



SPECIFIC CONTRACT N° 10 "IMPROVED KNOWLEDGE OF THE MAIN SOCIO-ECONOMIC ASPECTS RELATED TO THE MOST IMPORTANT FISHERIES IN THE ADRIATIC SEA (SEDAF)"



DELIVERABLE 2

FINAL REPORT

Responsible
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Partners involved: COISPA, CONISMA, CNR, IOF, ZZRS, IBM, LAP

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EXECUTIVE SUMMARY

PROJECT OUTLINE

The establishment of appropriate management measures for sustainable fisheries requires an understanding of the status of the different fish stocks involved and of the technical characteristics of the fisheries, but also a clear knowledge of the socio-economics aspects pertaining to these fisheries.

In the particular case of the Adriatic Sea there is a serious imbalance between countries concerning the level of knowledge regarding the socio economic aspects linked to the different fisheries. Being itself a problem, this imbalance makes difficult the implementation of measures at regional level, pending the assessment of the impact of these measures on the concerned fisheries. In particular, the use of bio-economic models would rely upon strong assumptions and inputs which are fragmentary or incomplete, thus biasing the evaluation.

The main objective of the SEDAF project, lasting 14 months, was thus to contribute at the improvement of such knowledge exploiting and combining all the different sources of socio-economic information. This to provide a baseline description of the main socioeconomic elements pertaining to the different fisheries undertaken by the relevant countries (e.g. Adriatic coasts of Italy, Slovenia, Croatia, Montenegro and Albania) on the basis of their evolution over the last years, following, in terms of time span, the approach usually adopted by STECF for the analyses and report of the economic performance of the fleet (e.g. generally 5 years). The indicators collected were in line with the methodology and interpretation developed in the DCF and STECF reports¹ for socio-economic data and in the STECF reports on balance between fishing capacity and fishing opportunities².

To these end, the following specific objectives were foreseen:

1. To identify the main fisheries occurring in the Adriatic Sea, with special attention to those fisheries that are exploited by several of the Adriatic countries.
2. On the basis of this identification, collate, review and scrutinize the available information on the main socio-economic indicators pertaining to these fisheries.
3. For the same fisheries, review the available information on current stock status and recommendations of the scientific advice.
4. To collate, review and scrutinize the available information on marketing of fish products in the Adriatic Sea, with particular attention to the commercial interactions between the different coastal countries and with neighbor countries with limited access to the resources (e.g. Austria, Bosnia, Serbia, etc.). This task will include a description of the mechanisms governing the formation of prices³ at the different

¹ In particular the Annual Economic Report of the EU fleets (publicly available in the STECF webpage)

² In particular the Review of national reports on Member States efforts to achieve balance between fleet capacity and fishing opportunities (publicly available in the STECF webpage)

³ <http://ec.europa.eu/fisheries/market-observatory/eumofadoc/obj4/Guidelines~Pricestructure.pdf>

levels of the supply chain in the Adriatic area as well as the collection of a 5 years series of first sale prices for the main species.

5. Report on data trends, drivers and results of the abovementioned tasks including a clear description and analysis of the socio-economic characteristics linked to the fisheries identified under task 1.
6. On the basis of the most recent scientific advice, assess the likely biological and socioeconomic consequences of the different management scenarios derived from the application of the recommendations of the scientific advice for the selected fisheries.

The SEDAF project has thus been structured in 5 work packages and 12 tasks as in table 1.

Table 1 – Structure of the SEDAF project.

WP	TASK
WP0 = project management and coordination	
WP1 = Fisheries identification	Task 1.1 - Fishery identification demersals.
	Task 1.2 - Fishery identification small pelagics.
WP2 = Collation and review on the main socio-economic information on the main fisheries	Task 2.1 - Collection and review of data in Italy, Slovenia and Croatia
	Task 2.2 - Collection and review of data in Montenegro
	Task 2.3 - Collection and review of data in Albania
	Task 2.4 - Calculation of economic indicators and data presentation
	Task 2.5 Collation and review of the information on marketing of fish products in the Adriatic Sea
WP3 = Review of the current stock status and recommendations of the scientific advice	Task 3.1 Review of the current status of the main stocks and recommendations of the scientific advice for small pelagics
	Task 3.2 Review of the current status of the main stocks and recommendations of the scientific advice for demersals
WP4 = Assessment of the likely biological and socioeconomic consequences of the different management scenarios	Task 4.1 - Case studies for small pelagics
	Task 4.2- Case studies for demersals
	Task 4.3 - Parameterization of economic variables of the model at case study and fishery level

Partner of the Project are: Consorzio Nazionale Interuniversitario per le Scienze del Mare, Roma (**CoNISMa**), COISPA Tecnologia & Ricerca, Bari (**COISPA**), Consiglio Nazionale delle Ricerche – ISMAR, Ancona (**CNR**); Fisheries Research Institute of Slovenia (**ZZRS**); Institute of Oceanography and Fisheries, Split (**IOF**); Institute of Marine Biology, Kotor (**IMB**); Laboratory of Fisheries and Aquaculture - Agricultural University of Tirana (**LAP**).

Work-Packages, Task leaders and list of Deliverables of the project are reported in the table 2 and 3.

Table 2 - Work-Packages and Task leaders of the project

Name	Surname	WP/TASK	Partner or Sub-contractor
Maria Teresa	Spedicato	MAREA Coordinator	COISPA
Giuseppe	Lembo	SEDAF Coordinator	COISPA
Nedo	Vrgoč	WP3 and task 1.1	IOF
Vanja	Cikes Kec	task 3.1	IOF
Barbara	Zorica	task 2.1	IOF
Bojan	Marceta	task 3.2	ZZRS
Jerina	Kolitari	task 2.3	LAP
Evelina	Sabatella	WP2 and task 2.4	CoNISMa
Rosaria	Sabatella	task 2.5	CoNISMa
Giuseppe	Scarcella	WP1	CNR
Isabella	Bitetto	WP4 and task 4.2	COISPA
Alberto	Santojanni	task 4.1	CNR
Monica	Gambino	task 4.3	CoNISMa
Olivera	Marković	task 2.2	IMB
Ana	Pešić	task 1.2	IMB

Table 3 – Project deliverables with indication of the Working Package, the responsible and the month of delivery

Deliverable No	Deliverable title	WP No.	Lead Participant	Delivery month
D01	Interim Report	0	G. Lembo	6
D02	Draft Final Report	0	G. Lembo	14
D03	Data set of the collected statistics of fleet structures at National level	1	G. Scarcella	4
D04	Report on the identification of the main Adriatic fisheries, with relevant maps, focusing on the shared stocks	1	G. Scarcella	5
D05	Data set and preliminary estimation of socio-economic parameters for modelling in WP4	2	E. Sabatella	10
D06	Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region)	2	E. Sabatella	11
D07	Report on the Aspects of Fish Markets in the Adriatic Sea	2	R. Sabatella	12
D08	Report of the review of the current status of small pelagics and demersal stocks and recommendations of the scientific advice.	3	N. Vrgoc	6

D09	Report and discussion of the outputs of scenario modelling obtained using BEMTOOL	4	I. Bitetto	13
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The project benefits of the support of the AdriaMed FAO Regional Project, in terms of expertise and knowledge of the information available in the Adriatic region.

WP0 - COORDINATION

Along the life of the project the coordination activities were focused on the following aspects:

- preparation of the working documents on the guidelines of the methods which were presented during the kick-off meeting;
- organization of the project kick-off meeting that was held on February 6-7, 2014 at the Hotel Princess, in Bar, Montenegro;
- preparation of an overview on the state of the art of knowledge of the fisheries in the Adriatic by country;
- preparation of the Interim report.
- realization of the 2nd meeting of the project, which has been held on September 17 at FAO headquarter in Rome, following the Workshop of WP2 - Collation and review on the main socio-economic information linked to the main fisheries - held at the same premises on September 15-16;
- realization of the 3rd meeting of the project, which has been held on December 19 at IOF in Split, following the Workshop of WP4 - Assessment of the likely biological and socioeconomic consequences of the different management scenarios - held at the same premises on December 17-18;
- monitoring of all the activities for ensuring the flow of information among WPs and project Deliverables, the organization of the work to be done among tasks and the check of the project outputs according to the decision taken and time schedule;
- preparation of the draft final report taking into account the inputs received from DGMARE on the Interim Report.

WP1 – FISHERIES IDENTIFICATION

As regards the WP1 - Fisheries identification, two Deliverables were accomplished under this WP, D3 and D4, that contain respectively the data and an analysis on the identification of the main fisheries and potential shared stocks.

Information on the following aspects have been collated, reviewed and scrutinized:

1. sites, i.e. location of the harbours and fishing grounds;
2. fleets by fleet segment (number of vessels, overall tonnage, average length overall, overall engine power);
3. fishery/métier with relevant target species;
4. most common gears employed;
5. fishing activity by fleet segment (fishing season, days at sea, number of fishing trips);

6. amount and values of landings of the main target species and overall by fleet segment.

The main outcome of the Deliverable 4 is the list of the most important fleet segments for each typology of fishery (i.e. small pelagic and demersal) in each country and GSA.

The fleet segments have been selected considering two rankings, respectively based on landing in weight and value. A threshold of 75% of the total production of the country in weight and in value has been chosen as criteria to include or not a particular fleet segment in the list of those to be considered in the further analyses.

During the workshops of WP2 and WP4 this list was further expanded to take into account peculiarities of some fleet segments, thus 36 fleet segments have been considered in the analyses of WP2 and WP4.

WP2 – COLLATION AND REVIEW ON THE MAIN SOCIO-ECONOMIC INFORMATION ON THE MAIN FISHERIES

The general aim of WP2 was to collate, review and scrutinize the available information on the main socioeconomic indicators at fleet segment level and on the basis of the fisheries identified in WP1, estimating the main socio-economic indicators pertaining to these fisheries. Collation and review of the information on marketing of fish products in the Adriatic Sea was also an objective of WP2, as well as a preliminary exploration on the level of the dependence of fishing activities of the different communities affected by the identified fisheries.

The list of socio-economic variables to be collected/reviewed was according to the macro-categories and categories reported in table 4.

Table 4 - The list of socio-economic variables to be collected/reviewed

CAPACITY	Number of vessels
	Average vessel age
	Gross Tonnage (GT)
	Power (kW)
EFFORT	Days at sea
	Energy consumption
	Maximum days at sea
EMPLOYMENT	Total Employed
	FTE
LANDING	Weight
	Value
	Weight by target species
	Value by target species
INCOME	Landings income
	Direct subsidies
	Other income
EXPENDITURE	Crew wages

	Energy costs
	Other variable costs
	Repair and maintenance costs
	Other fixed costs
	Depreciation costs
	Opportunity costs of capital
CAPITAL VARIABLES	Fleet depreciated replacement value
	Investments
	Financial position (%)

A Glossary of the economic variables was also prepared and it is reported in the report of Deliverables 3 and 5.

In Albania and Montenegro the information in the official statistics and from previous surveys were complemented with the collection of economic and social data.

The disaggregation level at which the economic data have been made available, according to SEADF proposal, are the main fleet segments identified under WP1 (Deliverable 4). The time span has been 5 years, following the approach usually adopted by STECF for the analyses and report of the economic performance of the fleets. Following the decision taken during the WP2 workshop and further refinement during the data review, the list of fleet segments included in the economic analysis is that reported in table 5.

Table 5 – List of segments for which the economic analysis is reported

1	ITA GSA 18 all fleet segments
2	ITA GSA 18 pelagic trawlers 24-40 m
3	ITA GSA 18 demersal trawlers 12-18 m
4	ITA GSA 18 demersal trawlers 18-24 m
5	ITA GSA 18 polyvalent passive gears 06-12 m
6	ITA GSA 17 all fleet segments
7	ITA GSA 17 pelagic trawlers 24-40 m
8	ITA GSA 17 pelagic trawlers 18-24 m
9	ITA GSA 17 pelagic trawlers 12-18 m
10	ITA GSA 17 dredgers -12-18 m
11	ITA GSA 17 demersal trawlers 18-24 m
12	ITA GSA 17 demersal trawlers 12-18 m
13	ITA GSA 17 demersal trawlers 24-40 m
14	ITA GSA 17 beam trawlers ("rapido") 24-40 m
15	ITA GSA 17 polyvalent passive gears 06-12 m
16	ITA GSA 17 purse seiners 24-40 m
17	Croatia National fleet
18	HRV - Demersal trawlers 06-12 m
19	HRV - Demersal trawlers 12-18 m
20	HRV - Demersal trawlers 18-24 m
21	HRV - Demersal trawlers 24-40 m

22	HRV - Drift and fixed nets 06-12 m
23	HRV - Purse seiners 18-24 m
24	HRV - Purse seiners 24-40 m
25	HRV - Purse seiners 12-18 m
26	Slovenia National fleet
27	SVN - Purse seiners 12-18 m
28	SVN - Demersal trawlers 12-18 m
29	SVN - Drift and fixed nets 06-12 m
30	Montenegro National fleet
31	MNE - Demersal trawlers 12-18 m
32	MNE - Demersal trawlers 06-12 m
33	MNE - Drift and fixed nets < 6 m
34	MNE - Drift and fixed nets 06-12 m
35	MNE - Purse seiners 06-12 m
36	MNE - Polyvalent active vessels 6-12 m
37	MNE - Polyvalent active vessels<6 m
38	Albania National Fleet

This final list of indicators is reported in the following table 6.

Table 6 – List of economic indicators

Indicator	
Performance Indicators (AER)	Gross value added (GVA)
	Gross profit (GRP)
	Net profit (with or without direct subsidies)
	Gross profit margin
	Net profit margin
Economic and Social Indicators ("Balance Report")	Return on fixed tangible assets (ROFTA)
	Current Revenues/Break Even Revenue (CR/BER)
	GVA per fisherman

Regarding the task 2.1, 2.2, 2.3 the source of data is different according to the country. Italian data are from the Italian National Program for data collection within the EU Reg. 199/08.

Slovenian data have been extracted from the STECF/JRC data dissemination tool.

Croatian data were made available by the national authorities and they have been integrated when necessary through ad hoc estimations. Croatian official data are under revision and therefore their interpretation should be carefully considered.

Regarding Montenegro and Albania, very poor economic information was available before the project. Economic and social data for 2013, as well as data on production volume and

value, have been collected through a specific survey that has been implemented in the period April-June with the support of AdriaMed. For Albania, some economic data were also available for the years 2011 and 2012. Montenegrin economic data for the years 2009 and 2012 were estimated on the basis of a set of explanatory variables (number of vessels, days-at-sea, total revenue). As a consequence of these diversified situations also the data quality is not homogenous.

Information compiled under WP2 tasks allowed the preparation of the following deliverables:

- D5. Data set and preliminary estimation of socio-economic parameters for modelling in WP4; this deliverable has been joined to the Deliverable 3; a unique data base in Access was finalized, containing all the type of information (capacity, landing, effort, economic variables);
- D6. Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments;
- D7. Report on the Aspects of Fish Markets in the Adriatic Sea with a preliminary exploration on the level of the dependence of fishing activities of the different communities.

WP2 - Results from economic indicators

According to the data collected and reviewed by the SEDAF project, the total number of vessels in the Adriatic fishing fleet in 2013 was 9,411, with a combined gross tonnage (GT) of 124.8 thousand tons and engine power of 870 thousand kilowatts (kW).

Overall, capacity of the Adriatic fleet increased between 2009 and 2013 by 2% both in terms of vessels that in terms of GT. Croatia had the highest number of vessels in 2013, accounting for 46.4% of the Adriatic total. The Italian fleet was the second largest in number, accounting for 44.5% of the Adriatic total (operating in GSA 17 and 18), followed by Albania at 6%. Italian's fishing fleet was the largest in terms of GT, with almost 54% of the Adriatic total, followed by Croatia at 37% and Albania at 8.8%.

The total number of fishers employed in the Adriatic fleet in 2013 was 13,118, 3.5% increase when compared to 2012. Average wage per employee in 2013 was €6,331, 23% decreasing compared to 2012.

The Adriatic fishing fleet spent just over 663 thousand days at sea in 2013. Italian and Croatian fleets together accounted for almost all the registered days at sea.

The overall fuel consumption decreased by 10.6% from 2012 to 2013 and it coincides with the decrease in the average price of fuel for the Adriatic fleet (a decrease of 5% compared to 2012) and a decrease in days at sea (-13% compared to 2012).

According to available data, 196 thousand tons of seafood were landed by the Adriatic fleet in 2013, amounting to an estimated €588 million in value. The leading Adriatic fishing countries were Italy and Croatia which together accounted for over 90% of the landings weight in 2013. The Adriatic fishing fleet generated an income of €417 million in 2013, while operating costs amounted to €262 million. Total costs, including capital costs, amounted to €340 million in 2013, equating around 88% of income.

Total costs increased around 2.7% in 2013 compared to 2012. The main cost items included labour costs (€107 million) amounting to 41% of total operating costs, and energy costs (€101 million), totaling 38% of total costs.

Analysis of economic performance in 2013 by country revealed a mixed picture. The data suggests that 3 out of 4 countries generated a net profit in 2013 and 1 country (Slovenia) generated net losses in 2013.

The Italian fleet in GSA 17 generated the highest GVA in absolute terms (51% of the Adriatic total), followed by the Italian fleets in GSA 18 and the Croatian fleet, with 33% and 13% of the Adriatic total, respectively (Figure 3). In relative terms, the Croatian fleet generated the highest level of GVA in relation to income (79%), followed by the Italian fleet in GSA 18 (69%) and Italian fleet in GSA 17 (60%).

WP2 - Results from task 2.5 collation and review of the information on marketing of fish products in the Adriatic Sea

The aim of this task was to collate and review the information on marketing of fish products in the Adriatic Sea, considering both quantitative and qualitative aspects of trade and marketing. The following analyses have been performed:

1. analysis of international trade regulation, such as the Stabilization and Association Process in the western Balkans;
2. analysis of the position of the Adriatic sea in world fishery trade;
3. analysis on trade flows among the Adriatic countries (UN-Comtrade data, this section aims to outline the structure of an intra-Mediterranean matrix of fishery trade);
4. fish trade between Adriatic countries and the EU;
5. analysis of trade in fishery products by countries with particular attention to commercial interactions with EU countries and neighbor countries with limited access to the resources (e.g. Bosnia and Herzegovina, Serbia and Macedonia).

Data source for International trade was from FAO – FISH STAT plus, United Nations (UN)-Comtrade and Eurostat data (for European Union [EU] trade). These statistics are the official source of information about imports, exports and the trade balance in the EU, its Member States and the euro area. Fish per capita consumption of Adriatic countries has been achieved using as main source of information FAO Food balance sheets. For Consumer prices the main source of information has been EUROSTAT.

For the analysis of first-sale or ex-vessel price, the source of information for the variable “price by species” is European Data Collection Framework (DCF) for Slovenia, Croatia and Italy. Montenegro and Albania have submitted information on ex-vessel price by the ten most important species in terms of landed value. The source of information for the variable “Price by fishing technique and vessel length” is from SEDAF project.

Results of the analyses carried out in this task evidenced that the Adriatic countries depend heavily on imports of fish products and this situation is worsened in the last ten years. Countries that make greater use of fishery products of Adriatic origin are Slovenia (about 41 percent of imports originate in the countries of the basin), Albania and Montenegro, with the share of supply by Adriatic partners ranges between 31 percent and 34 percent of total imports. Italy imports from Adriatic countries only 2 percent of total fish imported.

In the Adriatic basin the fish per capita consumption (i.e. the apparent human consumption) has shown constant growth with large differences between Croatia and Italy on one side and Albania, Montenegro and Slovenia on the other side. For the latter countries, fish per capita consumption has remained below the average fish consumption in Europe (21.8 kg in 2001) and in the rest of the world (18.9 kg).

The task related to the ex-vessel prices highlighted that the highest level is registered in Albania with around 7.50 €/kg in 2013, but strong fluctuations have been observed over the period (5 last years). The price level shows the following ranking schedule: Montenegro – 5.35 €/kg, Slovenia – 5.17 €/kg, Italy – 3.81 €/kg, and Croatia – 0.80 Euro/kg. In general, in Adriatic countries the level of landed prices is greater than the level observed in EU countries (respectively 2.59 €/kg and 1.31 €/kg).

In addition, an analysis of dependency on fisheries in the coastal regions of the Adriatic basin has been carried out with the purpose of providing a picture of the regional role and importance of the fisheries sector and its four sub-sectors: *fishing, fish processing, aquaculture and ancillary activities*, in terms of creation of income (Ratio 1) and maintenance of employment (Ratio 2), and thus dependency of the regional economies on the fisheries sector.

The dependency analysis of the fishery sector is influenced by the geographical scale at which the transversal and economic data used to describe the fishery sector are collected and available. Thus the results might be considered indicative of the relevance in comparative terms, i.e. among the examined countries. Incomes from the fishery sectors, compared to the total income, are more relevant in Slovenia than in Italy and Croatia. Whilst regarding employment there is a higher dependency in Croatia compared to Italy and Slovenia, and the employment dependency of Albania is more aligned with that of Croatia.

In future developments regarding the fishery dependency analysis, specific studies may support a data collection and information availability at a microscale geographic aggregation level, thus allowing a better understanding of the fishery dependency linked to economic and social characteristics of smaller communities. In addition in the analyzed Countries, the artisanal fishery is predominant, so it represents a strong socio-economic aspect that will be strategic for supporting the economic and social sustainability.

Important, however, will be also the information related to the interactions of small-scale fishery - in direct and indirect terms- with others activities present on the same coastal areas, such as tourism, recreational fishery, fishing tourism, supporting activities for environmental and ecosystem services.

In this task the Deliverable 7 - Report on the Aspects of Fish Markets in the Adriatic Sea with a preliminary exploration on the level of the dependence of fishing activities of the different communities was accomplished.

WP3 - REVIEW OF THE CURRENT STOCK STATUS AND RECOMMENDATIONS OF THE SCIENTIFIC ADVICE

The aim of WP3 was to review the available information on the current status of the main stocks exploited by the fisheries identified in WP1 and associated recommendations of the scientific advice.

This activity is fundamental for providing the relevant inputs and data to the work of bio-economic modelling foreseen in WP4.

Under this WP the activities of two tasks were undertaken:

Task 3.1 Review of the current status of the main stocks and recommendations of the scientific advice for small pelagics;

Task 3.2 Review of the current status of the main stocks and recommendations of the scientific advice for demersals.

The activities related to the Review of the current stock status and recommendations of the scientific advice have been finalized in the Deliverable 8, compiling the most updated available information on the current status of the main stocks exploited by the commercial fisheries in the Adriatic Sea and associated recommendations of the scientific advice. The Deliverable 8 includes information from the GFCM WG and GFCM Sub-Committee and STECF-EWG reports taking into account those of 2014. It was decided to include the most updated information given that the assessment carried out in the GFCM were endorsed at the Sub-Committee Stock Assessment at the beginning of February, while those carried out in the STECF-EWG were discussed and endorsed during the meeting held in January 2015, though the final discussion in the STECF plenary is still pending.

The information are systematized identifying the status of the assessed stocks, the stock parameters used in the assessments, the output of the assessment in terms of fishing mortality and reference points, level of catches, level of the Spawning Stock Biomass, structure of the stocks and of the populations of the different species in terms of age/size, forecasts if available, pros and cons of the reviewed analyses.

In the last fifteen years, almost all the stock assessments are carried out jointly between Adriatic scientists. Adriatic stock assessment documents have been done mainly inside three international bodies: AdriaMed, GFCM and STECF. The usual way of work is that stock assessments are performed through the working groups AdriaMed (WG Small pelagic and WG demersal) and then presented to the SCSA of SAC GFCM or within STECF.

Stock assessment documents for sardine and anchovy in the GSA 17 are permanently present on the meeting of SAC GFCM since 2001. The common series of data (Croatia, Slovenia and Italy) for sardine and anchovy in the GSA 17 are ranging from 1975 till now. Since 2006 the stock assessment of Common sole has been done on the basis of data collected through the project SOLEMON, and for red mullet since 2013. First preliminary stocks assessment of sardine and anchovy in GSA 18 were presented to the SAC GFCM in 2007. In GSA18 since 2010 common work is carried out (Italy, Albania and Montenegro) for stock assessment for hake and thereafter for deep-water rose shrimp.

The review of the available information on the current status of the main small pelagic and demersal stocks exploited by the commercial fisheries in the Adriatic includes recommendations from the scientific advice, as described in the reports of the GFCM Working Group, GFCM Subcommittee and STECF-EWG.

The information are systematized identifying the stock parameters used in the assessments, the level of catches, the output of the assessment in terms of fishing mortality and reference points, structure of the stocks and populations of the different species in terms of age/size, level of the Spawning Stock Biomass, the status of the assessed stocks, forecasts if available, pros and cons of the reviewed analyses.

In GSA17 ten assessments have been reviewed, four were related to the small pelagic stocks and six to the demersal ones. A joint assessment in GSA17 and GSA18 was also attempted for sardine and anchovy stocks. In GSA18 nine assessments have been reviewed, one was preliminary for anchovy stock while the other eight were related to demersal stocks.

Renewable resources of the Adriatic Sea have many specificities which make assessment and management very demanding. Exploitation of the majority of stocks is typical multigear exploitation (the same species are exploited using different fishing gears and different type of fisheries) with very important cumulative, competitive and synergetic effects

Adriatic Sea is relatively small sea and majority of the stocks inhabit the whole Adriatic. Because of that, more or less all commercially important stocks are biologically common but economically shared between fishing fleets from different countries. At the same time, fishing effort and fishing legislations are different in different parts of Adriatic Sea, which is reflecting on the recent state of stocks, and also has a big impact onto possibility of establishing long-term sustainable management and protection measures.

It is thus clear that it is necessary to continue and improve the cooperation between all countries participating in the fisheries, on the scientific level, as well as on the level of fishermen, fishermen associations and administration.

WP4 - REVIEW ASSESSMENT OF THE LIKELY BIOLOGICAL AND SOCIOECONOMIC CONSEQUENCES OF THE DIFFERENT MANAGEMENT SCENARIOS

The objective of WP4 was to assess the likely biological and socioeconomic consequences of the different management scenarios for the relevant fisheries as identified in WP1. This WP is aimed also highlight the gap knowledge and the needed assumption in the Adriatic context.

The work within this WP is divided in 3 tasks:

- Task 4.1 Case studies for small pelagics;
- Task 4.2 Case studies for demersals;
- Task 4.3 Parameterization of economic variables of the model at case study and fishery level.

Among the tools intended to be used to assess the impact of different scenarios the recently developed BEMTOOL model (developed in the specific contract 4 and successively upgraded in the specific contract 11), implemented with a focus on the Mediterranean fisheries characteristics, is prioritised.

During SEDAF some specifications of the economic core and ALADYM core of BEMTOOL were made, in addition the output were reorganized to avoid redundancy. Details are reported in the ANNEX I to the Deliverable 9.

For answer to the commitments of SEDAF project, considering the output of stock assessment working groups, three case studies have been implemented:

- Small pelagic stocks in GSA 17;
- Demersal stocks in GSA 17;
- Demersal stocks in GSA 18.

The steps followed for all case studies were:

- Association matrix stock-fleet segment (using results from WP1);
- Parameterization of biological module (using results from WP3);
- Parameterization of pressure module (using results from WP3);
- Parameterization of economic module (using results from WP2);
- Parameterization of management scenarios (according to the agree management measures to be investigated).

Uncertainty on recruitment has been taken into account, applying for both stocks a multiplicative error on the geometric mean of recruitment computed for the last three years.

Taking into account that official Croatian socio- economic data are under revision for the purpose of this study scientist presumed data needed for this exercise. Nevertheless, Croatian socio- economic data were obtained from the data collected and reviewed by the SEDAF project and refer to the period 2009-2012. Socio-economic data for 2008 and 2013 of Croatian fleet segments data were assumed equal to 2009 and 2012 data respectively. For all fleet segments, 2014 data were assumed equal to 2013.

The internal option of BEMTOOL model performing a Multi-Criteria Decision Analysis, that combines multi-attribute utility theory (MAUT) and the analytic hierarchy process(AHP), has been used to assess the performances of the alternative fisheries management policies.

GSA 17 small pelagic case study

The main stocks identified for the GSA 17 small pelagic case study are *E. encrasicolus* and *S. pilchardus*. Both stocks are shared among the countries of GSA 17 (Italy, Croatia, Slovenia).

The main fishing gears targeting anchovy and sardine are pelagic trawls and purse seines. 8 fleet segments targeting the selected stocks and considered for this case study are:

1. ITA_TM_VL_1218
2. ITA_TM_VL_1824
3. ITA_TM_VL_2440
4. ITA_PS_VL_2440
5. HRV_PS_VL_1218
6. HRV_PS_VL_1824
7. HRV_PS_VL_2440
8. SVN_PS_VL_1218

The selected fleet segments represent about 95% of production and revenues of anchovy and around 93% of production and revenues of sardine in GSA 17 in 2013.

The data used for the parameterization of the biological and pressure modules of BEMTOOL come from the stock assessments carried out during the Working Group on Stock Assessment of Small Pelagic of GFCM (GFCM-WGSASP report) held in November 2014.

7 forecast scenarios have been implemented.

1 HR2 RED_E04ane2018	reduction (7%) of F towards the reference point of anchovy ($E=0.4$) in 2018 for each fleet segment and applied only to fishing days;
2 HR2 RED_E04ane2020	reduction (7%) of F towards the reference point of anchovy ($E=0.4$) in 2020 for each fleet segment and applied only to fishing days;
3 HR2 RED_E04pil2018	reduction (20%) of F towards the reference point of sardine ($E=0.4$) in 2018 for each fleet segment and applied only to fishing days;
4 HR2 RED_E04pil2020	reduction (20%) of F towards the reference point of sardine ($E=0.4$) in 2020 for each fleet segment and applied only to fishing days;
5 HR2 RED_E04pil2020_PropF_100d	reduction of F towards the reference point of sardine ($E=0.4$) in 2020 with higher reductions for fleet segments impacting more sardine stock, applied to fishing days (except Italian and Slovenian purse seines, because representing less than 1% of the impact);
6 HR2 RED_E04pil2020_PropF_50v50d	reduction of F towards the reference point of sardine ($E=0.4$) in 2020 with higher reductions for fleet segments impacting more sardine stock, applied half to fishing days and half to the number of vessels as potential withdrawal (except Italian and Slovenian purse seines, because representing less than 1% of the impact);
7 HR2 RED_Fprop_FB	fishing ban in the months with higher occurrence of offspring of sardine with higher reductions for fleet segments impacting more sardine stock. This measure is applied each year from 2015 to 2021. The fishing ban already carried out by the different fleet segments has been taken into account.

Forecasts evidenced the following results.

- Regarding SSB all scenarios targeting the reference point of sardine gave equivalent results with improvements around +4-5% for anchovy and +8% for sardine compared to the status quo.
- Catches of both stocks were not much reduced in any scenario if the overall fleet is considered, given that the variations compared to the status quo were less or equal to -8%. However, considering the focus on fleet segments, HRV_PS_1824 and HRV_PS_2440 were more penalized by the management strategies (being the more impacting on sardine stock), while the other fleet segments would benefit, as expected, by the gradual rebuilding of the stocks and by the reduced competition among the fleets.
- Given the reduction of 31% in predicted fishing days, the Croatian purse seine segment 24-40 m is the most affected fleet, with a decrease of -18% in the predicted landings and of -16% in the predicted revenues.
- At the end of the forecast period, revenues and average salaries of fleet segments characterized by lower incidences of sardine in production, as the Italian pelagic trawlers 1824 m and 2440 m, benefit from the implementation of management measures aimed at a reduction of the fishing mortality of sardine, because they are less impacted in respect to the other fleet segments by these measures.

- For all fleet segments analysed, employment undergoes moderate variation across scenarios with the only exception of HR2-RED_E04pil2020_PropF_50v50d, aimed at reducing mortality rates of the sardine stock by reducing both the number of days at sea and the number of vessels. HR2-RED_E04pil2020_PropF_50v50d produced the largest positive variation in average salary with an increase of 14% for the whole fleet and an increase of 21% for the Italian pelagic trawl 1824m. However, expected employment of the whole fleet would reduce by 8% by 2021. Under a social point of view the most affected segment is the Croatian purse seine fleet 2440m with an expected drop in employment of 16% by 2021 compared with the status quo.
- Considering only the percentage variations of the scenarios from the status quo, the best performing one is HR2-RED_E04pil2020_PropF_50v50d, that allows to obtain the best trade off among the different variables, considering the same weight for each indicator. This especially because, among the different indicators, the increase of salary overcompensates the decrease of employment.
- The internal option of BEMTOOL model performing a Multi-Criteria Decision Analysis, that combines Multi-Attribute Utility Theory (MAUT) and the Analytic Hierarchy Process (AHP), has been used to assess the performances of the alternative fisheries management policies. According to MCDA, the scenario allowing to reach the highest overall utility is HR2-RED_E04pil2018 (0.7932), while the lowest utility is given by HR2-RED_E04pil2020_PropF_50v50d scenario that produces an utility value (0.757) slightly lower than the status quo scenario (0.7644). This because the MCDA attributes a higher weight to the biological indicators, but takes into account the value of the social indicators.
- The scenario that has the second higher utility is HR2-RED_E04pil2020_propF_100d (0.7896), that is very close to the best scenario in terms of overall utility. This seems to indicate that a higher reduction of F applied to the more impacting fleet segments gives overall a benefit equivalent to the reduction of 20% for all the fleet segments in 2018. Also this result can be influenced by the higher relative weight attributed by the MCDA to the biological indicators.
- The methodology and the scenarios tested cover a wide range of different options and provide a general and complete overview of the situation of small pelagics in the Adriatic Sea. The results are consistent with the advices that have been provided so far in different fora and give a more robust evaluation of the efficiency of each of the measures proposed.
- There are certainly some limitations in the approach used. In particular, one of the main issues is the difficulty in forecasting recruitment in small pelagic species. These species are in fact strongly influenced from environmental variables and the recruitment can show dramatic variability from one year to the next.
- A step forward would be to test the probability of some estimates of falling below a certain reference limit throughout a Management Strategy Evaluation (MSE). However, the measures proposed from BEMTOOL are conservative enough to be efficient against recruitment failures.

GSA 17 demersal case study

The main stocks identified for the GSA 17 demersal case study are *M. merluccius*, *S. mantis*, *M. barbatus* and *S. solea*. These stocks are shared among the countries belonging to GSA 17 (Italy, Croatia and Slovenia).

The main fishing gears targeting the four stocks selected for this case study are bottom trawls, small scale fisheries, longlines and rapido trawlers.

The 11 fleet segments targeting the selected stocks and considered for this case study are:

1. ITA_DTS_0612;
2. ITA_DTS_1218;
3. ITA_DTS_1840;
4. ITA_PGP_0012;

5. ITA_TBB_1218;
6. ITA_TBB_1824;
7. HRV_DFN_0612;
8. HRV_DTS_0612;
9. HRV_DTS_1218;
10. HRV_DTS_1824;
11. SVN_DFN_0612_DTS_1218.

The data used for the parameterization of the biological and pressure modules of BEMTOOL come from the stock assessments carried out during the Working Group on Stock Assessment of Demersal Species at GFCM (GFCM-WGSASP) and during the STECF Expert Working Group meetings.

According to the state of exploitation of the four demersal stocks in GSA 17 case study, the ratio between $F_{current}$ and F_{MSY} is 3.3 for European hake and red mullet), 1 for spottail mantis and 1.4 for common sole. 6 forecast scenarios have been thus implemented, besides the status quo, in order to evaluate the consequences of several management strategies in terms of costs and benefits on the stocks and on the productive and economic performances of different fleet segments.

The 6 management scenarios have been implemented to reduce the overall combined fishing mortality F towards a combined F_{MSY} . This reference point was estimated as the average F_{MSY} among all the stocks, weighed using stock landing value, following the approach as for balance indicators. The reduction was applied to each fleet segment, considering the relative portion of $F_{current}$ and F_{MSY} , on the basis of fleet segment landing to overall landing of the stock. The needed reduction is 59% of the $F_{current}$ combined ($F_{current}$ combined=0.76; F_{MSY} combined=0.31).

Scenarios implemented to reach the combined F_{MSY} in GSA17

Scenario 2 F01_2018_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 3 F01_2018_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 4 F01_2018_FB	Gradual closure of fishing activity until 2018 in the months with higher occurrence of offspring of the four target species (July, August, September, October, November and January) (except SVN_DFN_0612_DTS_1218);
Scenario 5 F01_2020_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 6 F01_2020_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 7 F01_2020_FB	Gradual closure of fishing activity until 2020 in the months with higher occurrence of offspring of the four target species (July, August, September, October, November and January) (except SVN_DFN_0612_DTS_1218).

