on OUs were organized in order to compare the different approaches and to reach a general agreement on the OU related issues.

The most important issues discussed during the meetings and studies on OUs are related to the level of aggregation of vessels, the relation of OUs with the fleet segments and fishing activity concepts, the definition of a minimum data set to collect at OU level, and the sources for collecting these data.

2.1 Operational Units, a preliminary study

Camilleri, Coppola and De Leiva Moreno (2000) drew up the first document to analyse the OU concept and provided a preliminary basis for the identification of OUs and recognized that the definition for an OU may need to be revised and areas hosting the OUs for different species have yet to be clearly established.

This preliminary study within the context of the proposed definition, also identified some OUs through a literature and database review.

It also highlighted the fact that the geographical limits for an OU are highly unclear; an OU is confined to a particular area within a Management Unit or may even be associated with two or more Management Units. It was therefore recommended that areas occupied by distinct populations of various species are to be clearly established before an inventory of OUs could be formulated.

2.2 The Alboran study on economic indicators – 2001

A pilot study on the economic indicators of the Mediterranean Sea was carried out within the framework of the FAO Scientist Visitors Programme.[1] In September 1999, the SAC Chairman, Mr Juan Antonio Camiñas, and the Chairman of the Sub-Committee on Economic and Social Sciences, Mr Scander Ben Salem, agreed to include the analysis of this pilot study on economic indicators in the agenda of the Sub-Committee for Economics and Social Sciences (SCESS).

These indicators should give insight to the capacity level of the main fleets and gear types; on the other hand, together with other indicators (especially biological indicators), they should be used as an objective guide for the analysis of management proposals made or measures taken for this region. Furthermore, these indicators are expected to allow a systemic approach to the knowledge of the socio-economic reality of the fishing sector in every country concerned. This knowledge should be aimed mainly at analyzing the impact of ongoing changes in these fisheries on every fleet, area and country. The changes being referred to here are, namely, changes in production, in prices, in costs, in economic yields, in employment, in technology and also changes in the resources (which may for example call for rest periods).

This kind of analysis needs to fit in with the rest of the SAC's activities; therefore, whenever possible, the authors have tried to estimate the indicators according to the regions as defined by the GFCM.[2]

The main researcher resorted to the national institutions involved (Institut National de Recherche Halieutique [INRH] and Istituto Español de Oceanografía [IEO]) for collaboration, as well as on the ongoing activities developed under the auspices of the COPEMED project to set up a georeferenced database on artisanal and industrial fishing vessels.

[1] Ramón Franquesa joined FAO/FIPP as main researcher in the project, from October to December 1999.
[2] The final definition of the GFCM management areas as established in the meeting of the summer of 2001.

One of the aspects of this study was the definition of the object of analysis: the fleet segments identified as the management subject and which encompass vessels with similar characteristics.

The study found that the decision-maker's regulations (on fishing schedules, licences, taxes, etc.) are normally binding on specific fleet groups and thus a correct fleet segmentation is essential in the construction of the indicators. The study attempted to address a pertinent issue and to reach a conclusion related to the number of segments that have to be established. The vessel categories should be flexible enough to cover the whole of the fishing fleet operating in the Mediterranean Sea; however, at the same time, they should be precise enough to be relevant for management purposes. To ensure that the segmentation was compatible with the concepts being used by the SAC the OU concept as defined by the SAC was kept in view.

However, at economic level the differences between local areas inside a Management Unit (later renamed as Geographical Sub-Area by GFCM) can be relevant. For this reason, the study divided the OUs of the Alboran Sea Management Units (MU) into Local Operational Units (LOUs), linked to each port in the area.

Essentially this pilot study was a contribution towards a standardized categorization of fishing segments in the Mediterranean Sea, using the concept of Operational Units. The classification used in the study contributed to the consolidation of a standard methodology among the researchers from different scientific fields (mainly biology and economics) and from different countries to define the characteristics and the structures of the Mediterranean fishing units. The segmentation is based both upon a theoretical definition, which was not yet fully endorsed within the SAC, and upon empirical, quantified and consequently objective evidence provided by the economic indicators.

The study proposed the use of 16 Local Sub-Areas inside the Alboran Area (10 in Spain, 6 in Morocco), and a total of 9 fleet segments.

The Working Group on Socio-Economic Indicators (WGSEI) established by the SCESS in their second session,[3] stated that it was important to define the LOUs[4] and recommended the formal adoption of this concept.

2.3 The Ancona meeting 2001

A Working Group, under the coordination of the SCSI, met between 18 and 19 April 2001 in Ancona. During the meeting the "Preliminary study" by Camilleri, Coppola and De Leiva Moreno (2000) and an ADRIAMED working paper entitled "A preliminary contribution to the Mediterranean Operational Units" (Mannini, 2001) were presented. The latter provided an overview of some of the basic information available in the region concerned (Management Units 17 and 18) relevant to the identification and listing of OUs.

It was stressed that the OUs should serve as a tool for the SAC to advise the GFCM on the control of fishing effort. It was also noted that in the ADRIAMED paper an analogous approach had been applied, using some concepts developed in the work, dealing with socio-economic indicators for Mediterranean fisheries by Franquesa, Malouli and Alarcón (2001). This indicated that aspects such as fleet segmentation could be applied in both biological and economic perspectives.

A proposal to switch from a descriptive approach into a database management approach was presented by Salvatore Coppola (FAO). The system proposed would aggregate the data according to the disciplines of the users. The data entered into the system will be organized into basic parameters, combinable parameters and sector parameters. There are two major outputs from the system: (1) output models by discipline, (2) list of OUs. The structure of the databank is split into

[3] GFCM, Scientific Advisory Committee – Sub-Committee on Economic and Social Sciences (SCESS) – Working Group on Socio-Economic Indicators – 2nd Session. Salerno, Italy, 11–13 March 2002.
[4] The WGSEI defines a LOU as a statistical unit by space (maritime district) and fleet segment.

a number of databanks: (a) elementary, (b) sector, (c) bibliography, (d) referral (backbone), (e) spatial, (f) links and connections to external access databank. The system has three functions: data entry and data management, data manipulating and modelling, data retrieval and presentation.

A table listing the required basic parameters for identifying OUs was distributed (Appendix 1) and as a first step, participants were encouraged to provide the data associated with these parameters. It was stressed that in order to have a comprehensive set of data enabling sound management, all countries should adhere to this initiative and submit the data in due course. It was suggested that the concept of OUs could be linked to the issue of indicators as used in other fisheries management studies and reviews.

Following the discussion and agreement on the definitions of basic parameters which should be collected, the data sheet was amended accordingly, making it more user-friendly in the process. With respect to the parameter related to "economic structure", it was agreed that the necessary basic information had yet to be indicated by the appropriate economic experts who were not present at the meeting. However, the minimum required economic parameters were broadly identified as being GRT, HP, employment, salary share, landings value, vessel value, running costs and fixed costs. It was agreed that countries should focus in particular on the GFCM selected species as listed in paragraph 55 of the Report of the twenty-fifth session of the GFCM. A summary table essentially gathering the general information on OUs was also prepared. This summary table would be filled in by the GFCM technical secretariat from the data available at FAO and/or provided by the countries at the next SCSI meeting.

It was agreed that the SAC would bring the request for information on the basic parameters to the attention of national delegates of every member country who would in turn be responsible for the compilation of the form. They would later be expected to submit the collected data to the next SCSI meeting (May 2001).

2.4 The Madrid meeting 2003

The GFCM twenty-seventh session (November 2002), stated the following in their conclusions[5]: *1.2 To update, at sub-regional level and by geographical sub-areas, the inventory of operational units generating catches of shared stocks. To this end, SAC is also requested to monitor and fine tune, as necessary, the fleet segmentation, as adopted in principle (Appendix E of the report of the fifth session of SAC). Whenever possible, description of Operational Units should report the share, by weight and value, of priority species as well as of other important species, their fishing regime, trends in catches and landings, discard estimates.*

To answer to this mandate and to coordinate the analysis in progress in different studies and countries an informal meeting in Madrid, hosted by COPEMED, was scheduled. The participants considered that it was necessary to reach a consensus regarding the meaning of "Operational Units" in relation to the Management Units adopted by the Commission which would allow a more accurate assessment of the fishing effort carried out in each Management Unit. The purpose of the meeting was to prepare a draft document to be presented at the SAC and its Sub-Committees for discussion, approval and submission to the Commission if agreed.

The meeting attempted to answer the following questions:

What elements should be taken into account in making a definition of fishing effort useful for resource management purposes?

What are the basic elements defining an operational unit?

Should the OU be considered individually or as a compound of units?

[5] GFCM twenty-seventh Plenary Session (November 2002), paragraph 1.2 of Appendix H of the report.

What are the secondary elements of the definition of OUs? (elements that are not considered as essential in the definition of an OU which, however, can be helpful to differentiate components or to create sub components within an OU).

What is the correct definition of an OU unit in the case of large pelagic species fisheries, demersal and benthic species fisheries, small pelagic species fisheries, etc.?

What is the reason for grouping OUs in each Management Unit and in different Management Units?

2.5 The Rome meeting 2003 – Working Group on Operational Units

The next workshop on OUs organized by the SCSI was held in Rome in April 2003. This transversal Sub-Committee meeting produced important improvements in the identification of the minimum set of socio-economic data (Appendix 2) useful to describe the economic structure and to identify the OUs from the economic point of view.

During this meeting, the relevance of the fleet segmentation adopted by SAC (Appendix 3) as a starting point to identify the OUs was highlighted. An exercise undertaken by Istituto Ricerche Economiche per la Pesca e l'Acquacoltura (IREPA) (Italy), showed the possibility to identify the species targeted and the fishing period for each fleet segment within a Management Unit. The method for linking species and fleet segments was based on the use of a matrix, where the rows represent the species, and the columns the fleet segments. An example is reported in Appendix 4.

The Working Group recommended that two case studies on OUs should be performed with the support of the ADRIAMED and COPEMED projects.

2.6 The OUs in the Adriatic Sea

Based on the OU definition endorsed by the GFCM and the work developed within the SAC Sub-Committees, two meetings were organized by the ADRIAMED project to test the possible application of the OU concept in the Adriatic Sea. The first meeting was in Dürres (Albania) on 1 and 2 April 2004 and the second one was in Zagreb (Croatia) on 14 and 15 September 2004. The ADRIAMED working group identified the OUs in the Adriatic Sea, and collected bio-economic data on the OUs identified.

The approach used to identify the OUs in the Adriatic Sea was based on a fleet segmentation perspective. Following the definition of OU, the segmentation of the fleet was produced by defining groups of fishing vessels with the highest level of homogeneity as possible with regard to "type of fishing operation" practised, "species or group of species" targeted, "similar economic structure" presented.

To segment the fleet into OUs within a Management Unit, the following geographical and structural variables were used:

Country
Main fishing zone
Gear type
Length overall (LOA)

These variables have been used in such a way to increase the homogeneity within each group of fishing vessels with regards to the three criteria included in the OU definition.

The "type of fishing operation" was essentially defined by the variable "gear type". This variable was defined by the ADRIAMED working group with regards to the fishing gear name and

abbreviation according to the International Standard Statistical Classification of Fishing Gear (ISSCFG). Since the ISSCFG has three levels of detail, the WG agreed on the use of the second level, with exceptions in some cases, where more detailed information is useful.

The fleet segmentation determined from the economic point of view and adopted by SAC (Appendix 3) shows that the "economic structure" mainly depends on the fishing gear and the vessel length. The approach taken up by the working group took into account the fleet segmentation proposed by SAC, and adapted it at sub-regional level. It was found that the same fleet segment could present a different economic structure in different countries due to the differences in technology, vessels' average age, costs structure and market prices. At the same time, the fishing zones could determine differences in the economic structure due to differences in productivity and local market features. Therefore, geographical variables are needed to identify homogeneous groups of vessels with regard to the economic structure.

