

EastMed TECHNICAL DOCUMENTS

18



**REPORT OF THE 2nd MEETING OF THE PERMANENT
WORKING GROUP ON STOCK ASSESSMENT
KAVALA, GREECE 9 - 14 SEPTEMBER 2013**





**FOOD AND AGRICULTURE
ORGANIZATION
OF THE UNITED NATIONS**



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**KAVALA, GREECE
9 - 14 SEPTEMBER 2013**



**ITALIAN MINISTRY OF AGRICULTURE, FOOD
AND FORESTRY POLICIES**



**Hellenic Ministry of
Foreign Affairs**

**Hellenic Ministry of Rural
Development and Food**



GCP/INT/041/EC – GRE – ITA

Athens (Greece), December 2013

The conclusions and recommendations given in this and in other documents in the *Scientific and Institutional Cooperation to Support Responsible Fisheries in the Eastern Mediterranean* series are those considered appropriate at the time of preparation. They may be modified in the light of further knowledge gained in subsequent stages of the Project. The designations employed and the presentation of material in this publication do not imply the expression of any opinion on the part of FAO or donors concerning the legal status of any country, territory, city or area, or concerning the determination of its frontiers or boundaries.

Preface

The Project “Scientific and Institutional Cooperation to Support Responsible Fisheries in the Eastern Mediterranean – EastMed” is executed by the Food and Agriculture Organization of the United Nations (FAO) and funded by Greece, Italy and EC.

The Eastern Mediterranean countries have for long lacked a cooperation framework as created for other areas of the Mediterranean, namely the FAO sub-regional projects AdriaMed, MedSudMed, CopeMed II and ArtFiMed. This made it more difficult for some countries in the region to participate fully in international and regional initiatives for cooperation on fishery research and management. Following the very encouraging experience of technical and institutional assistance provided to countries by the other FAO sub-regional Projects,

EastMed

was born to support the development of regional cooperation and the further development of multidisciplinary expertise, necessary to formulate appropriate management measures under the FAO *Code of Conduct for Responsible Fisheries* and the principles of the *Ecosystem Approach to Fisheries (EAF)* to ensure rational, responsible and participative fisheries management

The project’s **longer-term objective** is to contribute to the sustainable management of marine fisheries in the Eastern Mediterranean, and, thereby, to the support of national economies and to the protection of the livelihoods of those involved in the fisheries sector.

The project’s **immediate objective** is to support and improve the capacity of national fishery departments in the sub-region, to increase their scientific and technical information base for fisheries management and to support the development of coordinated and participative fisheries management plans in the Eastern Mediterranean sub-region.

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Publications

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ABSTRACT

The second meeting of the EASTMED Permanent Working Group on Stock Assessment was held in Kavala (Greece) from 9 to 14 of September 2013. It was attended by experts from Egypt, Cyprus, Greece, Italy, Lebanon, and Turkey as well as FAO staff. The meeting had six main general objectives i) to identify surveys and fishery-dependent data collection projects carried out in the last 10 years in each country of Eastmed area; ii) to provide advice on how to increase the standardization between surveys carried out in the Eastmed area; iii) to process with the raw data as collected through the pilot activities supported by the project and/or supported by the countries in the framework of the DCF, in order to produce stock assessments aiming to be presented in the GFCM WGs, iv) to make an effort to define a few shared stocks in order to monitor through the GFCM management plans, v) to discuss the possibility of establishing two WGs on stock assessment, one for demersals and one for small pelagics, vi) to define gaps existed in the sampling protocol which is used during the implementation of the pilot activities on data collection and decide on amendments. Furthermore five stock assessments were accomplished out and other preliminary analyses were carried out. The five stocks assessed, represented also by two Lessepsian species, showed a state of overfishing with the exception of *Spicara smaris* in GSA 25. The outcomes provided by such analyses will be presented during the next GFCM WG on demersal.