- All scenarios give a remarkable increase of SSB for all the assessed stocks. Recovery of hake SSB is noteworthy compared to the other species, given the characteristics of high productivity of this stock. Among the different scenarios, the best result is obtained in the Scenario 2 - F01_2018_100D, while the worst was always observed in the status quo. Scenario 4 - F01_2018_FB performed quite well, especially for SSB recovery of red mullet.
- In terms of catches, those of European hake are expected to improve in the medium term (2018 and 2020), given the high productivity and the current high level of exploitation of this stock, whilst the other stocks will be rather underutilised, because the combined F_{MSY} is fairly influenced by the hake reference point that is low compared to the other ones. The Scenario 4 - F01_2018_FB was less impacting in terms of reduction of landings, but to the cost of not reaching the reference point.
- Catches of the fleet segments ITA_DTS_0612, ITA_TBB_1218 and SVN_DFN_0612_DTS_1218 generally take advantage of the stock rebuilding following the reduction applied to the other fleet segments, given that they are not affected by the management measures (their relative impact lower than 3%), except for the scenario S. 4 - F01_2018_FB, i.e. the fishing ban, that is also applied to the first two fleet segments.
- The fleet segments more impacted by the management measures are those not targeting European hake, as the loss of other species catches is not compensated by the increase of hake productivity. This is holding for the fleet segment ITA_TBB_1840 and especially for ITA_PGP_0012.
- Considering the overall landings, the worst performance is shown by the fishing ban scenarios (Scenario 4 and Scenario 7), with a decrease of total landing of about 50%, given that these scenarios have been applied to all the fleet segments, excluding only SVN_DFN_0612_DTS_1218.
- All the fleet segments, when affected by the management measures, obtain a higher landing in the status quo scenario, but a decrease of discard respect to the status quo, reflecting the decrease of the total catch.
- Regarding landing of common sole, the highest decrease respect to the status quo is shown in the Scenarios 2 and Scenario 5 (reduction applied to the fishing activity only by 2018 and 2020) with an overall landing about 30% lower than status quo. The most affected fleet segment are ITA_TBB_1840, which main target are spottail mantis and common sole and HRV_DFN_0612.
- Over the period 2008-2013, the economic performance of the demersal fleet in GSA 17 has generally deteriorated, reaching the lowest level in 2012. Four fleets (ITA_DTS_0612, ITA_DTS_1840, ITA_TBB_1840 and SVN_DFN_DTS_0612), suffered losses in 2012. The decrease in revenue and net profit is consistent with the drop in the total landings weight and days at sea of the whole selected fleet.
- In 2013, the ratio between current revenue and break-even revenue is much greater than 1 for most of the selected fleets, thus indicating that demersal fishery in GSA 17 is generally profitable. However, Italian demersal trawl segments 1218 m and 1840 m and Italian vessels using passive gears only, which totally account 66% of total landing weight, show ratios close to 1.
- Regarding the economic performance of the overall fleet, revenues decreases in all the scenarios of about 12% on average. Such reduction is more pronounced in the scenarios simulating fishing ban, in which revenues drop to -30%. Profitability generally show the worst performance in the fishing ban scenarios (with drop of 65% for ITA_DTS_0612 and ITA_PGP_0012), except for TTB_1840, where the values are higher than status quo. The best performances are shown in scenario 3 – F01_2018_50D50V for all fleet segments (especially for Croatian DTS_1840 reaching in 2021 a value three times the status quo). As expected, almost all the scenarios show a substantial increase of the annual average salary per man (about 50%

respect to the status quo), especially those with a mix of measures (e.g. scenario 2 and scenario 5). Regarding economic indicators at fleet segment level, the Croatian trawlers 12-18 m, 18-40 m, and Italian 18-40 are more benefited in all the scenarios (except fishing ban).

- Given the reduction in the number of vessels foreseen in the mixed scenarios, it's evident that permanent withdrawal performs better for the vessels remaining in the fleet, thus revealing a conflict between economic and social objectives.
- A Multi-Criteria Decision Analysis method that combines multi-attribute utility theory (MAUT) and the Analytic Hierarchy Process (AHP), as implemented in BEMTOOL, has been used to assess the performances of the alternative fisheries management policies.
- According to MCDA, that takes into account the weights to the different indicators associated through expert judgement, the scenario that allows to reach an higher overall utility is Scenario 2 – F01_2018_100D (0.64), followed by Scenario 5 – F01_2020_100D, while the status quo scenario produces the lowest overall utility (0.39).
- The lack of a reliable stock-recruitment relationship that did not allow a proper forecasting of recruitment level in the projections. However, the performed scenarios took into account the variability due to the process error thus allowing a more adaptive advice for demersal fisheries in this area.
- Following the present results, the current regulations (i.e. the status quo scenario) cannot be considered suitable to reach the MSY objective for this case study. All the proposed scenarios, aimed to reach a combined F_{MSY} , produce a remarkable improvement in SSB respect to status quo. On the other hand, all the proposed scenarios would produce a decrease in catches respect to status quo, except for hake which productivity would increase.

GSA 18 demersal case study

The main stocks identified for the GSA 18 demersal case study are *M. merluccius*, *P. longirostris*, *N. norvegicus* and *M. barbatus*. *M. merluccius*, *P. longirostris* and *M. barbatus* stocks are shared among the countries belonging to GSA 18 (Italy, Albania and Montenegro), while *N. norvegicus* is essentially exploited by Italy.

The main fishing gears targeting the four selected stocks are bottom trawls, small scale fisheries, longlines.

The 10 fleet segments targeting the selected stocks and considered for this case study are:

1. ITA_DTS_0612;
2. ITA_DTS_1218;
3. ITA_DTS_1824_2440;
4. ITA_HOK_1218;
5. ITA_PGP_0006_0612;
6. ALB_DTS_1224;
7. MNE_DFN_0012;
8. MNE_DTS_0612;
9. MNE_DTS_1224;
10. MNE_HOK_0012.

The data used for the parameterization of the biological and pressure modules of BEMTOOL come from the stock assessments carried out during the Working Group on Stock Assessment of Demersal Species of GFCM (GFCM-WGSASP report) held in November 2014 and during the STECF EWG 14-19 held in Rome in January 2015. According to the state of exploitation of the four demersal stocks in GSA 18 case study, the ratio between $F_{current}$ and F_{MSY} is 3.3 for European hake, 1.77 for deep water rose shrimp, 1.27 for red mullet and 6.15 for Norway lobster. 6 forecast scenarios have been

implemented, besides the status quo, in order to evaluate the consequences of several management strategies in terms of costs and benefits on the stocks and on the productive and economic performances of different fleet segments.

The 6 management scenarios have been implemented to reduce the overall combined fishing mortality F towards a combined F_{MSY} . This reference point was estimated as the average F_{MSY} among all the stocks, weighed using stock landing value, following the approach as for balance indicators. The reduction was applied to each fleet segment, considering the relative portion of $F_{current}$ and F_{MSY} , on the basis of fleet segment landing to overall landing of the stock. The needed reduction is 66% of the $F_{current}$ combined ($F_{currentcombined}=0.87$; $F_{MSY combined}=0.3$).

Scenarios implemented to reach the combined F_{MSY} in GSA18.

Scenario 2 F01_2018_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA PGP 0006_0612, ITA DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 3 F01_2018_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA PGP 0006_0612, ITA DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 4 F01_2018_FB	Gradual closure of fishing activity until 2018 in a period with higher occurrence of offspring of the four target species (June, July, August, September, October) (except Montenegrin fleets).
Scenario 5 F01_2020_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA PGP0006_0612, ITA DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 6 F01_2020_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA PGP 0006_0612, DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 7 F01_2020_FB	Gradual closure of fishing activity until 2020 in a period with higher occurrence of offspring of the four target species (except Montenegrin fleets).

Forecast evidenced the following results.

- According to the traffic light summary tables, all the performed scenarios allow to obtain a benefit on the SSB for the 4 stocks compared to the status quo. SSB showed remarkable changes in all the different scenarios, although better performances were observed in Scenario 2 - F01_2018_100D, that was followed by in Scenario 5 - F01_2020_100D, indicating that a reduction applied in a narrower timeframe is more effective. Increase of SSB was especially observed for hake and Norway lobster that show highest increase in SSB respect to the status quo (more than 100%). The scenario less performing is the fishing ban, given that reduction applies a lower cut than it was necessary to reaching F_{MSY} combined.

- Given the gain in productivity of stocks as Norway lobster and European hake, also predicted catches for the whole fleet were improving compared to the status quo, increasing from an average of 12% for Norway lobster and 20% for European hake. Conversely the catches of red mullet and deep water pink shrimp decreased on average 18% and 6%, indicating an underutilization of such stocks.
- Revenues of the overall fleet are improving compared to the status quo in all the scenarios (+9% on average), as a result of the increased revenues of fleet segment as ITA_DTS_1824_2440. Italian longlines take the highest benefit from the reduction in the shortest time frame (revenues in 2021 are about 30% more than status quo). These fleets, together with those not affected by the management measures, compensate the negative performance of the revenues of fleet segment as ALB_DTS_1224. The fleets ITA_PGP_0006_0612, MNE_DFN_0012, MNE_DTS_0612, MNE_DTS_1224 and MNE_HOK_0012, took advantage, in all the scenarios, of the management measures applied to the other fleets, without taking any negative drawback, given that they were not or partially (ITA_PGP_0006_0612 only for the fishing ban) affected by the management rules.
- Forecasts show improvements in the average salary ranging from +17% of Scenario 7 - F01_2020_FB to + 78% of Scenario 3 - F01_2018_50D50V compared with the status quo. The higher profitability would be the one of Albania fleet, 3 times higher than status quo, and of Italian DTS_1824_2440, more than 2.5 times higher than status quo. Scenarios F01_2018_50D50V and HR2-F01_2020_50D50V produce the largest positive variations in average salaries of Albania DTS 1224 and Italian DTS_1824_182440, but also imply a remarkable reductions in the number of employees, estimated around -30% by 2021 for both scenarios. As excluded from all the scenarios, wages of all Montenegrin segments undergo variations higher than 50%, in particular longlines show very high increase across scenarios.
- The internal option of BEMTOOL model performing a Multi-Criteria Decision Analysis, that combines Multi-Attribute Utility Theory (MAUT) and the Analytic Hierarchy Process(AHP), has been used to assess the performances of the alternative fisheries management policies). According to MCDA, the scenario obtaining the higher rank is Scenario 2 - F01_2018_100D followed by Scenario 5 - F01_2020_100D. Indeed the utility associated to the socio-economic indicators is lower in Scenario 3 - F01_2018_50D50V and Scenario 6 - F01_2020_50D50V, that reduce the number of vessels. These scenarios are ranked as less efficient in the MCDA, as the social component is negatively affected by the expulsion of workers following the scraping of the vessels.
- The performed scenarios take into account the variability due to the process error, thus allowing a more adaptive advice for demersal fisheries in this area. Nevertheless the lack of a reliable stock-recruitment relationship did not allow a proper forecasting of recruitment level in the projections.
- Following the results of the predictions, the current regulations (i.e. the status quo scenario) cannot be considered effective to reach the MSY objective for this case study. All the proposed scenarios, aimed at reaching a combined F_{MSY} , produced an overall improvement respect to status quo for all the fleets.

CORE FINDINGS OF THE PROJECT

- **SEDAF** was an unprecedented opportunity to provide a detailed database for socio-economic variables by country and fleet segment in Adriatic through an *ad hoc* data collection and through estimation process in the particular cases where the data were not available; this data will be useful for further analyses in the future and in particular to continue to take into account also the socio-economic component in the

evaluation process of the state of the fisheries in Adriatic, through bio-economic models.

- The collection of detailed socio-economic data by fishing regions and fleet segments, as well the comparison among homogenous fleets, allowed a better understanding of the quality of collected variables and an improving in methodologies. In some cases as for the number of employees and for the average salary, the existence of significant differences among homogenous fleets revealed inconsistency in some of the official data and a different interpretation about the estimation of variables was also evidenced by the BEMTOOL socio-economic output.
- BEMTOOL model allowed to modulate a variety of management scenarios, with different implications in terms of biological and economic consequences, also taking into account the differentiated impact on the target stocks of the various involved fleets.
- The use of the stock assessment output to parameterize BEMTOOL model revealed the need to update (e.g. *S. mantis* in GSA 17, updated to 2011) and review (e.g. small pelagic in GSA 17) several stock assessments, as well as increase the number of stock assessments in Adriatic, in order to improve the accuracy of the evaluation of resources and the corresponding catches and revenues for the relevant fisheries.

Further developments:

- pursuing an harmonised collection of fisheries data, including the socio-economic ones, at level of the Adriatic basin;
- modelling scenarios according to reviewed socio-economic data and updated stock assessments;
- analysing the effects of additional management measures in respect to those applied for the case studies, for example based on selectivity and considering the reaction of the sector with investments/disinvestments;
- investigating and searching for stock-recruitment relationships to properly project the recruitment in the future;
- combining bio-economic prediction with a Management Strategy Evaluation (MSE);
- using the developed framework for the design and preparation of multiannual management plans.

1. BACKGROUND AND PROJECT OBJECTIVES

Appropriate management measures for sustainable fisheries require to understand the status of the targeted fish stocks and the technical characteristics of the fisheries, but also the knowledge of the socio-economics aspects pertaining to these fisheries.

Since the mid 2000's, the EU has established an appropriate framework, the Data Collection Framework, which provides the basis to gather relevant biological, technical and economic information regarding the main EU fisheries. Together with the collection of data on catch, effort, discards, size composition and biological parameters (e.g. growth, reproduction), the collection of socio-economic variables such as income, personnel costs, energy costs, repair and maintenance costs, capital value, investments, employment, etc. is a pillar of DCF. The knowledge of economic dynamics is aimed at helping decision makers to better establish connections between the policy and management measures and to evaluate how these measures impact the fisheries.

In contrast to biological data, which are generally available at GSA level, the economic data are rarely available at such geographical level in the Mediterranean. These data were requested at Member State (MS) level by DCF until 2008 and DCF thereafter. As a consequence, a re-aggregation of economic data at GSA is often necessary. However, a description of possible approaches to aggregate DCF-DCF economic data in a way compatible with the spatial stratification of the GFCM-GSAs has been investigated in the BEMTOOL project (MAREA framework, Specific Project 4) and the relevant outcomes are available to the present project.

In the particular case of the Adriatic Sea there is a serious imbalance between countries concerning the level of knowledge regarding the socio economic aspects linked to the different fisheries. Being itself a problem, this imbalance makes difficult the implementation of measures at regional level, pending the assessment of the impact of these measures on the concerned fisheries. In particular, the use of bio-economic models would rely upon strong assumptions and inputs which are fragmentary or incomplete, thus biasing the evaluation.

Despite the efforts that have already been accomplished in the framework of the AdriaMed Regional Project (e.g. AdriaMed 2001; AdriaMed 2002; AdriaMed 2004; Albanian Fishery Policies Directorate, 2006), there are still knowledge gaps, in particular for the Croatian, Albanian and Montenegrin sectors. This was stated by the three countries during the GFCM workshop on Fisheries Data Collection and Management plans⁴ held in Split in March 2013.

The contribute of SEDAF project has been thus aimed at improving such knowledge exploiting and combining all the different sources of socio-economic information and evaluating the knowledge gaps. This has been done in combination with a process of identification of the main fisheries in the Adriatic and the analyses of the status of related shared and non-shared resources, all of which being the basis for the application of bio-economic models for simulations/forecast, that has been foreseen in the project.

⁴http://151.1.154.86/GfcmWebSite/FWP/2013/DataCollectionMgmtPlanAdriatic/Report_FWP_Adriatic_2013.pdf

Objectives and outline of tasks as foreseen in the project proposal

The main objective of the study is to provide a baseline description of the main socioeconomic elements pertaining to the different fisheries undertaken by the relevant countries (e.g. Adriatic coasts of Italy, Slovenia, Croatia, Montenegro and Albania) on the basis of their evolution over the last years, following, in terms of time span, the approach usually adopted by STECF for the analyses and report of the economic performance of the fleet (e.g. generally 5 years). The indicators collected will be in line with the methodology and interpretation developed in the DCF and STECF reports⁵ for socio-economic data and in the STECF reports on balance between fishing capacity and fishing opportunities⁶.

The indicators will be reported as annual averages by fleet segment (following DCF segments) for the economic assessment and profit/loss analysis, whilst selected variables will be taken and estimated at fishery and/or GSA level for bio-economic modeling.

To these end, the following specific objectives are foreseen:

1. To identify the main fisheries occurring in the Adriatic Sea, with special attention to those fisheries that are exploited by several of the Adriatic countries.
2. On the basis of this identification, collate, review and scrutinize the available information on the main socio-economic indicators pertaining to these fisheries.
3. For the same fisheries, review the available information on current stock status and recommendations of the scientific advice.
4. To collate, review and scrutinize the available information on marketing of fish products in the Adriatic Sea, with particular attention to the commercial interactions between the different coastal countries and with neighbor countries with limited access to the resources (e.g. Austria, Bosnia, Serbia, etc.). This task will include a description of the mechanisms governing the formation of prices⁷ at the different levels of the supply chain in the Adriatic area as well as the collection of a 5 years series of first sale prices for the main species.
5. Report on data trends, drivers and results of the abovementioned tasks including a clear description and analysis of the socio-economic characteristics linked to the fisheries identified under task 1.
6. On the basis of the most recent scientific advice, assess the likely biological and socioeconomic consequences of the different management scenarios derived from the application of the recommendations of the scientific advice for the selected fisheries.

The SEDAF project, with a duration of 14 months, has thus been structured in 5 work packages and 12 tasks as below summarized and as schematised in the figure 1.1.

WPO = project management and coordination.

⁵ In particular the Annual Economic Report of the EU fleets (publicly available in the STECF webpage)

⁶ In particular the Review of national reports on Member States efforts to achieve balance between fleet capacity and fishing opportunities (publicly available in the STECF webpage)

⁷ <http://ec.europa.eu/fisheries/market-observatory/eumofadoc/obj4/Guidelines~Pricestructure.pdf>

WP1 = Fisheries identification

Task 1.1 - Fishery identification demersals.

Task 1.2 - Fishery identification small pelagics.

WP2 = Collation and review on the main socio-economic information on the main fisheries

Task 2.1 - Collection and review of data in Italy, Slovenia and Croatia

Task 2.2 - Collection and review of data in Montenegro

Task 2.3 - Collection and review of data in Albania

Task 2.4 - Calculation of economic indicators and data presentation

Task 2.5 Collation and review of the information on marketing of fish products in the Adriatic Sea

WP3 = Review of the current stock status and recommendations of the scientific advice

Task 3.1 Review of the current status of the main stocks and recommendations of the scientific advice for small pelagics

Task 3.2 Review of the current status of the main stocks and recommendations of the scientific advice for demersals

WP4 = Assessment of the likely biological and socioeconomic consequences of the different management scenarios

Task 4.1 - Case studies for small pelagics

Task 4.2- Case studies for demersals

Task 4.3 - Parameterization of economic variables of the model at case study and fishery level

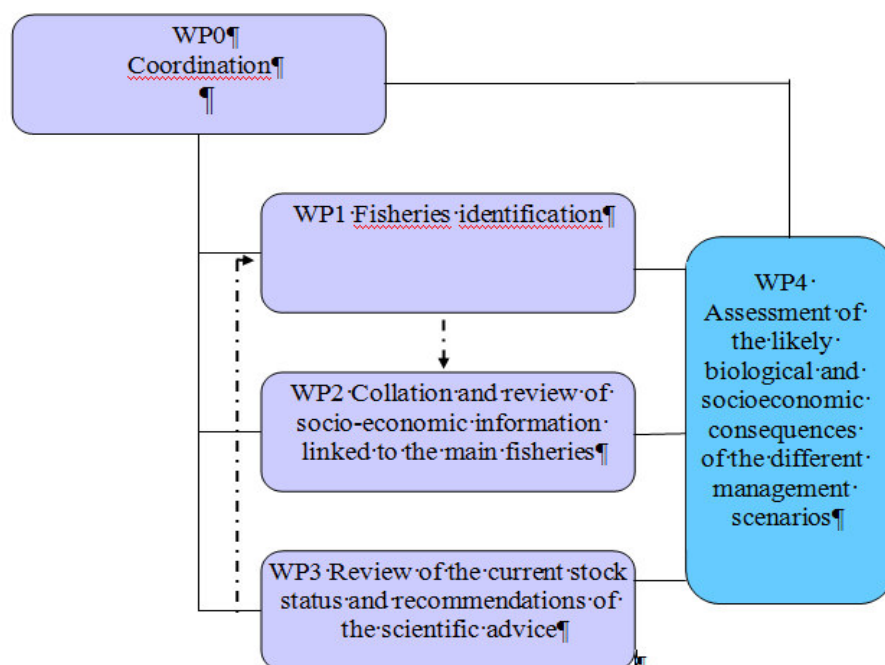


Fig. 1.1 – Scheme of the relationships among the project WPs.

Partner of the Project are reported in table 1.1

Tab. 1.1 – Partners and subcontractors involved in the project.

PARTNER OR SUBCONTRACTOR CODE	SCIENTIFIC RESPONSIBLE	AFFILIATION	WPs/TASKS INVOLVED
5	Maria Teresa Spedicato (Marea Coordinator)	COISPA	MAREA Coordinator WP0
5	Giuseppe Lembo	COISPA	PROJECT coordinator WPs 0, 1, 2, 3, 4
1	Angelo Tursi	CONISMA	WP0
4	Fabio Fiorentino	CNR Consiglio Nazionale delle Ricerche	WP0
S2	Nedo Vrgoč	IOF Institute of Oceanography and Fisheries, Split	WP0-4
S6	Aleksandar Joksimovic	IMB; Institute of Marine Biology, Kotor	WP0-4
S1	Jerina Kolitari	LAP - Laboratori i Akuakultures Dhe Peshkimit, Durres	WP0-4
S7	Bojan Marceta	ZZRS - Fishery Research Institute of Slovenia	WP0-4

Work-Packages and Task leaders of the project, which duration is 14 months, are reported in the table 1.2, while the list of deliverable in table 1.3

Table 1.2 - Work-Packages and Task leaders of the project

Name	Surname	WP/TASK	Partner or Sub-contractor
Maria Teresa	Spedicato	MAREA Coordinator	COISPA
Giuseppe	Lembo	SEDAF Coordinator	COISPA
Nedo	Vrgoč	WP3 and task 1.1	IOF
Vanja	Cikes Kec	task 3.1	IOF
Barbara	Zorica	task 2.1	IOF
Bojan	Marceta	task 3.2	ZZRS
Jerina	Kolitari	task 2.3	LAP
Evelina	Sabatella	WP2 and task 2.4	CoNISMa
Rosaria	Sabatella	task 2.5	CoNISMa
Giuseppe	Scarcella	WP1	CNR
Isabella	Bitetto	WP4 and task 4.2	COISPA
Alberto	Santojanni	task 4.1	CNR
Monica	Gambino	task 4.3	CoNISMa

Olivera	Marković	task 2.2	IMB
Ana	Pešić	task 1.2	IMB

Table 1.3 – Project deliverables with indication of the Working Package, the responsible and the month of delivery

Deliverable No	Deliverable title	WP No.	Lead Participant	Delivery month
D01	Interim Report	0	G. Lembo	6
D02	Draft Final Report	0	G. Lembo	14
D03	Data set of the collected statistics of fleet structures at National level	1	G. Scarcella	4
D04	Report on the identification of the main Adriatic fisheries, with relevant maps, focusing on the shared stocks	1	G. Scarcella	5
D05	Data set and preliminary estimation of socio-economic parameters for modelling in WP4	2	E. Sabatella	10
D06	Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region)	2	E. Sabatella	11
D07	Report on the Aspects of Fish Markets in the Adriatic Sea	2	R. Sabatella	12
D08	Report of the review of the current status of small pelagics and demersal stocks and recommendations of the scientific advice.	3	N. Vrgoc	6
D09	Report and discussion of the outputs of scenario modelling obtained using BEMTOOL	4	I. Bitetto	13

The project benefits of the support of the AdriaMed FAO Regional Project, in terms of expertise and knowledge of the information available in the Adriatic region.

2. PROJECT ACTIVITIES AND ACHIEVED RESULTS

2.1 WPO - PROJECT MANAGEMENT AND COORDINATION

Along the life of the project the coordination activities were focused on the following aspects:

- preparation of the working documents on the guidelines of the methods which were presented during the kick-off meeting;
- organization of the project kick-off meeting that was held on February 6-7, 2014 at the Hotel Princess, in Bar, Montenegro;
- preparation of an overview on the state of the art of knowledge of the fisheries in the Adriatic by country;
- preparation of the Interim report.
- realization of the 2nd meeting of the project, which has been held on September 17 at FAO headquarter in Rome, following the Workshop of WP2 - Collation and review on the main socio-economic information linked to the main fisheries - held at the same premises on September 15-16;
- realization of the 3rd meeting of the project, which has been held on December 19 at IOF in Split, following the Workshop of WP4 - Assessment of the likely biological and socioeconomic consequences of the different management scenarios - held at the same premises on December 17-18;
- monitoring of all the activities for ensuring the flow of information among WPs and project Deliverables, the organization of the work to be done among tasks and the check of the project outputs according to the decision taken and time schedule;
- preparation of the draft final report taking into account the inputs received from DGMARE on the Interim Report.

The minutes of the meetings – kick-off, 2nd meeting and WP2 workshop, 3rd meeting and of WP4 workshop - are reported in the **Annex 1** to this report.

To gather data relevant for the project the issue of a data call for the Member States was asked to DGMARE, as in other MAREA projects. In the meanwhile the MAREA Coordinator was advised by DGMARE that the following link:

<https://fishreg.jrc.ec.europa.eu/web/datadissemination/tables>

with public access could be used for gathering data relevant to the project.

Letters to the national Authorities were also delivered to ask the access to more detailed information. DGMARE prepared a presentation letter (**Annex 2** to this report) to support the requests at level of the Member States and other Institutions involved in the data collection. An access to relevant data through a data call launched to Member States was obtained on July 2014 by Joint Research Center.

Regarding the activities of WP2 in particular, the project has benefited of the support of AdriaMed FAO Regional Project.

An overview of the state of the art of the knowledge of the fisheries in the Adriatic Sea was also produced at country level and it is reported in the [Annex 3](#) to this report.

2.2 WP1 - FISHERIES IDENTIFICATION

The aim of this WP was to identify the main fisheries occurring in the Adriatic Sea, with special attention to those which occur in several of the Adriatic countries to take into account considerations of shared stocks in the Adriatic sea.

WP1 was split in 2 tasks:

Task 1.1 - Fishery identification of demersal resources

Task 1.2 - Fishery identification small pelagic resources

Information on the following aspects have been collated, reviewed and scrutinized:

7. sites, i.e. location of the harbours and fishing grounds;
8. fleets by fleet segment (number of vessels, overall tonnage, average length overall, overall engine power);
9. fishery/métier with relevant target species;
10. most common gears employed;
11. fishing activity by fleet segment (fishing season, days at sea, number of fishing trips);
12. amount and values of landings of the main target species and overall by fleet segment.

The information was collected using Data Collection Framework (DCF) data, as well as scientific and institutional channels through the network of contacts of the Consortium partners and AdriaMed FAO regional project. GFCM and STECF publications, grey literature, peer reviewed papers were the source of information for the fisheries identification of demersals and small pelagics.

Two Deliverables were accomplished under this WP, D3 and D4, that contain respectively the data and an analysis on the identification of the main fisheries and potential shared stocks.

Two data sets were prepared according to the framework of the Deliverable 3, taking into account comments and suggestions received during the kick-off meeting and successively during the 2nd and 3rd meetings of the project. The two data sets (in Access formats), one for small pelagic and one for demersal resources, together with a Glossary of terms to be used in the SEDAF project for the fishery data, are parts of the Deliverable 3. The outcomes of the project STOCKMED (Fiorentino et al., 2015) have been mainly used to define the fishing grounds of the main fleet segments (see point 1 above) and to improve the knowledge about potential shared stocks in the area.

In the Adriatic sea small pelagics fishery is carried out with two kind of fishing gears, mid-water pelagic pair trawl net towed by two vessels, mostly operated in the northern and central areas by Italian vessels, and purse seines. Until the mid-sixties the main gear used to catch small pelagic species was light attraction purse seine and is still in use in the Gulf of

Trieste and south of Ancona on the Western side; it is also the main gear used in Slovenia, Croatia, Montenegro and Albania.

The bottom otter trawls are used in the Adriatic Sea to fish demersal species like red mullets, hake, octopus, cuttlefish and mantis shrimp, while another bottom gear, the "rapido" is used mainly in north Italy for the demersal fishery targeting flatfish. Small scale fishery using set nets and traps is active mainly in the coastal areas of the basin, exploiting common sole, cuttlefish, and other demersal resources. Moreover in the Italian coasts bivalves, especially striped venus, are usually caught by vessels equipped with hydraulic dredges. This fishery system operates on sandy bottoms within 1 mile from the coast. Fishing areas of hydraulic dredges are managed by Consortiums operating at marine district level.

The spatial pattern of the fishing effort of pelagic pair trawl fleets is concentrated in the northern and central western side of GSA 17 mainly because the highest number of boats involved in this kind of fishery is located in the harbor corresponding to this side of the area, while the purse seiners are distributed in a wider area. In WP1 also the national legislation regarding temporal and spatial fishery restrictions in Adriatic Sea enforced in Italy, Slovenia, Croatia, Montenegro and Albania was summarised. This review is reported in the Deliverable 4. In this deliverable also a synthesis of the Adriatic small pelagics and demersal fisheries is presented both in term of capacity and production.

The datasets collected have been analysed in terms of fishing capacity and landings, the latter both as weights and values. The main outcome of the Deliverable 4 is the list of the most important fleet segments for each typology of fishery (i.e. small pelagic and demersal) in each country and GSA.

The fleet segments have been selected considering two rankings, respectively based on landing in weight and value. A threshold of 75% of the total production of the country in weight and in value has been chosen as criteria to include or not a particular fleet segment in the list of those to be considered in the further analyses.

In particular 32 fleet segments (11 targeting small pelagics and 21 targeting demersal species), as summarized in the table 2.2.1, have been selected for further analyses in WP2 and WP4. Moreover in the Deliverable 4 an analysis on the potential shared stocks has been carried out using a multivariate approach which confirmed the shared stock listed by GFCM and identified in the STOCKMED project.

Tab. 2.2.1 – Fleet segment selected in WP1 (see Deliverable 4 for details) for further analysis.

Country/GSA	Fishery	Fleet segments selected
Italy GSA 17	Small pelagics	TM_VL2440; TM_VL1824; TM_VL1218
Croatia GSA 17	Small pelagics	PS_VL2440; PS_VL1824
Slovenia GSA 17	Small pelagics	PS_VL1218
Italy GSA 18	Small pelagics	TM_VL2440
Montenegro GSA 18	Small pelagics	PS_VL0612; SB_VL0006; SB_VL0612
Albania GSA 18	Small pelagics	PS_VL1218
Italy GSA 17	Demersal	DRB_VL1218; DTS_VL1824; PGP_VL0612; DTS_VL1218
Croatia GSA 17	Demersal	DTS_VL1218; DTS_VL0612; DTS_VL1824; DTS_VL2440; DFN_VL0612

Slovenia GSA 17	Demersal	DTS_VL1218; DFN_VL0612
Italy GSA 18	Demersal	DTS_VL1218; DTS_VL1824; PGP_VL0612
Montenegro GSA 18	Demersal	DTS_VL1218; DFN_VL0006; DFN_VL0612; DTS_VL0612
Albania GSA 18	Demersal	DTS_VL1224; DTS_VL2440; PGP_VL0612

During the workshop of WP2 held in Rome on September 15-16, 2014 this list was discussed and it was considered as appropriate for the objectives of WP2. It was also decided to expand the analysis adding the following segments:

- PS 24-40 in ITA GSA 17, because of the relevance of the Italian purse seiners in the Adriatic pelagic fishery, for which a regional multiannual plan is also under enforcement;
- DTS 24-40 m in ITA GSA 17, in order to include in the economic review all the demersal Adriatic fisheries;
- TBB 24-40 in ITA GSA 17, because of its economic importance in GSA 17.

Furthermore during the workshop of WP4 held in Split on December 17-18, 2014 it was decided to include also the fleet segment PS_VL12-18 of Croatia fleet, because it was considered rather relevant in terms of production.

Therefore 36 fleet segments have been further considered in the analyses of WP2 and WP4, though in WP4 also other considerations were carried out at level of specific contribution in terms of fishing mortality. On the basis of such considerations a fleet segment was included or not in the simulations (details are reported in the Deliverable 9).

2.3 WP2 - COLLATION AND REVIEW ON THE MAIN SOCIO-ECONOMIC INFORMATION ON THE MAIN FISHERIES

The general aim of WP2 was to collate, review and scrutinize the available information on the main socioeconomic indicators at fleet segment level and on the basis of the fisheries identified in WP1, estimating the main socio-economic indicators pertaining to these fisheries. In particular, WP2 specific objectives were to address the following tasks:

1. to collate and review the available information on the main socioeconomic indicators at fleet segment level (task 2.1, 2.2 and 2.3);
2. to estimate the main socio-economic indicators pertaining to these fisheries (task 2.4);
3. to collate and review of the information on marketing of fish products in the Adriatic Sea (task 2.5).

WP2 was split in the following tasks:

Task 2.1 - Collection and review of data in Italy, Slovenia and Croatia

Task 2.2 - Collection and review of data in Montenegro

Task 2.3 - Collection and review of data in Albania

Task 2.4 - Calculation of economic indicators and data presentation

Task 2.5 Collation and review of the information on marketing of fish products in the Adriatic Sea.

In this WP it was also foreseen to carry out a preliminary exploration on the level of the dependence of fishing activities of the different communities affected by the identified fisheries and on the potential activities to absorb the manpower in case of fleet reduction (not only fishers but also indirect jobs) in the context of the potential Blue growth (aquaculture, tourism, renewable energy, etc) in case of the availability of the relevant information. This task has been accomplished within the task 2.5.

Information compiled under these tasks allowed the preparation of the following deliverables:

- D5. Data set and preliminary estimation of socio-economic parameters for modelling in WP4; this deliverable has been joined to the Deliverable 3; a unique data base in Access was finalized, containing all the type of information (capacity, landing, effort, economic variables);
- D6. Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments;
- D7. Report on the Aspects of Fish Markets in the Adriatic Sea with a preliminary exploration on the level of the dependence of fishing activities of the different communities.

List of socio-economic variables to be collected/reviewed

Tasks 2.1, 2.2 and 2.3 were finalized to collate and review the socio-economic data necessary to achieve the objectives of task 2.4 (main socio-economic indicators) and of WP4 (bio-economic modelling) from the Adriatic countries. Economic data cover a period of 5 years.

Before starting with the actual collection and revision of socio-economic data, it has been necessary to clearly identify the variables to be collected, the disaggregation level and the time span. Indeed, the SEDAF project proposal includes a list of "variable/parameters/indicators", but this list has been considered to be rather ambiguous when mixing variables as well as derived indicators.

In the definition of variables to be collected the following criteria have been followed:

- Data to be collected/reviewed should be consistent with the informative needs of the SEDAF project in relation to deliverables of WP2 and data input for bio-economic modelling under WP4.
- Data to be collected should be homogenous with already established procedures adopted in EU DCF (STECF, 2012).
- Data to be collected/reviewed should allow the calculation of socio-economic indicators used by STECF for assessing the economic performance of the fleets and the balance between fishing capacity and fishing opportunities.

These criteria have been also recalled by the EU representatives during the presentation of expectations of DGMARE about SEDAF project (kick-off meeting).

According to these criteria, the socio-economic variables to be included in the project have been identified as reported in the following table 2.3.1.

Table 2.3.1 – List of socio-economic variables to be collected/reviewed

CAPACITY	Number of vessels
	Average vessel age
	Gross Tonnage (GT)
	Power (kW)
EFFORT	Days at sea
	Energy consumption
	Maximum days at sea
EMPLOYMENT	Total Employed
	FTE
LANDING	Weight
	Value
	Weight by target species
	Value by target species
INCOME	Landings income
	Direct subsidies
	Other income
EXPENDITURE	Crew wages
	Energy costs
	Other variable costs
	Repair and maintenance costs
	Other fixed costs
	Depreciation costs
	Opportunity costs of capital
CAPITAL VARIABLES	Fleet depreciated replacement value
	Investments
	Financial position (%)

A Glossary of the economic variables was prepared in order to help each partner in the collection and review of economic data (see the reports of D3 and D5).