The homogeneity within the "species or group of species" targeted, represents the most difficult component with respect to an approach based on fleet segmentation; with a few exceptions Mediterranean fisheries are multi-species in nature. However, as for the economic structure, this component was handled by using the four variables listed above. The fishing gear used and the fishing zone represent the most important variables to determine the landings composition; the fishing gear is specified by the variable "gear type" and the fishing zone is specified by the variables "country" and "main fishing zones". In addition, the variable "LOA" often determines the fishing zones in the Adriatic Sea; vessels with different length could exploit fishing zones at different distances from the coast.

The relation between the variables used to identify the OUs in the Adriatic Sea and the criteria of homogeneity requested by the OU definition are summarized in the following diagram:

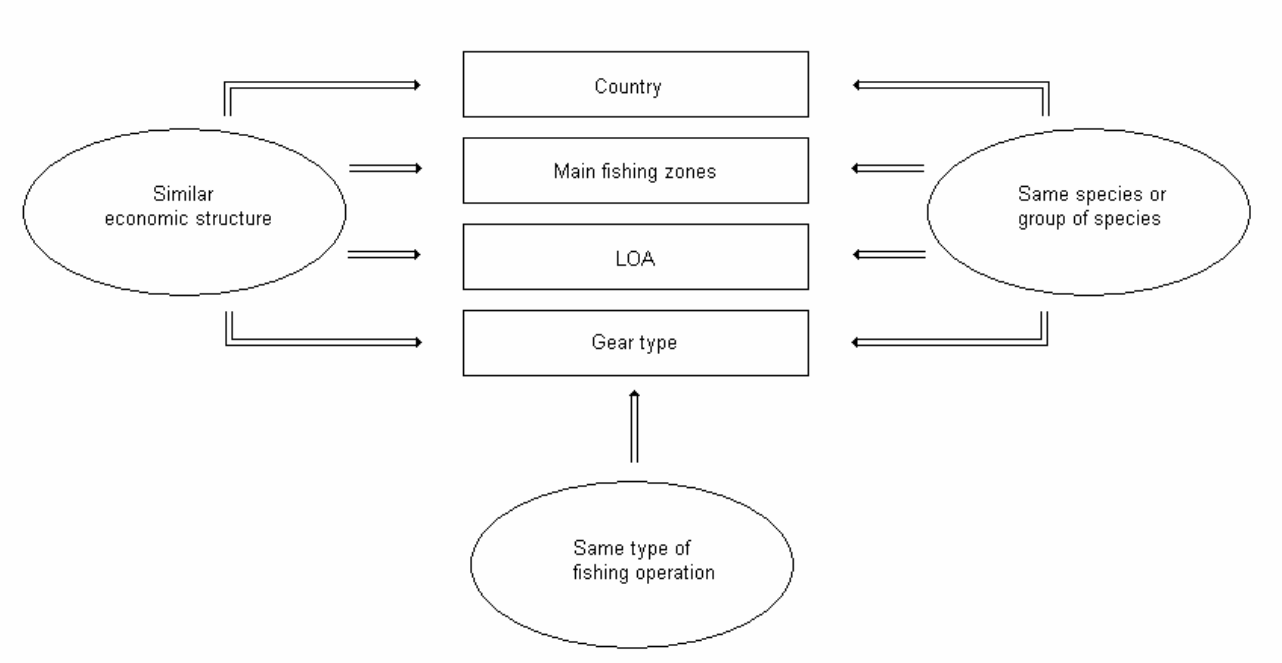

Figure 2.1: Relationship between variables and criteria to identify OUs

Figure 2.1 shows that the homogeneity within each OU was obtained by handling the four variables in such a way as to satisfy the criteria requested by the OU definition. The working group identified the OUs for each country by using qualitative information and expert advice. Constraints were encountered in using the SAC fleet segmentation (Appendix 3), and some specific related guidelines (Appendix 5) in the OU identification process.

Starting from the standard form (Appendix 1) proposed by the SCSI (Ancona, 2001), the working group discussed the possibility to complete this form on the basis of available data from the two Adriatic GSAs. This led to the formulation of a set of four tables (Appendix 5): the first holding the basic OU data (*Fleet and area*), the second the exploited resources (*Main resource components*), the third effort information (*Effort*) and the fourth socio-economic data (*Economic structure*). Appendixes 6 to 9 show these tables completed for the Adriatic Sea.

The working group also suggested the use of an OU alphanumeric code, composed as follows:

- first three characters indicate the United Nations country abbreviation (Albania: ALB; Croatia: HRV; Italy: ITA; Serbia and Montenegro[6]: SCG; Slovenia: SVN).
- country abbreviations are followed by a 2-digit number representing the GSA (17 or 18)
- the fishing gear is abbreviated by two or three characters according to ISSCFG.
- last 2-digits indicate the specific OU number to be assigned when compiling the table.

As for the fishing gear name and abbreviation, the working group standardized and bullet the species common name and abbreviations according to the FAO three-letter code based on the FAO English common name as in the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP).

2.6.1 Some results by ADRIAMED 2004

The working group identified 80 OUs, 47 for GSA 17 and 33 for GSA 18. The total number of vessels is 7023, 5325 for GSA 17 and 1698 for GSA 18. Table 2.1 shows these results divided by GSA and by country. The figures given in the table are not conclusive largely due to the incomplete information on the small-scale coastal fisheries of some countries. Moreover, fishing vessels registered as polyvalent were not all included in the OU tables.

Table 2.1: Number of OUs and fishing vessels by GSA and by country (data on small-scale fisheries of Albania and Croatia are either incomplete or underestimated)

GSA	Country	No. of Operational Units	No. of vessels
17	Italy	28	4 087
	Slovenia	7	130
	Croatia	12	1108
17	**all**	**47**	**5 325**
18	Serbia – Montenegro	11	221
	Albania	12	196
	Italy	10	1 281
18	**all**	**33**	**1 698**

The demersal fleet, consisting of all the vessels classified as bottom trawlers and bottom otter trawlers in the Adriatic Sea, is composed of 2437 vessels, 1862 in GSA 17 and 575 in GSA 18. These vessels are divided into 27 OUs, 17 in GSA 17 and 10 in GSA 18. The number of bottom trawl OUs and vessels by GSA and by country is given in Table 2.2.

The pelagic fleet identified in the Adriatic Sea, consisting of the vessels classified as pair trawlers, midwater pair trawlers, purse seiners and boat or vessel seiners, is composed of 489 vessels, 409 in GSA 17 and 80 in GSA 18. These vessels are divided into 21 OUs, 13 in GSA 17 and 8 in GSA 18. The number of pelagic OUs and vessels by GSA and by country is given in Table 2.3.

[6] At the time of preparation of this paper Serbia and Montenegro was a single State.

Table 2.2: Number of OUs and fishing vessels for demersal fleets by GSA and by country

GSA	Country	No. of Operational Units	No. of vessels
17	Italy	9	990
	Slovenia	2	17
	Croatia	6	855
17	**total**	**17**	**1 862**
18	Serbia – Montenegro	3	16
	Albania	4	129
	Italy	3	430
18	**total**	**10**	**575**

Table 2.3: Number of OUs and fishing vessels for pelagic fleet by GSA and by country

GSA	Country	No. of Operational Units	No. of vessels
17	Italy	4	150
	Slovenia	3	6
	Croatia	6	253
17	**total**	**13**	**409**
18	Serbia – Montenegro	4	36
	Albania	2	7
	Italy	2	37
18	**total**	**8**	**80**

The "Main resource components" table, as proposed by the working group, is useful to create a link between species and OUs. It is very similar to the matrix presented in the workshop on OUs held in Rome in 2003 (Appendix 4), which allows to link species and fleet segments. In fact, the table can be used to identify the species caught by the vessels of each OU, and, for each species, to highlight how many and which OUs are involved in the fishery targeting it. For example, the table prepared by the working group (Appendix 7), shows that, in the Adriatic Sea, 21 OUs participate in *Engraulis encrasicolus* and *Sardina pilchardus* fisheries: pair trawl and purse seine in Italy, purse seine in Slovenia and Albania, purse seine and "boat or vessel seines" in Serbia-Montenegro and purse seine in Croatia.

In the Adriatic, only Italy has an economic data collection system, consequently in the table prepared by the working group (Appendix 9), these data are available only for the Italian OUs. The other Adriatic countries have partially collected economic data, mainly with regards to structural variables, such as GT, HP and total employment, or to activity variables, such as fishing days by year and fishing hours by day.

2.7 The estimation of socio-economic indicators in the western Mediterranean

The analysis carried out in the Alboran Sea on economic indicators included 5 countries and was supported by the COPEMED Project. During the Tangiers Meeting on OUs (see Section 2.8) a first version on the entire study "The estimation of economic indicators in the Mediterranean fisheries"[7] was presented. The study started in 1999 and was finalized in 2005 and covered West Libyan Arab Jamahiriya, Tunisia, Algeria, Mediterranean Morocco and Andalusia (Spain). The study provided a first picture on the economic trends in this area, based on a common methodology and involving the OUs concept and the SAC fleet segmentation (13 groups), disaggregated geographically at the level of Local Operational Units (LOUs). The LOU comprises the landing places and harbours of each of the 55 areas considered (each comprising between 15 to 50km of coastline). The outcomes of the study show that the present segmentation

[7] Franquesa, R. (ed); Amor El Abed; Aboukhader, A; Ben Salem, S.; Ferhane, D.; Guillén, J.; Alarcón, JA.; Malouli Idrissi, M.; Hachemane, M.; Zergani, M. *La estimación de indicadores económicos en las pesquerías mediterráneas*, 2005, Proyecto FAO-COPEMED

allows coverage of most of the vessels in the area. The high level of geographical desegregation (that produces 355 LOU) is useful for management purposes, but can be excessive within the GFCM context, and the geographical division can thus be limited to the statistical GFCM areas. In this case OUs can be defined as Fleet segment-Country-GFCM Statistical Area.

2.8. The Workshop on Operational Units and Fishing Effort Measurement – Tangiers, July 2005

The meeting on OUs was held between 4 and 6 July 2005 in Tangiers (Morocco) under the co-ordination of the SCSI. It was a transversal workshop attended by 21 experts from the fields of economics, biology, and statistics. The meeting was faced with the task of reviewing the "state of affairs" and the future of the OU concept with regards to its application in fisheries management in the Mediterranean.

During the meeting, several documents were presented. These presentations served to provide the participants with an overview of the various approaches to defining and implementing the OU concept in various sub-regions. Such approaches varied from the use of national census data supplemented by national representative surveys, to the use of pilot studies at national and sub-regional levels. The participants discussed the utility of various levels of aggregation that were used to develop the OU inventory. The meeting highlighted the issue that the OU concept was defined to provide managers with the multidisciplinary information necessary for fisheries management at both the national and regional levels.

After lengthy discussion on the limitations and advantages of the approaches presented, the participants agreed to adopt templates for the collection of data related to OUs, based on the experiences gained at sub-regional level, particularly in the Adriatic Sea. Issues remaining to be clarified included the following:

- the ability to include biological information to the OU codification scheme;
- the coding of polyvalent/multipurpose vessels;
- means to incorporate additional, less-aggregated information into the OU scheme;
- identifying the minimal list of biological parameters.

The identification of OUs based on the fleet segmentation perspective, applied in the ADRIAMED project 2004 assumes that every vessel remains in its defined OU for the entire period of interest (i.e. the year). This assumption, which determines a strong similarity between the OU and fleet segment concepts, was deemed necessary as the corresponding economic data exist only at the vessel level; therefore, it could not be divided into multiple OUs during any given period.