Table of Contents

<i>Introduction</i>	1
<i>Opening of the meeting and election of the chairman</i>	1
<i>ToR I. To compile a list of surveys and fishery-dependent data collection projects carried out in the last 10 years in each country, summarizing information on sampling area, periods, sampling design, type of data collected, data collection methodology, gear characteristics and stock assessments</i>	2
Overview of Lebanese Surveys and Data Collection (Sherif Jemaa and Myriam Lteif).....	4
Cyprus Fisheries and Biological Data collection system (Marios Josephides).....	4
An Overview on the studies on deep water trawl surveys in the Antalya Bay (Turkey), eastern Mediterranean GSA 24 (Mehmet Cengiz Deval).....	5
Overview of the North-western Ionian Sea, surveys and data collection in the GSA19 (Roberto Carlucci).....	5
Overview on Mediterranean Egyptian fisheries – Fisheries dependent data collection projects (Hatem Hanafy Mahmoud)	9
<i>ToR II. To provide advice on how to increase the standardization between surveys and to discuss the possibility and technical requirements to expand the MEDITS survey to the other countries in the region</i>	10
<i>ToR III. To process with the raw data as collected through the pilot activities supported by the project and/or supported by the countries in the framework of the DCF, in order to produce stock assessments aiming to be presented in the GFCM WGs</i>	10
Stock assessments	11
Red mullet, <i>Mullus barbatus</i> , GSA 19	11
Picarel, <i>Spicara smaris</i> , in GSA 25	11
Brushtooth lizardfish, <i>Saurida undosquamis</i> , GSA 26.....	11
Peregrine shrimp, <i>Metapenaeus stebbingi</i> , in GSA26.....	12
Striped mullet, <i>Mullus surmuletus</i> , GSA 26.....	12
Preliminary analyses	13
Information to be used on stock assessment of giant red shrimp (<i>Aristomorpha foliacea</i> , Risso 1827) in the Gulf of Antalya, eastern Mediterranean, GSA 24.	13

Comparison of <i>Sardinella aurita</i> length frequency distributions and Weight-Length relationships between Lebanon, Egypt, and Gaza Strip in order to explore the possibility of defining stock boundaries	13
<i>ToR IV. To make an effort to define a few shared stocks in order to monitor through the GFCM management plans</i>	14
<i>ToR V. To discuss the possibility of establishing two WGs on stock assessment, one for demersal and one for small pelagic.....</i>	16
<i>ToR VI. To define gaps existed in the sampling protocol which is used during the implementation of the pilot activities on data collection and decide on amendments.....</i>	16
<i>Conclusions and recommendations</i>	17
<i>Draft ToRs for the next meeting of the EastMed PWGSA.....</i>	18
<i>Adoption of the working group report and closure of the meeting</i>	18
<i>References</i>	19
ANNEXES	20
Annex I List of participants.....	21
Annex II Terms of Reference.....	22
Annex III Agenda.....	23
Annex IV Stock assessment sheets	25
Stock: <i>Mullus barbatus</i>	25
Stock: <i>Spicara smaris</i>	30
Stock: <i>Saurida undosquamis</i>	36
Stock: <i>Metapenaeus stebbingi</i>	38
Stock: <i>Mullus surmuletus</i>	40
Annex V Egypt sampling schemes.....	42

REPORT OF THE 2nd MEETING OF THE PERMANENT WORKING GROUP ON STOCK ASSESSMENT

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Table of Contents

Introduction

During the third coordination meeting of the EastMed project held in Bari, Italy from 19-20 April 2012, the countries advanced proposals for new activities to be carried out in the 3rd year. Within these proposals, there was also the follow up of the Permanent Working Group on Stock Assessment (EastMed PWGSA) in the Eastern Mediterranean, to enhance the capacity of the Eastern Mediterranean countries to work on data and deliver advice for fisheries management in the region.

On the base of the most important stocks in the region identified during the first PWGSA, the main aim of the working group was, to process the raw data of fishery monitoring collected in the framework of pilot projects carried out in the Eastmed area and supported by the project in order to prepare the input datasets useful to run stock assessment. Moreover, in the case there was the availability of DCF data, exploratory analyses on stock assessment model would have to be carried out.