The list of socio-economic variables includes all parameters needed for task 2.4 (calculation of economic indicators) and also for WP4 (bio-economic modelling). In particular, the variable “maximum days at sea” has been included, because it is necessary as input in bio-economic modelling and for calculation of indicators of technical efficiency.

In addition to the variables reported in table 2.3.1, information on landings and average price of target species by commercial categories have also been collected and reviewed, because this is a requirement for the bio-economic models. This activity has been implemented under task 2.5 (collation and review of the information on marketing of fish products in the Adriatic Sea).

Collection of economic and social data in Albania and Montenegro

Population and stratification of the fishing fleet

The survey was undertaken in order to examine the socio-economic situation of the fisheries in Albania and Montenegro referred to the year 2013. The population for the economic survey was defined as the licensed motorized fishing fleet operating at sea in 2013. The information on the fishing fleet was obtained from the official national vessel registers and classified under the following items:

- i) Vessel name
- ii) Vessel registration number
- iii) Port of registration
- iv) Date of registration of the vessel
- v) Gross Tonnage
- vi) Length overall (LOA)
- vii) Horse power (hp)
- viii) Year of construction
- ix) Owner's name
- x) Fishing gears

The fishing fleet was classified and stratified according to the Data Collection Framework (DCF) of the European Union (Commission Decision 2008/949/EC) and the GFCM Task 1 Statistical Matrix⁸. The minimum geographical disaggregation level was decided to be the GSAs. The next disaggregation criterion was based on the technical and dimensional characteristic of the vessels, which was basically the DCF (reference) and GFCM fleet segmentations.

Sampling design

The sampling survey involves the collection of data from a sample of the target population. The key advantage of the sample survey is that less data need to be collected and analyzed. The method is therefore more cost effective compared to the census, where the data from all the individuals of the target population are collected.

The sampling unit of the multivariate sampling survey for the collection of socio-economic data was the single licensed fishing vessel and this unit was selected from the official population, with the reference year being 2013. The technique of 'stratified random sampling without replacement' (Sabatella E., & Franquesa R., 2003) was used whereby the sample size was selected randomly from the stratified total population. Sampling was stratified due to the fact that the fishing vessels of the fleet are divided into homogenous groups or segments based on suitable variables and independent samples are then taken from each of these segments. Following this process, each sampling unit was chosen, such that each sampling unit has the same probability of being chosen during the sampling process and avoiding the possibility to be chosen more than once. The sample was randomly chosen from the stratified population of fishing vessels.

⁸ RECOMMENDATION GFCM/33/2009/3, ANNEX 3

The sample size was determined in order to have a large sample and to minimize as much as possible the variance. The coverage rate was planned in such a way as to be higher for the smaller-sized segments. The table 2.3.2 shows the scheme followed in the two countries:

Table 2.3.2 - Planned samples and coverage rate in Albanian and Montenegrin survey

Country	Fleet segment	Total no. Vessels	Planned Coverage rate (%)	Planned sample
Albania	Polyvalent	16	100%	16
	Polyvalent passive < 6	271	15%	41
	Polyvalent passive 6 - 12	85	20%	17
	Polyvalent passive >=12 <18	8	100%	8
	Trawler 12 - 18	93	25%	23
	Trawler 18 - 24	90	30%	27
	Trawler 24 - 40	43	30%	13
Montenegro	Polyvalent passive <6	41	51%	21
	Polyvalent passive >=6 <12	31	52%	16
	Purse seine >=6 <12	16	100%	16
	Trawler >=12 <18	13	100%	13
	Trawler >=18 <24	7	100%	7

Questionnaire survey and training course

The questionnaires were designed with the aim of evaluating the socio-economic characteristics and activity of fishing vessels. The selected vessels were surveyed by means of direct interviews in June 2014. Technical data on the fleet, such as vessel length, engine power and age were obtained from the fleet registers. In order to undertake the questionnaire survey, in each country a training course over three days was held, which was attended by four data collectors. After the training course the questionnaire was updated and finalized and the data collectors started collecting the data, over a one month period.

Disaggregation level and time frame

The disaggregation level at which the economic data have been made available, according to SEADF proposal, are the main fleet segments identified under WP1 (Deliverable 4). The time span has been 5 years, following the approach usually adopted by STECF for the analyses and report of the economic performance of the fleets. Following the decision taken during the WP2 workshop and further refinement during the data review, the list of fleet segments included in the economic analysis is reported in table 2.3.3.

Table 2.3.3 – List of segments for which the economic analysis is reported

1	ITA GSA 18 all fleet segments
2	ITA GSA 18 pelagic trawlers 24-40 m
3	ITA GSA 18 demersal trawlers 12-18 m
4	ITA GSA 18 demersal trawlers 18-24 m
5	ITA GSA 18 polyvalent passive gears 06-12 m
6	ITA GSA 17 all fleet segments
7	ITA GSA 17 pelagic trawlers 24-40 m

8	ITA GSA 17 pelagic trawlers 18-24 m
9	ITA GSA 17 pelagic trawlers 12-18 m
10	ITA GSA 17 dredgers -12-18 m
11	ITA GSA 17 demersal trawlers 18-24 m
12	ITA GSA 17 demersal trawlers 12-18 m
13	ITA GSA 17 demersal trawlers 24-40 m
14	ITA GSA 17 beam trawlers ("rapido") 24-40 m
15	ITA GSA 17 polyvalent passive gears 06-12 m
16	ITA GSA 17 purse seiners 24-40 m
17	Croatia National fleet
18	HRV - Demersal trawlers 06-12 m
19	HRV - Demersal trawlers 12-18 m
20	HRV - Demersal trawlers 18-24 m
21	HRV - Demersal trawlers 24-40 m
22	HRV - Drift and fixed nets 06-12 m
23	HRV - Purse seiners 18-24 m
24	HRV - Purse seiners 24-40 m
25	HRV - Purse seiners 12-18 m
26	Slovenia National fleet
27	SVN - Purse seiners 12-18 m
28	SVN - Demersal trawlers 12-18 m
29	SVN - Drift and fixed nets 06-12 m
30	Montenegro National fleet
31	MNE - Demersal trawlers 12-18 m
32	MNE - Demersal trawlers 06-12 m
33	MNE - Drift and fixed nets < 6 m
34	MNE - Drift and fixed nets 06-12 m
35	MNE - Purse seiners 06-12 m
36	MNE - Polyvalent active vessels 6-12 m
37	MNE - Polyvalent active vessels<6 m
38	Albania National Fleet

Economic indicators

The list of economic indicators calculated under task 2.4 has been elaborated and presented for discussion during the kick off meeting and successively during the WP2 workshop held in Rome on October 15-16, 2014.

This final list of indicators is reported in the following table 2.3.4.

Table 2.3.4 – List of economic indicators

Indicator	Definition
Performance Indicators (AER)	

Gross value added (GVA)	Income from landings + other income – energy costs – repair costs – other variable costs – non variable costs
Gross profit (GRP)	Income from landings + other income – crew costs – unpaid labour - energy costs – repair and maintenance costs – other variable costs – non variable costs
Net profit (with or without direct subsidies)	Income from landings + other income – crew costs – unpaid labour - energy costs – repair costs – other variable costs – non variable costs – depreciation cost – opportunity cost of capital
Gross profit margin	Gross profit as a percentage of total income
Net profit margin	Net profit as a percentage of total income
Economic and Social Indicators ("Balance Report")	
Return on fixed tangible assets (ROFTA)	(profits + opportunity cost)/ fixed tangible assets
Current Revenues/Break Even Revenue (CR/BER)	(income from landings + other income)/revenue point at which the gross cash flow equals the fixed costs
GVA per fisherman	Gross value added dived by number of fishermen

Common protocol to systematize the information

Parallel with the collection and revision of available information, a common protocol to systematize the information collected in the tasks 2.1, 2.2 and 2.3 was finalized:

- present the data in a common format
- calculate economic and social indicators, reducing possible errors in the interpretation of the definitions
- generate some graphs for a visual presentation of the main trends.

This protocol has been applied by each national responsible.

Methodology and data issues

Regarding the task 2.1, 2.2, 2.3 the source of data is different according to the country. Italian data are from the Italian National Program for data collection within the EU Reg. 199/08.

Slovenian data have been extracted from the STECF/JRC data dissemination tool.

Croatian data were made available by the national authorities and they have been integrated when necessary through ad hoc estimations. Croatian official data are under revision and therefore their interpretation should be carefully considered.

Regarding Montenegro and Albania, very poor economic information was available before the project. Economic and social data for 2013, as well as data on production volume and value, have been collected through a specific survey that has been implemented in the period April-June with the support of AdriaMed. For Albania, some economic data were also available for the years 2011 and 2012. Montenegrin economic data for the years 2009 and 2012 were estimated on the basis of a set of explanatory variables (number of vessels, days-at-sea, total revenue). As a consequence of these diversified situations also the data quality is not homogenous.

Italy

In Italy a cost and earnings data collection program started in 1988 with a systematic survey for the collection of technical and economic parameters of the Italian fishing fleets. This first initiative was followed by a large concerted action funded by the European Commission which gathered research institutes from more than 20 countries and started to produce a yearly "Economic Assessment of European Fisheries" between 1996 and 2005.

Since 2001 the economic survey is included in the National Program of the EU Data Collection Framework (DCF), which obliges EU Member States to collect yearly cost and earnings data for commercial fishing vessels at national level.

In particular, regarding the economic data, the following variables are collected within the DCF National Program through a Probability Sample Survey:

1. Income (Income from leasing out quota or other fishing rights, Direct subsidies, Other income)
2. Personnel costs (Wages and salaries of crew, Imputed value of unpaid labour)
3. Energy costs
4. Repair and maintenance costs
5. Other operational costs (Variable costs, Non-variable costs, Lease/rental payments for quota or other fishing rights)
6. Investments in physical capital
7. Financial position

These data are collected in face to face questionnaire interviews of a selection of vessel owners, stratified by area (administrative regions and FAO GSA) and vessel characteristics (size, gears). The vessel sampling strategy is proportional random with some vessels being kept in the sample for several years to increase the response rate.

Economic data are available by year, FAO/GSA and fleet segment.

They are stored in the Italian database of the data collected within the DCF NPs, managed by MIPAAF. Data are available upon request to the Italian National Correspondent and according to article 18 of EU Regulation 199/08.

Croatia

The economic data on the fishing sector were collected mostly in cooperation with Directorate of Fisheries of the Ministry of Agriculture. Some of the data from 2009 to 2011,

especially the ones concerning the socio-economic, where missing thus some estimations were carried out:

- for investigated DFN segment we assumed that the fleet did not change so the data for 2011 was applied to previous years;
- for PS segments in mentioned years (2009, 2010) we had some of the data (number of vessels, their age, length, kW and landings) and according to increase/decrease (percentage) socioeconomic data were assumed.

Further on, as some inconsistency in obtained data sets were noticed, scientists make some corrections in correspondence with some of the active commercial fisherman. As landing weight was an official data, that we consider to be true in order to obtain good landing value, for DTS segments VL0612, VL1218 and VL1824 price for landed demersal organisms was assumed on average 5€/kg. Some changes were made also concerning fuel consumption per kg landed (liter/kg) that for demersal segments VL1824 and VL1218 was put as 2.5 liter/kg, while for demersal segment VL0612 was 2.0 liter/kg. Mentioned assumptions were made according to some preliminary results obtained throughout project DEMMON within which monitoring of demersal species and some demersal fishery segments were done.

Direct subsidies were defined as landing income multiplied by 0.1 for pelagic segments and by 0.24 for other segments. Here it should be stressed that direct subsidies were absent in 2013 for every segment except pelagic ones. Other incomes were calculated as multiplication of energy consumption (million liters) and 0.132 (the difference in the price of fuel partly covered by Ministry). Economy cost were defined as energy consumption (million liters) multiplied by fuel price, which was around 0.75€ per liter.

Slovenia

The economic data on the fishing sector were collected mostly from accounting records – AJPES, from data base 'InfoRib', through questionnaires and sales notes. In the monitoring programme all fishing vessels were included (approximately 180 units). The data collected from all sources were combined in such a way that a complete set of accounting items is compared for each business enterprise. The target population was all fishing sector in Slovenia. There were approx. 100 companies or fishermen in Slovenia. In March 2013 the questionnaires for 2012 were sent to all users of fishing vessels in Slovenia. Where the questionnaire was the only source used, the response rate was more than 60%. Where the data from annual accounts of business enterprises was used the response rate was 100%, because there are economic reports for all investigated companies or fishermen.

Montenegro

The socio-economic data on the fishing sector were collected from three institutions: MONSTAT, the Ministry of Agriculture and Rural Development and Institute of Marine Biology (IMB)

In the data collection of all institutions there were some gaps: MONSTAT collects only the data on number of fishermen, fishing vessels engaged in fishing and total catch for some species. Logbooks and monthly reports were not submitted to Ministry of Agriculture and Rural Development (MARD) for all the vessels and IMB monitoring was not covering all vessels from the fleet. Data collected by these three institutions were combined in order to obtain the best result possible. Available data from Logbooks, monthly reports and interviews with fishermen, were crosschecked in cases suspicious data were identified.

Regarding the socio-economic surveys in the fishery sector, three economic surveys have been carried out in Montenegro until 2014.

The first economic survey has been carried out from September 2007 to August 2008, but data are available only for September 2007 to May 2008. Economic survey was executed in cooperation with the Ministry of Agriculture, Forestry and Water Management of Montenegro, AdriaMed and the Institute for Economic Research in Fishery and Aquaculture (IREPA) with the major aim of contributing to create the basis for the establishment of a national monitoring system covering all the dimensions of fishing activities (social, biological and economic) in the view of an ecosystem approach to fisheries.

The second project through which the socio-economic data has been collected is EU IPA project "Sustainable Management of Marine Fishery" (Europeaid/128947/C/SER/ME). Within the framework of this project a Socio-economic Study of the Montenegrin Fishery Sector has been conducted. The aim of that study was to perform a socio-economic analysis of the Montenegrin fishery sector covering all sub-sectors (capture fisheries, mariculture, aquaculture, sports fisheries, processing, marketing and distribution, and ancillary sectors (e.g. boat building and repairs, service industry, feed supply etc.).

In 2014, the third socio-economic sample survey was undertaken with the support of AdriaMed and of SEDAF project in order to examine the socio-economic situation of the fisheries in Montenegro referred to the year 2013. The information on the fishing fleet was obtained from the official national vessel register. The fishing fleet was classified and stratified according to the Data Collection Framework of the European Union and the GFCM Task 1 Statistical Matrix. During the survey the data collectors contacted 78 fishermen, of which 63 had fishing days during 2013, while 15 fishermen were not participating in the research for different reasons. Although this survey has many advantages compared to the previous two, it must be taken with some caution because it was based on questionnaires with fishermen who sometimes give inaccurate and not reliable data.

Fishing logbooks are also a problem; a lot of fishermen deliver logbooks to the Ministry in order to get regressed fuel prices even when they have not been at sea. This can only be checked by comparing VMS data with logbooks data to verify whether the vessel in question actually went to sea.

Through this survey all socio-economic data referred to the year 2013 were collected. For the previous analyzed period 2008-2012, only transversal data (capacity, landings and effort) as well as data on employment were available. In order to get the picture of socio-economic data for the previous period, backward economic performance projection model was applied.

In line with the disaggregation level requested in the EU Data Collection Framework (DCF), all variables are aggregated at the level of fleet segment at least five years. When time series are not available, missing data are computed using linear functions based on a number of functional relationships between economic and transversal variables, which have been already identified in the BEMTOOL model and applied in "The 2013 Annual Economic Report on the EU Fishing Fleet" (STECF-13-15).

Albania

From 1999 to 2013 the Fisheries Directorate has been part of the Ministry of Environment, Forestry and Water Management, from 2014 there is a Fisheries Units at the Ministry of Agriculture. In the Geographical Sub Areas 18, the Albanian coastline is 480 km long, there

are 4 main ports: Shengjini, Durrës, Vlore, Sarande. Fishing activity is almost exclusively on continental shelf.

Effort and landing data are collected using logbooks. Biological data are collected with MEDITS surveys, MEDIAS surveys and DEPM survey. Economic and social data were collected in 2004 with a FAO AdriaMed social survey, with a FAO AdriaMed/MedFisis Catch and effort survey, in 2012 and 2013 with FAO AdriaMed socio-economic survey and in the last year with the support of SEDAF project. For the aim of the socio-economic analysis, 2013 data have not been used because they present high variations with respects to previous years.

Results from economic indicators

According to the data collected and reviewed by the SEDAF project, the total number of vessels in the Adriatic fishing fleet in 2013 was 9,411, with a combined gross tonnage (GT) of 124.8 thousand tons and engine power of 870 thousand kilowatts (kW).

Overall, capacity of the Adriatic fleet increased between 2009 and 2013 by 2% both in terms of vessels that in terms of GT. Croatia had the highest number of vessels in 2013, accounting for 46.4% of the Adriatic total. The Italian fleet was the second largest in number, accounting for 44.5% of the Adriatic total (operating in GSA 17 and 18), followed by Albania at 6%. Italian's fishing fleet was the largest in terms of GT, with almost 54% of the Adriatic total, followed by Croatia at 37% and Albania at 8.8%.

According to the available data, the total number of fishers employed in the Adriatic fleet in 2013 was 13.118, 3.5% increase when compared to 2012. Data on crew costs and employment levels show that average wages in the Adriatic fish catching sector oscillated between 2009 and 2013, and appear to fluctuate in line with landings value and fuel costs. Average wage per employee in 2013 was €6,331, 23% decreasing compared to 2012.

The Adriatic fishing fleet spent just over 663 thousand days at sea in 2013. Italian and Croatian fleets together accounted for almost all the registered days at sea.

The overall fuel consumption decreased by 10.6% from 2012 to 2013 and it coincides with the decrease in the average price of fuel for the Adriatic fleet (a decrease of 5% compared to 2012) and a decrease in days at sea (-13% compared to 2012). In 2013, the average price of fuel decreased in all countries except Croatia, where fuel consumption actually increased.

According to available data, 196 thousand tons of seafood were landed by the Adriatic fleet in 2013, amounting to an estimated €588 million in value. The leading Adriatic fishing countries were Italy and Croatia which together accounted for over 90% of the landings weight in 2013. The Adriatic fishing fleet generated an income of €417 million in 2013, while operating costs amounted to €262 million. Total costs, including capital costs, amounted to €340 million in 2013, equating around 88% of income.

Total costs increased around 2.7% in 2013 compared to 2012. The main cost items included labour costs (€107 million) amounting to 41% of total operating costs, and energy costs (€101 million), totaling 38% of total costs.

Analysis of economic performance in 2013 by country revealed a mixed picture. The data suggests that 3 out of 4 countries generated a net profit in 2013 and 1 country (Slovenia) generated net losses in 2013.

The Italian fleet in GSA 17 generated the highest GVA in absolute terms (51% of the Adriatic total), followed by the Italian fleets in GSA 18 and the Croatian fleet, with 33% and 13% of the Adriatic total, respectively (Figure 3). In relative terms, the Croatian fleet generated the highest level of GVA in relation to income (79%), followed by the Italian fleet in GSA 18 (69%) and Italian fleet in GSA 17 (60%).

Tasks 2.5 - Collation and review of the information on marketing of fish products in the Adriatic Sea

The aim of this task was to collate and review the information on marketing of fish products in the Adriatic Sea, considering both quantitative and qualitative aspects of trade and marketing. In particular, the specific objectives of the task can be identified as follows:

1. analysis of the fish trade between the two sides of the Adriatic basin, the EU and the non-EU countries;
2. overview of fish and seafood consumption and of consumer price;
3. analysis of ex vessel price;
4. analysis of consumer price.

This task also included the collection of a 5-years series of first sale prices for the main species).

Regarding the quantitative and qualitative aspects of the fish international trade between the two sides of Adriatic basin, the EU and the non-EU countries the following analyses have been performed:

- ✓ analysis of international trade regulation, such as the Stabilization and Association Process in the western Balkans;
- ✓ analysis of the position of the Adriatic sea in world fishery trade;
- ✓ analysis on trade flows among the Adriatic countries (UN-Comtrade data, this section aims to outline the structure of an intra-Mediterranean matrix of fishery trade);
- ✓ fish trade between Adriatic countries and the EU;
- ✓ analysis of trade in fishery products by countries with particular attention to commercial interactions with EU countries and neighbor countries with limited access to the resources (e.g. Bosnia and Herzegovina, Serbia and Macedonia).

In order to delineate more clearly the framework of trade in fish products among coastal Adriatic countries, both EU and non-EU, countries have been classified into three groups:

- EU Adriatic countries (EUAC): Italy, Slovenia and Croatia,
- Third Adriatic countries (TAC): Albania and Montenegro,
- Other Balkan countries (OBC): Bosnia and Herzegovina, Serbia and Macedonia with limited access to the resources.

International trade

This sub-task has focused on the exchange of fishery products, based on data from FAO – FISH STAT plus, United Nations (UN)-Comtrade and Eurostat data (for European Union [EU] trade). Eurostat Statistics on the international trade of goods measure the value and quantity of goods traded between Member States of the EU (known as intra-EU trade) and goods traded by EU Member States with non-member countries (known as extra-EU trade).

These statistics are the official source of information about imports, exports and the trade balance in the EU, its Member States and the euro area. Statistics are published for each declaring country with respect to each partner country, for several product classifications. One of the most commonly used product classifications is the Standard international trade classification (SITC Rev. 4) of the United Nations (UN); this allows a comparison of international trade statistics to be made on a worldwide basis.

The products categories that have been considered are the followings:

- Fish, fresh (live or dead), chilled or frozen (034)
- Fish, dried, salted or in brine, smoked fish; flours, meals and pellets of fish, fit for human consumption (035)
- Crustaceans, molluscs fresh, chilled, frozen, dried, salted or in brine (036)
- Fish, crustaceans, molluscs and other aquatic invertebrates, prepared or preserved (037)
- Preparations of meat, of fish or of crustaceans, molluscs (16).

Results of the analyses carried out in this task evidenced that the Adriatic countries depend heavily on imports of fish products and this situation is worsened in the last ten years. Countries that make greater use of fishery products of Adriatic origin are Slovenia (about 41 percent of imports originate in the countries of the basin), Albania and Montenegro, with the share of supply by Adriatic partners ranges between 31 percent and 34 percent of total imports. Italy imports from Adriatic countries only 2 percent of total fish imported.

Taking into account the intra-Adriatic exports of fishery products, Italy is the most important partner (49 percent of total fish exports of Adriatic countries goes to Italy). The situation is quite similar for the Adriatic countries: Albania, Croatia and Montenegro export exclusively in Italy (this share reaches 100 percent).

Overview of consumption

Fish per capita consumption of Adriatic countries has been achieved using as main source of information FAO Food balance sheets. This database includes data from Italy, Croatia, Slovenia, Albania, Montenegro for the variables reported in the table 2.3.5.

Table 2.3.5- FAO Food Balance Sheet

Total Population - Both sexes (1000)	Waste (1000 tonnes)
Production (1000 tonnes)	Processing (1000 tonnes)
Import Quantity (1000 tonnes)	Other Util (1000 tonnes)
Stock Variation (1000 tonnes)	Food (1000 tonnes)
Export Quantity (1000 tonnes)	Food supply quantity (kg/capita/yr)
Domestic supply quantity (1000 tonnes)	Food supply (kcal/capita/day)
Feed (1000 tonnes)	Protein supply quantity (g/capita/day)
Seed (1000 tonnes)	Fat supply quantity (g/capita/day)

For Consumer prices the main source of information has been EUROSTAT

In the Adriatic basin the fish per capita consumption (i.e. the apparent human consumption) has shown constant growth with large differences between Croatia and Italy on one side and Albania, Montenegro and Slovenia on the other side. For the latter countries, fish per capita consumption has remained below the average fish consumption in Europe (21.8 kg in 2001) and in the rest of the world (18.9 kg). Fish consumption in Montenegro is almost the lowest in Europe and amounts to approximately 9.7 kg per capita. At Adriatic level, the domestic market are mainly matched by imports (only 25% of domestic supply is met by domestic production) with the exception of Croatia. For this country, on the basis of FAO food balance sheets all the domestic supply in quantity is covered by production. In Italy, the self-supply rate continued to slide in recent years due both to an increase in imports and decline of domestic production.

Fish Prices

For the analysis of first-sale or ex-vessel price, the source of information for the variable "price by species" is European Data Collection Framework (DCF) for Slovenia, Croatia and Italy. Montenegro and Albania have submitted information on ex-vessel price by the ten most important species in terms of landed value. The source of information for the variable "Price by fishing technique and vessel length" is from SEDAF project.

The task related to the ex-vessel prices highlighted that the highest level is registered in Albania with around 7.50 €/kg in 2013, but strong fluctuations have been observed over the period (5 last years). The price level shows the following ranking schedule: Montenegro – 5.35 €/kg, Slovenia – 5.17 €/kg, Italy – 3.81 €/kg, and Croatia – 0.80 Euro/kg. In general, in Adriatic countries the level of landed prices is greater than the level observed in EU countries (respectively 2.59 €/kg and 1.31 €/kg).

In Croatia, the first sale price showed an increase between 2010 and 2011. The changes in prices are related to the price of anchovy that varied slightly between 2011 and 2013. According to Department of Fisheries, market organization of fisheries products in Republic of Croatia is based on cooperatives, buy-off stations and registered first buyers. The first sales in accordance with the Marine Fisheries Act may only be done to the registered first buyers. Capture fisheries products may be placed on the market for the first time in accordance with the regulation governing marketing standards (presentation, preservation, freshness and size).

In Italy, in the last years, the landing price trend showed a slight decline, in spite of the considerable decrease of domestic production in the last five years (from 124 thousand tons in 2009 to 102 thousand tons. in 2013); the drop in landing prices is partly connected to the stagnation of domestic demand and covered almost all the main species, with the only exception of the average price of European anchovy which increased by 27% in the period 2011-2013. Such price increase is partly due to the adoption of initiatives aimed at improving product quality and a better control of the supply. This initiatives are linked to the development of a self-management approach and concerns the Adriatic midwater pair trawlers. For instance, in the Marche region, midwater pair trawlers agreed upon a reduction of fishing days and catch levels depending on internal and export market.

Fishery and aquaculture products are distributed by wholesale fish traders and only a minor part is sold directly by fishermen or farmers. There are at present 28 Adriatic fish markets, divided into production and mixed markets.

The prices obtained for the key species targeted by the Slovenian fleet increased between 2009 and 2013. European pilchard achieved the highest average price per kilo in 2013 (€ 2.08 per kg).

Fish trading in Slovenia is organized through various networks: wholesalers, retailers, processing plants, anglers and exports. Fish markets are located in almost all Slovene cities, and in almost every store it is possible to buy at least frozen fish. The fish markets usually have their own supply, often directly from producers. A significant part of fish catch is also sold at the fish stock in Trieste.

Finally, in Montenegro, the first sale price showed an increase between 2010 and 2013. The price has increased for all demersal species, while a stable trend has been registered for pelagic species. In Montenegro producer's organizations don't exist, and neither do auctions or any kind of organised fish selling facilities. Fish are sold mainly at green markets and directly to the consumer or supplied directly to restaurants by fishermen, although small amounts are exported. Sales strategies are diverse across the large-scale fleet and range from wholesale to direct sales to customers. The most prevalent strategy by far is to sell through fresh fish markets.

The average landed price of seafood in Albania is quite stable in the last years, with an average value of €7.50 per kilo of seafood landed. Among the ten top species, the landed prices for pilchards and anchovy is on the same level (0.86 €/kg) and the trend for these two species is stable over the period.

Dependency analysis

In addition an analysis of dependency on fisheries in the coastal regions of the Adriatic basin has been carried out with the purpose of providing a picture of the regional role and importance of the fisheries sector and its four sub-sectors: *fishing, fish processing, aquaculture and ancillary activities*, in terms of creation of income (Ratio 1) and maintenance of employment (Ratio 2), and thus dependency of the regional economies on the fisheries sector.

A review of the international existing literature on the regional dependence on fisheries (P. Salz, 2007) has been the starting point in order to identify the most appropriate indicators to assess the dependence of coastal areas from the fishery sector. A specific questionnaire has been prepared for each Country.

The questionnaire was presented and shared with partners during the SEDAF meeting on 15-16 September 2014 in Rome.

The Adriatic Country dependency on fisheries is described by the following indicators:

- Employment – number of persons employed in the specific sub-sector of the fisheries sector.
- Income – gross value added (i.e. contribution to the gross national product – GNP) in mln Euro.
- Ratio 1 – Income generated by the fisheries sector as a percentage of the total national income.
- Ratio 2 - Employment created by the fisheries sector as a percentage of the total national employment.

The results of the dependency analysis highlighted that the total income generated from all the fishery sectors in 2012 was equal to 2.572,64 billion Euro. The largest proportion comes from processing industry that accounts for more than 60%. On the hand of employment, according to estimate data, the most important sub-sector is represented by "ancillary activity sub-sector", with around 20 thousands persons. This value, in percentage, represents around the 45% of the total employment. Related to the level of dependence from fisheries, and according to the two ratios have been considered, Croatia registered the higher level of dependence in terms of income generated by the fishery sector as a % of the National GDP. While, in terms of employment (Ratio 2), all Adriatic Countries have similar dependence levels, ranging between 0.02% and 0.05%.

However, the dependency analysis of the fishery sector is influenced by the geographical scale at which the transversal and economic data used to describe the fishery sector are collected and available. Rarely the scale of such data is in line with a NUTS 3 aggregation level or with a more restricted spatial scale. Also in Italy and Slovenia, where Data Collection Framework data are available since more than 5 years, details at such levels for the fishery sector are very scant. Thus a macro dimension has been considered in this first overview, although this is penalizing the relevance of the fishery sector in terms of income and employment when referred to the GDA and employment of the country (of the Adriatic area for Italy). However, the results might be considered indicative of the relevance in comparative terms, i.e. among the examined countries. Incomes from the fishery sectors, compared to the total income, are more relevant in Slovenia then in Italy and Croatia. Whilst regarding employment there is a higher dependency in Croatia compared to Italy and Slovenia, and the employment dependency of Albania is more aligned with that of Croatia.

In future developments regarding the fishery dependency analysis, specific studies may support a data collection and information availability at a microscale geographic aggregation level, thus allowing a better understanding of the fishery dependency linked to economic and social characteristics of smaller communities. In addition, in the analyzed Countries, the artisanal fishery is predominant, so it represents a strong socio-economic aspect that will be strategic for supporting the economic and social sustainability.

Important, however, will be also the information related to the interactions of small-scale fishery - in direct and indirect terms- with others activities present on the same coastal areas, such as tourism, recreational fishery, fishing tourism, supporting activities for environmental and ecosystem services.

2.4 WP3 - REVIEW OF THE CURRENT STOCK STATUS AND RECOMMENDATIONS OF THE SCIENTIFIC ADVICE

The aim of WP3 is to review the available information on the current status of the main stocks exploited by the fisheries identified in WP1 and associated recommendations of the scientific advice.

This activity is fundamental for providing the relevant inputs and data to the work of bio-economic modelling foreseen in WP4.

Under this WP the activities of two tasks were undertaken:

Task 3.1 Review of the current status of the main stocks and recommendations of the scientific advice for small pelagics;

Task 3.2 Review of the current status of the main stocks and recommendations of the scientific advice for demersals.

The activities related to the Review of the current stock status and recommendations of the scientific advice have been finalized in the Deliverable 8, compiling the most updated available information on the current status of the main stocks exploited by the commercial fisheries in the Adriatic Sea and associated recommendations of the scientific advice. The Deliverable 8 includes information from the GFCM WG and GFCM Sub-Committee and STECF-EWG reports taking into account those of 2014. It was decided to include the most updated information given that the assessment carried out in the GFCM were endorsed at the Sub-Committee Stock Assessment at the beginning of February, while those carried out in the STECF-EWG were discussed and endorsed during the meeting held in January 2015, though the final discussion in the STECF plenary is still pending.

The information are systematized identifying the status of the assessed stocks, the stock parameters used in the assessments, the output of the assessment in terms of fishing mortality and reference points, level of catches, level of the Spawning Stock Biomass, structure of the stocks and of the populations of the different species in terms of age/size, forecasts if available, pros and cons of the reviewed analyses.

In the last fifteen years, almost all the stock assessments are carried out jointly between Adriatic scientists. Adriatic stock assessment documents have been done mainly inside three international bodies: AdriaMed, GFCM and STECF. The usual way of work is that stock assessments are performed through the working groups AdriaMed (WG Small pelagic and WG demersal) and then presented to the SCSA of SAC GFCM or within STECF.

Stock assessment documents for sardine and anchovy in the GSA 17 are permanently present on the meeting of SAC GFCM since 2001. The common series of data (Croatia, Slovenia and Italy) for sardine and anchovy in the GSA 17 are ranging from 1975 till now. Since 2006 the stock assessment of Common sole has been done on the basis of data collected through the project SOLEMON, and for red mullet since 2013. First preliminary stocks assessment of sardine and anchovy in GSA 18 were presented to the SAC GFCM in 2007. In GSA18 since 2010 common work is carried out (Italy, Albania and Montenegro) for stock assessment for hake and thereafter for deep-water rose shrimp.

The review of the available information on the current status of the main small pelagic and demersal stocks exploited by the commercial fisheries in the Adriatic includes recommendations from the scientific advice, as described in the reports of the GFCM Working Group, GFCM Subcommittee and STECF-EWG.

The information are systematized identifying the stock parameters used in the assessments, the level of catches, the output of the assessment in terms of fishing mortality and reference points, structure of the stocks and populations of the different species in terms of age/size, level of the Spawning Stock Biomass, the status of the assessed stocks, forecasts if available, pros and cons of the reviewed analyses.

In the table 2.4.1, a summary of the stock assessment results and advices for small pelagic and demersal stocks in the Adriatic sea is reported.

In GSA17 ten assessments have been reviewed, four were related to the small pelagic stocks and six to the demersal ones. A joint assessment in GSA17 and GSA18 was also attempted

for sardine and anchovy stocks. In GSA18 nine assessments have been reviewed, one was preliminary for anchovy stock while the other eight were related to demersal stocks.

Renewable resources of the Adriatic Sea have many specificities which make assessment and management very demanding. Exploitation of the majority of stocks is typical multigear exploitation (the same species are exploited using different fishing gears and different type of fisheries) with very important cumulative, competitive and synergetic effects

Adriatic Sea is relatively small sea and majority of the stocks inhabit the whole Adriatic. Because of that, more or less all commercially important stocks are biologically common but economically shared between fishing fleets from different countries. At the same time, fishing effort and fishing legislations are different in different parts of Adriatic Sea, which is reflecting on the recent state of stocks, and also has a big impact onto possibility of establishing long-term sustainable management and protection measures.

It is thus clear that it is necessary to continue and improve the cooperation between all countries participating in the fisheries, on the scientific level, as well as on the level of fishermen, fishermen associations and administration.