From a biological point of view, this assumption is considered to be a limitation since the same group of vessels can be involved in different fisheries along the year. For this reason, it was agreed that the table "*Main resource components*" is arranged in such a way to make it possible that more than one different target species or group of species, related to different fishing periods, can be associated to the same group of vessels. Through this arrangement, it is possible to identify several fisheries along the year for each fleet segment. The association of the OUs to the group of vessels consisting the fleet segment or to the group of vessels involved in a specific fishing activity was discussed in detail.

2.8.1 The current and future use of OUs in the FAO Global Inventory of Fisheries

The Adriatic fisheries inventory is part of the global inventory of fisheries and marine resources, a project of the FAO Fisheries Department aiming at listing and monitoring the status of fisheries and marine resources worldwide. The main source used to fill the inventory of fisheries for the Adriatic Sea has been the "Adriatic Sea Operational Units: first identification and listing". [8] This

[8] ADRIAMED 2004

paper was prepared on the occasion of the seventh session of the GFCM Scientific Advisory Committee. The FIRMS methodology used to fill inventories of fisheries has been applied in developing a first list of OUs in the Adriatic Sea, without encountering any major compatibility issue between the concept of OU and that of fisheries. In doing so, OUs have been aggregated according to Geographical Sub-Areas (GSAs), country, fishing gear and target species in order to define "higher level fisheries". Link with OUs has been maintained by a column, added to the original template of the inventory, which contains the OU codes. It is important to note the fact that the fisheries inventory is also linked to the shared marine resources inventory of the Mediterranean Sea drawn up in collaboration with GFCM: through this initiative, a link between data related to marine resources and OUs has been established.

Ultimately the goal of this study was to design the methodology for extending the fisheries inventory to the whole Mediterranean Sea.

2.8.2 The current discussions on the EU fleet segmentation matrix

In the last reform in the Common Fishing Policy, the European Commission highlighted the importance to define a coherent fleet segmentation to improve the management measures based on effort control.

The Scientific, Technical and Economic Committee for Fisheries (STECF)[9] was consulted to provide criteria to develop clear legal rules on fleet segmentation. The European Commission (EC) asked for advice on two regulation proposals on this issue: Annex IV of the EC Regulation 1543/2000 of 29 June 2000 and the EC Regulation 1639/2001 of 25 July 2001. Both Regulations are addressed to establish an official segmentation of EU fleets.

The STECF at their fourteenth session[10] supported the proposals on fleet segmentation based on different studies and regulations. This proposal takes into account the GFCM criteria developed by the SCCES-SAC.

The EC criteria for fleet segmentation is included in the Appendix. This segmentation is relevant to the GFCM purposes since it standardizes the procedure in 7 Mediterranean countries (Members of the EU) which have financial support from the EC to develop data collection based on these criteria.

2.8.3 Standardizing fishing effort measurement by OUs

The meeting in Tangiers focused also on the subject of determining a standardized measure of effort to be applied throughout the Mediterranean.

Effort is one of the most important parameters in the OU dimension, since the purposes for management of their data collection. The subject of determining a standardized measure of effort to be applied throughout the Mediterranean is the main objective to assure the utility of the work on data collection. Some progress in this regard has already been achieved within the European Union, and can be applied at regional level. In the more recent workshops some experiences in measuring effort either at national or multinational level was considered. In the Tangiers workshop, experiences were shared from the European Commission, Italy, Malta, Morocco and Spain, covering a wide variety of measurements and levels of detail. In addition, explanations were provided for cases where changes in effort measurements were adopted.

The general definition of effort is as a function of capacity/engine power and fishing activity. However, the exact definitions of these variables merited further discussion on the three levels of parameters:

[9] The STECF is a consultative committee that provides scientific advice to the European Commission.
[10] STECF, fourteenth Report of the Scientific, Technical and Economic Committee for Fisheries, 22-26 April 2002, Commission of the European Communities, Brussels.

- Capacity of vessels in gross tonnage (GT) or power (kW); the formulas dependent on the vessel being shorter or longer than 15 meters.
- Fishing activity; time at sea of the vessel.
- Gear-based measures of effort

For example, the European Commission has changed its capacity definition from gross registered tonnage (GRT) to gross tonnage (GT) to comply with the London Convention formula. There is an economic justification for the use of GT: economic agents tend to maximise profits given restrictions placed upon them, most importantly, the vessel size. Therefore, vessels' size as measured by Gross Tonnage is most appropriate in terms of cost efficiency and efficacy, and serves as an indicator to differentiate amongst vessels within the same OU.

The definition of fishing activity needs to clearly and transparently define such a variable. Definitions used in the Mediterranean include the number of fishing trips, fishing days, and fishing hours. In any case, it is important to consider that differences exist between the biological use and the economic use of capacity and fishing activity; in the former case, more detailed information concerning "effective" fishing time is required to perform the calculation of fishing mortality by gear type. From an economic perspective, fishing activity data could be less detailed but would include time spent travelling to the fishing grounds.

The effort measurement is also affected, in some cases by the use of supplementary vessel equipment, such as Fish Aggregating Devices (FADs) and aeroplanes. In these specific fisheries additional information may be useful but in any case, the vessel remains an essential part of the activity.

During the most recent workshop,[11] in order to develop simple yet flexible measures of Effort, it was agreed that effort measurement would be based on capacity measures in GT or GRT[12] and Fishing Activity in fishing days. Acknowledging that these definitions leave room for different interpretation, it was stressed that, as long as the method applied to each OU were homogenous, conversion factors (based on estimates of fishing mortality by gear type) and normalization of variables would necessitate only mechanical transformations using these conversion factors. In addition, the provision of additional effort-related information, such as power (kW) and fuel consumption[13] would also be relevant.

The workshop agreed that the measurement of parameters related to fishing effort should follow a standardized scheme consisting of four levels of priority (first level is the most important) as follows:

Level 1 – Capacity and fishing activity[14]
– gross tonnage (GT) or gross registered tonnage (GRT)
– Days at sea or hours fishing

Level 2 – Other vessel parameters
– Power (kW)
– Fuel consumption

Level 3 – Gear related parameters[15]
– Number of hooks, sets of nets, number of pots, etc.
– Effective fishing time (eg. soaking time, searching time, number of hauls, etc.)

[11] Tangiers 2005
[12] Note that, for the purpose of the GFCM Record of Vessels, member countries are required to submit GRT data for all vessels over 15 metres. GFCM Report of the twenty-ninth session.
[13] Note: European Union member countries are required, under the EU Council Regulation 1543/2000, to collect effort data including GT, kW and fuel consumption
[14] This level constitutes the minimum standard measure of fishing effort, i.e. the product of capacity (GT or kW) and fishing activity (days at sea or hours fishing).
[15] An expert working group to identify the standard unit measures of each gear and to address Level 4 needs to be convened.

Level 4 – Detailed standardization parameters[16]

3. RESULTS – DATA REQUIREMENTS; DATA COMPILATION BASED ON NATIONAL ROUTINE MONITORING SCHEMES

During the last meeting of the SAC Sub-Committees held between 27 and 30 September 2005 at the FAO headquarters in Rome, the conclusions and recommendations of the Tangiers workshop on OUs and fishing effort measurement were discussed. During the joint meeting of the SCSI/SCESS, the discussion focused on the main issues related to OU: its meaning and its relations with some concepts generally known at international level, such as "fleet segment" and "fishing activity"; the data structure useful to collect information by OU and the sources for these data.

On the basis of joint Sub-Committee discussions, a general consensus was reached on the points outlined above. It was agreed that the OU concept combines those of fleet segmentation and of fishing activity. The group of vessels belonging to a fleet segment and involved in a specific fishing activity during a specific period during the year compromise an OU. In this way, each fleet segment consists of a number of OUs and a vessel may switch between OUs.

This approach has the disadvantage that economic data cannot be collected by OU. For this reason, the joint Sub-Committee meeting agreed on the necessity to collect data by different levels of aggregation. In particular, the economic data should be collected by fleet segments, while biological data by OUs.

The recommendations of the workshop held in Tangiers on the data structure and tables were retained.

The first table "*Fleet and area*" contains the fleet data required for defining the OU within a country/sub-area/region (Table 3.1). It consists of 7 variables. Four of them are variables useful to describe the fleet segment and its geographical dimension: GSA, Country, SAC fleet segment, and Base ports. The remaining variables are the number of vessels belonging to the fleet segment, the capacity of the fleet segment, expressed in GT or GRT, and the Operational Activity. The last one is the list of all the fishing activities in which the vessels belonging to the fleet segment are involved during the year. The fishing activities are listed as codes.

The second table, named "*Main resource and activity components*", consists of 9 variables (Table 3.2). The first variable, the OU code, is reported in this table to create a link with the previous table on the fleet segment description. The other variables are related to biological features, such as the species or group of species targeted, the fishing period and the areas where this fishing activity is practised, and to the weight of this OU in terms of activity, expressed in days or hours, and of number of vessels involved.

The third table on the "Economic components" consists of a minimum list of socio-economic data introduced during the working group on OUs held in Rome in 2003. The table consists of 11 economic variables (Table 3.3), which should be collected by fleet segment, due to the difficulty in collecting them by OU. These data are useful to measure the economic performance for each fleet segment and their social relevance in terms of total employment.

The last table reports the information on the fishing effort by OU (Table 3.4). This table consists of 3 variables: landings, effort expressed as the product of capacity and activity, and the ratio between them, i.e. the landings per unit of effort.

[16] Ibid.

Table 3.1: Fleet and area variables

- **GSA**: GFCM Geographical Sub-Area
- **Country**
- **SAC fleet segment**
- **Vessel number**: Number of fishing vessels belonging to the fleet segment
- **Capacity:** Gross Tonnage (GT) or Gross Registered Tonnage (GRT)
- **Operational activity:** Open a code for each activity developed around the year. Code composed as follows:
  - First three characters indicate the United Nations country abbreviation
  - Followed by two-digit number identifying the GSA
  - Followed by the letter of the SAC fleet segment
  - Last 2-digit number indicates the specific Operational Unit number
- **Base ports**: port/s of operation of the given Operational Unit

Table 3.2: Main resource and activity components variables per OU

- **Operational Unit code**: For each of the following variables on the fishing activity practised around the year
- **Activity**: Days at sea or hours fishing
- **Fishing gear**: abbreviated (two or three characters) according to the International Standard Statistical Classification of Fishing Gear (ISSCFG).
- **Target species** (FAO Code): scientific name of the bio-economically most important target species (up to a maximum of five species).
- **FAO species code**: The FAO three-letter code based on the English common name as from the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP).
- **Main associated exploited resources:** the species, species group or assemblage exploited in association with the target species previously indicated.
- **Fishing period:** self-explanatory (e.g. annual, June to September)
- **Relative weight**: Percentage of total vessels included in the fleet segment that practiced this activity
- **Areas:** areas where this activity is practiced expressed in descriptive way

The “Effort” table represents an attempt to standardize the effort measure to allow the comparison between different OUs. The effort measure depends on the fishing gear used by the vesselsincluded in the specific OU. This approach determines the impossibility to compare CPUE/LPUE data for different OUs which use different fishing gears. The problem of identifying an equivalent effort measure was broadly discussed during the meeting in Tangiers. Agreement was found on the adoption of the general effort measure based on the product of capacity and activity for each OU.

As for the economic data in Table 3.3, also the effort and landings data in Table 3.4 are generally available only at the level of fleet segment. This presents a strong limitation for the possibility to obtain the LPUE data at OU level for management purposes. In order to overcome this problem, routine fleet and catch-effort data collection schemes must be in place at national level in such a way to obtain the OU related data.