The second meeting of the EastMed PWGSA was held in Kavala (Greece), from 9 to 14 of September and was attended by nine experts (Annex I) from Cyprus, Egypt, Greece, Lebanon, Italy and Turkey, as well as FAO staff and consultant.

Since one of the most important tasks for the group was to process the data for providing stock assessment and management advice during the next GFCM WGs on demersal and small pelagic, it was decided to give priority to work directly on the raw data, coming from pilot activities supported by the project, European Data Collection Framework and national trawl surveys analysing them in order to estimate the most appropriate input data and suitable stock assessment model, on the base of data availability.

The group furthermore made recommendations on the ToRs for the next meeting.

Opening of the meeting and election of the chairman

The meeting took place in the conference room of the National Agricultural Research Foundation, Fisheries Research Institute of Kavala from the 9th to 14th of September 2013. Local arrangements were organized by the personnel of the Institute.

Mr. Argyris Kallianotis, director of the National Agricultural Research Foundation, Fisheries Research Institute of Kavala, welcomed the participants presenting the main activities carried out by the institute and providing information about the logistic for the meeting.

Mrs Konstantina Karlou-Riga, Coordinator of the EastMed Project, welcomed the participants and thanked them for attending the meeting. She thanked the National Agricultural Research Foundation, Fisheries Research Institute of Kavala for the organization of this meeting with respect to an important activity for the project. She presented the suggested scope and objectives of the Permanent WG, emphasizing the importance of fisheries research for the sustainable management of fisheries resources in an area characterized by the lack of information and scientific advice. She introduced the scope and objectives of the project, the terms of reference (Annex II) and agenda (Annex III), which the participants adopted without changes.

The participants appointed the Project's consultant, Mr. Giuseppe Scarcella, as chairman and Mr. Marios Josephides from Cyprus as rapporteur. After the appointment of the chairman all the participants introduced themselves to the meeting.

Mr. G. Scarcella while emphasizing the importance of the second meeting of the Permanent WG, he presented a review of the data and information available to run stock assessments. He also noted that at the same time the gaps in data and requirements for data collection should have to be identified. Within this context he proposed a list of candidate stocks, for which the data collection is already implemented, which have to be assessed in order to be presented in the next GFCM WGs on demersal and small pelagic.

ToR 1. To compile a list of surveys and fishery-dependent data collection projects carried out in the last 10 years in each country, summarizing information on sampling area, periods, sampling design, type of data collected, data collection methodology, gear characteristics and stock assessments

The discussion on the ToR 1 started after the presentation made by the consultant. The current research projects carried out in some GSAs in Eastmed region under the framework of EU-DCF were presented in terms of temporal and spatial coverage. It was mentioned that the fishery independent monitoring project for demersals (MEDITS) covers in different periods the GSAs 19, 20, 22, 23 and 25 (Table I), while that for small pelagics (MEDIAS) covers from 2003 the GSAs 22 and 23. Participants presented then the fishery dependent and independent surveys as implemented in their countries, either in the past or currently running, a number of which are carried out under the framework of Eastmed project (Table I). The discussion was then focused on the criteria to be used for the identification of the most reliable sampling design in order to run a scientifically sound evaluation of commercially exploited stocks. Moreover the group discussed the data collection methodologies for future activities and stock assessments in the region.

Table I - List of surveys and fishery-dependent data collection projects carried out in the last 10 years in each country of EastMed region