Table 2.4.1 – Summary of the stock assessment results and advices for small pelagic and demersal stocks in the Adriatic sea.						
GSA	Species	Validated	Year	Assessment tools	Data type	Status / recommendation
17	Sardine, <i>Sardina pilchardus</i>	GFCM	2014	SAM tuned by acoustic data	Survey data: 2004-2013 Catch data: 1975-2013; biological data (west from 1975, east from 2001)	Biomass higher than reference points (RP), E=0.53, high fishing mortality- in overexploitation Reduce fishing mortality.
17	Sardine, <i>Sardina pilchardus</i>	STECF	2013	SAM tuned by acoustic data	Survey data: 2004-2012 Catch data: 1975-2012; biological data (west from 1975, east from 2001)	Biomass is above RP, recruitment level increasing, high fishing mortality, E >0.4. Short term forecasts: Fishing mortality in 2014 should not exceed FMSY= 0.46 corresponding to catches of 36962 tons in 2014.
17	Anchovy, <i>Engraulis encrasicolus</i>	GFCM	2014	SAM tuned by acoustic data	Survey data: 2004-2013 Catch data: 1975-2013; biological data (west from 1975, east from 2001)	SSB below 30 th percentile, high fishing mortality, E=0.49 Overexploited and in overexploitation Reduce fishing mortality immediately
17	Anchovy, <i>Engraulis encrasicolus</i>	STECF	2013	SAM tuned by acoustic data	Survey data: 2004-2012; Catch data: 1975-2012; biological data	Biomass is below RP, recruitment level fluctuates, high fishing mortality, E>0.4. Short term forecasts: Fishing mortality in 2014 should not exceed FMSY (F=0.38) corresponding to catches of 13432 tons.
17	Common sole, <i>Solea solea</i>	GFCM	2014	XSA, SCAA with SS3, a4a	Trawls surveys, catch; Lfreq catch 1970-2012 (SCAA); 2006-2012 (XSA)	Given the results of the present analysis (current F is around 0.46), the stock appeared to be subject to overfishing. A considerable reduction is necessary to approach the reference point. Considering the overexploited situation and the low values of SSB and biomass of the sole stock in GSA 17 a reduction of fishing effort and an improvement in

						exploitation pattern is advisable, especially of Italian rapido trawlers and gillnetters, which mainly exploit juveniles.
17	Red mullet, <i>Mullus barbatus</i>	GFCM	2013	XSA, Y/R	Trawls surveys, catch at age (2006-2012)	High overfishing status with relatively intermediate high biomass level- overfishing. Reduction of fishing mortality towards the proposed reference point is advised, reduction of fishing pressure and an improvement in exploitation pattern (especially of Italian trawlers exploiting a larger amount of age 0+ group) is advisable. However, from the analysis of the relative biomass observed in 2012 from MEDITS and from the SSB and total biomass estimated for the same year from XSA is possible to conclude that the abundance of the stock is high and there is not risk of stock depletion.
17	Red mullet, <i>Mullus barbatus</i>	STECF	2013	XSA, Y/R	Trawls surveys, catch at age (2006-2012)	SCAA analyses shows constant SSB trend, but SS3 model with SCAA shows a critical situation in older ages; not possible to fully evaluate the state of the spawning stock due to the absence of proposed or agreed management reference points for the SSB. Recruitment has been stable, fishing mortality appears higher than the respective estimates of F0.1 - the resource is overexploited. Short term forecasts: Catch in 2014 not to exceed 1441tons, corresponding to F0.1.=0.21.
17	Spottail mantis shrimp <i>Squilla mantis</i>	STECF	2012	VPA (VIT), Y/R	Catch, trawl surveys & Lfreq catch 2007-2011	The current F=1.00 is above the FMSY reference point (0.30)- exploited unsustainably. Reducing fishing mortality towards the proposed reference point FMSY is recommended by reducing fishing effort or/and catches of the relevant fleets taking into account mixed-fisheries effects. Catch forecasts consistent with the adopted measures shall be estimated.

17	European hake <i>Merluccius merluccius</i>	GFCM	2014	SS3	Catch at age data; MEDITS,	SSB shows a clear decreasing trend. Resource is subjected to overfishing. A reduction of fishing mortality is recommended.
17	European hake <i>Merluccius merluccius</i>	STECF	2012	XSA, SURBA and steady state VPA using VIT program	Catch at age data; MEDITS,	The spawning stock biomass shows a clear decreasing trend, the recruitment shows a fluctuating pattern with a general decreasing trend. The values of the most recent F_{bar} range from 1.48 to 2.02 and the values of $F_{0.1}$ is 0.2 - exploited unsustainably.
GSA	Species	Validated	Year	Assessment tools	Data type	Status / recommendation
18	Anchovy, <i>Engraulis encrasicolus</i>	GFCM	2013	DEPM		Preliminary assessment: no advices can be provided. Low fishing pressure in eastern GSA 18, especially in Montenegro. Higher fishing pressure in the western GSA18, although part of the fleet also operates in GSA17.
18	European hake <i>Merluccius merluccius</i>	GFCM	2014	XSA, a4a, ALADYM	Catch, effort, Lfreq catch, trawl surveys survey data: 1996-2013; catch data: 2007-2013	The stock is in overexploitation with low biomass levels, as current fishing mortality exceeds $F_{0.1}$ levels (0.8 vs. 0.2) and thus it is necessary to consider a considerable reduction of the fishing mortality to allow the achievement of $F_{0.1}$. The reference point $F_{0.1}$ can be gradually achieved by multiannual management plans. As observed in 2013, the production of hake in GSA 18 is split in 6% caught by Italian longlines, 82% by Italian trawlers, about 1% by Montenegrin trawlers, about 1% by Montenegrin gillnets and trammel nets and about 10% by Albanian trawlers.
18	European hake <i>Merluccius merluccius</i>	STECF	2013	XSA; ALADYM	Catch, effort, Lfreq catch, trawl surveys survey data: 1996-2012; catch data: 2007-2012	High overfishing status and intermediate biomass. Current fishing mortality exceeds the $F_{0.1}$ levels (1 vs. 0.18). Considerable reduction of the fishing mortality is necessary. Objectives of a more sustainable harvest

						<p>strategy could be achieved with a multiannual plan that foresees a reduction of fishing mortality through fishing limitations.</p> <p>As observed in 2012, the production of hake in GSA 18 is split in 17% caught by Italian longlines, 74% by Italian trawlers, about 1% by Montenegrin trawlers and about 8% by Albania trawlers.</p>
18	Deep-water pink shrimp, <i>Parapenaeus longirostris</i>	GFCM	2014	XSA, ALADYM	Trawl surveys, catch & Lfreq catch; survey data: 1996-2013; catch data: 2007-2013	<p>The stock is in overexploitation with low biomass levels, as current fishing mortality exceeds $F_{0.1}$ levels (1.62 vs. 0.74) and thus it is necessary to consider a reduction of the fishing mortality to allow the achievement of $F_{0.1}$.</p> <p>The reference point $F_{0.1}$ can be gradually achieved by multiannual management plans which foresee a reduction of fishing mortality through fishing limitations. As observed in 2013, the contribution of each country to the total production of <i>P. longirostris</i> in the GSA18 is: Italy 67%, Albania 30%, and Montenegro 3%.</p>
18	Deep-water pink shrimp, <i>Parapenaeus longirostris</i>	STECF	2012	VIT and Y/R	Trawl surveys, catch & Lfreq catch; survey data: 1996-2013; West catch data 2007-2011, east reconstructed catch data 2008-2011	<p>Given the results of the present analysis (current F is around 1.45 vs. $F_{0.1} = 0.68$), the stock appeared to be subject to overfishing in the period 2007-2011. EWG 12-19 recommends the relevant fleets' effort and/or catches to be reduced until fishing mortality is below or at the proposed FMSY level, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations. Catches and effort consistent with FMSY should be estimated.</p> <p>It is necessary to consider that the contribute of each fleet to the total production in the GSA18 is: Italy 71%, Albania 26%, Montenegro 3%.</p>

18	Red mullet*, <i>Mullus barbatus</i>	STECF	2015	XSA	West catch data 2007-2013 including a sensitivity analysis for the east side Trawls surveys, catch MEDITS survey 1996-2013	EWG 14-19 proposed $F_{0.1} = 0.45$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields. Taking into account the results obtained by the XSA and ALADYM analysis (current F corresponding to the F in the 2013 is around 0.48), the stock is considered exploited at levels close to sustainability.
18	Red mullet, <i>Mullus barbatus</i>	STECF	2012	XSA, Y/R	Trawls surveys, catch MEDITS survey 1996-2011	the stock is considered exploited unsustainably-current F is around 1.50. Survey indices indicate an increasing biomass in recent years. Relevant fleets' effort and/or catches should be reduced until fishing mortality is below or at the proposed F_{MSY} level, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations. Catches and effort consistent with F_{MSY} should be estimated.
18	Spottail mantis shrimp <i>Squilla mantis</i>	STECF	2012	VPA (VIT), Y/R	Catch, trawl surveys & Lfreq catch 2007-2011	SSB estimate of 190 tons and current F is around 1.04 - exploited unsustainably Since no biomass reference point for this stock has been proposed, EWG proposed $F_{0.1} = 0.27$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.
18	Norway lobster* <i>Nephrops norvegicus</i>	STECF	2015	XSA	MEDITS (1996-2013), catch data by fisheries 2007-2013	STECF EWG 14-19 proposes $F = 0.14$ as limit management reference point (basis $F_{0.1}$) of exploitation consistent with high long term yield. Given the results of the present analysis ($F_{current}$ (2013) = 0.85), the stock is considered exploited unsustainably during the period 2007-2013. EWG 14-19 recommends the relevant fleets' effort to be

						reduced to reach the proposed level F0.1, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan.
18	Norway lobster <i>Nephrops norvegicus</i>	STECF	2012	VIT	MEDITS (1996-2011), catch data	Survey indices indicate a variable pattern of abundance and biomass and current F is around 0.54 - exploited unsustainably Proposed to use F0.1 = 0.30 as proxy of FMSY and as the exploitation reference point consistent with high long term yields. EWG recommends the relevant fleets' effort and/or catches to be reduced until fishing mortality is below or at the proposed FMSY level, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations. Catches and effort consistent with FMSY should be estimated.
18	Giant red shrimp <i>Aristaeomorpha foliacea</i>	STECF	2012	VIT	MEDITS	Survey indices indicate a variable pattern of abundance and biomass that is oscillating without trend but current F is around 1.00 - exploited unsustainably In the absence of proposed and agreed precautionary management references, EWG is unable to fully evaluate the status of SSB but proposed F0.1 = 0.30 as proxy of FMSY and as the exploitation reference point consistent with high long term yields. EWG recommends the relevant fleets' effort and/or catches to be reduced until fishing mortality is below or at the proposed FMSY level, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations. Catches and effort consistent with

						FMSY should be estimated.
GSA	Species	Validated	Year	Assessment tools	Data type	Status / recommendation
17+18	Sardine, <i>Sardina pilchardus</i>	STECF	2014	SAM tuned by acoustic data		Fbar (1-3) shows the highest value in 2002 equal to 0.598 and then decrease; the estimated value for 2013 is 0.533. Thus, the current F (0.53) is larger than FMSY (0.23), which indicates that sardine in GSA 17-18 is exploited unsustainably. The relevant fleets' effort to be reduced until fishing mortality is below or at the proposed FMSY level, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations.
17+18	Anchovy, <i>Engraulis encrasicolus</i>	STECF	2014	SAM tuned by acoustic data		The current F (1.04) is larger than FMSY (0.50), which indicates that anchovy in GSA 17 is exploited unsustainably. The relevant fleets' effort to be reduced until fishing mortality is below or at the proposed FMSY level, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations.

*A stock assessment update was presented at STECF-EWG in January 2015 (EWG 14-19), not yet discussed at the STECF plenary.

2.5 WP4 - REVIEW ASSESSMENT OF THE LIKELY BIOLOGICAL AND SOCIOECONOMIC CONSEQUENCES OF THE DIFFERENT MANAGEMENT SCENARIOS

The objective of WP4 is to assess the likely biological and socioeconomic consequences of the different management scenarios for the relevant fisheries as identified in WP1. This WP is aimed also highlight the gap knowledge and the needed assumption in the Adriatic context.

The work within this WP is divided in 3 tasks:

- Task 4.1 Case studies for small pelagics;
- Task 4.2 Case studies for demersals;
- Task 4.3 Parameterization of economic variables of the model at case study and fishery level.

The milestones of WP4 were:

- Building a matrix linking stocks and fisheries: the combinations stock- fleet segment have to be defined according to WP1 outcomes;
- Parameterization of biological variables of the model: for demersal and small pelagic stocks the input related to life history traits (growth, natural mortality, maturity, etc...) as well as recruitment have to be set. All this information is available from the review performed in WP3;
- Identification of fishery parameters (landings, effort, etc...): for each demersal and small pelagic stock, the annual total and fishing mortality have to be defined; possibly, the fishing mortality has to be set by fleet segment. In case total mortality is used for simulation, the weights of the different productions combined with selectivity functions by fleet segment has to be used to derive the partial fishing mortalities. All this information is available from the review performed in WP3 as well as bibliography about selectivity studies;
- Parameterization of economic variables of the model at fishery level: all the functions related to costs, prices, etc.. have to be set by fleet segment, on the basis of relationships derived on economic data collated and collected in WP2;
- Identification and listing of management scenarios to be modelled specifying the rationale of each scenario: the scenarios will be agreed with DG MARE and scenario modelling will be in line with the outcomes of the STECF and GFCM working groups. Model outputs will be analyzed and discussed in a Workshop (WP4 Workshop) with the participation of all the partners and AdriaMed representatives.

Among the tools intended to be used to assess the impact of different scenarios the recently developed BEMTOOL model, implemented with a focus on the Mediterranean fisheries characteristics, is prioritised.

BEMTOOL platform, developed within MAREA project (in the specific contract 4 and successively upgraded in the specific contract 11) is based on different modules:

1. Biological (related to the biological characteristics of all the stocks involved in the case study);
2. Pressure (communication component between fleet and stocks, mainly based on fishing mortality and yield);

3. Economic (related to the economic characteristics of the fleet);
4. Behavioral (dealing with the reaction of fishermen to the change in profit);
5. Harvest rules (management component, through which the measures to be implemented are set).

The communication among these five components allows to forecast and evaluate the consequences of different management scenarios on the different components of the system. The model has been implemented in a software written in R language; it has been conceived as a platform comprehensive of other tools already existing and extensively used in the stock assessment working groups. The outputs of these tools can be automatically read by BEMTOOL and used to parameterize ALADYM model (Lembo et al., 2009) and simulate the past and present years as well as to project the system according to different parameterizations.

The harvest rules can be explicitly related to the characteristics of the fleet (change in selectivity, fishing activity and capacity) or applied directly to the fishing mortality without explicitly go through the fleet characteristics. In this last case the assumption that a change in the average fishing days and capacity produces a proportional change in the fishing mortality is made in order to connect also this particular harvest rule to the fleet segment.

The basic management scenarios that can be implemented in BEMTOOL are:

Scenario 1 - Change in gear selectivity: It consists in a change of the proportion of the individuals retained by the fishing gear by age-length class. This change in the proportion of captured individuals is related to the size at first capture of the individuals of the stock.

Scenario 2 - Change in fishing effort: this management measure is applied by means of factors which are applied to the existing number of vessels and fishing days in a given fleet segment to modulate the changes. These will be propagated to the current fishing mortality by fleet segment;

Scenario 3 - Change of fishing mortality (by fleet segment): this scenario is implemented by means of ALADYM model. The change in the fishing pattern is not explicitly made on the capacity, on the activity of the fleet and/or on the selectivity, but is made on the fishing mortality as aggregated rate that takes into account also the history traits of the stock according to the different models that have been selected for BEMTOOL. In ALADYM model it is possible to simulate a gradual reduction of F until reaching of a target reference point, according to 3 different scenarios, differentiated by fleet segment (linear, negative exponential and logistic decrease). Moreover, the fishing mortality by fleet segment is calculated;

Scenario 4 - Change of total fishing mortality: this scenario is implemented by means of medium term forecast FLR scripts, developed in STECF meetings. The reduction scenario (linear) is applied on the overall fishing mortality;

Scenario 5 - Status quo: the same parameterization of the last year are used for the forecast;

Scenario 6 - Introduction/variations of TAC: TAC is derived as a function of the estimated stock size and F . Three options are provided according to Apostolaki and Hillary (2009).

The basic scenarios can be also combined to simulate a combination of management measures:

Scenario 7: Change in selectivity and in fishing effort;

Scenario 8: Change in selectivity with behavioural module;

Scenario 9: Change in fishing effort with behavioural module;

Scenario 10: Change in selectivity and fishing effort with behavioural module.

BEMTOOL produces different indicators (biological, pressure and economic) that allow the user to monitor the different components of the system (the stocks, the fleet segments, etc...), in order to make a diagnosis of the current situation as well as to evaluate the likely consequences of different management measures. The outputs of the software are synthetic tables and graphs of the most relevant variables/indicators. Furthermore, BEMTOOL model can calculate for each stock the biological reference points (or proxies in case a reliable stock-recruitment relationship is lacking) as well as a proxy of the maximum economic yield.

During SEDAF some specifications of the economic core and ALADYM core of BEMTOOL were made, in addition the output were reorganized to avoid redundancy. Details are reported in the ANNEX I to the Deliverable 9.

For answer to the commitments of SEDAF project, considering the output of stock assessment working groups, three case studies have been implemented:

- Small pelagic stocks in GSA 17;
- Demersal stocks in GSA 17;
- Demersal stocks in GSA 18.

The steps followed for all case studies were:

- Association matrix stock-fleet segment (using results from WP1);
- Parameterization of biological module (using results from WP3);
- Parameterization of pressure module (using results from WP3);
- Parameterization of economic module (using results from WP2);
- Parameterization of management scenarios (according to the agree management measures to be investigated).

The Information from WP1 (fisheries identification) was used to construct the matrices of associations between demersal species and fleet segments in the study areas.

To parameterize the biological part of the simulation model the following information for each stock were gathered from the reports of the stock assessment working groups (WP3):

- Growth parameters (von Bertalanffy and length-weight relationship);
- Maturity and natural mortality information;
- Recruitment (numbers and season);
- Life span.

To parameterize the pressure component of the model the following information and data for each combination stock-fleet segment were used:

- Fishing mortality (better if by fleet segment);
- Selectivity functions (according to the prevalent gear used) and/or information/data on the characteristics of the fishing gears (e.g. mesh size, etc...);
- Landing by year, stock and fleet segment;
- Discard ogive and volume (in weight).

The parameterization of economic module of the model mainly refers to two modules: the economic module which simulates the evolution of the main economic variables, and the behavioural module which simulates the dynamic of the fleet capacity and fishing effort.

More specifically, the economic module consists of five components and include the variable costs dynamics, the labour cost dynamics, the fixed costs dynamics, the capital costs dynamics and the price dynamics. The behavioural module consists of three components aimed to simulate the fleet dynamics, the activity dynamics and the technological progress (Accadia *et al.*, 2013)

These components have been mainly sourced from existing Mediterranean bio-economic models: BIRDMOD (Lembo (coord.), 2005; Accadia and Spagnolo, 2006), MEFISTO (Lleonart *et al.*, 2003), FISHRENT (Salz *et al.*, 2011), AMURE IAM (Merzereaud *et al.*, 2011), BEMMFISH (Prellezo *et al.* 2009). Therefore, the selection of the most appropriate function for each component among a number of alternative technical solutions or options can be operated by the model user on the basis of specific knowledge on the case study under analysis, data availability and the specific objectives of the simulations.

In line with the disaggregation level agreed in work packages 1 and 2 and requested in the EU Data Collection Framework (DCF), all dependent and independent variables within each module are aggregated at the level of fleet segment (f). In addition, prices and landings are handled under two dimensions: fleet segment (f) and stock (S).

Economic and transversal data were provided for five years, in order to estimate parameters on time series data.

In order to assess the impact of different management scenarios derived from the application of recommendations from scientific advice, BEMTOOL model has been applied to three case studies identified in the Adriatic Sea and involving Italy, Slovenia, Croatia, Montenegro and Albania: small pelagics case study in GSA 17, demersal case study in GSA 17 and demersal case study in GSA 18.

Data 2008-2013 for the estimation of the socio-economic parameters for Italy and Slovenia were obtained from the National Programs of the EU Data Collection Framework and are in line with data collected in the WP2 - Collation and review on the main socio-economic information on the main fisheries (SEDAF-D6 Report economic and structural overview). Taking into account that official Croatian socio- economic data are under revision, for the purpose of this study scientist presumed data needed for this exercise. Nevertheless, Croatian socio- economic data were obtained from the data collected and reviewed by the SEDAF project and refer to the period 2009-2012. Socio-economic data for 2008 and 2013 of Croatian fleet segments data were assumed equal to 2009 and 2012 data respectively. For all fleet segments, 2014 data were assumed equal to 2013.

In the forecast scenarios the uncertainty on recruitment has been taken into account, applying for both stocks a multiplicative error on the geometric mean of recruitment computed for the last three years.

The stocks and fisheries involved, the data and parameters used for modelling, a brief description of the management scenarios and the obtained results follow for each case study.

GSA 17 small pelagic case study

The main stocks identified for the GSA 17 small pelagic case study are *E. encrasicolus* and *S. pilchardus*. Both stocks are shared among the countries of GSA 17 (Italy, Croatia, Slovenia).

The main fishing gears targeting anchovy and sardine are pelagic trawls and purse seines. 8 fleet segments targeting the selected stocks and considered for this case study are:

9. ITA_TM_VL_1218
10. ITA_TM_VL_1824
11. ITA_TM_VL_2440
12. ITA_PS_VL_2440
13. HRV_PS_VL_1218
14. HRV_PS_VL_1824
15. HRV_PS_VL_2440
16. SVN_PS_VL_1218

The selected fleet segments represent about 95% of production and revenues of anchovy and around 93% of production and revenues of sardine in GSA 17 in 2013.

The data used for the parameterization of the biological and pressure modules of BEMTOOL come from the stock assessments carried out during the Working Group on Stock Assessment of Small Pelagic of GFCM (GFCM-WGSASP report) held in November 2014.

In order to evaluate the impact of different management measures, 7 forecast scenarios have been implemented (Table 2.5.1) besides the status quo.

Table 2.5.1 Description of forecast scenarios

HR2 RED_E04ane2018	reduction (7%) of F towards the reference point of anchovy (E=0.4) in 2018 for each fleet segment and applied only to fishing days;
HR2 RED_E04ane2020	reduction (7%) of F towards the reference point of anchovy (E=0.4) in 2020 for each fleet segment and applied only to fishing days;
HR2 RED_E04pil2018	reduction (20%) of F towards the reference point of sardine (E=0.4) in 2018 for each fleet segment and applied only to fishing days;
HR2 RED_E04pil2020	reduction (20%) of F towards the reference point of sardine (E=0.4) in 2020 for each fleet segment and applied only to fishing days;
HR2 RED_E04pil2020_PropF_100d	reduction of F towards the reference point of sardine (E=0.4) in 2020 with higher reductions for fleet segments impacting more sardine stock, applied to fishing days (except Italian and Slovenian purse seines, because representing less than 1% of the impact);
HR2 RED_E04pil2020_PropF_50v50d	reduction of F towards the reference point of sardine (E=0.4) in 2020 with higher reductions for fleet segments impacting more sardine stock, applied half to fishing days and half to the number of vessels as potential withdrawal (except Italian and Slovenian purse seines,

	because representing less than 1% of the impact);
HR2 RED_Fprop_FB	fishing ban in the months with higher occurrence of offspring of sardine with higher reductions for fleet segments impacting more sardine stock. This measure is applied each year from 2015 to 2021. The fishing ban already carried out by the different fleet segments has been taken into account.

The main results of the projections are summarised in the figure 2.5.1 (MultiCriteria Decision Analysis outcomes) and in the tables 2.5.2, 2.5.3, and 2.5.4 where results are expressed as relative percentage of variation in respect to the status quo scenario.

Forecasts evidenced the following results.

- Regarding SSB all scenarios targeting the reference point of sardine gave equivalent results with improvements around +4-5% for anchovy and +8% for sardine compared to the status quo (Table 2.5.2).
- Catches of both stocks were not much reduced in any scenario if the overall fleet is considered, given that the variations compared to the status quo were less or equal to -8%. However, considering the focus on fleet segments, HRV_PS_1824 and HRV_PS_2440 were more penalized by the management strategies (being the more impacting on sardine stock) (Tables 2.5.3 and 2.5.4), while the other fleet segments would benefit, as expected, by the gradual rebuilding of the stocks and by the reduced competition among the fleets.
- Given the reduction of 31% in predicted fishing days, the Croatian purse seine segment 24-40 m is the most affected fleet, with a decrease of -18% in the predicted landings and of -16% in the predicted revenues.
- At the end of the forecast period, revenues and average salaries of fleet segments characterized by lower incidences of sardine in production, as the Italian pelagic trawlers 1824 m and 2440 m, benefit from the implementation of management measures aimed at a reduction of the fishing mortality of sardine, because they are less impacted in respect to the other fleet segments by these measures.
- For all fleet segments analysed, employment undergoes moderate variation across scenarios with the only exception of HR2-RED_E04pil2020_PropF_50v50d, aimed at reducing mortality rates of the sardine stock by reducing both the number of days at sea and the number of vessels (Table 2.5.2). HR2-RED_E04pil2020_PropF_50v50d produced the largest positive variation in average salary with an increase of 14% for the whole fleet and an increase of 21% for the Italian pelagic trawl 1824m. However, expected employment of the whole fleet would reduce by 8% by 2021. Under a social point of view the most affected segment is the Croatian purse seine fleet 2440m with an expected drop in employment of 16% by 2021 compared with the status quo (Table 2.5.3 and 2.5.4).
- Considering only the percentage variations of the scenarios from the status quo, the best performing one is HR2-RED_E04pil2020_PropF_50v50d, that allows to obtain the best trade off among the different variables, considering the same weight for each indicator. This especially because, among the different indicators, the increase of salary overcompensates the decrease of employment.
- The internal option of BEMTOOL model performing a Multi-Criteria Decision Analysis, that combines Multi-Attribute Utility Theory (MAUT) and the Analytic Hierarchy Process (AHP), has been used to assess the performances of the alternative fisheries management policies. According to MCDA, the scenario allowing to reach the highest overall utility is HR2-RED_E04pil2018 (0.7932), while the lowest utility is given by HR2-RED_E04pil2020_PropF_50v50d scenario that produces an utility value (0.757) slightly lower than the status quo scenario (0.7644) (Fig. 2.5.1). This because

the MCDA attributes a higher weight to the biological indicators, but takes into account the value of the social indicators.

- The scenario that has the second higher utility is HR2-RED_E04pil2020_propF_100d (0.7896), that is very close to the best scenario in terms of overall utility. This seems to indicate that a higher reduction of F applied to the more impacting fleet segments gives overall a benefit equivalent to the reduction of 20% for all the fleet segments in 2018. Also this result can be influenced by the higher relative weight attributed by the MCDA to the biological indicators.
- The methodology and the scenarios tested cover a wide range of different options and provide a general and complete overview of the situation of small pelagics in the Adriatic Sea. The results are consistent with the advices that have been provided so far in different fora and give a more robust evaluation of the efficiency of each of the measures proposed.
- There are certainly some limitations in the approach used. In particular, one of the main issues is the difficulty in forecasting recruitment in small pelagic species. These species are in fact strongly influenced from environmental variables and the recruitment can show dramatic variability from one year to the next.
- A step forward would be to test the probability of some estimates of falling below a certain reference limit throughout a Management Strategy Evaluation (MSE). However, the measures proposed from BEMTOOL are conservative enough to be efficient against recruitment failures.

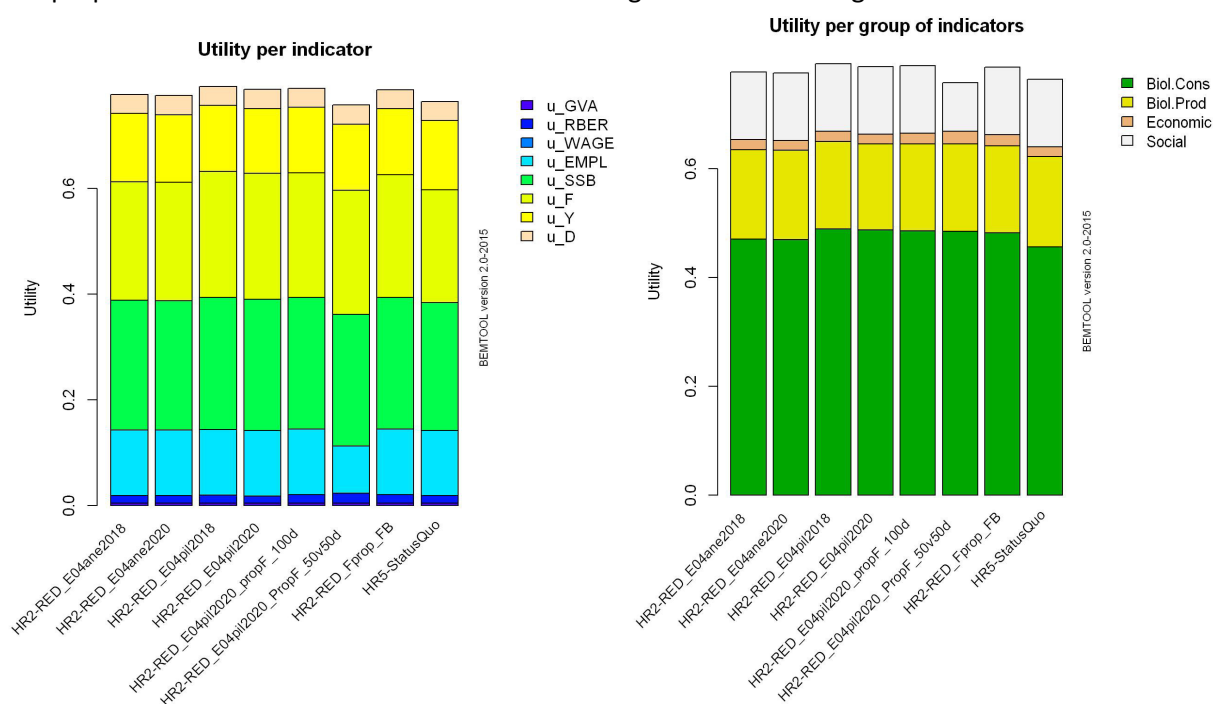


Figure 2.5.1 MCDA results: evaluation of the overall utility associated to each management scenario for the case study of small pelagics in GSA17.

Table 2.5.2 Performances of the management scenarios (% respect to status quo) simulated in terms of SSB and overall catches of anchovy and sardine, salary, CR/BER, employment and revenues. The green values are higher than +5%, the red ones are smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17.

Scenario, year 2021	All fleets							
	Salary	CR.BER	Rev.	Emp.	Catch Anchovy	Catch Sardine	SSB Anchovy	SSB Sardine

MAREA MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE
 SPECIFIC CONTRACT NO 10 - SEDAF: "IMPROVED KNOWLEDGE OF THE MAIN SOCIO-ECONOMIC ASPECTS RELATED TO THE
 MOST
 IMPORTANT FISHERIES IN THE ADRIATIC SEA"

HR2-RED_E04ane2018	1.5	0.6	-1.3	0.0	-1.3	-2.3	2.9	2.0
HR2-RED_E04ane2020	1.0	0.4	-1.6	0.0	-1.2	-3.2	2.1	3.3
HR2-RED_E04pil2018	3.2	1.1	-4.5	0.0	-5.7	-5.4	5.5	7.9
HR2-RED_E04pil2020	1.9	0.5	-5.4	0.0	-6.5	-6.9	3.5	8.3
HR2-RED_E04pil2020_propF_100d	4.4	2.3	-1.3	0.0	-2.6	-8.0	4.6	8.1
HR2-RED_E04pil2020_PropF_50v50d	14.1	6.7	-0.4	-7.6	-1.4	-6.4	4.2	7.8
HR2-RED_Fprop_FB	5.0	2.5	-1.9	0.0	-3.0	-7.2	4.7	7.6

Table 2.5.3 Performances of the management scenarios (% respect to status quo) simulated in terms of catches of anchovy and sardine, salary, CR/BER, employment and revenues by fleet segment (HRV_PS_1218, HRV_PS_1824, HRV_PS_2440 and ITA_PS_2440 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17

Scenario, year 2021	HRV_PS_1218						HRV_PS_1824					
	Salary	CR.BE R	Rev.	Emp.	Catch Anchovy	Catch Sardine	Salary	CR.BE R	Rev.	Emp.	Catch Anchovy	Catch Sardine
HR2-RED_E04ane2018	-1.1	-1.2	-1.6	0.0	-1.6	-2.3	1.4	-3.4	-1.6	0.0	-1.6	-2.3
HR2-RED_E04ane2020	-1.6	-1.7	-2.0	0.0	-1.6	-3.2	0.7	-1.7	-2.1	0.0	-1.6	-3.2
HR2-RED_E04pil2018	-3.5	-3.7	-4.7	0.0	-6.3	-5.5	3.9	-9.3	-4.7	0.0	-6.3	-5.4
HR2-RED_E04pil2020	-4.4	-4.7	-5.6	0.0	-6.8	-7.0	2.5	-5.9	-5.6	0.0	-6.8	-7.0
HR2-RED_E04pil2020_propF_100d	7.5	8.0	6.6	0.0	6.5	9.6	4.5	-10.5	-2.4	0.0	-4.6	-1.9
HR2-RED_E04pil2020_PropF_50v50d	10.4	11.1	6.9	-2.3	7.0	10.0	13.6	-32.0	-1.7	-7.3	-3.7	-1.0
HR2-RED_Fprop_FB	7.1	7.6	5.9	0.0	4.8	9.3	6.0	-14.2	-2.4	0.0	-4.2	-1.9
Scenario, year 2021	HRV_PS_2440						ITA_PS_2440					
	Salary	CR.BE R	Rev.	Emp.	Catch Anchovy	Catch Sardine	Salary	CR.BE R	Rev.	Emp.	Catch Anchovy	Catch Sardine
HR2-RED_E04ane2018	1.1	1.4	-1.6	0.0	-1.5	-2.3	0.4	0.5	-1.0	0.0	-1.4	-2.4
HR2-RED_E04ane2020	0.4	0.5	-2.1	0.0	-1.6	-3.1	0.1	0.2	-1.3	0.0	-1.6	-3.3
HR2-RED_E04pil2018	3.2	4.3	-4.6	0.0	-6.3	-5.4	-1.7	-2.0	-5.2	0.0	-6.8	-5.2
HR2-RED_E04pil2020	1.7	2.3	-5.6	0.0	-6.8	-7.0	-2.3	-2.8	-5.7	0.0	-7.3	-6.8
HR2-RED_E04pil2020_propF_100d	-11.1	-14.6	-17.9	0.0	-23.1	-20.9	11.0	13.5	8.9	0.0	11.3	14.5
HR2-RED_E04pil2020_PropF_50v50d	8.4	11.1	-15.4	-15.6	-20.1	-18.0	11.5	14.1	9.3	0.0	11.8	15.0
HR2-RED_Fprop_FB	-7.9	-10.4	-15.7	0.0	-17.7	-18.3	10.7	13.1	8.6	0.0	11.4	17.4

Table 2.5.4 Performances of the management scenarios (% respect to status quo) simulated in terms of catches of anchovy and sardine, salary, CR/BER, employment and revenues by fleet segment (ITA_TM_1218, ITA_TM_1824, ITA_TM_2440 and SVN_PS_1218). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17

Scenario, year 2021	ITA_TM_1218						ITA_TM_1824					
	Salary	CR.BER	Rev.	Emp.	Catch Anchovy	Catch Sardine	Salary	CR.BER	Rev.	Emp.	Catch Anchovy	Catch Sardine
HR2-RED_E04ane2018	0.3	0.4	-1.1	0.0	-1.2	-2.3	5.2	7.0	-1.0	0.0	-0.8	-1.7
HR2-RED_E04ane2020	0.3	0.4	-1.1	0.0	-1.1	-3.0	4.2	5.7	-1.5	0.0	-0.6	-3.2
HR2-RED_E04pil2018	-0.6	-0.6	-4.4	0.0	-5.6	-5.3	11.8	15.9	-4.3	0.0	-5.5	-5.1
HR2-RED_E04pil2020	-1.5	-1.7	-5.2	0.0	-6.3	-6.8	9.9	13.4	-5.2	0.0	-6.2	-6.8
HR2-RED_E04pil2020_propF_100d	10.9	12.1	8.3	0.0	10.1	12.6	18.1	24.5	6.6	0.0	7.3	9.5
HR2-RED_E04pil2020_PropF_50v50d	12.4	13.7	8.6	-1.1	10.5	12.9	21.2	28.7	6.8	-2.3	7.6	9.7
HR2-RED_Fprop_FB	5.6	6.3	2.4	0.0	2.3	6.3	17.0	22.9	1.9	0.0	0.8	4.4
Scenario, year 2021	ITA_TM_2440						SVN_PS_1218					
	Salary	CR.BER	Rev.	Emp.	Catch Anchovy	Catch Sardine	Salary	CR.BER	Rev.	Emp.	Catch Anchovy	Catch Sardine
HR2-RED_E04ane2018	2.3	2.8	-1.1	0.0	-1.2	-2.1	0.0	-1.3	0.0	0.0	-1.2	-2.4
HR2-RED_E04ane2020	2.1	2.6	-1.2	0.0	-1.0	-2.9	-0.3	-1.5	-0.4	0.0	-1.3	-3.0
HR2-RED_E04pil2018	4.7	5.7	-4.3	0.0	-5.4	-5.2	-1.0	-4.5	-1.2	0.0	-5.8	-5.2
HR2-RED_E04pil2020	3.3	4.0	-5.2	0.0	-6.3	-6.8	-2.1	-5.3	-2.4	0.0	-6.5	-6.8
HR2-RED_E04pil2020_propF_100d	9.7	11.7	3.3	0.0	3.6	5.7	12.6	10.3	14.8	0.0	12.1	15.1
HR2-RED_E04pil2020_PropF_50v50d	14.8	17.8	3.6	-4.0	4.0	6.3	13.0	10.6	15.2	0.0	12.5	15.4
HR2-RED_Fprop_FB	10.7	12.9	3.1	0.0	2.9	7.0	13.6	11.2	15.9	0.0	12.1	18.6

GSA 17 demersal case study

The main stocks identified for the GSA 17 demersal case study are *M. merluccius*, *S. mantis*, *M. barbatus* and *S. solea*. These stocks are shared among the countries belonging to GSA 17 (Italy, Croatia and Slovenia).