Table 3.3: Economic components variables

- **Gross tonnage**: Total gross tonnage of fishing vessels belonging to the given Fleet Segment.
- **Horse power**: Total engine power of fishing vessels belonging to the given Fleet Segment.
- **Employment**: Total number of people employed on fishing vessels belonging to the given Fleet Segment. The number of crew members can be estimated on a full time equivalent (FTE) basis.
- **Salary share %:** Percentage of the revenues after discounting commercial costs, daily costs and fuel costs that pertain to the crew. It will be distributed among the crew as salary.
- **Landing weight**: Total landings in weight.
- **Landing value**: The volume of landed fish valued against actual market prices. It equals to quantities landed multiplied by the landing average price.
- **Vessel value of total fleet**: This is defined as total invested capital – value of hull, engine, gear and equipment. The replacement-value method can be used to estimate this parameter.
- **Fishing days/y**ear per vessel: Number of fishing days per year.
- **Fishing hours/day per vessel**: Number of fishing hours per day.
- **Cost of fishing/day per vessel**: These include daily expenses incurred in fishing activity, such as fuel, lubricants, etc. They are variable costs that depend on the time spent in fishing.
- **Yearly fixed costs per vessel**: These comprise costs not directly connected with operational activity, such as non-routine maintenance, vessel insurance, taxes and dues, etc. The fixed costs are all the costs that are inevitable to pay yearly, independently from the time spent to fish.

Table 3.4: Effort variables

- **Landing weight:** Total landings in weight
- **Effort measure:** Capacity * Fishing Activity
- **LPUE:** Landings per Unit of Effort

The identification and description of the OUs requires different types and sources of data. Some of them are readily available, such as the data coming from the fleet national registers and the qualitative data, which can be collected by using scientific literature sources or based on expert advice. The collection of quantitative data can be performed through a census or by a sampling scheme. In many cases, the census approach is not feasible considering the high number of vessels and the cost it incurs. Therefore a sampling scheme is often the preferred option.

Sampling schemes do not necessarily need to be designed according to OU stratification, as long as data compilation could be made by OU. The data produced by a national routine monitoring scheme could have a different level of aggregation with respect to the data the OU needs. Therefore, in order to make the OU approach feasible, the identification of the OUs has to result from the best compromise between the homogeneity requested by the definition and the availability of data.

4. SUITABILITY TO SUPPORT THE FISHERY MANAGEMENT PROCESSES

The OUs can be identified by using a multidisciplinary approach and should be obtained by ensuring homogeneity within each group of vessels. The identification of OUs is very useful to the fishery management process, since it needs to deal with homogeneous groups of vessels by social, economic, and biological perspectives.

Fishery management also requires some essential information with respect to each OU identified. Biological data which contribute to the assessment of the state of the resources, economic and social data which give an overview of the performance of the vessels belonging to each OU, together with information regarding the relation between stocks and fishing vessels, are the minimum information the authorities need to efficiently manage fisheries.

Within the OU approach, attempts to list biological, social and economic data by OU have been made. However most part of the Mediterranean countries do not have a national routine monitoring scheme and there is a lack of information representing the most critical issue on the applicability and effective utility of the OUs as a management tool.

Where a national routine census or sampling scheme is available, it is possible to aggregate these data by OU and perform a management process based on the OU concept. Where these data are not available, the first step must be the implementation of a national routine data collection scheme which should take into account the need to organize data at OU level for management purposes.

5. TESTING THE OU CONCEPT IN A FISHERY MANAGEMENT CONTEXT

The best way to verify the effective utility and feasibility of the OU approach is to test it in areas where there is sufficient data.

Thus, the practical application of the OU approach within a fishery management procedure could be verified by performing some case studies in different areas of the Mediterranean. During the Tangiers meeting, it was suggested that case studies be undertaken to analyse the socio-economic and biological impacts of potential effort reduction strategies in the Adriatic Sea. Other potential areas of applied studies could include the impacts of economic-driven management measures, such as cases where negative profits exist but fishing persists.

6. MAIN CONCLUSIONS

An OU is a group of vessels and its definition has in some cases been attributed to the concept of fleet segmentation. This approach had the advantage of facilitating the economic data collection, since this data exists only at the vessel level; therefore, they could not be divided into multiple OUs during any given period.

The following discussions on this approach highlighted the need of a stronger homogeneity from the biological point of view. The final agreement was to identify an OU as a group of vessels involved in a specific fishing activity and belonging to a fleet segment. In this manner, each fleet segment consists of a number of OUs, and a vessel may switch between OUs. As reported above, this approach does not allow the collection of economic data by OU.

This difficulty was overcome by specifying different levels of aggregation on the basis of the data availability. In particular, the economic data should be collected by fleet segment, while biological data by OU.

A final and agreed data structure was adopted by GFCM at its thirtieth session (Istanbul, January 2006) to collect OU data for management purposes. The four tables are related to structural, biological, socio-economic and catch-effort data, and are named as follows: (i) fleet and area, (ii) main resource and activity components, (iii) economic components, and effort.
As for the economic data, also the effort and landings data in the effort table are generally available only at level of fleet segment. This is a problem and leaves an open-ended question related to the practical use of the data structure proposed. In any case, the main problem remains the data availability in the different areas of Mediterranean, since a routine data collection scheme is not yet in place for many Mediterranean countries, representing the most critical obstacle to the use of the OU approach within a fishery management process.

Although some problems remain, the adoption of the OU data compilation framework and recommendations proposed jointly by SCSI and SCESS, was suggested as follows:

- given that it is necessary to initiate immediately the collection of basic data on effort to transform recommendations on management stocks into effort proposals in an operative way;
- given that a GFCM-approved fleet segmentation exists;
- given that a GFCM agreement on Geographical Statistical Areas (GSA) divisions exists;
- given that the collection of data are produced mostly from national sources;
- given that the collection on effort data is for fisheries management at the GFCM level and this requires the need for homogeneous data, with established data collection and analysis methodologies;
- given that effort description needs to include capacity and activity dimensions;
- given that the basic element that describes the Operational Units is the fleet segment;
- given that the vessels of same economic characteristics, when trying to maximise their profitability, tend to use the same combination of operational activities during the year in a specific area;
- given that the best procedure to develop a database is to collect information starting from basic parameters and advancing towards more complex variables (i.e. from the easiest to the most difficult in terms of data collection);
- given that the vessels characteristics are generally linked to the life-time of the vessel, but that operational activities can change each year depending on biological, legal, and economic conditions; and
- considering that it is a high priority to collect data on the total dimension of the population of effort units (vessels) to allow for the introduction of additional information on fishing activities.

The following recommendations were made concerning the collection and use of OU data:

i. To adopt a table containing fleet data required for defining the OU within a country/sub-area /region (see Table 3.1).

ii. To adopt a table containing operational unit data required for the main resource components variables (see Table 3.2).

iii. To adopt a table containing economic variables by Fleet Segment (see Table 3.3)

iv. To adopt a table containing effort variables by Operational Unit (see Table 3.4)

v. That effort is to be expressed as a product of the capacity and fishing activity for each Operational Unit, even if the landings data are available only at level of fleet segments. This information allows for the estimation of LPUE/CPUE: Landings/catch per unit of effort.

vi. In order to obtain specific catch and effort data, routine fleet and catch-effort data collection schemes must be in place at national level in order to obtain the OU related

data. Sampling schemes do not necessarily need to be designed according to OU stratification, as long as data compilation could be made by OU.

vii. That, when this data collection occurs and if it is deemed necessary, a standardization coefficient could be applied for each fleet segment and activity to obtain a measure of equivalence between the fishing effort of one group of vessels (fleet segment or OU) and another. For example, the fishing mortality factor of each group (estimated by biologists) could be used to standardize the effort measured in Level 1 (eg. 1 unit of fishing effort of a vessel in OU1 is equivalent to x units of fishing effort of a vessel in OU2 targeting the same species or group of species in a particular sub-area).

viii. That a codification scheme to identify OU based on geographical sub-area, country, fleet segment, gear type, and spatial location be tentatively adopted.

ix. That routine fleet and catch / effort data collection schemes must be in place at national level in order to obtain the OU related data. Sampling schemes do not necessarily need to be designed according to OU stratification, as long as data compilation could be made by OU.

x. That, as a follow up to the ADRIAMED study and particularly the COPEMED Coryphaena study, further case studies be undertaken to analyse the socio-economic and biological impacts of potential effort reduction strategies affecting selected OU in particular sub-areas of the Mediterranean. These would help demonstrate the use of the OU approach as a tool for fisheries management.

xi. That, in carrying out work related to OU, collaboration with projects such as FIRMS is important in order to complete the FAO/GFCM inventory of fisheries and marine resources.

xii. That, continued support from FAO subregional projects, along with national commitments, be ensured to maintain sustainable data collection schemes. In the case of EU members a specific attention to the Mediterranean collection of data is required to assure that the collection of data programs are coherent with the needs of GFCM.

Note: The EU fleet segmentation using the Matrix Approach[17] proposed is currently under review and Member States should note that the EU fleet segmentation differs in some aspects from the GFCM-approved fleet segmentation (Appendix 4). There is, therefore, the potential that data collection/manipulation needs will vary amongst Members.

xiii. That all Sub-Committees of SAC should work in the same categories. In particular the SCSA should address the issue as to whether or not biological data could be compiled and assessments be carried out by fleet segments and OU. The Sub-Committee on Marine Environment and Ecosystems (SCMEE) particularly can provide considerations on the incorporation of the ecosystem/environment approach to the OU work.

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Appendix 1

Operational Units Form - Basic Parameters													
Management Unit	**Resource name**	**Main resource component**	**Scientific name***	**Associated species**	**Resources distribution references**[+]	**Base**[#] **ports**	**Gear category**^	**Vessel size class** (length)	**Number of Units** (fishing vessels)	**Fishing period** (months)	**Operational Units name** (in full)	**Economic structure**[~]	**Comments**

* of main resource components
+ if available
# operative
^ FAO classification
~ type of information for this field has yet to be identified

Appendix 2: Lists of minimum data requirements

Socio-economic data recommended by the Sub-Committee on Economic and Social Sciences and accepted by the SAC, 2002:

Macro-level data:	**Micro-level (vessel) data:**
Import/export weight and value	Number of vessels
Annual interest rate	Gross tonnage
Population	Horse power
Working population	Employment
Gross national product	Salary share %
Aquaculture production weight and value	Landings weight
	Landings value
	vessel value
	number of days fishing /year
	number of fishing hours/day
	cost of fishing/day
	yearly fixed costs

Although still in the early stages of development, the SCESS proposed to the SAC the following list of sociological data to be gathered for each vessel:

Age of each crew member
Number of years of active fishing for each crew member
Capital ownership of each crew member
Educational attainment of each crew member
Household structure of each crew member
Social background
Professional experience

Resource-based data recommended by the Sub-Committee on Statistics and Information:

As far as the resource-base data set is concerned, this should contain seasonal catch and effort estimates by target and associated species in each sub-regional area, by operational port and by fleet (vessel/gear) grouping.

Appendix 3: Fleet segmentation

Groups	< 6 metres	6-12 metres	12-24 metres	More than 24 metres
1. Minor gear without engine	A	⇐		
2. Minor gear with engine	B	C		
3. Trawl	⇒	D	E	F
4. Purse seine		G	H	⇐
5. Longline			I	
6. Pelagic trawl		⇒	J	⇐
7. Tuna seine			K	⇐
8. Dredge		⇒	L	
9. Polyvalent			M	

Segments description

A – Minor gear without engine. All vessels less than 6 metres in length without an engine (wind or oar propulsion). Exceptionally, vessels without engine longer than 6 metres can be included.
B – Minor gear with engine less than 6 m. length. All vessels under 6 metres length with engine, excluding trawl vessels.
C – Minor gear with engine between 6 to 12 metres. All vessels between 6 to 12 metres length with engine, excluded specific gears as demersal trawl, purse seine, pelagic trawl and dredge.
D – Trawlers less than 12 m. length. All demersal trawlers less than 12 metres. Exceptionally, trawl vessels under 6 metres can be included.
E – Trawlers between 12 to 24 m. Demersal trawl between 12 to 24 metres.
F – Trawlers of more than 24 m. Demersal trawl with length of more than 24 metres
G – Purse seines between 6 to 12 m.
H – Purse seines between 12 to 24 m. Excluded tuna seine. Exceptionally, purse seines vessels of more than 24 metres, can be included
I – Long line of more than 12 m. Long line as exclusive gear more than 12 m. Exceptionally, vessels more than 24 metres, can be included.
J – Pelagic trawlers. All Pelagic Trawl vessels, but normally this group is between 12 to 24 metres.
K – Tuna seine. All tuna seine vessels.
L – Dredge. All dredge vessels. Normally this group is between 12 to 24 metres, but exceptionally dredges under 12 metres can be included.
M – Polyvalent (and other) longer than 12 m**.** All vessels longer than 12 metres, that use different gears along the year or use a gear not already listed in this classification.