Country	GSA/ Area	Period	Sampling Period	Sampling design	Type of data collected	Gear	Used for Stock assessment	Note
Greece	23/ Thracian sea	2008-2009	All year	random stratified	survey data + fisheries	Purse seine	Yes	Report in Greek
Greece	23/ Thermaikos gulf	2007-2008	All year	random stratified	survey data + fisheries	Bottom trawl + artisanal	Yes	Report in Greek
Greece	23/Thracian sea	2008-2009	All year	random stratified	survey data + fisheries	Purse seine		Report in Greek
Greece	23/ Thermaikos gulf	2007-2008	All year	random stratified	survey data + fisheries	Bottom trawl + artisanal		Report in Greek
Greece	23/ Thracian sea	2008-2009	All year	random stratified	survey data + fisheries	Purse seine		Report in Greek
Greece	23/ Thermaikos gulf	2007-2008	All year	random stratified	survey data + fisheries	Bottom trawl + artisanal		Report in Greek
Greece	23/ Thracian sea	2008-2009	All year	random stratified	survey data + fisheries	Purse seine		Report in Greek
Greece	23/ Thermaikos gulf	2007-2008	All year	random stratified	survey data + fisheries	Bottom trawl + artisanal		Report in greek
Greece	23/ Thracian sea	2008-2009	All year	random stratified	survey data + fisheries	Purse seine		Report in Greek
Greece	23/ Thermaikos gulf	2007-2008	All year	random stratified	survey data + fisheries	Bottom trawl + artisanal		Report in Greek
Greece	23/ Thracian sea	2008-2009	All year	random stratified	survey data + fisheries	Purse seine	Yes	Report in Greek
Greece	23/ Thermaikos gulf	2007-2008	All year	random stratified	survey data + fisheries	Bottom trawl + artisanal		Report in Greek
Greece	20-22-23	1996-2008 (no 2007)	June-July	random stratified	MEDITs protocol	MEDIT trawl net	Yes	DCF
Greece	20-22-23	1996-2008 (no 2007)	All year for commercial fisheries	Stratified by metier	Landings, discards, length,		Yes	DCF
Cyprus	25/Cyprus	2005-2012	All year for commercial fisheries	Stratified by metier	Landings, discards, length,		Yes	DCF
Cyprus	25/Cyprus	2005-2012	June-July	random stratified	MEDITs protocol	MEDIT trawl net	-	DCF
Egypt	26/ Egypt	July 2011 to December 2012	All year	Random	Landing catch by size	Trawl	Yes	EastMed protocol
Lebanon	27	2012-2013	All year	Random	Survey data	Gillnets-Trammel net Long-lines		
Lebanon	27	2012-2013	All year	Random	Fishery dependent datat	Purse seine		
Turkey	24/ Antalya Bay	2009-2011	All year	Random stratified	Survey data	Experimental trawl net		
Turkey	24/ Saros Bay	2006-2008	All year	Random stratified	Survey data	Experimental trawl net		
Italy	19/ North-western Ionian Sea	1994-2012	Summer	Random stratified	Survey data	Medit's trawl	Yes	Medit's protocol
Italy	19/ North-western Ionian Sea	2000-2006	Fall	Random stratified	Survey data	GRUND trawl	Yes	GRUND protocol
Italy	19/ North-western Ionian Sea	2006-2012	All year	Stratified by métier	Landing data	DCF	Yes	DCF protocol

Overview of Lebanese Surveys and Data Collection (*Sherif Jemaa and Myriam Lteif*)

Lebanon was known in the past for its coastal richness, especially in terms of biodiversity and fishery resources, which however nowadays is not the case due to the impact of war and pollution. Using 35 different ports along the coast from north to south, 1948 boats practice only artisanal fishing. In the fisheries research little has been done and there are no official data. The CIHEAM Pesca Libano project with the involvement of the Ministry of Agriculture and the National Center for Marine Sciences – National Council for Scientific Research (CNRS) has recently started to assess the marine coastal resources in order to support the Lebanese Government in strengthening their management. In a 2 years survey (2012, 2013) different types of gear were used in 47 and 65 sites during 2012 and 2013 respectively. According to the results 66 and 109 species were obtained in 2012 and 2013 respectively. In parallel, biological data were collected from purse seines, which referred to *Sardina pilchardus*, *Sardinella aurita*, *Sardinella maderensis* and *Engraulis encrasicolus*. Thus, under the context of the 2013 Pesca Libano survey and the data collection from fisheries, data from four species (*Sargocentron rubrum*, *Dentex macrophthalmus*, *Sardinella aurita* and *Engraulis encrasicolus*) were chosen for stock assessment needs during the 2nd Meeting of the Permanent Working Group on Stock Assessment of the EastMed project. However, the lack of data in certain months prevented to run a stock assessment model.