The main fishing gears targeting the four stocks selected for this case study are bottom trawls, small scale fisheries, longlines and rapido trawlers.

The 11 fleet segments targeting the selected stocks and considered for this case study are:

12. ITA_DTS_0612;
13. ITA_DTS_1218;
14. ITA_DTS_1840;
15. ITA_PGP_0012;
16. ITA_TBB_1218;
17. ITA_TBB_1824;
18. HRV_DFN_0612;
19. HRV_DTS_0612;
20. HRV_DTS_1218;
21. HRV_DTS_1824;
22. SVN_DFN_0612_DTS_1218.

The fleet segments ITA_PGP_0012 and SVN_DFN_0612_DTS_1218, ITA_DTS_1840 are strata representing an aggregation of fleet segments, because sharing similar characteristics. This is also to avoid unnecessary fragmentation in the analysis.

The data used for the parameterization of the biological and pressure modules of BEMTOOL come from the stock assessments carried out during the Working Group on Stock Assessment of Demersal Species at GFCM (GFCM-WGSASP) and during the STECF Expert Working Group meetings.

According to the state of exploitation of the four demersal stocks in GSA 17 case study, the ratio between $F_{current}$ and F_{MSY} is 3.3 for European hake and red mullet), 1 for spottail mantis and 1.4 for common sole. 6 forecast scenarios have been thus implemented, besides the status quo, in order to evaluate the consequences of several management strategies in terms of costs and benefits on the stocks and on the productive and economic performances of different fleet segments.

The 6 management scenarios have been implemented to reduce the overall combined fishing mortality F towards a combined F_{MSY} . This reference point was estimated as the average F_{MSY} among all the stocks, weighed using stock landing value, following the approach as for balance indicators. The reduction was applied to each fleet segment, considering the relative portion of $F_{current}$ and F_{MSY} , on the basis of fleet segment landing to overall landing of the stock. The needed reduction is 59% of the $F_{current}$ combined ($F_{current\ combined}=0.76$; $F_{MSY\ combined}=0.31$).

The scenarios implemented to reach the combined F_{MSY} are reported in the following table 2.5.5.

Table 2.5.5 Scenarios implemented to reach the combined F_{MSY} in GSA17

Scenario 2 F01_2018_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 3 F01_2018_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218,

	because representing less than 3% of the combined F);
Scenario 4 F01_2018_FB	Gradual closure of fishing activity until 2018 in the months with higher occurrence of offspring of the four target species (July, August, September, October, November and January) (except SVN_DFN_0612_DTS_1218);
Scenario 5 F01_2020_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 6 F01_2020_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA DTS_0612 and ITA TBB_1218 and SVN_DFN_0612_DTS_1218, because representing less than 3% of the combined F);
Scenario 7 F01_2020_FB	Gradual closure of fishing activity until 2020 in the months with higher occurrence of offspring of the four target species (July, August, September, October, November and January) (except SVN_DFN_0612_DTS_1218).

The main results of the projections carried out are reported in the figure 2.5.2 (MultiCriteria Decision Analysis outcomes) and in the tables 2.5.6, 2.5.7, 2.5.8, 2.5.9 where results are expressed as relative percentage of variation in respect to the status quo scenario.

- All scenarios give a remarkable increase of SSB for all the assessed stocks (Table 2.5.6). Recovery of hake SSB is noteworthy compared to the other species, given the characteristics of high productivity of this stock. Among the different scenarios, the best result is obtained in the Scenario 2 - F01_2018_100D, while the worst was always observed in the status quo. Scenario 4 - F01_2018_FB performed quite well, especially for SSB recovery of red mullet.
- In terms of catches, those of European hake are expected to improve in the medium term (2018 and 2020), given the high productivity and the current high level of exploitation of this stock, whilst the other stocks will be rather underutilised, because the combined F_{MSY} is fairly influenced by the hake reference point that is low compared to the other ones. The Scenario 4 - F01_2018_FB was less impacting in terms of reduction of landings, but to the cost of not reaching the reference point.
- Catches of the fleet segments ITA_DTS_0612, ITA_TBB_1218 and SVN_DFN_0612_DTS_1218 generally take advantage of the stock rebuilding following the reduction applied to the other fleet segments, given that they are not affected by the management measures (their relative impact lower than 3%), except for the scenario S. 4 - F01_2018_FB, i.e. the fishing ban, that is also applied to the first two fleet segments.
- The fleet segments more impacted by the management measures are those not targeting European hake, as the loss of other species catches is not compensated by the increase of hake productivity. This is holding for the fleet segment ITA_TBB_1840 and especially for ITA_PGP_0012.
- Considering the overall landings, the worst performance is shown by the fishing ban scenarios (Scenario 4 and Scenario 7), with a decrease of total landing of about 50%, given that these scenarios have been applied to all the fleet segments, excluding only SVN_DFN_0612_DTS_1218.
- All the fleet segments, when affected by the management measures, obtain a higher landing in the status quo scenario, but a decrease of discard respect to the status quo, reflecting the decrease of the total catch.
- Regarding landing of common sole, the highest decrease respect to the status quo is shown in the Scenarios 2 and Scenario 5 (reduction applied to the fishing activity only by 2018 and 2020) with an

overall landing about 30% lower than status quo. The most affected fleet segment are ITA_TBB_1840, which main target are spottail mantis and common sole and HRV_DFN_0612.

- Over the period 2008-2013, the economic performance of the demersal fleet in GSA 17 has generally deteriorated, reaching the lowest level in 2012. Four fleets (ITA_DTS_0612, ITA_DTS_1840, ITA_TBB_1840 and SVN_DFN_DTS_0612), suffered losses in 2012. The decrease in revenue and net profit is consistent with the drop in the total landings weight and days at sea of the whole selected fleet.
- In 2013, the ratio between current revenue and break-even revenue is much greater than 1 for most of the selected fleets, thus indicating that demersal fishery in GSA 17 is generally profitable. However, Italian demersal trawl segments 1218 m and 1840 m and Italian vessels using passive gears only, which totally account 66% of total landing weight, show ratios close to 1.
- Regarding the economic performance of the overall fleet, revenues decreases in all the scenarios of about 12% on average. Such reduction is more pronounced in the scenarios simulating fishing ban, in which revenues drop to -30%. Profitability generally show the worst performance in the fishing ban scenarios (with drop of 65% for ITA_DTS_0612 and ITA_PGP_0012), except for TTB_1840, where the values are higher than status quo. The best performances are shown in scenario 3 – F01_2018_50D50V for all fleet segments (especially for Croatian DTS_1840 reaching in 2021 a value three times the status quo). As expected, almost all the scenarios show a substantial increase of the annual average salary per man (about 50% respect to the status quo), especially those with a mix of measures (e.g. scenario 2 and scenario 5). Regarding economic indicators at fleet segment level, the Croatian trawlers 12-18 m, 18-40 m, and Italian 18-40 are more benefited in all the scenarios (except fishing ban).
- Given the reduction in the number of vessels foreseen in the mixed scenarios, it's evident that permanent withdrawal performs better for the vessels remaining in the fleet, thus revealing a conflict between economic and social objectives.
- A Multi-Criteria Decision Analysis method that combines multi-attribute utility theory (MAUT) and the Analytic Hierarchy Process (AHP), as implemented in BEMTOOL, has been used to assess the performances of the alternative fisheries management policies.
- According to MCDA, that takes into account the weights to the different indicators associated through expert judgement, the scenario that allows to reach an higher overall utility is Scenario 2 – F01_2018_100D (0.64), followed by Scenario 5 – F01_2020_100D, while the status quo scenario produces the lowest overall utility (0.39) (Fig. 2.5.2).
- The lack of a reliable stock-recruitment relationship that did not allow a proper forecasting of recruitment level in the projections. However, the performed scenarios took into account the variability due to the process error thus allowing a more adaptive advice for demersal fisheries in this area.
- Following the present results, the current regulations (i.e. the status quo scenario) cannot be considered suitable to reach the MSY objective for this case study. All the proposed scenarios, aimed to reach a combined F_{MSY} , produce a remarkable improvement in SSB respect to status quo. On the other hand, all the proposed scenarios would produce a decrease in catches respect to status quo, except for hake which productivity would increase.

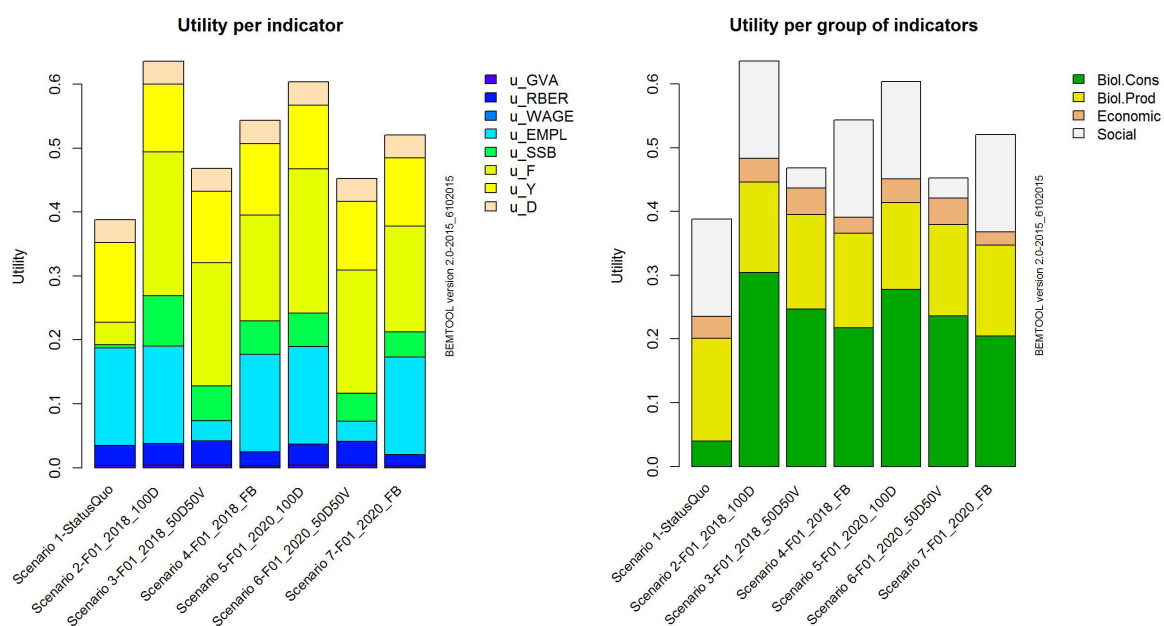


Figure 2.5.2 MCDA results: evaluation of the overall utility associated to each management scenario of the case study on demersal stocks in GSA17.

Table 2.5.6 Performances of the management scenarios (% respect to status quo) simulated in terms of SSB and overall catches, salary, CR/BER, employment and revenues. The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17

Scenario, year 2021	ALL fleets												
	Salary	CR.BER	Rev.	Emp.	SSB hake	SSB spottail mantis	SSB red mullet	SSB sole	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole	
Scenario 2 - F01_2018_100D	10.7	15.7	-13.6	0.0	354.4	34.9	94.7	80.7	29.4	-35.3	-19.6	-33.9	
Scenario 3 - F01_2018_50D50V	58.1	71.8	-8.6	-28.3	263.0	27.6	74.0	66.2	30.4	-28.5	-13.1	-26.4	
Scenario 4 - F01_2018_FB	-21.4	-23.5	-30.5	0.0	242.7	29.0	80.5	66.1	30.2	-27.6	-13.8	-24.8	
Scenario 5 - F01_2020_100D	7.7	10.4	-16.1	0.0	251.7	32.2	78.9	62.3	16.5	-37.1	-26.1	-34.5	
Scenario 6 - F01_2020_50D50V	53.4	64.7	-11.1	-28.3	200.6	24.7	64.5	50.1	21.8	-30.5	-18.0	-27.8	
Scenario 7 - F01_2020_FB	-24.7	-28.3	-32.9	0.0	179.4	25.6	68.6	50.7	18.2	-30.1	-19.9	-27.4	

Table 2.5.7 Performances of the management scenarios (% respect to status quo) simulated in terms of catches, salary, CR/BER, employment and revenues by fleet segment (HRV_DFN_0612, HRV_DTS_0612, HRV_DTS_1218 and HRV_DTS_1840 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17

Scenario, year 2021	HRV_DFN_0612								HRV_DTS_0612							
	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole
S. 2 - F01_2018_100D	-11.3	-11.4	-13.2	0.0	41.7			-24.8	26.9	27.4	-1.9	0.0	28.3		-18.1	
S. 3 - F01_2018_50D50V	35.7	36.0	-6.1	-29.5	42.0			-16.6	84.1	85.7	2.9	-29.5	29.6		-11.6	
S. 4 - F01_2018_FB	2.3	2.3	0.3	0.0	12.8			-6.5	-23.5	-23.9	-32.4	0.0	8.2		-10.6	
S. 5 - F01_2020_100D	-17.4	-17.6	-19.0	0.0	24.9			-28.6	14.3	14.6	-10.3	0.0	15.6		-25.5	
S. 6 - F01_2020_50D50V	26.1	26.3	-12.6	-29.5	29.8			-21.5	70.4	71.8	-3.5	-29.5	21.1		-17.2	
S. 7 - F01_2020_FB	-5.1	-5.1	-6.8	0.0	0.1			-12.3	-32.0	-32.7	-38.1	0.0	-2.5		-17.5	
Scenario, year 2021	HRV_DTS_1218								HRV_DTS_1840							
	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole
S. 2 - F01_2018_100D	38.7	39.0	-2.0	0.0	28.3		-18.1		104.9	121.6	11.5	0.0	28.3		-18.1	
S. 3 - F01_2018_50D50V	99.6	100.4	2.7	-29.5	29.6		-11.6		184.2	213.4	14.5	-29.5	29.6		-11.6	
S. 4 - F01_2018_FB	-19.1	-19.3	-32.0	0.0	8.2		-10.6		3.3	3.7	-27.1	0.0	8.2		-10.6	
S. 5 - F01_2020_100D	24.9	25.1	-10.1	0.0	15.6		-25.5		82.2	95.2	1.7	0.0	15.6		-25.5	
S. 6 - F01_2020_50D50V	84.5	85.2	-3.4	-29.5	21.1		-17.2		161.5	187.1	7.6	-29.5	21.1		-17.2	
S. 7 - F01_2020_FB	-28.6	-28.8	-37.5	0.0	-2.5		-17.5		-11.0	-12.7	-33.2	0.0	-2.5		-17.5	

Table 2.5.8 Performances of the management scenarios (% respect to status quo) simulated in terms of catches, salary, CR/BER, employment and revenues by fleet segment (ITA_DTS_0612, ITA_DTS_1218, ITA_DTS_1840 and ITA_PGP_0012 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17

Scenario, year 2021	ITA_DTS_0612								ITA_DTS_1218							
	Salary	CR.B ER	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole
S. 2 - F01_2018_100D	54.9	70.9	32.4	0.0	212.0	48.9	75.7	24.5	37.1	41.8	-6.3	0.0	28.0	-39.0	-18.0	-47.4
S. 3 - F01_2018_50D50V	43.6	56.4	25.8	0.0	161.6	38.6	58.6	19.5	94.9	107.1	-2.2	-29.5	29.3	-31.8	-11.5	-38.1
S. 4 - F01_2018_FB	-50.6	-65.5	-51.6	0.0	16.0	-45.3	-51.3	-50.3	-6.6	-7.5	-23.7	0.0	40.6	-22.4	3.5	-28.0
S. 5 - F01_2020_100D	51.2	66.1	30.2	0.0	183.1	45.5	64.2	28.0	31.3	35.4	-9.4	0.0	15.2	-40.7	-25.3	-45.8
S. 6 - F01_2020_50D50V	40.4	52.2	23.9	0.0	144.7	35.1	52.2	17.8	88.3	99.6	-4.7	-29.5	20.8	-33.4	-16.8	-39.0
S. 7 - F01_2020_FB	-51.5	-66.6	-52.2	0.0	6.3	-46.5	-54.2	-51.9	-11.6	-13.2	-26.4	0.0	28.2	-24.8	-4.2	-28.3
Scenario, year 2021	ITA_DTS_1840								ITA_PGP_0012							
	Salary	CR.B ER	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole
S. 2 - F01_2018_100D	37.1	41.8	-7.0	0.0	28.0	-39.0	-18.0	-47.4	-20.8	-23.7	-31.2	0.0		-53.9		-43.3
S. 3 - F01_2018_50D50V	94.9	107.1	-4.8	-29.5	29.3	-31.8	-11.5	-38.1	22.5	25.8	-23.6	-29.5		-45.5		-34.4
S. 4 - F01_2018_FB	-6.6	-7.5	-100.0	0.0	40.6	-22.4	3.5	-28.0	-56.1	-64.1	-54.7	0.0		-81.1		-63.8
S. 5 - F01_2020_100D	31.3	35.4	-10.2	0.0	15.2	-40.7	-25.3	-45.8	-20.7	-23.6	-31.1	0.0		-54.0		-42.2
S. 6 - F01_2020_50D50V	88.3	99.6	-8.5	-29.5	20.8	-33.4	-16.8	-39.0	20.2	23.2	-24.8	-29.5		-46.0		-35.0
S. 7 - F01_2020_FB	-11.6	-13.2	-10.0	0.0	28.2	-24.8	-4.2	-28.3	-56.4	-64.5	-55.0	0.0		-81.3		-64.0

Table 2.5.9 Performances of the management scenarios (% respect to status quo) simulated in terms of catches, salary, CR/BER, employment and revenues by fleet segment (ITA_TBB_1218, ITA_TBB_1840 and SVN_DFN_DTS_0612 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA17

Scenario, year 2021	ITA_TBB_1218								ITA_TBB_1840							
	Salary	CR.B ER	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole	Salary	CR.BE R	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole
S. 2 - F01_2018_100D	5.2	26.4	19.0	0.0		55.6		35.5	-2.7	-3.2	-22.4	0.0		-32.6		-40.6
S. 3 - F01_2018_50D50V	23.0	21.7	15.6	0.0		42.3		29.6	46.4	54.7	-15.5	-29.5		-25.9		-32.2
S. 4 - F01_2018_FB	-100.0	-18.2	-23.9	0.0		-28.7		-39.1	20.5	24.1	-1.7	0.0		12.8		-7.3
S. 5 - F01_2020_100D	7.9	28.6	20.6	0.0		48.7		38.8	-4.1	-4.9	-23.4	0.0		-36.0		-39.8
S. 6 - F01_2020_50D50V	22.5	21.4	15.4	0.0		37.8		28.3	42.3	49.8	-17.4	-29.5		-28.9		-32.3
S. 7 - F01_2020_FB	8.6	-19.7	-25.0	0.0		-31.8		-39.6	15.9	18.7	-4.7	0.0		7.1		-9.8
Scenario, year 2021	SVN_DFN_DTS_0612															
	Salary	CR. BER	Rev.	Emp.	Catch hake	Catch spottail mantis	Catch red mullet	Catch sole								
S. 2 - F01_2018_100D	47.2	0.0	42.5	0.0		10.1	12.0	45.5								
S. 3 - F01_2018_50D50V	38.2	0.0	34.4	0.0		8.1	8.7	36.9								
S. 4 - F01_2018_FB	41.1	0.0	36.9	0.0		10.1	14.7	39.2								
S. 5 - F01_2020_100D	42.2	0.0	37.9	0.0		9.4	10.4	40.4								
S. 6 - F01_2020_50D50V	33.0	0.0	29.6	0.0		7.7	8.8	31.6								
S. 7 - F01_2020_FB	35.4	0.0	31.8	0.0		9.0	12.0	33.7								

GSA 18 demersal case study

The main stocks identified for the GSA 18 demersal case study are *M. merluccius*, *P. longirostris*, *N. norvegicus* and *M. barbatus*. *M. merluccius*, *P. longirostris* and *M. barbatus* stocks are shared among the countries belonging to GSA 18 (Italy, Albania and Montenegro), while *N. norvegicus* is essentially exploited by Italy.

The main fishing gears targeting the four selected stocks are bottom trawls, small scale fisheries, longlines.

The 10 fleet segments targeting the selected stocks and considered for this case study are:

11. ITA_DTS_0612;
12. ITA_DTS_1218;
13. ITA_DTS_1824_2440;
14. ITA_HOK_1218;
15. ITA_PGP_0006_0612;
16. ALB_DTS_1224;
17. MNE_DFN_0012;
18. MNE_DTS_0612;
19. MNE_DTS_1224;
20. MNE_HOK_0012.

The fleet segments ITA_DTS_1824_2440, ITA_PGP_0006_0612, MNE_DFN_0012, ALB_DTS_1224, MNE_DTS_1224 and MNE_HOK_0012 are strata representing an aggregation of fleet segments, because sharing similar characteristics. This is also to avoid unnecessary fragmentation in the analysis.

The data used for the parameterization of the biological and pressure modules of BEMTOOL come from the stock assessments carried out during the Working Group on Stock Assessment of Demersal Species of GFCM (GFCM-WGSASP report) held in November 2014 and during the STECF EWG 14-19 held in Rome in January 2015. According to the state of exploitation of the four demersal stocks in GSA 18 case study, the ratio between $F_{current}$ and F_{MSY} is 3.3 for European hake, 1.77 for deep water rose shrimp, 1.27 for red mullet and 6.15 for Norway lobster. 6 forecast scenarios have been implemented, besides the status quo, in order to evaluate the consequences of several management strategies in terms of costs and benefits on the stocks and on the productive and economic performances of different fleet segments.

The 6 management scenarios have been implemented to reduce the overall combined fishing mortality F towards a combined F_{MSY} . This reference point was estimated as the average F_{MSY} among all the stocks, weighed using stock landing value, following the approach as for balance indicators. The reduction was applied to each fleet segment, considering the relative portion of $F_{current}$ and F_{MSY} , on the basis of fleet segment landing to overall landing of the stock. The needed reduction is 66% of the $F_{current}$ combined ($F_{currentcombined}=0.87$; $F_{MSYcombined}=0.3$).

The scenarios implemented to reach the combined F_{MSY} are reported in the following table 2.5.10.

Table 2.5.10 Scenarios implemented to reach the combined F_{MSY} in GSA18.

Scenario 2 F01_2018_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA PGP 0006_0612, ITA DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 3 F01_2018_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA PGP

	0006_0612, ITA DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 4 F01_2018_FB	Gradual closure of fishing activity until 2018 in a period with higher occurrence of offspring of the four target species (June, July, August, September, October) (except Montenegrin fleets).
Scenario 5 F01_2020_100D	Linear reduction of combined F towards the combined F_{MSY} , applied to fishing days (except ITA PGP0006_0612, ITA DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 6 F01_2020_50D50V	Linear reduction of combined F towards the combined F_{MSY} , applied half to fishing days and half to the number of vessels (except ITA PGP 0006_0612, DTS_0612 and all the Montenegrin fleets because representing less than 3% of the combined F).
Scenario 7 F01_2020_FB	Gradual closure of fishing activity until 2020 in a period with higher occurrence of offspring of the four target species (except Montenegrin fleets).

The main results of the projections carried out are reported in the figure 2.5.3 (MultiCriteria Decision Analysis outcomes) and in the tables 2.5.11, 2.5.12, 2.5.13, 2.5.14, where results are expressed as percentage variations in respect to the status quo.

Forecast evidenced the following results.

- According to the traffic light summary tables, all the performed scenarios allow to obtain a benefit on the SSB for the 4 stocks compared to the status quo. SSB showed remarkable changes in all the different scenarios, although better performances were observed in Scenario 2 - F01_2018_100D, that was followed by in Scenario 5 - F01_2020_100D, indicating that a reduction applied in a narrower timeframe is more effective. Increase of SSB was especially observed for hake and Norway lobster that show highest increase in SSB respect to the status quo (more than 100%). The scenario less performing is the fishing ban, given that reduction applies a lower cut than it was necessary to reaching F_{MSY} combined.
- Given the gain in productivity of stocks as Norway lobster and European hake, also predicted catches for the whole fleet were improving compared to the status quo, increasing from an average of 12% for Norway lobster and 20% for European hake. Conversely the catches of red mullet and deep water pink shrimp decreased on average 18% and 6%, indicating an underutilization of such stocks.
- Revenues of the overall fleet are improving compared to the status quo in all the scenarios (+9% on average), as a result of the increased revenues of fleet segment as ITA_DTS_1824_2440. Italian longlines take the highest benefit from the reduction in the shortest time frame (revenues in 2021 are about 30% more than status quo). These fleets, together with those not affected by the management measures, compensate the negative performance of the revenues of fleet segment as ALB_DTS_1224. The fleets ITA_PGP_0006_0612, MNE_DFN_0012, MNE_DTS_0612, MNE_DTS_1224 and MNE_HOK_0012, took advantage, in all the scenarios, of the management measures applied to the other fleets, without taking any negative drawback, given that they were not or partially (ITA_PGP_0006_0612 only for the fishing ban) affected by the management rules.

- Forecasts show improvements in the average salary ranging from +17% of Scenario 7 - F01_2020_FB to + 78% of Scenario 3 - F01_2018_50D50V compared with the status quo. The higher profitability would be the one of Albania fleet, 3 times higher than status quo, and of Italian DTS_1824_2440, more than 2.5 times higher than status quo. Scenarios F01_2018_50D50V and HR2-F01_2020_50D50V produce the largest positive variations in average salaries of Albania DTS_1224 and Italian DTS_1824_182440, but also imply a remarkable reductions in the number of employees, estimated around -30% by 2021 for both scenarios. As excluded from all the scenarios, wages of all Montenegrin segments undergo variations higher than 50%, in particular longlines show very high increase across scenarios.
- The internal option of BEMTOOL model performing a Multi-Criteria Decision Analysis, that combines Multi-Attribute Utility Theory (MAUT) and the Analytic Hierarchy Process(AHP), has been used to assess the performances of the alternative fisheries management policies (Fig. 2.5.3). According to MCDA, the scenario obtaining the higher rank is Scenario 2 - F01_2018_100D followed by Scenario 5 - F01_2020_100D. Indeed the utility associated to the socio-economic indicators is lower in Scenario 3 - F01_2018_50D50V and Scenario 6 - F01_2020_50D50V, that reduce the number of vessels. These scenarios are ranked as less efficient in the MCDA, as the social component is negatively affected by the expulsion of workers following the scraping of the vessels.
- The performed scenarios take into account the variability due to the process error, thus allowing a more adaptive advice for demersal fisheries in this area. Nevertheless the lack of a reliable stock-recruitment relationship did not allow a proper forecasting of recruitment level in the projections.
- Following the results of the predictions, the current regulations (i.e. the status quo scenario) cannot be considered effective to reach the MSY objective for this case study. All the proposed scenarios, aimed at reaching a combined F_{MSY} , produced an overall improvement respect to status quo for all the fleets.

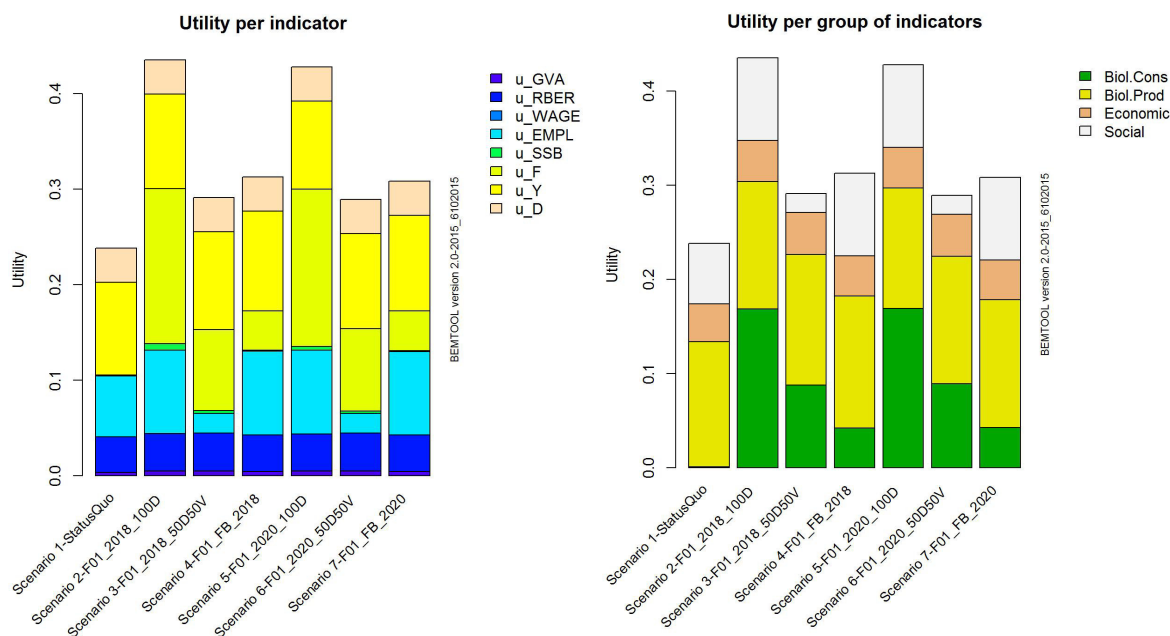


Figure 2.5.3 MCDA results: evaluation of the overall utility associated to each management scenario for the case study of demersal resources in the GSA18.

Table 2.5.11 Performances of the management scenarios (% respect to status quo) simulated in terms of SSB and overall catches, salary, CR/BER, employment and revenues. The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA18.

Scenario, year 2021	ALL fleets												
	Salary	CR.BER	Rev	Emp	SSB red mullet	SSB hake	SSB Norway lobster	SSB pink shrimp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp	
Scenario 2 - F01_2018_100D	41.7	49.1	12.5	6.1	103.7	336.1	308.8	149.3	-23.5	24.5	18.4	-10.7	
Scenario 3 - F01_2018_50D50V	78.3	95.2	14.2	-16.9	76.6	235.4	215.5	106.5	-17.3	26.2	23.0	-4.3	
Scenario 4 - F01_2018_FB	21.6	28.2	4.5	6.1	59.1	131.0	109.0	57.6	-8.4	23.4	18.9	0.4	
Scenario 5 - F01_2020_100D	34.8	40.9	7.5	6.1	87.1	219.3	229.0	140.0	-28.0	12.7	-3.6	-14.4	
Scenario 6 - F01_2020_50D50V	73.9	89.8	11.7	-16.9	67.4	172.5	173.2	99.4	-20.7	23.3	8.0	-6.7	
Scenario 7 - F01_2020_FB	17.2	23.2	1.5	6.1	53.2	92.8	85.5	54.9	-9.7	15.0	6.4	-1.6	

Table 2.5.12 Performances of the management scenarios (% respect to status quo) simulated in terms of catches, salary, CR/BER, employment and revenues by fleet segment (ALB_DTS_1224 ITA_DTS_0612, ITA_DTS_1218 and ITA_DTS_1824_2440 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA18.

Scenario, year 2021	ALB_DTS_1224								ITA_DTS_0612							
	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp
Scenario 2 - F01_2018_100D	102.7	108.8	-11.0	0.0	-40.2	9.7		-13.5	41.9	52.7	46.7	7.1	75.8	224.5	226.7	
Scenario 3 - F01_2018_50D50V	198.6	210.5	-4.5	-33.0	-29.4	15.9		-5.7	30.8	40.7	36.0	7.1	57.3	160.4	162.2	
Scenario 4 - F01_2018_FB	76.8	81.4	-3.0	0.0	-14.6	14.6		-13.4	-2.9	4.1	-0.2	7.1	-8.8	45.6	76.7	
Scenario 5 - F01_2020_100D	95.5	101.2	-13.3	0.0	-43.8	2.0		-16.8	37.1	47.5	42.0	7.1	65.3	194.4	159.9	
Scenario 6 - F01_2020_50D50V	192.7	204.2	-5.8	-33.0	-32.4	15.0		-8.6	28.1	37.7	33.4	7.1	50.0	153.4	124.4	
Scenario 7 - F01_2020_FB	71.7	76.0	-4.7	0.0	-15.9	7.7		-14.6	-5.1	1.6	-2.4	7.1	-10.6	36.2	55.8	
Scenario, year 2021	ITA_DTS_1218								ITA_DTS_1824_2440							
	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp
Scenario 2 - F01_2018_100D	-12.1	17.3	-4.7	32.3	-40.3	9.3	17.1	-15.5	65.9	74.9	7.9	1.0	-39.9	9.7	18.7	-16.0
Scenario 3 - F01_2018_50D50V	35.6	84.4	1.0	-11.3	-29.5	15.4	21.9	-7.5	149.9	169.0	13.6	-32.3	-29.3	15.9	23.4	-8.0
Scenario 4 - F01_2018_FB	-7.1	24.4	7.7	32.3	-7.8	27.6	18.5	3.9	60.6	69.0	18.1	1.0	-6.7	25.8	18.8	4.8
Scenario 5 - F01_2020_100D	-16.4	11.2	-9.0	32.3	-43.9	1.0	-4.2	-19.1	55.5	63.2	2.1	1.0	-43.7	0.8	-3.7	-19.8
Scenario 6 - F01_2020_50D50V	32.2	79.7	-1.3	-11.3	-32.7	14.2	7.2	-10.1	141.3	159.4	10.4	-32.3	-32.7	14.2	8.1	-10.8
Scenario 7 - F01_2020_FB	-10.6	19.5	4.2	32.3	-9.3	19.5	6.3	1.9	52.7	60.1	13.7	1.0	-9.0	17.8	5.9	2.9

Table 2.5.13 Performances of the management scenarios (% respect to status quo) simulated in terms of catches, salary, CR/BER, employment and revenues by fleet segment (ITA_HOK_1218, ITA_PGP_0006_0612, MNE_DFN_0012 and MNE_DTS_0612 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA18.

Scenario, year 2021	ITA_HOK_1218								ITA_PGP_0006_0612							
	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp	Salary	CR.BE R	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp
Scenario 2 - F01_2018_100D	42.2	73.5	31.4	16.6		16.6			111.6	120.1	68.7	-1.7	51.1	277.2		
Scenario 3 - F01_2018_50D50V	109.7	161.3	32.8	-21.9		-21.9			90.7	97.3	55.6	-1.7	37.9	194.3		
Scenario 4 - F01_2018_FB	-19.1	-6.3	-21.1	16.6		16.6			-7.4	-10.1	-24.5	-1.7	-31.7	-48.3		
Scenario 5 - F01_2020_100D	26.3	52.7	17.6	16.6		16.6			107.0	115.2	65.8	-1.7	47.2	244.1		
Scenario 6 - F01_2020_50D50V	95.1	142.2	24.3	-21.9		-21.9			90.4	96.9	55.4	-1.7	35.7	190.6		
Scenario 7 - F01_2020_FB	-24.6	-13.4	-25.8	16.6		16.6			-6.8	-9.4	-24.1	-1.7	-31.2	-51.4		
Scenario, year 2021	MNE_DFN_0012								MNE_DTS_0612							
	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp	Salary	CR.BE R	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp
Scenario 2 - F01_2018_100D	203.2	236.0	167.8	0.0	51.7	307.8			97.4	109.5	64.1	0.0	75.9	222.6		154.4
Scenario 3 - F01_2018_50D50V	141.5	164.4	116.9	0.0	38.2	211.4			76.1	85.6	50.2	0.0	57.2	158.1		110.0
Scenario 4 - F01_2018_FB	93.0	108.1	76.8	0.0	31.9	130.9			52.7	59.3	34.7	0.0	44.1	102.4		62.1
Scenario 5 - F01_2020_100D	168.0	195.1	138.7	0.0	47.7	248.3			94.6	106.4	62.3	0.0	65.3	200.0		144.8
Scenario 6 - F01_2020_50D50V	130.9	152.1	108.1	0.0	36.0	194.6			75.7	85.1	49.9	0.0	50.5	156.2		103.6
Scenario 7 - F01_2020_FB	83.6	97.1	69.0	0.0	33.9	111.6			50.8	57.1	33.4	0.0	44.1	91.0		59.2

Table 2.5.14 Performances of the management scenarios (% respect to status quo) simulated in terms of catches, salary, CR/BER, employment and revenues by fleet segment (ITA_HOK_1218, ITA_PGP_0006_0612, MNE_DFN_0012 and MNE_DTS_0612 fleet segments). The green values are higher than +5%, the red ones are the smaller than -5% and the yellow ones are between -5% and +5%. Rev=Revenues; Emp=Employment. GSA18.