Appendix 4: Example of linking FAO–SAC fleet segments data with main fishing stocks in the GFCM Geographical Sub-Area 9

FAO 09

	Fleet Segments														
FAO Code	A	B	C	D	E	F	G	H	I	J	K	L	M	Scientific Name	FAO Name
ALB							X	X			X		X	Thunnus alalunga	Albacore
AMB		X	X	X	X	X							X	Seriola dumerili	Greater amberjack
ANE	X	X	X	X	X	X	X	X			X		X	Engraulis encrasicolus	European anchovy
ARA				X	X	X							X	Aristeus antennatus	Blue and red shrimp
BFT				X	X	X							X	Thunnus thynnus	Northern bluefin tuna
BOZ	X	X	X	X	X	X	X	X	X		X		X	Boops spp	Bogues nei
CGZ		X	X	X	X	X			X				X	Conger spp	Conger eel
CNZ				X	X	X							X	Crangon spp	Shrimps
CRS				X	X	X							X	Portunus spp	Swimcrabs
CRU		X	X	X	X	X							X	Crustacea	Marine crustaceans nei
CTL		X	X	X	X	X							X	Sepiidae, Sepiolidae	Cuttlefishes, bobtail squids
DGZ		X	X	X	X	X							X	Squalus spp	Dogfishes nei
DPS				X	X	X							X	Parapenaeus longirostris	Deepwater rose shrimp
FIN	X	X	X	X	X	X	X	X	X		X		X	Osteichthyes	Finfishes nei
GAR														Belone belone	Garfish
GUX		X	X	X	X	X							X	Triglidae	Gurnards, searobins nei
HKE		X	X	X	X	X							X	Merluccius merluccius	European hake
JAX		X	X	X	X	X	X	X			X		X	Trachurus spp	Jack and horse mackerels nei
LBE		X	X	X	X	X							X	Homarus gammarus	European lobster
LNZ														Molva spp	Lings nei
MAC		X	X	X	X	X	X	X			X		X	Scomber scombrus	Atlantic mackerel
MAZ		X	X	X	X	X	X	X			X		X	Scomber spp	Scomber mackerels nei
MEG				X	X	X							X	Lepidorhombus whiffiagonis	Megrim
MNZ		X	X	X	X	X							X	Lophius spp	Monkfishes nei
MOL		X	X	X	X	X	X	X			X	X	X	Mollusca	Marine molluscs nei
MTS		X	X	X	X	X							X	Squilla mantis	Mantis squillid
MUL		X	X	X	X	X	X	X			X		X	Mugilidae	Mullets nei
MUR		X	X	X	X	X							X	Mullus surmuletus	Red mullet
MUT		X	X	X	X	X							X	Mullus barbatus	Striped mullet
NEP				X	X	X							X	Nephrops norvegicus	Norway lobster
OCM		X	X	X	X	X							X	Eledone spp	Horned and musky octopuses
OCZ		X	X	X	X	X							X	Octopus spp	Octopuses
OMZ		X	X	X	X	X	X	X			X		X	Ommastrphidae	Squids
PAC		X	X	X	X	X							X	Pagellus erythrinus	Common pandora
PDZ														Pandalidae	Prawns
PIC		X	X	X	X	X							X	Spicara spp	Picarels
PIL		X	X	X	X	X	X	X			X		X	Sardina pilchardus	European pilchard
POD														Trisopterus minutus capelanus	Poor cod
SDV		X	X										X	Mustelus spp	Smoothhounds
SIL				X	X	X							X	Atherinidae	Silversides (Sand smelts)
SJA														Pecten jacobeus	Great scallop
SKX		X	X	X	X	X							X	Elasmobranchii	Sharks, rays and skates etc.
SOL		X	X	X	X	X							X	Solea vulgaris	Common sole
SPR														Sprattus sprattus	European sprat
SRX		X	X	X	X	X							X	Rajiformes	Skate and Rays, nei
SVE												X		Venus gallina	Striped venus
SWO		X	X	X	X	X	X	X	X		X		X	Xiphias gladius	Swordfish
TGS		X	X	X	X	X							X	Penaeus kerathurus	Caramote prawn
TUN		X	X	X	X	X	X	X			X		X	Thunnini	Tunas nei
WHB				X	X	X							X	Micromesistius poutassou	Blue whiting
WHG				X	X	X							X	Merlangius merlangus	Whiting

Source: IREPA

Appendix 5: Description of the four Operational Units tables

Table 1 - Fleet and area (Appendix 6)

GSA: GFCM Geographical Sub-Area (i.e. 17 or 18)

Country: self-explanatory (i.e. Albania, Croatia, Italy, Serbia and Montenegro, Slovenia)

OU code: alphanumeric code composed as follows:
First three characters indicate the United Nations country abbreviation (Albania: ALB; Croatia: HRV; Italy: ITA; Serbia and Montenegro: SCG; Slovenia: SLV).
Followed by two-digit number to mean the GSA number (17 or 18).
Then the fishing gear is given abbreviated (two or three characters) according to the International Standard Statistical Classification of Fishing Gear (ISSCFG).
Last two digit number indicate the specific Operational Unit number.

Gear type: refer to the International Standard Statistical Classification of Fishing Gear (ISSCFG).

Vessel segment (LOA): self-explanatory (length overall).

Cross reference to SAC table: the previous entry (Vessel segment) needs, always when possible, to be cross-referred with the standardized fleet segmentation of the SAC.

Vessel N.: Number of fishing vessels belonging to the given Operational Unit.

Main fishing zones: self explanatory. In the future it might require a better definition to be agreed
upon.

Base ports: port/s of operation of the given OU.

Table 2 - Main resource components (Appendix 7)

OU code: as above

Target species (FAO Code): scientific name of the bio-economically most important target species (up to a maximum of five species).

FAO species code: The FAO three-letter code based on the English common name as from the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP).

Main associated exploited resources: the species, species group or assemblage exploited in association with the target species previously indicated.

Fishing period: self-explanatory.

Table 3 – Effort (Appendix 8)

OU code: as above

Effort measure: the effort measures used (e.g. trawling hours, net length, number of hooks, etc.)

Effort unit: the unit in which effort measure is expressed.

CPUE: Catch Per Unit of Effort

Table 4 – Economic structure (Appendix 9)

Vessel N.: Number of fishing vessels belonging to the given Operational Unit.

Gross tonnage: Total gross tonnage of fishing vessels belonging to the given Operational Unit.

Horse power: Total engine power of fishing vessels belonging to the given Operational Unit.

Employment: Total number of people employed on fishing vessels belonging to the given Operational Unit. The number of crew members can be estimated on a full time equivalent (FTE) basis.

Salary share %: Percentage of the revenues after discounting commercial costs, daily costs and fuel costs that pertain to the crew. It will be distributed among the crew as salary.

Landing weight: Total landings in weight.

Landing value: The volume of landed fish valued against actual market prices. It equals to quantities landed (6) multiplied by the landing average price.

Vessel value: This is defined as total invested capital – value of hull, engine, gear and equipment. The replacement-value method can be used to estimate this parameter.

Fishing days/year: Number of fishing days per year.

Fishing hours/day: Number of fishing hours per day.

Cost of fishing/day: These include daily expenses incurred in fishing activity, such as fuel, lubricants, etc. They are variable costs which depend on the time spent to fish.

Yearly fixed costs: These comprise costs not directly connected with operational activity, such as non-routine maintenance, vessel insurance, taxes and dues, etc. The fixed costs are all the costs that are inevitable to pay yearly, independently from the time spent to fish.

Appendix 6: Fleet and area

GSA	Country	OU code	Gear type	Vessel segment (LOA)	Cross reference SAC table	Vessel N.	Main fishing zones	Base ports
17	Italy	ITA17HMD01	Hidraulic Mec-Dredge	12-24 m	L	42	Coastal zone MN	Grado-Marano
17	Italy	ITA17HMD02	Hidraulic Mec-Dredge	12-24 m	L	82	Coastal zone VE	Caorle-Venezia
17	Italy	ITA17HMD03	Hidraulic Mec-Dredge	12-24 m	L	83	Coastal zone CI	Chioggia-Pila
17	Italy	ITA17HMD04	Hidraulic Mec-Dredge	12-24 m	L	19	Coastal zone RA	Goro-P.to Garibaldi-Ravenna-Cervia
17	Italy	ITA17HMD05	Hidraulic Mec-Dredge	12-24 m	L	37	Coastal zone RM	Cesenatico-Bellaria-Rimini-Cattolica
17	Italy	ITA17HMD06	Hidraulic Mec-Dredge	12-24 m	L	64	Coastal zone PS	Gabicce-Fano
17	Italy	ITA17HMD07	Hidraulic Mec-Dredge	12-24 m	L	73	Coastal zone AN	Senigallia-Ancona-P.to Civitanova M.
17	Italy	ITA17HMD08	Hidraulic Mec-Dredge	12-24 m	L	83	Coastal zone SB	P.to San Giorgio- S.Benedetto Tronto
17	Italy	ITA17HMD09	Hidraulic Mec-Dredge	12-24 m	L	103	Coastal zone PC	Giulianova-Pescara-Ortona-Vasto
17	Italy	ITA17HMD10	Hidraulic Mec-Dredge	12-24 m	L	9	Coastal zone TM	Termoli
17	Italy	ITA17PTM01	pair trawl	all	J	92	North Adriatic	Chioggia-P.to Garibaldi-Cesenatico-Rimini
17	Italy	ITA17PTM02	pair trawl	all	J	20	Central Adriatic	Ancona
17	Italy	ITA17PS01	Purse seine	all	G-H	24	North Adriatic	Trieste-Chioggia
17	Italy	ITA17PS02	Purse seine	all	H	14	Central Adriatic	S.Benedetto Tronto-Pescara
17	Italy	ITA17LL01	Long lines	all	I	14	North and Central Adriatic	Fano
17	Italy	ITA17PS03	Purse seine (Tuna)	all	K	13	North and Central Adriatic	Cesenatico-Pescara
17	Italy	ITA17MG01	Minor gear	all	B-C	895	Coastal of Veneto and Friuli Venezia Giulia	Grado-Marano-Caorle-Chioggia-Pila
17	Italy	ITA17MG02	Minor gear	all	B-C	1030	Coastal of Emilia Romagna and Marche	Goro-P.to Garibaldi-Cesenatico-Rimini-Cattolica-Fano-Ancona
17	Italy	ITA17MG03	Minor gear	all	B-C	400	Coastal of Abruzzo and Molise	Giulianova-Pescara-Ortona-Termoli
17	Italy	ITA17OTB01	Bottom trawl	< 12 m	D	57	3-6 miles off coast of Veneto	Grado-Marano-Caorle-Chioggia-Pila
17	Italy	ITA17OTB02	Bottom trawl	12-18 m	E	187	3-12 miles off coast of Veneto	Grado-Marano-Caorle-Chioggia-Pila
17	Italy	ITA17OTB03	Bottom trawl	> 18 m	E-F	83	3-40 miles North Adriatic	Caorle-Chioggia
17	Italy	ITA17OTB04	Bottom trawl	< 12 m	D	48	3-6 miles off coast Emilia Romagna and Marche	Goro-P.to Garibaldi- Cesenatico-Rimini-Fano-S.Benedetto Tronto
17	Italy	ITA17OTB05	Bottom trawl	12-18 m	E	208	3-12 miles off coast Emilia Romagna and Marche	Goro-P.to Garibaldi- Cesenatico-Rimini-Fano-S.Benedetto Tronto
17	Italy	ITA17OTB06	Bottom trawl	> 18 m	E-F	225	3-40 miles north area Central Adriatic	P.to Garibaldi-Cesenatico-Rimini-Fano-Ancona-Civitanova M.-S.Benedetto Tronto
17	Italy	ITA17OTB07	Bottom trawl	< 12 m	D	7	3-6 miles off coast Abruzzo and Molise	Giulianova-Pescara-Ortona-Vasto-Termoli