Scenario, year 2021	MNE_DTS_1224								MNE_HOK_0012							
	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp	Salary	CR.B ER	Rev	Emp	Catch red mullet	Catch hake	Catch Norway lobster	Catch pink shrimp
HR2-F01_2018_100D	105.4	148.0	63.7	0.0	75.9	222.6		154.4	573.6	886.4	393.1	0.0		411.5		
HR2-F01_2018_50D50V	82.5	115.9	49.9	0.0	57.2	158.1		110.0	394.6	609.8	270.4	0.0		282.1		
HR2-F01_2018_FB	57.6	80.8	34.8	0.0	44.1	102.4		62.1	229.8	355.1	157.5	0.0		163.5		
HR2-F01_2020_100D	102.2	143.4	61.7	0.0	65.3	200.0		144.8	413.0	638.2	283.1	0.0		295.3		
HR2-F01_2020_50D50V	82.0	115.1	49.5	0.0	50.5	156.2		103.6	321.1	496.2	220.1	0.0		229.1		
HR2-F01_2020_FB	55.4	77.8	33.5	0.0	44.1	91.0		59.2	177.9	274.9	121.9	0.0		126.3		

2.6 CORE FINDINGS OF THE PROJECT

- **SEDAF** was an unprecedented opportunity to provide a detailed database for socio-economic variables by country and fleet segment in Adriatic through an ad hoc data collection and through estimation process in the particular cases where the data were not available; this data will be useful for further analyses in the future and in particular to continue to take into account also the socio-economic component in the evaluation process of the state of the fisheries in Adriatic, through bio-economic models.
- The collection of detailed socio-economic data by fishing regions and fleet segments, as well the comparison among homogenous fleets, allowed a better understanding of the quality of collected variables and an improving in methodologies. In some cases as for the number of employees and for the average salary, the existence of significant differences among homogenous fleets revealed inconsistency in some of the official data and a different interpretation about the estimation of variables was also evidenced by the BEMTOOL socio-economic output.
- BEMTOOL model allowed to modulate a variety of management scenarios, with different implications in terms of biological and economic consequences, also taking into account the differentiated impact on the target stocks of the various involved fleets.
- The use of the stock assessment output to parameterize BEMTOOL model revealed the need to update (e.g. S. mantis in GSA 17, updated to 2011) and review (e.g. small pelagic in GSA 17) several stock assessments, as well as increase the number of stock assessments in Adriatic, in order to improve the accuracy of the evaluation of resources and the corresponding catches and revenues for the relevant fisheries.

Further developments:

- pursuing an harmonised collection of fisheries data, including the socio-economic ones, at level of the Adriatic basin;
- modelling scenarios according to reviewed socio-economic data and updated stock assessments;
- analysing the effects of additional management measures in respect to those applied for the case studies, for example based on selectivity and considering the reaction of the sector with investments/disinvestments;
- investigating and searching for stock-recruitment relationships to properly project the recruitment in the future;
- combining bio-economic prediction with a Management Strategy Evaluation (MSE);
- using the developed framework for the design and preparation of multiannual management plans.

3. CHANGES TO THE ORIGINAL WORK PLAN

No substantial changes have been made to the original workplan.

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ANNEX I –

MEETING MINUTES -



Zavod za ribištvo Slovenije



MAREA MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE

Specific Contract n° 10 "Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea" SEDAF

Kick-off meeting, February 6-7, 2014 – Final Report

HOTEL PRINCESS, Jovana Tomasevica 59, Bar, Montenegro

The kick-off meeting of the SEDAF project took place on February 6-7, 2014, at the Hotel PRINCESS in Bar, Montenegro.

Partner of the Project are: Consorzio Nazionale Interuniversitario per le Scienze del Mare, Roma (**CoNISMa**), COISPA Tecnologia & Ricerca, Bari (**COISPA**), Consiglio Nazionale delle Ricerche – ISMAR, Ancona (**CNR**); Fisheries Research Institute of Slovenia (**ZZRS**); Institute of Oceanography and Fisheries, Split (**IOF**); Institute of Marine Biology, Kotor (**IMB**); Laboratory of Fisheries and Aquaculture - Agricultural University of Tirana (**LAP**).

Work-Package and Task leaders are:

Name	Surname	WP/TASK	Partner or Sub-contractor
Maria Teresa	Spedicato	MAREA Coordinator	COISPA
Giuseppe	Lembo	SEDAF Coordinator	COISPA
Nedo	Vrgoč	WP3 and task 1.1	IOF
Vanja	Cikes Kec	task 3.1	IOF
Barbara	Zorica	task 2.1	IOF
Bojan	Marceta	task 3.2	ZZRS
Jerina	Kolitari	task 2.3	LAP
Evelina	Sabatella	WP2 and task 2.4	CoNISMa
Rosaria	Sabatella	task 2.5	CoNISMa
Giuseppe	Scarcella	WP1	CNR

Isabella	Bitetto	WP4 and task 4.2	COISPA
Alberto	Santojanni	task 4.1	CNR
Monica	Gambino	task 4.3	CoNISMa
Olivera	Marković	task 2.2	IMB
Ana	Pešić	task 1.2	IMB

The participants to the meeting are (in alphabetic order):

E. Arneri (FAO-AdriaMed); I. Bitetto (COISPA); P. Carpi (CNR); M. Gambino (CoNISMa/Nisea); Z. Ikica (IMB); A. Joksimovic (IMB); J. Kolitari (LAP); G. Lembo (COISPA); O. Marković (IMB); D. Medvesek (IOF); N. Milone (FAO-AdriaMed); N. Mitrakis (DGMARE); S. Nicolić (MPRR-MNE); K. Patterson (DGMARE); A. Pešić (IMB); D. Pinello (CoNISMa-Nisea); E. Sabatella (CoNISMa/Nisea); G. Scarcella (CNR); M.T. Spedicato (COISPA); X. Vazquez (DGMARE); N. Vrgoč (IOF).

Objective

The main objective of the study is to provide a baseline description of the main socioeconomic elements pertaining to the different fisheries undertaken by the relevant countries (e.g. Adriatic coasts of Italy, Slovenia, Croatia, Montenegro and Albania) on the basis of their evolution over the last years, following, in terms of time span, the approach usually adopted by STECF for the analyses and report of the economic performance of the fleet (e.g. generally 5 years). The indicators collected will be in line with the methodology and interpretation developed in the DCF and STECF reports for socio-economic data and in the STECF reports on balance between fishing capacity and fishing opportunities. The indicators will be reported as annual averages by fleet segment (following DCF segments) for the economic assessment and profit/loss analysis, whilst selected variables will be taken and estimated at fishery and/or GSA level for bio-economic modelling. To these end, the following tasks will be undertaken:

1. To identify the main fisheries occurring in the Adriatic Sea, with special attention to those fisheries that are exploited by several of the Adriatic countries.
2. On the basis of this identification, collate, review and scrutinize the available information on the main socio-economic indicators pertaining to these fisheries.
3. For the same fisheries, review the available information on current stock status and recommendations of the scientific advice.
4. To collate, review and scrutinize the available information on marketing of fish products in the Adriatic Sea, with particular attention to the commercial interactions between the different coastal countries and with neighbour countries with limited access to the resources (e.g. Austria, Bosnia, Serbia, etc.). This task will include a description of the mechanisms governing the formation of prices at the different levels of the supply chain in the Adriatic area as well as the collection of a 10 years series of first sale prices for the main species.
5. Report on data trends, drivers and results of the abovementioned tasks including a clear description and analysis of the socio-economic characteristics linked to the fisheries identified under task 1.
6. On the basis of the most recent scientific advice, assess the likely biological and socioeconomic consequences of the different management scenarios derived from the

application of the recommendations of the scientific advice for the selected fisheries.

The structure of the project has been organised according to 5 work packages.

WP0 = project management and coordination.

WP1 = Fisheries identification

WP2 = Collation and review on the main socio-economic information on the main fisheries

WP3 = Review of the current stock status and recommendations of the scientific advice

WP4 = Assessment of the likely biological and socioeconomic consequences of the different management scenarios.

The project will benefit of the support of the AdriaMed FAO Regional Project, in terms of expertise and knowledge of the information available in the Adriatic region. The project duration will be 14 months.

AGENDA

First day, Thursday, February 6th, 2014

09:30

Welcome and adoption of the agenda

09:35

❶ Presentation of the MAREA project framework

Maria Teresa Spedicato (COISPA)

09:50

❷ Project objectives and methodological approach

Pino Lembo, (COISPA)

10:15

❸ State of the Art in the different Adriatic Countries

Bojan Marceta (ZZRS), Nedo Vrgoč (IOF), Aleksandar Joksimovic (IMB), Jerina Kolitari (LAP), Evelina Sabatella (Nisea –CoNISMa)

~10 min. for each speech

11:00

❹ The expectations of DGMARE about SEDAF project

Xavier Vazquez and Nikolaos Mitrakis (DGMARE representatives)

11:15

❺ The contribution of ADRIAMED to the SEDAF project

ADRIAMED representative

11:30 – 11:45

Coffee break

11:45

❻ WP1 Fishery identification

Giuseppe Scarcella (CNR), with the contribution of Nedo Vrgoč (IOF) and Ana Pešić (IMB).

Data call issue and contacts with the Institutional levels. Distribution of questionnaires to Institutional levels. Compilation of relevant statistics (fleets, metier, gears, activity, landing volumes and value) using reporting tables and files. Aggregation of the components of fleets in each fisheries with information on capacity and activity. Spatial localization of fisheries.

12:30 – 13:00

Discussion

13:00 – 15:00

Lunch break

15:00

7 WP2 Collation and review on the main socio-economic information linked to the main fisheries

Evelina Sabatella (Nisea-CoNISMa), with the contribution of Barbara Zorica (IOF), Olivera Marković (IMB), Jerina Kolitari (LAP), Rosaria Sabatella (Nisea –CoNISMa), Bojan Marceta (ZZRS), Aleksandar Joksimovic (IMB)

Data call for economic data. Review of available data with knowledge gaps. Design and implementation of the sampling program in the relevant areas. Questionnaires distribution to the relevant Institutions. Exploring modelling fishing costs. Validation of collected data.

16:00 – 16:30

Discussion

16:30 – 17:00

Coffee break

17:00

8 WP3 Review of the current stock status and recommendations of the scientific advice

Nedo Vrgoč (IOF) with the contribution of Vanja Cikes Kec (IOF), Bojan Marceta (ZZRS)

Listing and archiving the STECF and GFCM reports and scientific/grey literature papers.

17:30 – 18:00

Discussion

20:30

Social Dinner

Second day, Friday February 7th, 2014

09:30

9 WP4 Assessment of the likely biological and socioeconomic consequences of the different management scenarios

Isabella Bitetto (COISPA) with the contribution of Alberto Santojanni (CNR) and Monica Gambino (Nisea-CoNISMa)

Building a matrix linking stocks and fisheries. Parameterization of biological variables of the model. Identification of fishery parameters (landings, effort). Parameterization of economic variables of the model at fishery level. Identification and listing of management scenarios to be modelled specifying the rationale of each scenario.

10:30 – 11:00

Discussion

11:00 – 11:30

Coffee break

11:30

10 Feedback on the kick-off meeting results

Open discussion with the DGMARE and ADRIAMED representatives

12:30

Administrative and financial issues

Planning of the next activities

Planning of the second meeting and the first workshop

Planning the structure and the content of the Interim Report

Closure of the meeting

Pino Lembo (COISPA)

13:00

Lunch break

The project coordinator **G. Lembo** welcomed the participants to the kick-off meeting of the SEDAF project. He expressed special appreciation for the participation to the meeting of DG Mare and FAO AdriaMed representatives.

A. Pešić and **I. Bitetto** kindly accepted to act as rapporteurs of the meeting.

Then, all participants briefly introduced themselves, their main backgrounds and their role in the project.

After reading and approval, without modifications, of the agenda, the coordinator gave the floor to **M.T. Spedicato**, the MAREA coordinator, who presented the MAREA projects already closed and ongoing. Answering to a question from **N. Mitrakis**, M.T. Spedicato explained that 1) a revised version of the MEDITS manual was delivered on March 2013 and 2) the web based application for scientific survey data management is ready to be presented at the next MEDITS international coordination meeting that will be held in March 2014.

G. Lembo thanked M.T. Spedicato for the presentation and took the floor for giving an overview of the SEDAF project. He highlighted the most relevant aspects of work-packages, tasks and deliverables. He pointed out the importance of complying with the time-table activities and reporting. He underlined the valuable contribution of the AdriaMed experience for the success of the project. He remarked the discrepancy between the Annex A of the SEDAF specific contract, where time-series of 10 years for the economic data and prices are mentioned, and the Annex B, where time-series of 5 years for the economic data and prices are mentioned. To this purpose, he highlighted the risk of lack of 10 years' time-series, and/or non-homogeneous/comparable 10 years' time-series between different countries. Finally, the coordinator proposed to bring backward one month (in July) the first workshop originally planned for the month 8 (August) and bring forward one month the second project meeting and the interim report (in July), in order to unify into a single occasion such activities. All the participants agreed with the proposal of G. Lembo.

Then the coordinator gave the floor to the partners for the presentation of the state of the art in the different Adriatic Countries.

N. Vrgoč shortly presented the fishery situation in Croatia.

Total catch are about 60.000 tons in the last years, majority is small pelagic (85%), demersal 8-9.000 tons, coastal fishery 1.000 tons. Data are collected through logbooks, according to the DCF. Recently, the collection of biological and transversal variables began, besides the economic variables which are collected by questionnaires. In Croatia 3 types of fishery are classified: 1) sport and recreational, 2) *small fishery* (not small scale fishery) and 3) commercial fishery. *Small fishery* will be replaced by small coastal fishery in January 2015. It will be allowed for people over 60 who lives on the islands; daily catch allowed will be 5 kilos with possibility to sell. 3.500 licenses will be issued, replacing the current approximate number of 14.000. Commercial fishery is small pelagic, large pelagic and demersal. From 2002 the fishery department (directorate) collected statistics on fishery and basic socio-economic information. After entering in EU, from July 2013, data collection is according to DCF. Questionnaires have been distributed to fishermen (10% of population in 2011 and 2012) for collecting socio-economic data. There is information also about catch and fishing effort, fishing areas, income, expenses, crew, etc. All the data are stored in a data-base.

A. Joksimovic shortly presented the fishery in Montenegro.

Fishery is classified into sport, big and small scale commercial. The fleet is rather old. 85% of the vessels is <10 meters, there are approximately 20 trawlers, 2 big purse seiners and 7 small purse seiners. In Montenegro there is also fishery in fresh-water environments. There are unexploited resources, narrow continental shelf and sharp slope. Strategic documents and a national management plan for fishery are in preparation. There is an agreement on data exchange between the Ministry and the Marine Biology Institute. Basic socioeconomic studies were carried out with previous projects (2006-2007) and there is the willing to improve the national data collection system.

G. Lembo noted that there is also the willingness of the project partners to work with the IMB to push forward successfully the data collection in Montenegro.

X. Vasquez (DG MARE representative).

The DG MARE expectation from SEDAF are:

- To get a comprehensive view of the main fisheries in the Adriatic Sea combined with the knowledge of economic data and indicators, which could drive managers to take sound decisions to achieve a sustainable exploitation of the fisheries and to promote the economy in the zone.
- To provide scenarios for managers that contemplate the sustainable exploitation of fisheries in the Adriatic Sea, in particular respecting the objectives of Johannesburg, in particular to have the stocks at MSY at the latest in 2015 and CFP.
- Since we have a management plan for small pelagic species agreed at GFCM, the conditions/harvest rules/characteristics of that management plan shall be included in SEDAF scenarios.
- Regarding the scenarios, the robustness of the scientific advice is fundamental to run the models and produce scenarios. Therefore, you need to be cautious when producing scenarios using the best available scientific information.
- DG MARE shall be informed timely of any issue that could arise during the works and that could potentially challenge the timely production of the deliverables.
- As it has been explained already in the presentation of Mr Lembo, we expect that you exploit synergies with other projects as AdriaMed.
- Regarding the changes of the time schedule proposed by the coordinator, in principle, the contract needs to be respected, unless there are duly justify circumstances that recommend changing the schedule. Therefore the coordinator should communicate this officially by writing to DG MARE.

Specific comments on Parameters are:

Economic parameters

- ROFTA (Return on fixed tangible assets);
- CR/BER (Current revenue divided by break-even revenue).

Important to record separately income by catches and income by subsidies.

Fleet activity parameters

- Size of the inactive fleet (inactive = no landings of fish at all in the year);
- Technical indicator (average number of days fishing divided by maximum feasible days fishing in the year for any vessel in the fleet).

Sound maybe obvious but try to use the same fleet segmentation for non-EU countries that the segmentation used for EU fleet.

Biological indicators

- Sustainable harvest indicator (Average across species of Fishing mortality / Fmsy), weighted by the value of each species in the catch.
- Stocks-at-risk indicator (number of stocks for each fleet for which there is a scientific

advice to cease fishing, to reduce fishing to the lowest possible level, or similar words).

The description of these indicators is given in the 2013-11 STECF 13-28 report, to be found at <http://stecf.jrc.ec.europa.eu/reports/balance>.

G. Lembo confirmed that several scenarios will be simulated, among which the management plan for small pelagic species agreed at GFCM. Harvest rules/scenarios shall be designed to simulate that MSY (or proxy of MSY) can be achieved by 2015 where possible and, on a progressive incremental basis, at the latest by 2020. For each scenario, the likely biological and economic consequences will be assessed.

N. Vrgoč underlined that the number of vessel in the East Adriatic is still not definitive and needs to be adjusted.

E. Sabatella shortly presented the state of the art in Italy.

Since 1992, in Italy, economic data are collected by questionnaire. Since 2001, in the framework of DCR and then DCF, the data are collected by GSA.

Landings and effort are collected on a monthly time scale; other variables by year.

All the data are stored in the database of the Italian Ministry of Agriculture, Directorate for fishery and aquaculture (MIPAAF). A second database is held by the STECF/JRC.

Annual economic report are provided to the STECF and to the GFCM/task1 statistical bulletin).

N. Vrgoč informed that the data in Croatia are collected for 7 different fishing grounds and asked if it is possible to have the Italian data split into fishing areas. **E. Sabatella** answered that Italian sampling design allows to have data at GSA or Regional level.

J. Kolutari shortly presented the state of the art in Albania.

From 1999 to 2013 the Fisheries Directorate has been part of the Ministry of Environment, Forestry and Water Management, from 2014 is a Fisheries Units at the Ministry of Agriculture. In the Geographical Sub Areas 18, the Albanian coastline is 480 km long, there are 4 main ports: Shengjini, Durrës, Vlore, Sarande. Fishing activity is almost exclusively on continental shelf. There are 468 vessels (70% polyvalent). Effort and landing data are collected using logbooks. Biological data are collected with MEDITS surveys, MEDIAS surveys and DEPM survey. Economic and social data were collected in 2004 with a FAO AdriaMed social survey, in 2004 with a FAO AdriaMed/MedFisis Catch and effort survey, in 2012 with a FAO AdriaMed socio-economic survey. Beside the above mentioned activities there is the willing to improve the national data collection system.

G. Lembo noted that there is also the willingness of the project partners to work with LAP to push forward successfully the data collection in Albania.

N. Milone shortly informed on the possible synergies with AdriaMed.

The AdriaMed project, which started in 1999, includes all the countries bordering on the Adriatic Sea, except Bosnia.

Several studies/surveys have been already carried out on behalf of the AdriaMed project, which could be useful, specially, for WP1, WP2 and WP3.

Market information was published in a technical document of AdriaMed (2004-2005). Socio-economic surveys were carried out in Albania in 2004 and 2013. Socio-economic survey was carried out in 2007 in Montenegro. Stock assessment of several species has been carried out in the AdriaMed working groups.

All the data collected and published by AdriaMed will be made available for the SEDAF project, as well as the methodologies used for the surveys.

As regard WP4 AdriaMed would be pleased to contribute for detecting the gaps and lack of data.

G. Scarcella presented the WP1 activities.

The objective of the WP1 is the identification of the main fisheries occurring in the Adriatic Sea, with a special consideration for the shared stocks. An extensive bibliographic research will be carried out in order to collect data and information useful to identify the main fisheries. Moreover a data call will be issued for gathering the more updated information from DCF as regards Italy, Slovenia and Croatia. Detailed information will be also collected at Ministry and Research Institutions, primarily among those involved in the Consortium. In Montenegro and Albania, relevant information on the structure of the fleets (Number of vessels, GT and Kw of units involved in the most important fisheries, as well as fishing activity pattern) and landings (plus discards if available), both in terms of weight and value of the main target species, will be collected at Institutional levels (e.g. Ministry, Research Institutes, Chambers of Commerce or equivalent Institutions and other stakeholders), also with the support of the AdriaMed project. The task 1.1 (**N. Vrgoč**) and 1.2 (**A. Pešić**) leaders will be responsible for the creation of maps with the location of the main harbours, with demersal and small pelagic fisheries, and the main fishing grounds. Moreover each task coordinator will compile two data sets with the main information on fishing capacity and fishing activity both for demersal and small pelagic fisheries. A detailed action plan for months 1 to 4 of the project was presented.

The coordinator opened the discussion on the WP1 activities.

E. Sabatella specified the definition of fleet segment: a set of vessels with a prevalent gear, which is belonging to a specific length category.

M.T. Spedicato said that for the scope of this WP, fleet segment can be identified with the fisheries, assuming that each fleet segment uses only the prevalent gear.

G. Scarcella proposed to use the fleet register for getting information on the prevalent gear.

D. Pinello explained the need to define fleet segment, active vessels, fishing day, etc... Therefore, it was decided to use the definitions of DCF and to create a glossary (**E. Sabatella** and **D. Pinello** committed).

E. Arneri highlighted that collecting the information at level of the different harbours in the GSAs, would give a more detailed picture of the situation.

G. Lembo pointed out that a segmentation of the information per-harbour would be difficult to use when modelling scenarios. Since the Management units are the GSAs, the simulations will be performed at GSA level.

On the basis of the discussion, it was decided to:

- use a glossary and DCF definitions;
- fishing grounds will be qualitative described on maps;
- two data sets with the main information on fishing capacity and fishing activity, both for demersal and small pelagic fisheries, will be connected in an access database;
- use the DCF definition of fishing trip for trawls and purse seiners, for set nets use the soaking time;
- a standard methodology for selecting the target species will be provided by G. Scarcella;
- AdriaMed will assist non-EU Countries for collecting information.
- deadlines for both data set and maps is 15.03.2014, April is the deadline for the deliverable D03.

Lunch break

E. Sabatella presented the WP2 activities.

The information compiled under this WP will help for the preparation of the following deliverables:

- D5. Data set and preliminary estimation of socio-economic parameters for modelling in WP4 (month 10).
- D6. Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region) (month 11).

The WP leader clearly identified and presented the variables to be collected, the disaggregation level and the time span.

In the definition of variables to be collected the following criteria have been followed:

- Data to be collected/reviewed should be consistent with the informative needs of the SEDAF project in relation to deliverables of WP2 and data input for bio-economic modelling under WP4.
- Data to be collected should be homogenous with already established procedures adopted in EU DCF (STECF, 2012).
- Data to be collected/reviewed should allow the calculation of socio-economic indicators used by STECF for assessing the economic performance of the fleets and the balance between fishing capacity and fishing opportunities.

According to the above criteria, WP2 leader presented the list of socio-economic variables to be considered in the project.

The coordinator opened the discussion on the WP2 activities.

Participants discussed this list and commented on each variable. On the basis of the discussion, it was decided to:

- Compile a glossary of the economic variables (**E. Sabatella** committed).
- Include in the list, under section effort, the variable “maximum days at sea” and under section capacity the variables “GT and KW”. These variables are necessary as input in bio-economic modelling and could be used for calculation of indicators of technical efficiency.
- Collect information on landings and average price of target species by commercial categories. This is a requirement for bio-economic models (**R. Sabatella** committed).
- The target species for which landings volume and value have to be collected will be identified under WP1.
- Two data sets with the main economic information and prices to be connected in an access database.

The action plan was decided as follow:

- Preparatory phase. To define the format and check, country by country, the data availability. February/March.
- Survey implementation. Data collection. April/June.
- Data processing. June/July.
- WP2 Workshop data analysis, discussion and validation. July.

E. Sabatella presented a focus on task 2.5 (prepared by **R. Sabatella**).

The objectives of this task can be summarized as follows:

1. analysis of the fish trade between the two sides of the Adriatic basin, the EU and the non-EU countries;

2. trends in prices at different levels of the chain: ex vessel price + consumer price;
3. EU overview; analysis at fishing region and by country: average fish prices by key species, fishing technology and vessel length.

The primary source of information for the international trade is Eurostat (EU27 Trade Since 1988 By HS2-HS4), this database covers all the countries involved in the SEDAF project.

As regard the first-sale or ex-vessel price, the source of information is Eurostat as well, and cover Croatia (from 2011 to 2012), Slovenia (from 2003 to 2012) and Italy (from 2003 to 2012).

The source of information for the variable "Price by fishing technique and vessel length" is the European Data Collection Framework (DCF). The available data cover Slovenia, Croatia (from 2013), Italy (from 2004 to 2012).

The primary source of information for the consumer price for Italy is Ismea. Such information is also available for Croatia.

After discussion it was agreed to follow three steps:

1. Collation and review of the available information (March).
2. Collection of new data (April).
3. Analysis and discussion, WP2 workshop, (July).

N. Vrgoč presented the WP3 activities.

The main WP activity will be the review of information on stock status, recommendations and scientific advice, accounting for demersal and small pelagic species. The main sources will be the reports of the STECF-SGMED, EWG, as well as the reports of AdriaMed, GFCM WG and GFCM Sub-Committee. The pertinent scientific literature will be also revised.

The basic information to be collected are: growth parameters; age data; length weight relationships; natural mortality; maturity; selectivity; stock assessment outputs; stock diagnosis; scientific advice; prediction; comments; other.

The first steps will be the preparation of a template (**N. Vrgoč** commitment) with guidelines for collecting information. The second step will consist in a review of the pros and cons of the current assessment of small pelagics and demersal stocks, recommendations and scientific advice (**N. Vrgoč** commitment).

After discussion it was agreed to follow three steps:

1. Preparation of a template and guidelines (February).
2. Collection of the available information (March).
3. Analysis and review. (June).

I. Bitetto presented the WP4 activities.

The milestones of WP4 are:

- Building a matrix linking stocks and fisheries: the combinations stock - fleet segment have to be defined by WP1.
- Parameterization of biological variables of the model: for demersal and small pelagic stocks the input related to life history traits (growth, natural mortality, maturity, etc...), as well as recruitment have to be set. All this information is available from the review performed in WP3.
- Identification of fishery parameters (landings, effort, etc...): for each demersal and small pelagic stock, the annual total and fishing mortality have to be defined; possibly, the fishing mortality has to be defined by fleet segment. In case total mortality has been used for simulation, the weights of the different productions combined with selectivity functions by fleet segment has to be used to derive the partial fishing mortalities. All this information is available from the review performed in WP3, as

well as bibliography about selectivity studies.

- Parameterization of economic variables of the model at fishery level: all the functions related to costs, prices, etc.. have to be defined by fleet segment, on the basis of relationship derived on economic data collected in WP2.
- Identification and listing of management scenarios to be modelled specifying the rationale of each scenario: the scenarios will be agreed with DG MARE and scenario modelling will be in line with the outcomes of the STECF and GFCM working groups. Model outputs will be analysed and discussed in a Workshop (WP4 Workshop) with the participation of all the partners and AdriaMed representatives.

For this WP a report and discussion on the assessment of the likely biological and socioeconomic consequences of the different management scenarios (deliverable D9) is foreseen in month 13.

Three case studies have been planned: Small pelagic stocks and Demersal stocks in GSA 17 (**A. Santojanni** committed); Demersal stocks in GSA 18 (**I. Bitetto** committed).

G. Scarcella presented a focus on task 4.1 (prepared by **A. Santojanni**).

Anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*) are between the most important commercial species in the Adriatic Sea, accounting for about 80% of the overall Adriatic catches.

A multi-annual management plan for small pelagic fisheries in the Adriatic Sea has been established by the General Fisheries Commission for the Mediterranean (GFCM) in 2013. The implementation of a case study, with the aid of a bio-economic model, will analyse inputs and output of such multi-annual management Plan and simulate additional scenarios/measures to be implemented whenever the stock undergoes through an unsustainable exploitation. The use of BEMTOOL model will allow simulating the effect of reduction in effort not only on the stock status, but also from a socio-economic point of view.

M. Gambino presented a focus on task 4.3.

The parameterization of economic variables of the BEMTOOL model mainly refers to two modules: the economic module, which simulates the evolution of the main economic variables and the behavioural module, which simulates the dynamic of the fleet capacity and fishing effort. More specifically, the economic module consists of five components and include the variable costs dynamics, the labour cost dynamics, the fixed costs dynamics, the capital costs dynamics and the price dynamics. The behavioural module consists of three components aimed at simulating the fleet dynamics, the activity dynamics and the technological progress.

The main social and economic outputs and indicators that will be estimated on the basis of the economic parameterization will be:

- Revenues, total revenues, other income and total income.
- Gross value added, gross cash flow and profit.
- Investment and capital value.
- Employment and average wage.
- Break even revenues.
- Net profit over the 15 years and net present value of profit in the future (infinity).

G. Lembo, concluding the scientific session, expressed his appreciation for the high level of the contributions provided by WP and Task leaders, as well as for the very useful discussion developed among participants.

About the planning of the next activities, each WP and Task leader was committed to send to

the coordinator a summary of the discussion/decisions/schedules of the relevant WPs/Tasks, within the end of February. Then, the coordinator will launch a first check on the progress of the activities at the beginning of April.

About the planning of the second meeting, the first workshop and the interim report, the coordinator will verify with DG MARE the possibility of the schedule modification.

About the planning of the structure and the content of the Interim Report, the coordinator gave a brief overview of the issues to be included in the report.

About the Administrative and financial issues, the coordinator gave some general indications, but informed the participants that any more specific administrative or financial issue could be addressed to Maddalena Laggini at CoNISMa.

About the place of the next meeting and first workshop, N. Vrgoč kindly offered to host in Croatia such meetings.

The meeting was concluded at h. 13:00 of Friday February 7th, 2014.

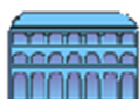


MAREA

MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE



Zavod za ribištvo Slovenije



Specific Contract n° 10

"Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea"

SEDAF

Second coordination meeting, September 17, 2014

Final Report

The meeting took place at the FAO Headquarter, Viale delle Terme di Caracalla, Roma, Italy

Partner of the Project are: Consorzio Nazionale Interuniversitario per le Scienze del Mare, Roma (**CoNISMa**), COISPA Tecnologia & Ricerca, Bari (**COISPA**), Consiglio Nazionale delle Ricerche – ISMAR, Ancona (**CNR**); Fisheries Research Institute of Slovenia (**ZZRS**); Institute of Oceanography and Fisheries, Split (**IOF**); Institute of Marine Biology, Kotor (**IMB**); Laboratory of Fisheries and Aquaculture - Agricultural University of Tirana (**LAP**).

Work-Package and Task leaders are:

Name	Surname	WP/TASK	Partner or Sub-contractor
Maria Teresa	Spedicato	MAREA Coordinator	COISPA
Giuseppe	Lembo	SEDAF Coordinator	COISPA
Nedo	Vrgoč	WP3 and task 1.1	IOF
Vanja	Cikes Kec	task 3.1	IOF
Barbara	Zorica	task 2.1	IOF
Bojan	Marceta	task 3.2	ZZRS
Jerina	Kolitari	task 2.3	LAP
Evelina	Sabatella	WP2 and task 2.4	CoNISMa
Rosaria	Sabatella	task 2.5	CoNISMa
Giuseppe	Scarcella	WP1	CNR
Isabella	Bitetto	WP4 and task 4.2	COISPA
Alberto	Santojanni	task 4.1	CNR
Monica	Gambino	task 4.3	CoNISMa
Olivera	Marković	task 2.2	IMB

Ana	Pešić	task 1.2	IMB
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The participants to the meeting are (in alphabetic order):

E. Arneri (FAO-AdriaMed); I. Bitetto (COISPA); P. Carpi (CNR); V Cikes Kec (IOF); M. Djurovic (IMB); M. Gambino (CoNISM/Nisea); Z. Ikica (IMB); I. Isajlovic (IOF); A. Joksimovic (IMB); J. Kolitari (LAP); R. Kristo(LAP); G. Lembo (COISPA); O. Marković (IMB); N. Milone (FAO-AdriaMed); A. Pešić (IMB); D. Pinello (CoNISM/Nisea); E. Sabatella (CoNISM/Nisea); R. Sabatella (CoNISM/Nisea); G. Scarcella (CNR); M.T. Spedicato (COISPA); X. Vazquez (DGMARE); N. Vrgoč (IOF); B. Zorica (IOF).

Objective of the project

The main objective of the study is to provide a baseline description of the main socioeconomic elements pertaining to the different fisheries undertaken by the relevant countries (e.g. Adriatic coasts of Italy, Slovenia, Croatia, Montenegro and Albania) on the basis of their evolution over the last years, following, in terms of time span, the approach usually adopted by STECF for the analyses and report of the economic performance of the fleet (e.g. generally 5 years). The indicators collected will be in line with the methodology and interpretation developed in the DCF and STECF reports for socio-economic data and in the STECF reports on balance between fishing capacity and fishing opportunities. The indicators will be reported as annual averages by fleet segment (following DCF segments) for the economic assessment and profit/loss analysis, whilst selected variables will be taken and estimated at fishery and/or GSA level for bio-economic modelling. To these end, the following tasks will be undertaken:

7. To identify the main fisheries occurring in the Adriatic Sea, with special attention to those fisheries that are exploited by several of the Adriatic countries.
8. On the basis of this identification, collate, review and scrutinize the available information on the main socio-economic indicators pertaining to these fisheries.
9. For the same fisheries, review the available information on current stock status and recommendations of the scientific advice.
10. To collate, review and scrutinize the available information on marketing of fish products in the Adriatic Sea, with particular attention to the commercial interactions between the different coastal countries and with neighbour countries with limited access to the resources (e.g. Austria, Bosnia, Serbia, etc.). This task will include a description of the mechanisms governing the formation of prices at the different levels of the supply chain in the Adriatic area as well as the collection of a 10 years series of first sale prices for the main species.
11. Report on data trends, drivers and results of the abovementioned tasks including a clear description and analysis of the socio-economic characteristics linked to the fisheries identified under task 1.
12. On the basis of the most recent scientific advice, assess the likely biological and socioeconomic consequences of the different management scenarios derived from the application of the recommendations of the scientific advice for the selected fisheries.

The structure of the project has been organised according to 5 work packages.

WP0 = project management and coordination.

WP1 = Fisheries identification

WP2 = Collation and review on the main socio-economic information on the main fisheries

WP3 = Review of the current stock status and recommendations of the scientific advice

WP4 = Assessment of the likely biological and socioeconomic consequences of the different management scenarios.

The project will benefit of the support of the AdriaMed FAO Regional Project, in terms of expertise and knowledge of the information available in the Adriatic region. The project duration will be 14 months.

AGENDA

Second coordination meeting

September 17, 2014

09:30

Welcome and adoption of the agenda

09:45

① Short presentation of the WP2 workshop
(E. Sabatella)

10:00

② Presentation of the project progress (Interim report, Deliverables D3-D4-D8)
(G. Lembo)

10:30

③ Comment on the Interim report
(DGMARE representative)

10:45

④ Discussion

11:00 – 11:30

Coffee break

11:30

⑤ Presentation of the WP4 workshop on the assessment of the likely biological and socioeconomic consequences of the different management scenarios (I. Bitetto)

11:45

⑥ Presentation of the model input for the case studies
(I. Bitetto, P. Carpi, M. Gambino)

12:30

⑦ Feedback on the meeting results

Administrative and financial issues

Planning of the third meeting and the second workshop

Closure of the meeting

(G. Lembo)

Report of the meeting

The project coordinator **G. Lembo** welcomed the participants to the second coordination meeting of the SEDAF project. He expressed appreciation for the participation to the meeting of the DG Mare representative and special thanks to the FAO AdriaMed representatives for the kind hospitality offered to the meeting.