GSA	Country	OU code	Gear type	Vessel segment (LOA)	Cross reference SAC table	Vessel N.	Main fishing zones	Base ports
17	Italy	ITA17OTB08	Bottom trawl	12-18 m	E	57	3-12 miles off coast Abruzzo and Molise	Giulianova-Pescara-Ortona-Vasto-Termoli
17	Italy	ITA17OTB09	Bottom trawl	> 18 m	E-F	118	3-40 miles Central Adriatic	Giulianova-Pescara-Ortona-Vasto-Termoli
17	Slovenia	SVN17GNS01	Set gillnets (anchored)	<12	B-C	104	Territorial waters	Koper, Izola, Piran
17	Slovenia	SVN17GNS02	Set gillnets (anchored)	12-18	M	3	Territorial waters	Izola, Koper
17	Slovenia	SVN17OTB01	Bottom otter trawls	<12	C-D	7	Territorial waters	Koper, Izola, Piran
17	Slovenia	SVN17OTB02	Bottom otter trawls	12-18	C-E	10	Territorial waters	Koper, Izola, Piran
17	Slovenia	SVN17PS101	Purse seines	<12	G	1	Territorial waters	Koper
17	Slovenia	SVN17PS102	Purse seines	12-18	H	3	Territorial waters	Izola, Koper
17	Slovenia	SVN17PTM01	Midwater pair trawls	>18	J	2	Territorial waters and international waters of North Adriatic	Izola
17	Croatia	HRV17PT01	Midwater pair trawl	> 12 m	J	16	North Adriatic waters	Pula, Rijeka, Senj, Zadar
17	Croatia	HRV17PT02	Midwater pair trawl	> 12 m	J	4	Mid-Adriatic waters	Split, Sibenik, Dubrovnik
17	Croatia	HRV17PS01	Purse seines	< 12 m	G	24	North Adriatic waters	Pula, Rijeka, Zadar
17	Croatia	HRV17PS02	Purse seines	< 12 m	G	26	Mid-Adriatic waters	Split, Sibenik, Dubrovnik
17	Croatia	HRV17PS03	Purse seines	> 12 m	G	106	North Adriatic waters	Rijeka, Zadar, Pula
17	Croatia	HRV17PS04	Purse seines	> 12 m	H	77	Mid-Adriatic waters	Split, Sibenik, Dubrovnik
17	Croatia	HRV17OTB01	Bottom otter trawl	< 12 m	D	190	Western Istrian coast	Umag, Poreč, Rovinj, Pula
17	Croatia	HRV17OTB02	Bottom otter trawl	< 12 m	D	170	Channel area of northern Adriatic Sea	Rijeka, Opatija, Krk, Cres, Rab, Novalja, Zadar
17	Croatia	HRV17OTB03	Bottom otter trawl	< 12 m	D	155	Channel area of central Adriatic Sea	Šibenik, Rogoznica, Murter, Tribunje, Split, Hvar, Dubrovnik
17	Croatia	HRV17OTB04	Bottom otter trawl	12-18 m	E	168	Channel area of northern Adriatic Sea and open northern Adriatic Sea	Rijeka, Opatija, Krk, Cres, Rab, Novalja, Zadar
17	Croatia	HRV17OTB05	Bottom otter trawl	12-18 m	E	109	Channel area of central Adriatic Sea and open central Adriatic Sea	Šibenik, Rogoznica, Murter, Tribunje, Split, Hvar, Komiža,Vela Luka, Makarska, Dubrovnik
17	Croatia	HRV17OTB06	Bottom otter trawl	> 18 m	E-F	63	Open Adriatic Sea	Rijeka, Pula, Šibenik, Rogoznica, Murter, Split, Vela Luka, Komiža, Dubrovnik
18	Serbia and Montenegro	SCG18OTB01	Bottom otter trawl	< 12 m	D	3	South eastern Adriatic, Montenegrin shelf	
18	Serbia and Montenegro	SCG18OTB02	Bottom otter trawl	12-18 m	E	8	South eastern Adriatic, Montenegrin shelf	
18	Serbia and Montenegro	SCG18OTB03	Bottom otter trawl	> 18 m	E-F	5	South eastern Adriatic, Montenegrin shelf and upper slope	
18	Serbia and Montenegro	SCG18PS01	Purse seine	< 6 m	B	7	South eastern Adriatic, Boka Kotorska Bay	
18	Serbia and Montenegro	SCG18PS02	Purse seine	> 6 m	G	4	South eastern Adriatic, Bigova Bay	

GSA	Country	OU code	Gear type	Vessel segment (LOA)	Cross reference SAC table	Vessel N.	Main fishing zones	Base ports
18	Serbia and Montenegro	SCG18SV01	Boat or vessel seines	< 6	A - B	23		
18	Serbia and Montenegro	SCG18SV02	Boat or vessel seines	> 6	A - C	2		
18	Serbia and Montenegro	SCG18GNS01	Set gillnet	< 6 m	A - B	34	South eastern Adriatic, Montenegrin shelf	
18	Serbia and Montenegro	SCG18GNS02	Set gillnet	6 - 12 m	C	8	South eastern Adriatic, Montenegrin shelf	
18	Serbia and Montenegro	SCG18NK01	Minor gear	< 6 m	A - B	96	South eastern Adriatic, Montenegrin shelf	
18	Serbia and Montenegro	SCG18NK02	Minor gear	> 6 m	A - C	31	South eastern Adriatic, Montenegrin shelf	
18	Albania	ALB18PS01	Purse seine	< 12 m.	G	1	Central Albanian Coast	Durrës
18	Albania	ALB18PS02	Purse seine	12-24 m.	H	6	Albanian Shelf	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18TB01	Bottom trawls	< 12 m.	D	4	Albanian Coast	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18TB02	Bottom trawls	12-18 m.	E	53	Albanian Shelf	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18TB03	Bottom trawls	18-24 m.	E	48	Albanian Shelf	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18TB04	Bottom trawls	> 24 m.	F	24	Albanian Shelf	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18GEN01	Gillnets and entangling nets	< 12 m.	C	37	Albanian Coast	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18GEN02	Gillnets and entangling nets	12-18 m.	M	12	Albanian Shelf	Durrës, Shëngjin, Vlorë, Sarandë
18	Albania	ALB18LX01	Hooks and lines	< 12 m.	B-C	4	Albanian Coast	Durrës, Vlorë, Sarandë
18	Albania	ALB18LX02	Hooks and lines	12-18 m.	I	1	South Albanian Shelf	Vlorë, Sarandë
18	Albania	ALB18NK01	Minor gear	< 12 m.	C	4	South Albanian Coast	Vlorë, Sarandë
18	Albania	ALB18NK02	Polyvalent	12-24 m.	M	2	South Albanian Shelf	Vlorë, Sarandë
18	Italy	ITA18OTB01	Bottom otter trawl	< 12 m	D	7	North and Central western shelf	Pietre Nere, Capoiale, Rodi Garganico, Peschici, Vieste, Manfredonia, Margherita di Savoia, Barletta, Trani, Bisceglie, Giovinazzo, Molfetta, Giovinazzo, Bari

GSA	Country	OU code	Gear type	Vessel segment (LOA)	Cross reference SAC table	Vessel N.	Main fishing zones	Base ports
18	Italy	ITA18OTB02	Bottom otter trawl	12-18 m	E	245	Western shelf and upper slope	Rodi Garganico, Peschici, Vieste, Manfredonia, Margherita di Savoia, Barletta, Trani, Bisceglie, Giovinazzo, Molfetta, Giovinazzo, Bari, Mola, Monopoli, Brindisi, S. Cataldo, S. Foca, Otranto
18	Italy	ITA18OTB03	Bottom otter trawl	> 18 m	E-F	178	Western shelf and upper slope	Rodi Garganico, Vieste, Molfetta, Bari, Mola, Monopoli, Brindisi, Otranto
18	Italy	ITA18HMD01	Hidraulic Mec-Dredge	12-24 m	L	61	North western shelf up to 10 m depth	Pietre Nere, Capoiale, Rodi Garganico, Peschici, Manfredonia, Margherita di Savoia
18	Italy	ITA18HMD02	Hidraulic Mec-Dredge	12-24 m	L	12	Central western shelf up to 10 m depth	Barletta
18	Italy	ITA18PS01	Purse seine	all	G-H	25	North-western Area	Vieste, Trani, Bisceglie, Molfetta
18	Italy	ITA18PTM01	Midwater pair trawl	all	J	12	Northern and Central western areas	Trani, Bisceglie, Molfetta
18	Italy	ITA18NK01	Minor gear	<12	B-C	449	North-western coastal area	Pietre Nere, Capoiale, Rodi Garganico, Peschici, Vieste, Manfredonia, Margherita di Savoia, Barletta, Trani, Bisceglie,
18	Italy	ITA18NK02	Minor gear	<12	B-C	104	South-western coastal areas	Torre a Mare, Mola, Monopoli, Polignano, Savelletri, Torre Canne, Villanova, Brindisi, Casalabate, S. Cataldo, S. Foca,
18	Italy	ITA18NK03	Polyvalent	>12	M	188	South-western offshore areas	Mola, Monopoli, Savelletri, Otranto

Appendix 7: Main resource component

O.U. code	Target species	FAO species code	Main associated exploited resources	Fishing period
ITA17HMD01	Venus gallina	SVE	Ensis minor, Callista chione	All year
ITA17HMD02	Venus gallina	SVE	Ensis minor, Callista chione	All year
ITA17HMD03	Venus gallina	SVE	Ensis minor, Callista chione	All year
ITA17HMD04	Venus gallina	SVE	Ensis minor	All year
ITA17HMD05	Venus gallina	SVE	Ensis minor	All year
ITA17HMD06	Venus gallina	SVE	Ensis minor	All year
ITA17HMD07	Venus gallina	SVE	Ensis minor	All year
ITA17HMD08	Venus gallina	SVE	Ensis minor	All year
ITA17HMD09	Venus gallina	SVE	Ensis minor	All year
ITA17HMD10	Venus gallina	SVE	Ensis minor	All year
ITA17PTM01	Engraulis encrasicholus, Sardina pilchardus	ANE-PIL	Sprattus sprattus, Scomber scomber	All year
ITA17PTM02	Engraulis encrasicholus, Sardina pilchardus	ANE-PIL	Trachurus sp, Scomber sp.	All year
ITA17PS01	Engraulis encrasicholus, Sardina pilchardus	ANE-PIL	Scomber sp	April - October
ITA17PS02	Engraulis encrasicholus	ANE-PIL	Trachurus sp, Scomber sp.	All year
ITA17LL01	Thunnus thynnus, Xiphias gladius	BFT- SWO	Thunnus, alalunga	All year
ITA17PS03	Thunnus thynnus	BFT	Thunnus, alalunga	March - October
ITA17MG01	Sepia officinalis, Solea vulgaris, Squilla mantis	CTC-SOL-MTS	Nassa mutabilis, Trigla lucerna	All year
ITA17MG02	Sepia officinalis, Solea vulgaris, Squilla mantis	CTC-SOL-MTS	Nassa mutabilis, Trigla lucerna	All year
ITA17MG03	Sepia officinalis, Solea vulgaris, Squilla mantis	CTC-SOL-MTS	Nassa mutabilis	All year
ITA17OTB01	Sepia officinali, Soleidi, Atherina	CTC-SOO-ATB	Demersal species	All year
ITA17OTB02	Loligo, Merlangus, Mullus	SQR-WHG-MUT	Demersal species	All year
ITA17OTB03	Mullus, Pecten, Eledone moschata	MUT-SJA-EDT	Demersal species	All year
ITA17OTB04	Squilla, Mullus, Sepia, Soleidi	MTS-CTC-SOO-MUT	Demersal species	All year
ITA17OTB05	Squilla, Mullus, Trisopterus	MTS-MUT-POD	Demersal species	All year
ITA17OTB06	Mullus, Trisopterus, Merluccius, Nephrops	MUT-POD-HKE-NEP	Demersal species	All year
ITA17OTB07	Mullus, Squilla, Sepia	MUT-MTS-CTC	Demersal species	All year
ITA17OTB08	Merluccius, Mullus, Nephrops	HKE-MUT-NEP	Demersal species	All year
ITA17OTB09	Merluccius, Mullus, Nephrops	HKE-MUT-NEP	Demersal species	All year
SVN17GNS01	Merlangius merlangus, Pagellus erythrinus, Solea solea, Platichthys flesus	WHG, PAC, SOL, FLE	Demersal species	All year
SVN17GNS02	Merlangius merlangus, Pagellus erythrinus, Solea solea, Platichthys flesus	WHG, PAC, SOL, FLE	Demersal species	All year
SVN17OTB01	Eledone moschata, Merlangius merlangus, Spicara flexuosa, Pagellus erythrinus, Sepia officinalis	EDT, WHG, PIC, PAC, CTC	Demersal species	All year
SVN17OTB02	Eledone moschata, Merlangius merlangus, Spicara flexuosa, Pagellus erythrinus, Sepia officinalis	EDT, WHG, PIC, PAC, CTC	Demersal species	All year
SVN17PS101	Sardina pilchardus, Engraulis encrasicolus, Mugilidae	PIL, ANE, MUL	Small pelagic species	All year
SVN17PS102	Sardina pilchardus, Engraulis encrasicolus, Mugilidae	PIL, ANE, MUL	Small pelagic species	All year
SVN17PTM01	Sardina pilchardus	PIL	Small pelagic species	All year
HRV17PT01	Sardina pilchardus, Engraulis encrasicolus	PIL, ANE	Small pelagic species	All year
HRV17PT02	Sardina pilchardus, Engraulis encrasicolus	PIL, ANE	Small pelagic species	All year
HRV17PS01	Sardina pilchardus, Engraulis encrasicolus	PIL, ANE	Small pelagic species	All year
HRV17PS02	Sardina pilchardus, Engraulis encrasicolus	PIL, ANE	Small pelagic species	All year
HRV17PS03	Sardina pilchardus, Engraulis encrasicolus	PIL, ANE	Small pelagic species	All year

O.U. code	Target species	FAO species code	Main associated exploited resources	Fishing period
HRV17PS04	Sardina pilchardus, Engraulis encrasicolus	PIL, ANE	Small pelagic species	All year
HRV17OTB01	Loligo vulgaris, Eledone moschata, Merlangius merlangus, Sepia officinalis	SQR, EDT, WGH, CTC	Demersal species	all year
HRV17OTB02	Merluccius merluccius, Mullus barbatus, Eledone moschata, Nephrops norvegicus, Trisopterus min. capellanus	HKE, MUT, EDT, NEP, POD	Demersal species	all year
HRV17OTB03	Merluccius merluccius, Mullus barbatus, Eledone moschata, Pagellus erythrinus, Lophius budegassa	HKE, MUT, EDT, PAC, ANK	Demersal species	all year
HRV17OTB04	Merluccius merluccius, Mullus barbatus, Eledone moschata, Octopus vulgaris, Pagellus erythrinus	HKE, MUT, EDT, OCC, PAC	Demersal species	all year
HRV17OTB05	Merluccius merluccius, Mullus barbatus, Pagellus erythrinus, Nephrops norvegicus, Parapenaeus longirostris	HKE, MUT, PAC, NEP, DPS	Demersal species	all year
HRV17OTB06	Merluccius merluccius, Mullus barbatus, Nephrops norvegicus, Parapenaeus longirostris, Eledone spp.	HKE, MUT, NEP, DPS, OCM	Demersal species	all year
SCG18OTB01	Mullus barbatus, Merluccius merluccius, Parapenaeus longirostris, Eledone spp.	HKE, MUT DPS, OCM	Demersal species	all year
SCG18OTB02	Merluccius merluccius, Mullus spp., Parapenaeus longirostris, Eledone spp.	HKE, MUX, OCM, DPS	Demersal species	all year
SCG18OTB03	Merluccius merluccius, Mullus spp., Parapenaeus longirostris, Eledone spp.	HKE, MUX, OCM, DPS	Demersal species	all year
SCG18PS01	Sardina pilchardus, Engraulis encrasicolus, Sarda sarda, Scomber japonicus	PIL, ANE, BON, MAS	Pelagic species	all year
SCG18PS02	Sardina pilchardus, Engraulis encrasicolus, Sarda sarda, Scomber japonicus	PIL, ANE, BON, MAS	Pelagic species	all year
SCG18SV01	Sardina pilchardus, Engraulis encrasicolus, Sarda sarda, Scomber japonicus	PIL, ANE, BON, MAS	Pelagic species	all year
SCG18SV02	Sardina pilchardus, Engraulis encrasicolus, Sarda sarda, Scomber japonicus	PIL, ANE, BON, MAS	Pelagic species	all year
SCG18GNS01	Scorpaena porcus, Octopus vulgaris, Sciaena umbra, Diplodus vulgaris, Puntazzo puntazzo	BBS, OCC, CBM, CTB, SHR	Demersal and semipelagic species	September - April
SCG18GNS02	Scorpaena porcus, Octopus vulgaris, Sciaena umbra, Diplodus vulgaris, Puntazzo puntazzo	BBS, OCC, CBM, CTB, SHR	Demersal and semipelagic species	September - April
SCG18NK01	Mustelus mustelus, Merluccius merluccius, Chelidonichthys lucerna, Scorpaena scrofa	SMD, HKE, GUU, RSE	Demersal species	all year
SCG18NK02	Mustelus mustelus, Merluccius merluccius, Trigla lucerna, Scorpaena scrofa	SMD, HKE, GUU, RSE	Demersal species	all year
ALB18PS01	Sardina pilchardus, Engraulis engrasicolus, Scomber scombrus	PIL, ANE, MAC	Trachurus trachurus, Pelamus pelamus	all year
ALB18PS02	Sardina pilchardus, Engraulis engrasicolus, Scomber scombrus	PIL, ANE, MAC	Trachurus trachurus, Pelamus pelamus	all year
ALB18TB01	Mullus barbatus, Merluccius merlucius, Aristeus antennatus	MUT, HKE, ARA	Solea vulgaris, Raja, sp., Octopus sp.	all year
ALB18TB02	Mullus barbatus, Merluccius merlucius, Aristeus antennatus	MUT, HKE, ARA	Solea vulgaris, Raja, sp., Octopus sp.	all year
ALB18TB03	Mullus barbatus, Merluccius merlucius, Aristeus antennatus	MUT, HKE, ARA	Solea vulgaris, Raja, sp., Octopus sp.	all year
ALB18TB04	Mullus barbatus, Merluccius merlucius, Aristeus antennatus	MUT, HKE, ARA	Solea vulgaris, Raja, sp., Octopus sp.	all year
ALB18GEN01	Sparidae,	SBX	Dicentrarchus labrax	all year
ALB18GEN02	Sparidae,	SBX	Dicentrarchus labrax	all year
ALB18LX01	Dentex dentex, Epinephelus sp.	DEC, GPX	Conger, Mustelus	all year
ALB18LX02	Dentex dentex, Epinephelus sp.	DEC, GPX	Conger, Mustelus	all year
ALB18NK01				
ALB18NK02				

O.U. code	Target species	FAO species code	Main associated exploited resources	Fishing period
ITA18OTB01	Mullus barbatus, Merluccius merluccius, Eledone spp., Squilla mantis, Sepia officinalis	MUT, HKE, OCM, MTS, CTC	Demersal species	all year
ITA18OTB02	Merluccius merluccius, Mullus spp., Eledone spp., Parapenaeus longirostris, Nephrops norvegicus	HKE, MUX, OCM, DPS, NEP	Demersal species	all year
ITA18OTB03	Merluccius merluccius, Mullus spp., Eledone spp., Parapenaeus longirostris, Nephrops norvegicus	HKE, MUX, OCM, DPS, NEP	Demersal species	all year
ITA18HMD01	Chamelea gallina	SVE	Acanthocardia tuberculata, Solenidae	all year
ITA18HMD02	Chamelea gallina	SVE	Acanthocardia tuberculata	all year
ITA18PS01	Engraulis encrasicolus, Sardina pilchardus	ANE, PIL	Sardinella aurita, Sprattus sprattus, Scomber spp., Trachurus spp., other pelagics	all year
ITA18PTM01	Engraulis encrasicolus, Sardina pilchardus	ANE, PIL	Sardinella aurita, Sprattus sprattus, Scomber spp., Trachurus spp., other pelagics	all year
ITA18NK01	Sepia officinalis, Solea vulgaris, Sparidae, Mullus spp., Squilla mantis / Sepia officinalis	CTC, SOL, SBX, MUX, MTS / CTC	Demersal species	all year / seasonal
ITA18NK02	Mullus spp., Sepia officinalis, Octopus vulgaris, Sparidae, Scorpaenidae	MUX, CTC, OCC, SBX, SCO	Demersal species	all year
ITA18NK03	Merluccius merluccius, Trigla lucerna, Pagellus bogaraveo / Xiphias gladius, Thunnus alalunga	HKE, GUU, SBR / SWO, ALB	Demersal species, Thunnus thynnus, Prionace glauca, Sarda sarda, Tunas nei	all year / seasonal