Z. Ikica (IMB) and **I. Isailovic (IOF)** kindly accepted to act as rapporteurs of the meeting.

After reading and approval, without modifications, the agenda, the coordinator gave the floor to **E. Sabatella**, who presented the results of the WP2 workshop (see report in the [Annex I](#)).

G. Lembo thanked **E. Sabatella** for the presentation, the work done and the good achieved results.

Then, **G. Lembo** took the floor for giving a presentation of the project progress (Interim report, Deliverables D3-D4-D8).

Then highlighted the comments provided by the Commission as regard WP1 (Deliverable D3 and D4), WP2 and WP3.

X. Vázquez (DG Mare representative) further highlight the following issues:

- a) to indicate always the data quality and reliability, particularly when making projections (including backwards projections to cover data gaps);
- b) In Croatia data from 2009 and 2010, collected with other methodology not contemplated in DCF. Therefore, there is a need to make also a data reworking including backwards projections, specifying the risks assumed;
- c) Data for 2013 not yet processed, but it will be available at the end of the project;
- d) ADRIAMED has collected data in Albania and Montenegro for 2013. A bit of delay to get the official data was expected;
- e) the whole period considered (2009-2013) is "inside" the economic crisis. In IT they have made an analysis for 10 years, they found the majority of the fleet (being a family business) shows a high level of resilience. The only sectors affected are exports;
- f) Breaking down point/ Could fleets assume further adjustments?

Regarding the expectations for the report, **X. Vázquez** explain that in the

preparation of the report it is necessary to include:

- a) Detailed overview for the fishing fleets performance;
- b) Table of contents of the deliverable D6 concerning methodology and data sources;
- c) overview of Adriatic fisheries, economic performance indicators;
- d) information on marketing including international trade, consumption overview;
- e) first sale numbers (by species and category);
- f) price structure analysis for two case studies (notably anchovy and sardine). A dependency analysis of the fishery sector shall be also preformed indicating notably the evaluation of income and employment (in all sectors extractive, and commercialisation).

G. Scarcella (Coordinator of WP1) acknowledged the comments by the Commission, which will be all taken into consideration when preparing the draft final report (most of them have been already implemented).

He, particularly, highlighted that the results from the STOCKMED project were not yet fully available at the time when the D3/4 were finalized. However, it will be possible incorporate the relevant outcomes of such project in the final draft report of SEDAF.

As regards the missing data of fishing efforts for the Croatian fleet segment targeting demersal species in GSA 18, he specified that it was due to the negligible Croatian fishing activity in GSA 18.

Relationships with the Mediterranean Advisory Council have been planned and the outcomes will be provided in the draft final Report.

As regards the comments of the Commission on the collection of economic and social data in Albania and Montenegro, **N. Milone** provided detailed information on the surveys carried out and specified that the planned activities (e.g. number of questionnaires) were substantially complied.

As regards the Deliverable D8, **N. Vrgoc** confirmed his commitment in providing a summary table with a concise analysis and main conclusions.

G. Lembo proposed to incorporate all the SEDAF datasets in a unique DataBase. For this purpose, the DataBase developed in D3 would fit very well. **G. Scarcella** committed himself to coordinate such activity.

G. Lembo introduced the work developed within the WP4 - Assessment of the likely biological and socioeconomic consequences of the different management scenarios, then gave the floor to **I. Bitetto** for the presentation of the activities carried out so far.

I. Bitetto presented the new features of BEMTOOL model that will be used for the purposes of the SEDAF project:

- Capability to use an external vector to model the discard (e.g. modelling discard by both under-sized individuals and damaged

individuals larger than the MCRS).

- Introduction of discard and escape survival rate, to produce more accurate estimates of the population at sea.
- Introduction of new relationships between fishing effort and fishing mortality.
- Modelling the relationship between landing, revenues of target species, total landing and revenues.
- Introduction of uncertainty in the recruitment process.
- A new and more intuitive graphical user-friendly interface in R language.

Then **I. Bitetto** presented the model input for the case studies in WP4.

She reminds that the WP4 workshop has to produce the expected results on time for the preparation of the deliverable D9 in month 13. For this reason the WP4 workshop should be held in December.

Two case studies will be simulated: Northern Adriatic (GSA17) and Southern Adriatic (GSA 18).

I. Bitetto showed a template developed for the parameter to be input into the BEMTOOL model. This template has been uploaded on the MAREA FTP -> SEDAF -> WP4.

The GSA 17 and GSA 18 case studies will consider small pelagic and demersal stocks, the already endorsed stock assessments (results from WP3), the relevant fisheries (WP1) and the relevant available socio-economic data (result from WP2).

The GSA 17 case study will include a selection of the following species, after consideration of the relevance of the assessments for the whole GSA 17:

- *M. merluccius*
- *M. barbatus*
- *S. mantis*
- *S. solea*
- *E. encrasicolus*
- *S. pilchardus*

The GSA 18 case study will include a selection of the following species, after consideration of the relevance of the assessments for the whole GSA 18:

- *P. longirostris*
- *M. merluccius*
- *M. barbatus*
- *A. foliacea*
- *N. norvegicus*
- *S. mantis*

Relevant fleet segments targeting these species for both GSAs.

The different scenarios to be simulated with BEMTOOL model are:

- Change of activity (days at sea);
- Change of capacity (number of vessels);
- Change of F to reach the reference points (overall and by fleet);

- Behavioural component with change of activity;
- Change in selectivity.

The deadline for delivering the inputs for the case studies is November 15th, in order to have enough time to producing the preliminary results to be discussed during the workshop.

G. Lembo thanked **I. Bitetto** for the presentation and the activities carried out so far, then gave the floor to **M. Gambino**, who presented the template for the socio-economic parameterization of BEMTOOL model, which has been uploaded on MAREA FTP.

Then **P. Carpi** showed further information on the input parameters for the small pelagic in Adriatic.

After discussion the group decided to use the stock assessments that are going to be presented to the next GFCM demersal and small pelagic working group for GSA 17 and 18, according to their availability and the deadlines of SEDAF project.

G. Lembo, concluding the meeting, expressed his appreciation for the high level of the contributions provided by WP and Task leaders, as well as for the very useful discussion developed among participants.

About the planning of the third meeting and second workshop, the Croatian colleagues offered to host the meeting in Split. The three days meeting will be held in the week 51, 2014. **G. Lembo** thanked the Croatian partner.

About the Administrative and financial issues, the coordinator gave some general indications, but informed the participants that any more specific administrative or financial issue could be addressed to Maddalena Laggini at CoNISMa.

The meeting was concluded at h. 13:00 of September 17th, 2014.

ANNEX I

Agenda and Report of the Workshop WP2

Collation and review on the main socio-economic information linked to the main fisheries

**FAO Headquarter, Viale delle Terme di Caracalla, Roma, Italy
September 15-16, 2014**

AGENDA

Monday, September 15th, 2014

15,00 – 16,00

- Opening of the workshop (Pino Lembo, SEDAF coordinator).
- Adoption of the agenda, discussion on the aim of the workshop and on the expected results (Evelina Sabatella, WP 2 leader).
- The expectations of DGMARE about the WP2 workshop. (DGMARE representative).
- Presentation of the templates and discussion on the economic variables and indicators (Evelina Sabatella).

16,00 – 16,30

- Presentation of Italian data. Analysis of the main trends and discussion (Evelina Sabatella).

16,30 – 17,00 Coffee break

17,00 – 17,30

- Presentation of Slovenian and Croatian data. Analysis of the main trends and discussion (Barbara Zorica IOF).

17,30 – 18,00

- Socio-economic surveys in Albania and Montenegro (Adriamed).

Tuesday, September 16th, 2014

9,00 – 9,30

- Presentation of Montenegrin data. Analysis of the main trends and discussion (Olivera Marković IMB).

9,30 – 10,00

- 🌐 Presentation of Albanian data. Analysis of the main trends and discussion (Jerina Kolutari, LAP).

10,00 – 10,30

- 🌐 Presentation of WP2 database: coverage, completeness, steps forward to get missing data (Evelina Sabatella)

10,30 – 11,00 Coffee break

11,00 – 11,30

- 🌐 Presentation of WP2 database (continua)

11,30 – 12,30

- 🌐 General discussion on the preparation of the deliverables D05 - Data set and preliminary estimation of socioeconomic parameters for modelling in WP4 (month 10).

12,30 – 14,30 Lunch

14,30 – 16,00

- 🌐 General discussion on the preparation of the deliverables D06 - Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments, for each country and for the whole Adriatic Region (month 11).

Discussion on the contents and selection of data/indicators to be included.

16,00 – 16,30

- 🌐 State of the art of task 2.5: collation and review of the information on marketing of fish products in the Adriatic Sea (R. Sabatella).

16,30 – 17,00 Coffee break

17,00 – 17,45

- 🌐 Presentation of the methodology for the exploratory analysis on the level of the dependence of fishing activities of the different communities affected by Adriatic fisheries

17,45 – 18,00

- 🌐 Conclusions and achievements of the workshop

REPORT

Introduction

The workshop on WP2 of the SEDAF project was convened in order to analyse, discuss and validate the data collected under task 2.1 (collection and review of data in Italy, Slovenia and Croatia), task 2.2 (collection and review of data in Montenegro) and task 2.3 (collection and review of data in Albania).

The workshop started with presentation and discussion of the specific objectives of Work package 2 that are the following:

- 1) Collate and review the available information on the main socioeconomic indicators at fleet segment level and on the basis of the fisheries identified in WP1
- 2) Estimating the main socio-economic indicators pertaining to these fisheries.
- 3) Collate and review of the information on marketing of fish products in the Adriatic Sea

The list of economic and social variables to be considered was reviewed and analyzed in order to ensure that all partners have the same understanding of the definitions of each item.

For the purpose of the preparation of the workshop two templates have been circulated two months before the date of the workshop:

- One template for the compilation of all data collected in a common database
- One template for presentation of data (table and graphs) and for calculation of economic indicators.

These templates were further discussed and adapted in order to be used for the finalization of the following task and deliverables:

- task 2.4, calculation of economic indicators and data presentation
- D5. Data set and preliminary estimation of socio-economic parameters for modelling in WP4 (month 10)
- D6. Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region) (month 11)

Identification of main fisheries

The data have to be presented for the whole fleet (at GSA/country level) and for each of the fleet segment identified in WP1, that are reported in the following table:

Table 1 - Identification of main fisheries (source: WP1)

Country/GSA (Year)	Fishery	Fleet segments selected
Italy GSA 17 (2012)	Small pelagics	TM_VL2440; TM_VL1824; TM_VL1218
Croatia GSA 17 (2011)	Small pelagics	PS_VL2440; PS_VL1824
Slovenia GSA 17 (2012)	Small pelagics	PS_VL1218
Italy GSA 18 (2012)	Small pelagics	TM_VL2440
Montenegro GSA 18 (2013)	Small pelagics	PS_VL0612; SB_VL0006; SB_VL0612
Albania GSA 18 (2013)	Small pelagics	PS_VL1218
Italy GSA 17 (2012)	Demersal	DRB_VL1218; DTS_VL1824; PGP_VL0612; DTS_VL1218
Croatia GSA 17 (2013)	Demersal	DTS_VL1218; DTS_VL0612; DTS_VL1824; DTS_VL2440; DFN_VL0612
Slovenia GSA 17 (2012)	Demersal	DTS_VL1218; DFN_VL0612
Italy GSA 18 (2012)	Demersal	DTS_VL1218; DTS_VL1824; PGP_VL0612
Montenegro GSA 18 (2013)	Demersal	DTS_VL1218; DFN_VL0006; DFN_VL0612; DTS_VL0612
Albania GSA 18 (2013)	Demersal	DTS_VL1224; DTS_VL2440; PGP_VL0612

During the workshop it was discussed if this list can be considered as appropriate for the objectives of WP 2 and it was decided to add the following segments:

- PS 24-40 in ITA GSA 17, because of the relevance of the Italian purse seiners in the Adriatic pelagic fishery, for which a regional multiannual plan is also under enforcement;
- DTS 24-40 m in ITA GSA 17, in order to include in the economic review all the demersal Adriatic fisheries;
- TBB 24-40 in ITA GSA 17, because of its economic importance in GSA 17.

Table 2 – Number of fleet segments to be included in the economic analysis

Country/area	n. of segments
Italy GSA 17	10
Italy GSA 18	4

Slovenia	3
Croatia	7
Montenegro	6
Albania	4
Total	35

Regarding the time span of the data to be collected/presented it was decided to consider for each GSA/country and for each fleet segment the period 2009-2013 (5 years as foreseen by the project).

Coverage of data collected/reviewed

Each partner responsible for a specific task of WP2 presented the achievements of the objectives of each task in accordance with the timing of the project.

In particular, the following presentations were addressed and discussed:

- Presentation of Italian data. Analysis of the main trends and discussion by Evelina Sabatella
- Presentation of Slovenian and Croatian data. Analysis of the main trends and discussion by Barbara Zorica, IOF
- Presentation of Montenegrin data. Analysis of the main trends and discussion by Olivera Marković IMB
- Presentation of Albanian data. Analysis of the main trends and discussion by Roland Kristo, LAP
- Nicoletta Milone presented the socio-economic surveys carried out in Albania and Montenegro by the Adriamed project.

On the basis of these presentations, it was possible to identify the data already available and the data that are still missing. In addition, for data not yet available, specific actions in order to overcome the gaps were identified.

Italy

VARIABLE	Italy					Data by segment
	2009	2010	2011	2012	2013	
Structure						
Number of vessels						
Average vessel age						
GT						
Engine power						
Employment						
Total fishers employed						
Full Time Equivalent						
Fishing effort						
Days at sea						

Maximum days at sea						
Energy consumption						
Production						
Landings weight						
Landings value						
Income						
Landings income						
Direct subsidies						
Other income						
Costs						
Crew wages						
Energy costs						
Repair costs						
Other variable costs						
Other fixed costs						
Depreciation costs						
Capital value						
Fleet value						
Investments						

Green: data already available. Yellow: data that will be available by the first week of October

Italian data are available for the period 2009-2012. They are articulated by GSA and by fleet segment. Data referred to the year 2013 are not yet available because, according to the Italian National Program for data collection (EU DCF), these data will be finalized by the end of September. The source of data is the Italian National Program for data collection (EU DCF). The maximum number of days at sea is an additional calculation that is external to the basic DCF, therefore this parameter has to be calculated within the project.

Slovenia

VARIABLE	Slovenia					Data by segment
	2009	2010	2011	2012	2013	
Structure						
Number of vessels						
Average vessel age						
GT						
Engine power						
Employment						
Total fishers employed						
Full Time Equivalent						
Fishing effort						
Days at sea						
Maximum days at sea						
Energy consumption						

Production						
Landings weight						
Landings value						
Income						
Landings income						
Direct subsidies						
Other income						
Costs						
Crew wages						
Energy costs						
Repair costs						
Other variable costs						
Other fixed costs						
Depreciation costs						
Capital value						
Fleet value						
Investments						

Green: data already available. Yellow: data that will be available by the first week of October

Only economic data by national totals for the period 2009-2012 are already available for the scope of the SEDAF project. However, data by segment will be provided by the national authorities because already available within the EU data collection framework.

Data for the year 2013 will be asked to Slovenia authorities but in case they will not be provided because not yet processed, they will be estimated through the projection methods currently applied by the STECF working groups.

Croatia

VARIABLE	Croatia					Data by segment
	2009	2010	2011	2012	2013	
Structure						
Number of vessels						
Average vessel age						
GT						
Engine power						
Employment						
Total fishers employed						
Full Time Equivalent						
Fishing effort						
Days at sea						
Maximum days at sea						
Energy consumption						
Production						
Landings weight						

Landings value						
Income						
Landings income						
Direct subsidies						
Other income						
Costs						
Crew wages						
Energy costs						
Repair costs						
Other variable costs						
Other fixed costs						
Depreciation costs						
Capital value						
Fleet value						
Investments						

Green: data already available. Yellow: data that will be available by the first week of October

Capacity, landing and effort data are available for the period 2011-2013-
 Economic data are available for 2011 and 2012. These data are available
 for the total national fleet and not by fleet segment.

However:

- 2013 economic data will be made available through the EU DCF
- 2011, 2012 and 2013 data by fleet segments are already available at the level of national authorities
- Data for the year 2009 and 2010 are available but these data are not homogenous in terms of variables and segmentation because they were estimated on the basis of a different methodology compared to the methodology applied in the DCF. The partner responsible for this task will process the available information in order to present them in accordance with the SEDAF structure.

Montenegro

VARIABLE	2008	Montenegro					Data by segment
		2009	2010	2011	2012	2013	
Structure							
Number of vessels							
Average vessel age							
GT							
Engine power							
Employment							
Total fishers employed							
Full Time Equivalent							
Fishing effort							
Days at sea							

Maximum days at sea							
Energy consumption							
Production							
Landings weight							
Landings value							
Income							
Landings income							
Direct subsidies							
Other income							
Costs							
Crew wages							
Energy costs							
Repair costs							
Other variable costs							
Other fixed costs							
Depreciation costs							
Capital value							
Fleet value							
Investments							

Green: data already available. Yellow: data that will be available by the first week of October

Data on capacity, effort and production are already available at the level of fleet segment and for the period 2009-2012. However, no other economic data have been already submitted.

In 2014 Adriamed carried out a specific survey to estimate economic data by fleet segment. On the basis of this survey, data for the whole period will be estimated, also considering that structural and production data are already available.

Albania

VARIABLE	Albania					Data by segment
	2009	2010	2011	2012	2013	
Structure						
Number of vessels						
Average vessel age						
GT						
Engine power						
Employment						
Total fishers employed						
Full Time Equivalent						
Fishing effort						
Days at sea						
Maximum days at sea						
Energy consumption						

Production						
Landings weight						
Landings value						
Income						
Landings income						
Direct subsidies						
Other income						
Costs						
Crew wages						
Energy costs						
Repair costs						
Other variable costs						
Other fixed costs						
Depreciation costs						
Capital value						
Fleet value						
Investments						

Green: data already available. Yellow: data that will be available by the first week of October

Albanian data are already available for the total national fleet. Data by fleet segment will be provided by the end of September.

Exploratory data analysis

The workshop assessed the data already available and identified actions to complete the data needed for the project. It was recommended that all partners should use the common template on data base structure. The final validated set of data should be sent to the WP2 coordinator at the latest in the first week of October.

Once all the data will be received, the WP2 coordinator will assess the coherence and consistency of the data.

This quality valuation will be done using different tools, in particular:

- Analysis of trends, list of significant variations across years
- Calculation of average parameters (average values per vessel and per day)
- Summary statistics on the average first-sale price (euro/kg) by segment
- Annual cost structure

The outcomes of this control procedures will be sent to partners for comment and explanations. All this process should be finalized by the third week of October, in order to finalize the deliverable D05 according with the project timing.

In addition to this data validation, in case of large fluctuations in the time series, each partner will be asked to explain the reasons behind them

(market conditions, introduction of particular management measures, increase of fuel cost, reduction/increase of activity due to xx). A comparison of the economic performance of similar segments will be also considered, explaining the reasons of differences if any. These “qualitative” information on the economic performance should be delivered to WP2 coordinator by the first week of November.

Discussion for the preparation of deliverable D6

Deliverable D6 will consist on a report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region). This deliverable will be finalized by month 11.

During the workshop, the structure of this report was discussed and the following table of contents was agreed:

Deliverable, D6, table of contents

- Main findings
- Introduction
- Methodology (by Country)
- Overview of the Adriatic fishery:
 - Fleet structure
 - Socio-Economic structure
 - Fishing activity and output
 - Economic Performance Indicators

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-by fishery (demersal and pelagic)
 - By Country/GSA
- Country/GSA analysis
 - Italy GSA17
 - Italy GSA 18
 - Slovenia
 - Croatia
 - Albania
 - Montenegro

⇒

- All fleet segments
 Quantitative and qualitative assessment of the main fleet segments
- Conclusions

Task 2.5, Collation and review of the information on marketing of fish products in the Adriatic Sea

The aim of this task is to collate and review the information on marketing of fish products in the Adriatic Sea.

The work is divided into four sections:

1. International trade: quantitative and qualitative aspects of the fish trade between the two sides of Adriatic basin, the EU and the non-EU countries
2. Overview of consumption
3. Analysis of first sale or ex-vessel prices

4. Price structure analysis (EUMOFA 2013)

During the workshop, methodological aspects related to each of this task were discussed. In addition, it was considered the availability of data and the deadlines for sending the final information to the task coordinator. The final outcome of the discussion and the roadmap for next actions is reported in the following table:

Table 3 – Contribution for finalization of task 2.5

<i>Section</i>	<i>Deadline</i>	<i>Contribution</i>
1. International trade	31 th October	A first draft will send to the responsible at national level in order to receive comments/corrections and additional observations
2. Overview of consumption	30 th November	
3. Analysis of first sale	31 th October	Provide data on <u>price by species</u> and on <u>price by commercial category</u>
	30 th November	Template on fish markets (fish market analysis at country level)
4. Price structure analysis	15 December	2 case studies: anchovies in Italy/GSA 18 and sardines in Croatia
D.7 Report on the Aspects of Fish Markets in the Adriatic SEA	31 December	

Level of Dependency on fisheries of ADRIAMED Countries

The dependence analysis shows, in terms of creation of income and maintenance of employment, the dependency of the economies of each Adriatic Country on the fisheries sector. Into the SEDAF Project, the aim is to analyze and present statistical data on the National role and importance of the fisheries sector and its sub-sectors:

- Catching
- seafood processing
- aquaculture
- ancillary activities.

The dependency analysis can measure the weight of each sub-sector of fisheries. In terms of governance of the Fisheries Sector, the Dependency Analysis can driving the strategic national plans in the middle-long time. The analysis will be done for each Adriatic country.

Each national focal point of the SEDAF project will have to provide the following data:

1. Value Added at National level
2. Value Added in Total Fisheries sector
3. Value added of sub-sector:
 - Catching
 - Processing
 - Aquaculture
 - Ancillary Activities
4. Employment at National level
5. Employment in Total Fisheries sector
6. Employment in each sub-sector (number 100 person)
 - Catching
 - Processing
 - Aquaculture
 - Ancillary Activities
7. Total national income (Value in million of Euros and US\$)
8. Income generated by Total fisheries sector (Value million of Euros and US\$)
9. Income in each sub-sector:
 - Income Catching
 - Income Processing
 - Income Aquaculture
 - Income ancillary activities

These data will allow the calculation of the following 4 dependence indicators:

1. Employment – number of persons employed in the specific sub-sector of the fisheries sector.
2. Income – gross value added (i.e. contribution to the gross national product – GNP) in mln Euro.
3. Ratio 1 – Income generated by the fisheries sector as a percentage of the total national or regional income.
4. Ratio 2 - Employment created by the fisheries sector as a percentage of the total national or regional employment.

STECF methodology for economic performance projections at fleet segment

Crew wages (CW) were estimated as an average proportion of the value of landing (VaL)⁹:

$$CW_t = \frac{\sum_{t-3}^{t-1} CW}{\sum_{t-3}^{t-1} VaL} \times VaL_t$$

Non-variable costs (NVC) were estimated using the change in capacity i.e. number of vessels (N):

$$NVC_t = \frac{N_t}{N_{t-1}} \times NVC_{t-1}$$

Variable costs (VC) are projected using changes in effort, i.e. Days at Sea (DAS):

$$VC_t = \frac{DAS_t}{DAS_{t-1}} \times VC_{t-1}$$

The same method is to be applied on variable costs is applied at repair and maintenance.

Fuel costs (FC) are projected using changes in effort (DAS) and change in average fuel price (P):

$$FC_t = \frac{DAS_t}{DAS_{t-1}} \times \frac{P_t}{P_{t-1}} \times FC_{t-1}$$

⁹ "VaL" is preferred to "VL" used at the SGMOS-10-06 as the acronym for Value of Landings, in order to avoid any confusion with Vessel Length.



Zavod za ribištvo Slovenije



MAREA MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE

Specific Contract n° 10

"Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea"

SEDAF

Third coordination meeting, December 19, 2014

Draft Report

The meeting took place at the Institute of Oceanography and Fisheries (IOF)
Headquarter, Šetalište I. Meštrovića 63, Split – Croatia

Partner of the Project are: Consorzio Nazionale Interuniversitario per le Scienze del Mare, Roma (**CoNISM**), COISPA Tecnologia & Ricerca, Bari (**COISPA**), Consiglio Nazionale delle Ricerche – ISMAR, Ancona (**CNR**); Fisheries Research Institute of Slovenia (**ZZRS**); Institute of Oceanography and Fisheries, Split (**IOF**); Institute of Marine Biology, Kotor (**IMB**); Laboratory of Fisheries and Aquaculture - Agricultural University of Tirana (**LAP**).

Work-Package and Task leaders are:

Name	Surname	WP/TASK	Partner or Sub-contractor
Maria Teresa	Spedicato	MAREA Coordinator	COISPA
Giuseppe	Lembo	SEDAF Coordinator	COISPA
Nedo	Vrgoč	WP3 and task 1.1	IOF
Vanja	Cikes Kec	task 3.1	IOF
Barbara	Zorica	task 2.1	IOF
Bojan	Marceta	task 3.2	ZZRS
Jerina	Kolitari	task 2.3	LAP
Evelina	Sabatella	WP2 and task 2.4	CoNISM
Rosaria	Sabatella	task 2.5	CoNISM
Giuseppe	Scarcella	WP1	CNR
Isabella	Bitetto	WP4 and task 4.2	COISPA
Alberto	Santojanni	task 4.1	CNR
Monica	Gambino	task 4.3	CoNISM
Olivera	Marković	task 2.2	IMB
Ana	Pešić	task 1.2	IMB

The participants to the meeting are (in alphabetic order):

E. Arneri (FAO-AdriaMed); I. Bitetto (COISPA); P. Carpi (CNR); V. Cikes Kec (IOF); M. Djurovic (IMB); M.T. Facchini (COISPA); M. Gambino (CoNISMa/Nisea); Z. Ikica (IMB); A. Joksimovic (IMB); J. Kolitari (LAP); G. Lembo (COISPA); A. Perez Perera (DGMARE); A. Pešić (IMB); E. Sabatella (CoNISMa/Nisea); G. Scarcella (CNR); M.T. Spedicato (COISPA); X. Vazquez (DGMARE); N. Vrgoč (IOF); B. Zorica (IOF).

Objective of the project

The main objective of the study is to provide a baseline description of the main socioeconomic elements pertaining to the different fisheries undertaken by the relevant countries (e.g. Adriatic coasts of Italy, Slovenia, Croatia, Montenegro and Albania) on the basis of their evolution over the last years, following, in terms of time span, the approach usually adopted by STECF for the analyses and report of the economic performance of the fleet (e.g. generally 5 years). The indicators collected will be in line with the methodology and interpretation developed in the DCF and STECF reports for socio-economic data and in the STECF reports on balance between fishing capacity and fishing opportunities. The indicators will be reported as annual averages by fleet segment (following DCF segments) for the economic assessment and profit/loss analysis, whilst selected variables will be taken and estimated at fishery and/or GSA level for bio-economic modelling. To these end, the following tasks will be undertaken:

13. To identify the main fisheries occurring in the Adriatic Sea, with special attention to those fisheries that are exploited by several of the Adriatic countries.
14. On the basis of this identification, collate, review and scrutinize the available information on the main socio-economic indicators pertaining to these fisheries.
15. For the same fisheries, review the available information on current stock status and recommendations of the scientific advice.
16. To collate, review and scrutinize the available information on marketing of fish products in the Adriatic Sea, with particular attention to the commercial interactions between the different coastal countries and with neighbour countries with limited access to the resources (e.g. Austria, Bosnia, Serbia, etc.). This task will include a description of the mechanisms governing the formation of prices at the different levels of the supply chain in the Adriatic area as well as the collection of a 10 years series of first sale prices for the main species.
17. Report on data trends, drivers and results of the abovementioned tasks including a clear description and analysis of the socio-economic characteristics linked to the fisheries identified under task 1.
18. On the basis of the most recent scientific advice, assess the likely biological and socioeconomic consequences of the different management scenarios derived from the application of the recommendations of the scientific advice for the selected fisheries.

The structure of the project has been organised according to 5 work packages.

WP0 = project management and coordination.

WP1 = Fisheries identification

WP2 = Collation and review on the main socio-economic information on the main fisheries

WP3 = Review of the current stock status and recommendations of the scientific advice

WP4 = Assessment of the likely biological and socioeconomic consequences of the different

management scenarios.

The project will benefit of the support of the AdriaMed FAO Regional Project, in terms of expertise and knowledge of the information available in the Adriatic region. The project duration will be 14 months.

AGENDA

Third coordination meeting

December 19, 2014

① 09:30

Welcome and adoption of the agenda.
(**G. Lembo**)

② 09:45

Presentation of the project progress:
Deliverable 3 and 4 (**G. Scarcella**)
Deliverable 5 and 6 (**E. Sabatella**)
Deliverable 8 (**N. Vrgoc**)
Deliverable 7 (**R. Sabatella**)

③ 10:45

Presentation of the WP4 workshop results
(**I. Bitetto**)

④ 11:00 – 11:20

Coffee break

⑤ 11:20

Comments on the WP4 workshop
(DGMARE representative)

⑥ 11:40

Discussion

⑦ 12:30

Conclusion and Final report organization
(**G. Lembo**)

⑧ 13.00

Administrative and financial issues
Closure of the meeting

Report of the meeting

The project coordinator **G. Lembo** welcomed the participants to the third coordination meeting of the SEDAF project. He expressed appreciation for the participation to the meeting of the DG Mare representative and special thanks to the IOF colleagues for the kind

hospitality offered to the meeting.

Z. Ikica (IMB) and **P. Carpi (CNR)** kindly accepted to act as rapporteurs of the meeting.

After reading and approval, without modifications, the agenda, the coordinator informed that:

i) a dialogue is on-going with Albanian Ministry about the expected revision of the economic survey data; ii) Croatian Ministry is undertaking a deep revision of the data provided to Data Collection, thus, if such revision process will finish in time, it will be included in the SEDAF final report; iii) the original database (Deliverable 3), which originally included only fisheries, is changed and now includes all project-related data.

Then **G. Lembo** gave the floor to **G. Scarcella**, who gave a short presentation of the Deliverable 3 and 4 revised according to the DGMARE comments and suggestions.

X. Vazquez asked if the catch of sardine that goes to tuna farms in Croatia are included in the landings. **B. Zorika** answered that the delivery of sardine to tuna farms is considered as landing, and is included in the project statistics.

Then, **G. Lembo** gave the floor to **E. Sabatella** for the presentation of the Deliverable 5 and 6, revised according to the DGMARE comments and suggestions, and on the state of art of the deliverable 7. **X. Vazquez** asked if the economic crisis have had an impact on specific segments. **E. Sabatella** and **G. Lembo** observed that a more comprehensive answer to this question will be provided by a joint analysis of the Deliverable 6 and 9.

Then, **G. Lembo** gave the floor to **V. Cikes Kec** for the presentation of the Deliverable 8, revised according to the DGMARE comments and suggestions.

A. Perez asked if it could be possible to include also the assessments for GSA 17 and 18 that will be done in January at the STECF-EWG, **MT Spedicato** answered that those assessments will be endorsed well after the end of the SEDAF project, therefore, they could not be taken into account.

Then, **G. Lembo** gave the floor to **I. Bitetto** for the presentation of the outcomes of the workshop on WP4 (for details see [Annex 1](#) to this report). **I. Bitetto** highlighted the main results obtained by running the BEMTOOL model on the small pelagic case study in the GSA 17. In particular, the F_{current} assessed by the model, for the anchovy, was 0.68 and the F reduction to the $E_{0.4}$ reference point was $\approx 6\%$, while the F_{current} assessed by the model, for the sardine, was 0.67 and the F reduction to the $E_{0.4}$ reference point was $\approx 18\%$. Five scenarios were presented: 1) status quo; 2) reaching the reference point ($E_{0.4}$) for the anchovy on 2018; 3) as above, but in 2020; 4) reaching the reference point ($E_{0.4}$) for the sardine on 2018; 5) as above, but in 2020. **G. Scarcella** and **M. Gambino** gave further insight, respectively, on the small pelagic parameterization and the economic inputs.

X. Vázquez inquires whether the reference point can be defined as number or range. **G. Lembo** answered that the reference point ($E_{0.4}$) used in SEDAF is that of the endorsed assessment, which is expressed as a number and not as a range. However, the model is capable of producing results both in a deterministic manner, and as a range of values (i.e.

with uncertainty).

X. Vázquez asked if case studies with scenarios where different selectivity is applied for demersal species will be carried out. **G. Lembo**, proposed to explore other possible scenarios, since scenarios with different selectivity will be provided soon by the project DISCATCH.

A discussion was then opened on the possible scenarios to be applied. The group agreed to produce the final results with the uncertainty associated to the recruitment and with a reduction on days at sea and/or number of vessels, according to the impact of the different fleet segments on the considered stocks.

As the discussion showed that there are still gaps in the data, particularly of an economic nature, from Croatia, Montenegro and Albania, the colleagues of the respective institutes agreed to provide the data revised by the mid of January. **G. Lembo** pointed out that if this deadline will be met, then it will be possible to make the final results available on the SEDAF ftp for all the time necessary to an accurate assessment.

G. Lembo, concluding the meeting, expressed his appreciation for the contributions provided by the participants, he thanked **X. Vázquez** and **A. Perez** for the participation and the Croatian colleagues for their kind hospitality.




The meeting was concluded with the seasons' greetings at h. 13:00 of December 19th, 2014.

ANNEX I
Agenda and Report of the
Workshop WP4
Assessment of the likely biological and socioeconomic
consequences of the different management scenarios



Institute of Oceanography and Fisheries (IOF) Headquarter, Split – Croatia
December 17-18, 2014

AGENDA
Wednesday, December 17th, 2014

15,00 – 15,30


-  Opening of the workshop (**G. Lembo**, SEDAF coordinator).
-  Adoption of the agenda, discussion on the aim of the workshop and on the expected results.
-  The expectations of DGMARE about the WP4 workshop (DGMARE representative).

15,30 – 16,30


-  Presentation of the templates used to collate the inputs to parameterize BEMTOOL model (**I. Bitetto** and **M. Gambino**).
-  Brief overview of BEMTOOL model: description of the different modules and scenarios that can be simulated by the model (**I. Bitetto**).

16,30 – 16,50 Coffee break


16,50 – 17,05

-  Presentation of some preliminary outputs of the model derived from tentative simulations carried out for GSA 17 case study (**I. Bitetto** and **M. Gambino**).

17,05 – 17,20


-  Presentation of some preliminary outputs of the model derived from tentative simulations carried out for GSA 18 case study (**I. Bitetto** and **M. Gambino**).

17,20 – 18,00


-  Discussion on the case studies.

Thursday, December 18th, 2014

9,30 – 10,00


 Presentation of the software and installation on the laptops of the participants (**I. Bitetto**).

10,00 – 11,00

 BEMTOOL model running on case studies for GSA 17 and 18.


11,00 – 11,20 Coffee break

11,20 – 13,00

 BEMTOOL model running (cont.)


13,00 – 14,30 Lunch

14,30 – 16,30

 BEMTOOL model running (cont.)

16,30 – 16,50 Coffee break

16,50 – 17,45

 Presentation of the results of the case studies.

17,45 – 18,00

 Conclusions and achievements of the workshop.

Report of the Workshop WP4

Assessment of the likely biological and socioeconomic consequences of the different management scenarios

The project coordinator **G. Lembo** welcomed the participants to the second workshop of the SEDAF project. He expressed appreciation for the kind hospitality offered by IOF to the meeting.

Z. Ikica (IMB) and **P. Carpi** (CNR) kindly accepted to act as rapporteurs of the Workshop.

The workshop on WP4 of the SEDAF project was convened in order to assess the likely biological and socioeconomic consequences of the different management scenarios for the relevant fisheries as identified in WP1.