Appendix 8: Effort

OU code	Effort measure	Effort unit	CPUE
ITA17HMD01	dredged bottom surface	1000 square m.	
ITA17HMD02	dredged bottom surface	1000 square m.	
ITA17HMD03	dredged bottom surface	1000 square m.	
ITA17HMD04	dredged bottom surface	1000 square m.	
ITA17HMD05	dredged bottom surface	1000 square m.	
ITA17HMD06	dredged bottom surface	1000 square m.	
ITA17HMD07	dredged bottom surface	1000 square m.	
ITA17HMD08	dredged bottom surface	1000 square m.	
ITA17HMD09	dredged bottom surface	1000 square m.	
ITA17HMD10	dredged bottom surface	1000 square m.	
ITA17PTM01	trawling hours	1 hour	
ITA17PTM02	trawling hours	1 hour	
ITA17PS01	fishing sets	fishing set	
ITA17PS02	fishing sets	fishing set	
ITA17LL01	N° hooks	100 hooks/1000 hooks	
ITA17PS03	fishing sets	fishing set	
ITA17MG01	net length/N° traps	1000 square m/trap	
ITA17MG02	net length/N° traps	1000 square m/trap	
ITA17MG03	net length/N° traps	1000 square m/trap	
ITA17OTB01	trawling hours	1 hour	
ITA17OTB02	trawling hours	1 hour	
ITA17OTB03	trawling hours	1 hour	
ITA17OTB04	trawling hours	1 hour	
ITA17OTB05	trawling hours	1 hour	
ITA17OTB06	trawling hours	1 hour	
ITA17OTB07	trawling hours	1 hour	
ITA17OTB08	trawling hours	1 hour	
ITA17OTB09	trawling hours	1 hour	
SVN17GNS01	net length	1000 m	
SVN17GNS02	net length	1000 m	
SVN17OTB01	trawling hour	1 hour	
SVN17OTB02	trawling hour	1 hour	
SVN17PS101	fishing sets	fishing set	
SVN17PS102	fishing sets	fishing set	
SVN17PTM01	trawling hour	1 hour	
HRV17PT01	Fishing hour	1 hour	
HRV17PT02	Fishing hour	1 hour	
HRV17PS01	fishing sets	fishing set	
HRV17PS02	fishing sets	fishing set	
HRV17PS03	fishing sets	fishing set	
HRV17PS04	fishing sets	fishing set	
HRV17OTB01	trawling hours	1 hour	
HRV17OTB02	trawling hours	1 hour	
HRV17OTB03	trawling hours	1 hour	
HRV17OTB04	trawling hours	1 hour	
HRV17OTB05	trawling hours	1 hour	
HRV17OTB06	trawling hours	1 hour	
SCG18OTB01	trawling hour	1 hour	
SCG18OTB02	trawling hour	1 hour	
SCG18OTB03	trawling hour	1 hour	
SCG18PS01	net length	100 m	
SCG18PS02	net length	100 m	
SCG18SV01	lighting hour	1 hour	
SCG18SV02	lighting hour	1 hour	
SCG18GNS01	net length	100 m	
SCG18GNS02	net length	100 m	
SCG18NK01	net length/N° traps	1000 square m/trap	
SCG18NK02	net length/N° traps	1000 square m/trap	
ALB18PS01	Hours spent fishing	1 hour	
ALB18PS02	Hours spent fishing	1 hour	
ALB18PS(01+02)	*Hours spent fishing*	*1 hour*	
ALB18TB01	Trawl hour	1 hour	
ALB18TB02	Trawl hour	1 hour	
ALB18TB03	Trawl hour	1 hour	
ALB18TB04	Trawl hour	1 hour	
ALB18TB(01-04)	*Trawl hour*	*1 hour*	
ALB18GEN01	Net length	1000 m	

OU code	Effort measure	Effort unit	CPUE
ALB18GEN02	Net length	1000 m	
ALB18GEN(01+02)	*Net length*	*1000 m*	
ALB18LX01	Number of hooks	1000 hooks	
ALB18LX02	Number of hooks	1000 hooks	
ALB18LX(01+02)	*Number of hooks*	*1000 hooks*	
ALB18NK01			
ALB18NK02			
ITA18OTB01	trawling hours	1 hour	
ITA18OTB02	trawling hours	1 hour	
ITA18OTB03	trawling hours	1 hour	
ITA18HMD01	dredged bottom surface	1000 square m.	
ITA18HMD02	dredged bottom surface	1000 square m.	
ITA18PS01	fishing sets	fishing set	
ITA18PTM01	trawling hours	1 hour	
ITA18NK01	net length/N° traps	1000 square m/trap	
ITA18NK02	net length/N° hooks	1000 square m/100 hooks	
ITA18NK03	N° hooks	100 hooks/1000 hooks	

Appendix 9: Economic structure

OU code	Total GT	Total HP	Total employment	Salary share %	Yearly landing weight	Yearly landing value	Vessel value	Fishing days/year	Fishing hours/day	Cost of fishing day	Yearly fixed costs
ITA17HMD01	429	4964	84	27%	1632	7285	7007	6586	8	674	621
ITA17HMD02	796	8319	174	50%	2131	8304	13350	10151	11	1488	636
ITA17HMD03	791	9220	176	50%	2157	8405	13512	10275	11	1506	643
ITA17HMD04	165	1890	43	51%	451	1552	3084	1858	6	121	81
ITA17HMD05	369	3639	83	51%	879	3022	6006	3617	6	235	158
ITA17HMD06	676	6668	134	50%	1386	5461	11425	4588	5	606	336
ITA17HMD07	847	7461	153	50%	1581	6229	13032	5233	5	692	383
ITA17HMD08	921	9026	174	50%	1798	7082	14817	5950	5	786	435
ITA17HMD09	1159	11150	234	41%	1373	6935	18190	8935	9	979	591
ITA17HMD10	86	967	20	41%	120	606	1589	781	9	86	52
ITA17PTM01	3384	24485	540	49%	27169	26174	38680	18137	10	8061	2724
ITA17PTM02	2198	10205	170	50%	7799	11129	20135	3958	16	2409	436
ITA17PS01	191	2237	154	52%	4592	8143	17507	2353	11	1502	459
ITA17PS02	1411	5267	110	52%	3280	5816	12505	1681	16	1073	328
ITA17LL01	82	2311	26	48%	138	897	1328	1757	13	293	105
ITA17PS03	766	4575	95	52%	2843	5041	10838	1457	14	930	284
ITA17MG01	1434	20440	928	38%	3137	19620	25216	76045	8	4087	1680
ITA17MG02	1746	30247	1272	32%	9727	54479	30184	163245	6	6745	4244
ITA17MG03	623	6745	584	45%	1433	9673	10841	66219	10	1474	1182
ITA17OTB01	263	3198	109	50%	768	3720	7835	5180	11	1058	408
ITA17OTB02	1687	21065	498	50%	3492	16920	35637	23562	12	4814	1856
ITA17OTB03	3416	23749	251	50%	1759	8520	17945	11865	13	2424	935
ITA17OTB04	207	2884	116	51%	1250	7597	12435	4927	9	2359	728
ITA17OTB05	2039	20873	489	51%	5266	32002	52377	20754	16	9937	3064
ITA17OTB06	11739	61739	731	51%	7881	47887	78377	31056	20	14870	4586
ITA17OTB07	14	144	8	48%	70	487	948	314	14	136	42
ITA17OTB08	910	7200	196	48%	1774	12426	24167	7998	16	3465	1083
ITA17OTB09	6657	32548	430	48%	3896	27289	53072	17564	17	7610	2378
SVN17GNS01	185	2557	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SVN17GNS02	35	816	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SVN17OTB01	45	1028	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SVN17OTB02	178	1657	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SVN17PS101	31	311	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SVN17PS102	9	97	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SVN17PTM01	312	1200	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17PT01	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17PT02	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

OU code	Total GT	Total HP	Total employment	Salary share %	Yearly landing weight	Yearly landing value	Vessel value	Fishing days/year	Fishing hours/day	Cost of fishing day	Yearly fixed costs
HRV17PS01	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17PS02	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17PS03	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17PS04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17OTB01	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17OTB02	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17OTB03	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17OTB04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17OTB05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
HRV17OTB06	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SCG18OTB01	38	456	9	n.a.	n.a.	n.a.	n.a.	300	10	n.a.	n.a.
SCG18OTB02	97	1243	24	n.a.	n.a.	n.a.	n.a.	800	10	n.a.	n.a.
SCG18OTB03	289	1193	20	n.a.	n.a.	n.a.	n.a.	500	10	n.a.	n.a.
SCG18PS01	5	20	56	n.a.	n.a.	n.a.	n.a.	665	8	n.a.	n.a.
SCG18PS02	16	53	32	n.a.	n.a.	n.a.	n.a.	380	8	n.a.	n.a.
SCG18SV01	19	75	184	n.a.	n.a.	n.a.	n.a.	2530	6	n.a.	n.a.
SCG18SV02	12	38	19	n.a.	n.a.	n.a.	n.a.	220	6	n.a.	n.a.
SCG18GNS01	33	104	68	n.a.	n.a.	n.a.	n.a.	6800	4	n.a.	n.a.
SCG18GNS02	27	157	22	n.a.	n.a.	n.a.	n.a.	1600	4	n.a.	n.a.
SCG18NK01	80	373	184	n.a.	n.a.	n.a.	n.a.	19200	4	n.a.	n.a.
SCG18NK02	128	589	64	n.a.	n.a.	n.a.	n.a.	6200	4	n.a.	n.a.
ALB18PS01	7	40	3	n.a.	n.a.	n.a.	30	n.a.	n.a.	n.a.	n.a.
ALB18PS02	298	620	24	n.a.	n.a.	n.a.		n.a.	10	n.a.	n.a.
ALB18TB01	51	556	11	n.a.	n.a.	n.a.	120	n.a.	9	n.a.	n.a.
ALB18TB02	1160	11547	212	n.a.	n.a.	n.a.	2650	n.a.	11	n.a.	n.a.
ALB18TB03	2750	15927	192	n.a.	n.a.	n.a.	3120	n.a.	18	n.a.	n.a.
ALB18TB04	2668	11009	117	n.a.	n.a.	n.a.	1920	n.a.	23	n.a.	n.a.
ALB18TB(01-04)				*n.a.*	*1362*	*8172*		*n.a.*		*n.a.*	*n.a.*
ALB18GEN01	264	2728	75	n.a.	n.a.	n.a.	1110	n.a.	10	n.a.	n.a.
ALB18GEN02	171	1136	48	n.a.	n.a.	n.a.	600	n.a.	10	n.a.	n.a.
ALB18GEN(01+02)				*n.a.*	*n.a.*	*n.a.*		*n.a.*		*n.a.*	*n.a.*
ALB18LX01	37	130	12	n.a.	n.a.	n.a.	120	n.a.	10	n.a.	n.a.
ALB18LX02	10	135	4	n.a.	n.a.	n.a.	50	n.a.	10	n.a.	n.a.
ALB18LX(01+02)				*n.a.*	*9*	*63*		*n.a.*		*n.a.*	*n.a.*
ALB18NK01	19	161	12	n.a.	n.a.	n.a.	120	n.a.	10	n.a.	n.a.
ALB18NK02	66	265	8	n.a.	n.a.	n.a.	115	n.a.	10	n.a.	n.a.
ITA18OTB01	59	493	23	47%	321	1448	2212	1444	12	570	184
ITA18OTB02	2639	29736	797	47%	11231	50694	77428	50531	12	19934	6424
ITA18OTB03	10507	54958	579	47%	8159	36831	56254	36712	14	14483	4667

OU code	Total GT	Total HP	Total employment	Salary share %	Yearly landing weight	Yearly landing value	Vessel value	Fishing days/year	Fishing hours/day	Cost of fishing day	Yearly fixed costs
ITA18HMD01	561	6103	124	46%	852	7648	9416	9135	10	512	406
ITA18HMD02	109	118	24	46%	168	1505	1852	1797	10	101	80
ITA18PS01	1439	6867	188	51%	8217	8430	14927	1914	16	1703	486
ITA18PTM01	772	4949	93	47%	9263	8457	8081	1419	15	1001	182
ITA18NK01	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ITA18NK02	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ITA18NK01+ITA18NK02	*1304*	*8605*	*1182*	*32%*	*4423*	*28029*	*25839*	*119301*	*7*	*3757*	*2480*
ITA18NK03	2667	28438	479	47%	8469	39811	39476	47403	11	10864	2546

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1 Standardization of biometric and observation methods for Clupeidae (especially *Sardina pilchardus*) used in fisheries biology. FAO Fisheries Division. 1957

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This document gives an overview of the discussions on the concept of Operational Units, which was first conceived in 2000, and its development to date. The approach of categorizing fishing fleets into homogeneous groups, or Operational Units, to implement effort control fisheries management, as requested by the General Fisheries Commission for the Mediterranean, has been evaluated by many workshops, meetings and pilot studies, the conclusions of which are summarized in this document. Progress related to the agreement reached on the multidisciplinary criteria to define Operational Units is reported, together with outstanding uncertainties on the definition and use of the approach in certain cases. The data requirements and structure of four data compilation tables are also described in detail.

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