The workshop started with presentation and discussion of the specific objectives of Work package 4, that can be summarized as follow:

- 1) Parameterization of biological variables of the model and identification of fishery parameters (landings, effort) for small pelagics and demersal species.
- 2) Biological simulation implemented by using parameters of the life history traits and tools used for the assessment of the stocks involved in the case study.
- 3) Landings (by species) and effort matrices compiled to feed the model.
- 4) Parameterization of economic variables by settings price function, variable costs function, labour cost function, fixed costs function, capital costs function, economic indicators, taxes and subsidies.
- 5) Data aggregated by fleet segment for each year of the simulation period.

MT Spedicato informed that all the documents and presentations, the BEMTOOL software, the R software, etc. are available, for download, in the folder "specific project SEDAF" of the MAREA ftp.

I. Bitetto presented the templates used to collate the inputs to parameterize BEMTOOL model and **M. Gambino** showed the economic component. Then **I. Bitetto** presented some preliminary outputs of the model derived from tentative simulations carried out for GSA 17 case study. Due to the limited time available, it was decided to focus the workshop only on the small pelagic in the GSA 17. The group also decided to incorporate in the analyses the fleet segment PS 12-18 in Croatia (GSA 17) as it was considered relevant for small pelagics production.

MT Facchini presented the software, R and BEMTOOL, after that she helped the participants to install the software, where necessary.

Then the participants started to work in different groups.

After the conclusion of the simulation phase, that is the most time consuming, **G. Scarcella** presented the preliminary results, concerning the past and current years, showing the plots

of the different biological and pressure plots produced by the model. The socio-economic analyses were not completed, pending a review of the parameterization.

The scenarios that the group agreed during the meeting are:

- Reference point ($E=0.4$) in 2018 according to the stock more endangered.
- Reference point ($E=0.4$) in 2018 according to the stock less endangered.
- Reference point ($E=0.4$) in 2020 according to the stock more endangered.
- Reference point ($E=0.4$) in 2020 according to the stock less endangered.

After the conclusion of the forecast phase, the preliminary results, concerning the projections of SSB and yield, were presented showing the different plots produced by the model.

After discussion, the group agreed to produce the final results with uncertainty on recruitment and also to apply the reduction on days at sea and/or number of vessels according to the impact of the different fleet segments on the considered stock.

The meeting was closed at the 18:00.

ANNEX II –

LETTER OF PRESENTATION FOR DATA COLLECTION



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR MARITIME AFFAIRS AND FISHERIES
MEDITERRANEAN AND BLACK SEA

Brussels, 19 JUN 2014
MARE/D2/MM 202061

TO WHOM IT MAY CONCERN

Subject: Study on the main socio-economic aspects related to the most important fisheries in the Adriatic Sea: letter of credentials.

Dear Sir, Madam,

In the framework of the implementation and the evaluation of the Common Fisheries Policy, in August 2010 the European Commission (DG MARE) signed a Framework Contract with the Consortium CONISMA¹ for the provision of scientific advice for the implementation of this policy in the Mediterranean (Acronym: MAREA)

One of the specific projects requested by DG MARE in the context of this Framework Contract concerned improving knowledge of the socio-economic aspects pertaining to the fisheries in the Adriatic region, exploiting and combining all the various sources of socio-economic information and evaluating the knowledge gaps (Acronym: SEDAF).

The establishment of appropriate management measures for sustainable fisheries requires an understanding of the status of the different fish stocks involved and of the technical characteristics of the fisheries, as well as a clear knowledge of the socio-economic aspects pertaining to these fisheries. The project will cover the different fisheries undertaken along the Adriatic coasts by Italy, Slovenia, Croatia, Montenegro and Albania on the basis of their evolution over the last years.

This evaluation is carried out by the consortium of research institutes led by CoNISMa (Consorzio Nazionale Interuniversitario per le Scienze del Mare). The study will also involve investigations through structured interviews with fishery stakeholders, experts

¹ CIBM -Consorzio per il Centro Interuniversitario di Biologia Marina ed Ecologia Applicata "G. Bacci", CNR CNR-IAMC - National Research Council -Institute for Coastal and Marine Environment, COISPA -Tecnologia & Ricerca, HCMR -Hellenic Centre for Marine Research, LAMANS s. a. - Management Services

CoNISMa
Consorzio Nazionale Interuniversitario per le Scienze del Mare
Piazzale Flaminio 9
IT - 00196 – ROMA

MAREA MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE
SPECIFIC CONTRACT NO 10 - SEDAF: "IMPROVED KNOWLEDGE OF THE MAIN SOCIO-ECONOMIC ASPECTS RELATED TO
THE MOST IMPORTANT FISHERIES IN THE ADRIATIC SEA"

and/or representatives of other interested parties including national and EU administrations.

The bearer of this letter, who has been appointed by CONISMA, has been commissioned to carry out the study for the European Commission.

We would be grateful if you could ensure the widest possible cooperation.



Carla MONTESI
Director

ANNEX III –

**STATE OF THE ART OF THE KNOWLEDGE OF THE FISHERIES
IN THE ADRIATIC SEA**

State of the art of the knowledge of the Albanian Fisheries

Albania's coastline is 470 km long, of which 150 km belong to the Ionian Sea. Territorial waters extend 12 nautical miles (or 22 kilometers) from the shore. Continental shelf extends north to 25 miles (Adriatic Sea) and 2-3 miles to the south (Ionian Sea). International waters about 25 miles from shore in the Albanian part of the Adriatic have a depth of 1000 meters and varies from one end marine sandstone in baltor, while in the south reached a depth of 200 meters close to the coast.

Regarding water resources, Albania ranks among the first countries in Europe. Hydrographic basin of Albania has an area of 43,300 km² or 57% more than the state of our country's territory. Albania is a country with relatively abundant rainfalls. In its hydrographic territory fall approximately 1400 mm of rain per year. The average flow of perennial rivers flow overall is about 1,245 m³. Albania's hydrographic network consists of 11 major rivers, which, together with riverhead of the large streams reach 152. Watershed hydrographic network of Albania, has 247 natural lakes of various types and sizes, with a total area of 1,210 km² water and volume of approximately 60 billion m³, 5 artificial lakes, and 670 irrigation reservoirs.

Albanian coastal lagoons has a total area of 10 000 ha. The most important coastal lagoons are Karavasta (3900 ha, Ramsar site), Narta (2800 ha) and Butrinti lagoon (1600 ha, Ramsar site).

Fisheries

Marine and coastal artisanal fisheries is concentrated in four main fisheries ports and along the coast. This activity is more important from economic point of view in Albanian fisheries. Durres fishing is more important from number of vessels and volume of catch.

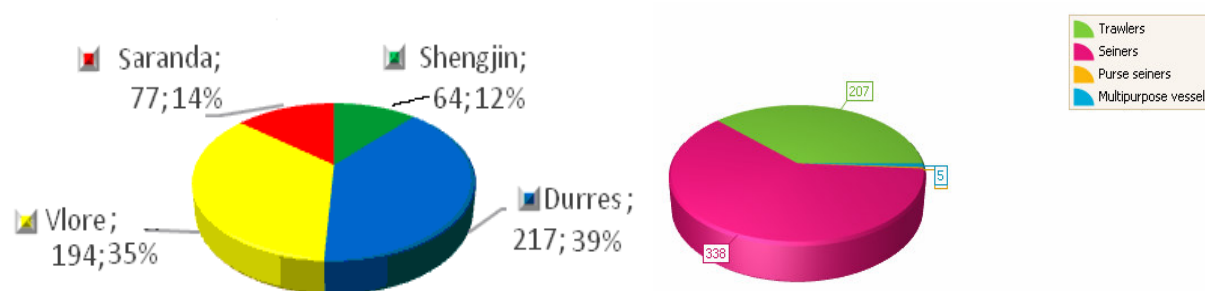


Fig 1 Distribution of Vessels by Port and by vessel type. Data from Albanian Fleet register 2013, Fisheries Directorate

From the total number of fishing vessels, 252 are distributed in coastal line, mainly in Himara region (between Vlora and Saranda) and Fier - Lushnje (between Vlora and Durres).

Bottom trawler vessels remain the most important fishing vessels with 65% of total vessels at ports. In table below is the distribution of fishing vessels by type and length.

Vessel Type	< 12m.	%	>= 12m.	%	Total
Trawlers/Trawlers	2	0.6%	203	85.3%	205
Seiners/Seiners	313	99.4%	28	11.8%	341
Purse seiners/Purse seiners	0	0.0%	2	0.8%	2
Multipurpose vessels/Multipurpose vessels	0	0.0%	5	2.1%	5
Total	315		238		553

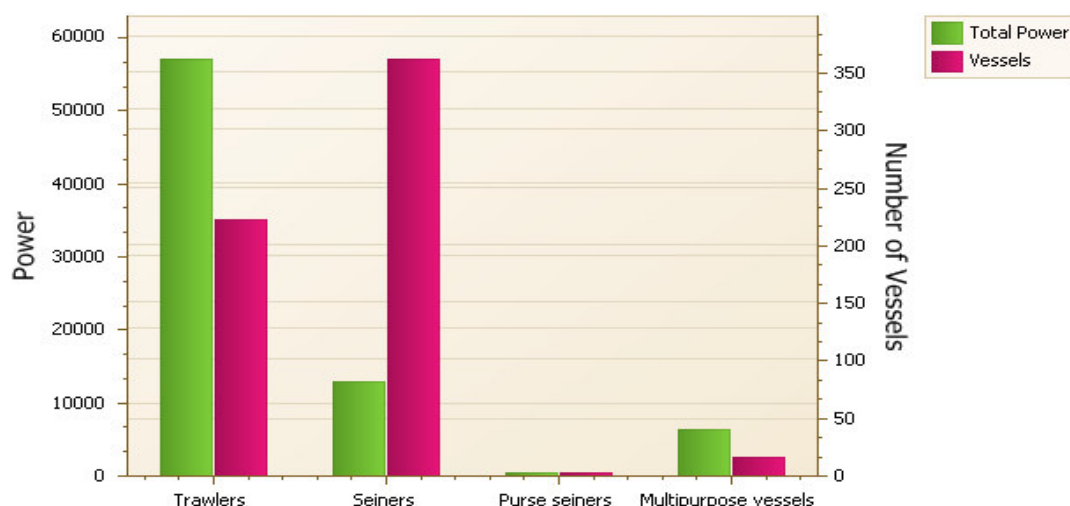


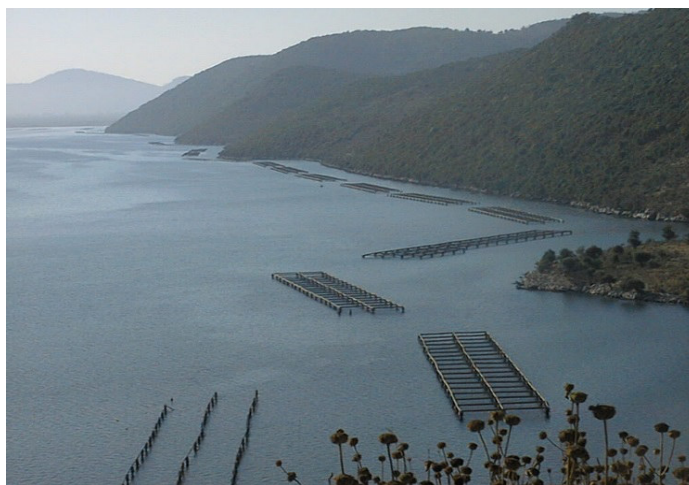
Fig. 2 Distribution of Vessel Power by Vessel Type. Data from Albanian Fleet register 2013, Fisheries Directorate

Fisheries activity in lakes is concentrated in three main natural lakes, Shkodra, Ohrid and Prespa. In this lakes, fishing activity is organized in Fisheries Management Organizations (FMO) which have responsibility too in resourcesmanagement. In these lakes, fishing rights are transferred to FMO and activity is permitted only for FMO members. Latest to Shkodra FMO are transferred some responsibility in control framework in order to combat illegal fishing and this practice results successful.

Aquaculture

Aquaculture in Albania currently developed with cages in the sea, mussels aquaculture and freshwater aquaculture of trout and carp. Cage culture aquaculture is concentrated in the southern part of the country from the coast of Karaburun to Saranda. This activity started in Albania in 2000 and today are 20 entities licensed. Total production is about 1400 ton/year and cover 70% of internal market demand.

Mussels aquaculture is developed in Butrinti Lake in concrete structures. There are 56 structure rent to private companies and production is around 1200 ton/year. In 2005 in Shengjin bay start activity a long lines aquaculture for mussels production.



Regarding freshwater aquaculture, this is an old activity in Albania. It starts in '60s with carp and carp family. Today this activity is reduced significantly due to the change of market demand. From 28 hatcheries constructed before 90ies, actually are operative only four, two private, one under Agricultural University of Tirana and one under Ministry of Agriculture, Rural Development and Water Administration (MARDWA). These hatcheries produce fingerlings for restocking purpose of agricultural dam for private companies and hatchery of MARDWA for restocking of PrespaLake with carp.

Trout culture is distributed in all the country, but there is not a clear picture of the real situation of this activity. In 2009 some changes in the fisheries and aquaculture law permit to do aquaculture activity in freshwater without license and from 2009 no clear evidence about number of companies, production and other standards was possible to collect for this sector.

Administrative capacities and legislative framework.

From September 2013, fisheries is under the responsibilities of Ministry of Agriculture, Rural Development and Water Administration. Despite this god development, fisheries is sector under two different Directorates: Agriculture Production and Commercial Policies Directorate and Food Security and Fisheries Directorate.

Under the MARDWA is established Directorate of Fisheries and Aquaculture Services, which have Fisheries inspectorate and monitors.

With EC support a new Fisheries Law was approved in May 2012 (Law nr. 64/2012) and four Decision of Council of Ministers:

1. DCM Nr.407, date 8.5.2013 "On establishing a control system for ensuring compliance with the rules of the management fisheries policy".

2. DCM Nr.402, date 8.5.2013 "On management measures for the sustainable exploitation of fishery resources in the Sea".
3. DCM Nr.301, date 10.4.2013 "On the establishment of a National framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Albanian Fisheries Strategy"
4. DCM Nr.302, date 10.4.2013 "On Establishing a system to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU) and establishing the schemes of fish catches certification".

Under preparation is the new Law "On Aquaculture" which has Allocation Zones for Aquaculture (AZA) concept. This Law supported by EC will improve legislation in aquaculture framework.

State of the art of the knowledge of the Croatian Fisheries

General description of the Fisheries sector in Croatia

Estimates of direct share of fisheries in GDP vary between 0.2% and 0.7%. However, the contribution of fisheries has to be analysed taking into account the share of GDP of all activities from certain aspect related to the sector. In addition to the direct production value of the sector of capture fisheries, fish farming, and processing, the assessment of the share of fisheries on the whole in GDP should also include the construction and servicing of vessels, production of fishing gears and equipment, transportation, storage and related logistics, port activities related to fisheries and to a certain extent some forms of tourism. Furthermore, in general assessments of importance of the fisheries sector one should include the element of supply of high quality food, a contribution to the positive foreign trade balance, and the significance of employment on the coast and the islands, where fishery is one of the rare activities which provide a source of income throughout the year. Also, it is estimated that the sectors' real contribution is underrated and that, if the value of accompanying activities is included, the contribution to national GDP exceeds 1%.

According to the data from Ministry of Agriculture (MINAGRI), Directorate of Fisheries (DoF), Croatia's catching and aquaculture production in 2011 was 84,073 tons (a 22% increase over 2009), of which 70,585 from capture fisheries (70,535 from marine capture fisheries and only 50 tons from freshwater fisheries) and 13,488 tons from aquaculture (7,205 tons from marine aquaculture and 6,283 from freshwater aquaculture). The fisheries sector (including processing industry) significantly participates in the export of the Republic of Croatia's food products with the value of total export in 2011 amounting to USD 178,503,695 (38,493 tons). At the same time, value of the import in 2011 was USD 123,676,657 (38,417 tons) which shows that the positive trade balance of the sector was maintained. The consumption of fish products in Croatia was estimated to be around 8.5 kg per capita, 36.5% of the EU average, but this estimation should be taken with due reserve, as there is a lack of systematic market and consumption related surveys and research. Some estimates show that every tenth Croat does not eat fresh fish or seafood at all, and every twentieth does not eat frozen fish or seafood. Only 3% of Croats eats fish every day and 33% once a week. Tourism sector also participates in the consumption of fish on the domestic market, being thus a significant marketing channel for fish products in the summer.

Data on the number of employees in the sector are currently being estimated by taking into account data from crafts and trade registers, data on number of crew members and number of licences (vessels) in the fishing fleet of Croatia, as well as the data from the register of fish farms. It is estimated that approximately 14,000 people (fishermen, employees in fishing companies, farming and processing) are directly employed in the sector. In addition to permanently employed, there is a significant number of seasonal workers, especially in the segment of employees on fishing vessels. It is estimated that around 25,000 people are involved in the sector, directly and indirectly.

Marine commercial fishing has economic significance. It includes commercial fishing *sensu stricto* and a special subcategory of small scale coastal fishing. Small scale coastal fishing represents the form of fishing which has developed from the former category of subsistence fishery for personal needs. The total catch in 2008 was 49,011 tons, in 2009 – 55,364 tons, in 2010 – 52,395 tons, and in 2011 – 70,535 tons, a 44% increase over 2008. The reason for this increase partially lies in the improvement of the catch registry and control of catches. Over the years, more than 80% of total catch consists of small pelagics (sardine and anchovy). In

2011, the share of demersal and pelagic fish species in the catches is around 97%, cephalopods 1.50%, crabs and shellfish around 1%. All the commercial fishing vessels are registered, regardless of their size. In 2011 the total number of fishing vessels was 4,136, including 3,484 vessels less than 12 m, and 652 above this size. The total power was 326,987 kW, of which about one third was the power of trawlers (about 155 kW per vessel on average), and one fifth, the power of purse seiners (about 206 kW per vessel on average).

The average age of Croatian fishing fleet is more than 30 years, but it is not equally distributed among all the segments. Average active trawlers are older than active purse seiners, while the trawlers are among the oldest active vessels. In addition to the age composition of the Croatian fishing fleet, it needs to be highlighted that most of the vessels are poorly equipped in terms of energy efficiency (old engines with high fuel consumption), product quality (lack of ice machines and adequate storage and cooling facilities on board) as well as equipment related to improvement of working conditions and safety on board.

The largest number of vessels is registered as multi-purpose (45.24% of the fleet). These vessels are typical for Mediterranean fisheries where there are no clearly defined target species and in which fishermen change gear during the year. In 2011, 226 vessels were active purse seiners, catching total of 64,389 tons of fish. In the same year, 562 vessels were active in bottom trawling, catching a total of 4,275 tons of fish. In 2011, catches of purse seine nets made 91.29% of total Croatian catches. At the same time 6.10% of the catch was caught using trawl nets while gillnetting achieved around 2% (24% of fleet registered for this gear). Percentages of other fishing gears are each represented with less than 1% of the total catch.

The fishing sea of Croatia is administratively divided into eleven fishing zones and thirty-seven fishing subzones. Out of eleven fishing zones, three are in the inner fishing sea of Croatia and four in outer fishing sea. Administrative division of the fishing sea is used for the purposes of management and data collection. Croatian fishing sea is the sea area governed by Croatia, where it exercises its sovereign rights and jurisdiction in issues related to fishing, and from the spatial aspect, it includes territorial sea of Croatia as well as the PEFZ (i.e., area over which RH exercises its sovereign rights and jurisdiction).

Assessment of the status of the resources

Demersal resources Having in mind the characteristic of the bottom trawl fleet in HR (small, old and poorly equipped vessels), it is expected that most of the catches are made in coastal areas, while the catches outside the territorial seas are negligible and make up only 0.6% of total catches. Majority of the catches are made in the open middle Adriatic – wider area of Jabuka Pit and these make up some 38% of total bottom trawl catches. The most important species in the catches in the area are hake, Norwegian lobster and musky octopus. The next most important zone in terms of catches is the zone A- northern Adriatic (15%), where the catch composition depends on the season, but is dominated by musky octopus, squid, mullet and sole. Catches in channel areas of the northern Adriatic make up 11.5%, and the dominant species are hake, mullet, Norway lobster and musky octopus. Channels of the mid-Adriatic make up some 10% of the catches, and the dominant species are hake and mullet, including monkfish, musky octopus and the like. Comparison of the total biomass (according to the MEDITS data) and the total catch in each of the zones indicates that there is a non-balanced exploitation rate of the resources. Bottom trawl activities in Croatia are of seasonal character, and the total catches and catch composition depend on the season when the catches were made. The highest values are realized in autumn. During the winter the catches fall due to bad weather conditions and a small number of fishing days. Increases in catches during the spring are the result of the increased catches of hake, musky octopus and Norway lobster. According

to the available data (project DemMon), the largest part of the bottom trawl catches is composed of bony fishes (72%), followed by cephalopods (13%), crustaceans (8%), cartilaginous fishes (6%) and shellfish (1%), while in 2011 the majority of the catches were composed of mullet (24%), hake (15%) and musky octopus (9%).

Resources of small pelagics. Although the catches of purse seine „srdelara“ are made in all Croatian fishing zones, the largest proportion of the catches are made in the outer north Adriatic where 41% of the Croatian catches of small pelagics using this gear are made. The catches of small pelagics make up 84.5% (2008) to 91.6% (2011) of total Croatian catches. Based on data available, it has been noted that the catches of sardine and anchovy (the most important species in the catches) alternate over the years and during the year as well. Biomass assessment methods for small pelagics in the Adriatic include a direct eco-sounding method, statistical data on catches as well as biological population parameters and inclusion of these in indirect methods such as Virtual Population Analyses (VPA) and Integrated Catch Analyses (ICA). The total biomass of sardine in the Adriatic has shown significant variations over the years. Over the last 10 years, sardine biomass in the Adriatic is increasing although it is still below the one recorded in the 1980s.. Current biomass of this stock in the Adriatic is considered intermediate. Biomass of anchovy has fluctuated over the last 10 years. From 2000 to 2005, the biomass grew significantly, after which time it dropped, but over the last 3 years indicates growth again. Overall, biomass of anchovy grew from 2000 to 2011. Recently, there is strong decrease in the biomass and the stock is considered overfished. In May 2013 GFCM adopted the Multiannual management plan for small pelagics in GSA 17.

State of the art of the knowledge of the Italian marine fisheries in the Adriatic Sea

Summary on the identified fleets and the gear characteristics of the Italian Adriatic fisheries

Fleet and gears

The Italian fishing fleets operating in the Adriatic sea is mainly constituted by vessels targeting demersal species. In particular, in the northern Adriatic Sea (GSA 17) the fleet targeting demersal species is composed of about 719 trawlers (mainly otter trawlers), 67 rapido trawlers, 592 dredgers (mainly using hydraulic dredge for bivalves) and 1826 vessels using polyvalent passive gears only. In term of tonnage around 60% of this fleet is constituted by otter trawlers, followed by dredgers, rapido trawlers and vessels using polyvalent passive gears only. The demersal fleet operating in the southern Adriatic Sea (GSA 18) is composed of about 414 demersal trawlers, 76 dredgers and 505 vessels using polyvalent passive gears only. In term of tonnage and engine power, demersal trawlers represent more than 75% of the total, followed by vessels using polyvalent passive gears only (mainly long liners) and dredgers.

The Italian fleet targeting small pelagics operating in the Adriatic sea is composed of a number of vessels smaller than the demersal fleet. Such fleet is mainly distributed in the northern part of the basin and operates both in GSA 17 and 18. In particular the small pelagic fleet of GSA 17 is composed of about 56 pairs of mid-water trawlers and about 32 purse seiners ('lampara' vessels operating at night with the use of light attraction), with the former having higher tonnage and engine power than the latter ones.

Production and most relevant species

The total production of the fleet targeting demersal species in the Adriatic Sea amounted in 2012 of almost 60,000 tons. The most important species were the striped venus exploited mainly with the hydraulic dredge, followed by a pool of demersal species (hake, red mullet, sole, mantis shrimp and cuttlefish) mainly fished with bottom otter trawl and "rapido" trawl.

The total production of the fleet targeting small pelagics amounted in 2012 of almost 47,000 tons. In both cases anchovy was the most important species followed by sardine.

Economic performance

In 2012 the Italian Adriatic fleet achieved a total income of 375 million €, (73% in GSA 17 and the rest in GSA 18).

The more productive segments in terms of value of landings are: DTS 12-18 GSA 17, PGP 06-12 GSA 17, DRB 12-18 GSA 17 and DTS 12-18 GSA 18. These 4 segments represents 51% of the total income generated by the Adriatic fleets.

Most of the fleet segments have been profitable in 2012. The total amount on Gross value added was equal to 194 million €, while the gross profit (which also takes into account the crew wages) amounted to around 100 million €. The GVA per employment amounted to 20 thousand €.

Around 9,600 fishermen operated in 2012, 37% of which on polyvalent passive vessels less than 12 meters.

Data availability

The Italian national programme for the collection of fishery data (EU REG. 1543/0 and 199/08) includes provisions to collect fishery data according to the following modules:

- A. Data on capacity (number of vessels, GT, kW, age)
- B. Data on landings (volume and value by species)
- C. Data on effort (days at sea, fishing days, fishing hours, fuel consumption)
- D. Data on biological sampling
- E. Surveys at sea
- F. Economic data.

In particular, since 2001 the economic survey is included in the National Program of the EU Data Collection Framework (DCF), which obliges EU member states to collect yearly cost and earnings data for commercial fishing vessels at national level. The following economic and social variables are collected within the DCF National Program through a Probability Sample Survey:

1. Income
 - Income from leasing out quota or other fishing rights
 - Direct subsidies
 - Other income
2. Personnel costs
 - Wages and salaries of crew
 - Imputed value of unpaid labour
3. Energy costs
4. Repair and maintenance costs
5. Other operational costs
 - Variable costs
 - Non-variable costs
 - Lease/rental payments for quota or other fishing rights
6. Investments
 - Investments in physical capital
7. Financial position

These data are collected in face to face questionnaire interviews of a selection of vessel owners, stratified by area (administrative regions and FAO GSA) and vessel characteristics (size, gears). The vessel sampling strategy is proportional random with some vessels being kept in the sample for several years to increase the response rate.

The sample survey is continuous in character and has a reference period of one year. The target population of the survey comprises the Italian fishing fleet and the list is based on the Vessel Register kept at the Directorate-General of Fisheries and Aquaculture of the Ministry of Agricultural and Forestry Policies. It includes vessels < 12 meters. The detailed statistical methodology is reported in the Italian National Program for the collection of fisheries data (available at: www.raccoltadati.irepa.org).

Economic data are available by year, FAO/GSA and fleet segment.

They are stored in the Italian database of the data collected within the DCF NP, managed by Mipaaf. Data are available upon request to the Italian National Correspondent and according to article 18 of EU Regulation 199/08.

Italian data are also published in STECF/JRC database and they are accessible through: <http://stecf.jrc.ec.europa.eu/data-reports>

In addition, Italian economic data are submitted to GFCM through the platform of task 1 and according to the aggregation level defined by GFCM guidelines.

[Economic analysis already available](#)

Economic data are widely used for a wide range of purposes and by several bodies (national and regional administration, research institutes, stockholders, etc.). In particular, in recent years

economic data have been used for the implementation of management plans and for their evaluation.

Systematic analysis of Italian data are included in the STECF Annual Economic Report on the EU fishing fleets. The Italian chapter includes:

1. A detailed economic and structural overview of the fishing fleets
2. Qualitative economic performance assessments for the most recent years
3. Detailed economic and structural analyses by fleet segments
4. The latest information on EU fish prices and price trends
5. Economic indicators for assessing balance between fleet capacity and fishing opportunities

A more extensive analysis of economic issues of the Italian fleets is reported in the “Osservatorio sulle strutture produttive della flotta da pesca italiana” edited by Irepa from 1996. The Italian observatory includes an analysis at the level of administrative region and by different fleet segments. It also reports an analysis of indicators in terms of technological, environmental and economic sustainability. The Observatory includes information on the macroeconomic scenario, trends in fishing effort, fishery production in the Mediterranean Sea and profitability of fishing enterprises¹⁰.

¹⁰ Osservatorio economico sulle strutture produttive della pesca marittima in Italia 2012. Edizioni Scientifiche Italiane, Napoli. ISBN 978-88-495-2235-8

State of the art of the knowledge of the Montenegrin Marine fisheries

The length of the Montenegrin coastline is about 300 km, of which about two-thirds (200 km) faces the open sea, and one-third forms the Boka Kotorska Bay. There are only a few small islands in Montenegrin waters, with a total island coast length of about 26 km.

Interior waters of Montenegro cover about 360 km², territorial waters (extending 12 nautical miles, or 22.22 km, from the coastline) are about 2000 km², and the epicontinental zone is around 3,900 km². The total sea area of Montenegro comes to about 6,400 km².

The Montenegrin shelf area is relatively narrow, extending only a few nautical miles in the northern reaches, in front of Boka Kotorska Bay, but extending over 20 nautical miles from the Bojana River estuary. Montenegro is part of GSA 18 along with Albania on the east coast and with Italy on the west coast. In front of Montenegro is south Adriatic basin with the greatest depth of 1228 m.

Fisheries sector amounts to 0.5% of the gross domestic product (GDP) of Montenegro. Marine fisheries is represented through three sectors: coastal waters (up to 3 NM from the coastline), open waters (area between 3 and 12 NM from the coastline) and international waters (more than 12 NM from coastline), and is divided into two main categories: commercial fisheries and sport and recreational fisheries. Commercial fisheries is divided into large-scale commercial fisheries, and further into demersal (exploited using bottom trawls) and pelagic fisheries, and small-scale fisheries. Montenegrin fishing fleet is small and the vessels are very old, on average 45 years. Most of the fishing fleet is made of vessels from the small-scale fisheries, with lengths of 10 m or less. The segmentation of the Montenegrin fishing fleet is given in Table 1.

Table 1. GFCM segmetation

Small-scale coastal fishing with small gear			Fishing with bottom trawls			Fishing with encircling nets and pelagic trawls for fishing of pelagic resources (small pelagic fish)		
Minor gear without engine <6 m	Minor gear with engine <6	Minor gear with engine 6-12 m	Minor gear without engine <6 m	Minor gear with engine <6	Minor gear with engine 6-12 m	Minor gear without engine <6 m	Minor gear with engine <6	Minor gear with engine 6-12 m
4.46%	36.61%	29.46%	4.46%	36.61%	29.46%	4.46%	36.61%	29.46%
70.54%			16.07%			13.39%		

Montenegro does not limit its fishing capacity and an increase in the number of fishing vessels and of engine capacity is presently allowed. But, scientific data provided by IMBK are used by the MARD to determine the number of fishing permits for all types of commercial fishing. According to scientific research, Montenegro can maintain sustainable fisheries with a fishing fleet of 223 vessels (of which 180 vessels are below 10 m LOA). The existing legal rules for tonnage and measurement of merchant ships and boats do not include a specific method to be used for tonnage measurement or measurement of engine power for fishing vessels. Montenegro is planning to introduce legislation on rules for tonnage measurements and the verification of engine power of fishing vessels. Montenegro plans to stop allowing increases in the overall fishing capacity, after the establishment of planned census (223 vessels).

The Ministry of Agriculture and Rural Development (MARD) is responsible for the management of fisheries. The scientific institution, the Institute of Marine Biology in Kotor (IMBK), monitors marine fisheries. The main legal provisions governing the fisheries sector are the Law on Marine Fisheries

and Mariculture (OG MNE 56/09) that lays down the objectives and the principles for sustainable management of living marine resources and marine environment.

Montenegro does not have an official data collection programme in line with EU requirements. Montenegro is a partner of the FAO sub-regional project AdriaMed and has been participating in the MEDITS and MEDIAS programmes. Stock assessments have been made with the help of EU funds for six species in Montenegrin waters and joint stock assessments have been made through participation in the MEDITS programme for another two species.

Joint assessment was continued for European hake (*Merluccius merluccius*) and deep-water pink shrimp (*Parapenaeus longirostris*) stocks in the geographic sub-region (GSA) 18, which encompasses southern Adriatic, and is exploited by Italian, Albanian and Montenegrin fleets. Obtained results were very similar to those of previous reports, with Montenegrin trawl fleet contribution to the fishing mortality of European hake being estimated to approximately 1% (74% Italian trawlers, 17% Italian longliners, 8% Albanian trawlers) and 2% for deep-water pink shrimp (60% Italian trawlers, 38% Albanian trawlers). Results of stock assessment were presented at GFCM WGD and GFCM SAC SCSA, Bar, Montenegro, 28.01.-04.02.2014.

According to MONSTAT – Statistical Office of Montenegro, in 2012 total landing of pelagic fish was 245 tons, demersal fish 298 tons, cephalopods 55 tons and crustaceans 25 tons (Statistical Yearbook 2013).

The first explanatory screening between Montenegro and EC was held on 15-16 March 2013, and the first bilateral screening for Chapter 13 – Fisheries was held on 5-6 June 2013. In November 2013 Montenegro received Screening Report from EC, with general comments on Montenegrin Fisheries sector and overview of compliance of national fishery legislation with EU CFP.

State of the Art of knowledge of the Slovenian Marine Fishery

Data collection, databases and data availability

Marine fisheries data from 2004 onward, including landing, socio-economic, biologic and other data is collected according to the DCF. All data is stored in databases, located in two institutions: Ministry of Agriculture and the Environment (MAE) and Fisheries Research Institute of Slovenia (FRIS). On MAE there are three information systems: InfoRib (the main system), VMS, and Aquaspec (inspection information system).

InfoRib is the centralized information system which contains all the relevant data on marine fisheries in Slovenia. In the system there are the following modules: Fleet vessel register, Logbooks, Fishing Permits, Socio-economic data, Reporting, Sampling, Technical indicators, Code lists First sale, Aquaculture, Processing Industry and Meetings Module.

The Biological database of the Fisheries Research Institute of Slovenia (BIOS) is located on FRIS. Among other it contains MEDITS data, data on biological sampling of landing, biological sampling of by-catch and discard, and recreational fishery data. Biological data as well data on Slovenian marine catch is available on www.biosweb.org.

Fishing grounds and fleet

The Slovenian fishing vessels are carrying out fishing activities in the northernmost part of GSA 17. The majority of the fishing trips are restricted to the territorial waters of the Republic of Slovenia.

Altogether there are 170 fishing vessels in the Fleet Register. From this there were 83 active vessels in 2013. All active vessels were smaller than 18 meters. In the length class less than six meters there were 33 vessels counting 31,28 GT and 483,56 kW. The biggest number of vessels (37) were in the length class from six to 12 meters counting 156,02 GT and 3171,27 kW. In length class from 12 to 18 meters there was 13 vessels counting 205,21 GT and 2316,30 kW.

Fishing gear

In 2013 there were 10 types of fishing gears in use. The most important fishing gear according the landed quantities were otter bottom trawl with 47,6% of landing and purse seine with 29,5% of landing. Significant share of landing were obtained also with bottom set nets (GTR and GNS) counting 22,1%.

Catch

In 2013 Slovenian marine catch reached the historical minimum with 280 metric tons. In period from 1939 to 2013 the peak of Slovenian marine catch has been in 1983 counting 8.478 metric tons (Bolje et al., 2014). The significant decreases of catch occurred in the years after 1991 when Slovenia gained independence. The reason for the decrease was mainly due to loss of former Yugoslav market and reduced fishing grounds.

Except last years, the small pelagic fish, mainly European pilchard (*Sardina pilchardus*) and European anchovy (*Engraulis encrasicolus*), were the most important catch. With changes in fleet structure (omission of pelagic trawlers), demersal species caught mainly with otter bottom trawls became more and more important.

According the reconstructed data from Bolje et al. (2014) catch in 2013 was composed of 85 species. The most important species in the catch composition were whiting (*Merlangius merlangus*) counting 61 tons followed by European pilchard (29 tons) and European anchovy (22 tons).

Economy

In 2012, the Slovenian fishing fleet generated revenue of EUR 2,64 million. The total income was the value of landings accounted for EUR 1,46 million, the value of state aid EUR 0,32 million, and the value of other income accounted EUR 0,85 million. Other revenues were primarily tourist activities, such as renting boats for sport fishing or transporting tourists in the summer season. The amount of total revenue of the Slovenian marine fishery in the period 2007-2012 was relatively stable at around EUR 2,5 million.

Total expenditure of the Slovenian fishing fleet in 2012 totaled EUR 1,85 million, which is 28% less than in 2011. The reason for the reduced expenditure was primarily scrapping of certain fishing vessels. Slovenian national fleet in 2012 generated a profit of EUR 0,79 million.

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