Cyprus Fisheries and Biological Data collection system (*Marios Josephides*)

Fishery Data collection scheme in Cyprus follows the Data Collection Framework (DCF) of the EU Regulation 1999/2008. Since 2005, all the obligations concerning collection of biological data were met. The data are being collected based on the DCF fleet segmentation and covered all licensed fishing vessels regardless of length category (<12 m, 12-24 m, 24-40 m). Biological data of length, age, maturity stage, sex ratio, growth parameters and natural mortality, with data from landings, discards and fishing effort, are being used to perform stock assessments for the five most commercial demersal species which are picarel (*Spicara smaris*), bogue (*Boops boops*), red mullet (*Mullus barbatus*), striped mullet (*Mullus surmuletus*) and common pandora (*Pagellus erythrinus*).

Precision of the fish length frequency distribution of landings is being calculated using the analytical methods described in the report of Workshop on Sampling and Calculation Methodology for Fisheries Data – WKSCMFD (ICES, 2004) and the Working Document of Vigneau and Mahevas, 2004, included as an annex in the WKSCMFD report. Age distribution of landings is being calculated using the estimated length (j) frequency distribution of landings (N j) and the proportion of landings of age i in the length class j, estimated from the constructed age-length key. The precision level is analytically being calculated using the method described in the report of Workshop on Sampling and Calculation Methodology for Fisheries Data – WKSCMFD (ICES, 2004) and the Working Document of Vigneau and Mahevas, 2004, included as an annex in the report.

In addition, the International Bottom Trawl Survey in the Mediterranean (MEDITS) is being performed around Cyprus waters (under the effective Government control of the Republic of Cyprus). The aim of the survey is to collect biological data from the Cyprus demersal species, for creating time series of abundance and biomass indices and length frequency distributions. The trends of these data series are providing information on the status of the Cyprus fishery resources, which may contribute to their management.

An Overview on the studies on deep water trawl surveys in the Antalya Bay (Turkey), eastern Mediterranean GSA 24 (Mehmet Cengiz Deval)

Monthly surveys have been carried out from September 2009 to July 2011 in Antalya Bay having various objectives. 132 valid hauls with a total towing time of ~296 h were carried out during the trials. Towing time of the hauls varied according to the objectives of the studies from 1 to 5 hours. Two main surveys were carried out: *i*) gear selectivity (between 400 and 650 m in depth) and *ii*) stratum survey (between 200 and 900 m). Within the selectivity survey retention efficiency was assessed and comparison was made on selectivity parameters among the “traditional” 44 mm PA diamond mesh, the 44 mm square mesh, the 50 mm diamond mesh and 50 mm turned (50T90) mesh codends. Data were collected for five shrimp species (*Aristeomorpha foliacea*, *Aristeus antennatus*, *Parapenaeus longirostris*, *Plesionika edwardsii* and *Plesionika martia*) and five fish species (*Phycis blennoides*, *Helicolenus dactylopterus*, *Merluccius merluccius*, *Lepidorhombus whiffiagonis*, *Lophius piscatorius*). Stratum surveys were done for five economically important species (*A. foliacea*, *A. antennatus*, *P. longirostris*, *P. blennoides*, *H. dactylopterus*) and four elasmobranch species (*Dipturus oxyrinchus*, *Raja clavata*, *Raja mirelatus* and *Raja radula*) to determine the population structure (spatial and temporal distributions between 200 and 900 m), abundance, biomass, reproduction, size at first maturity, age, growth, mortality rates and CPUE values.

Overview of the North-western Ionian Sea, surveys and data collection in the GSA19 (Roberto Carlucci)

The GSA 19 (Western Ionian Sea) is located between Cape Otranto and Cape Passero. This area covers a surface of about 16,500 km², ranges from 10 to 800 m deep and has a coast line of about 1,000 km along the Apulia, Lucania, Calabria and Sicily regions, where eight maritime compartments are located. The North-Western Ionian Sea is geo-morphologically divided in two sectors by the Taranto Valley (NW-SE canyon exceeding 2200 m in depth). Along the Calabria and Sicily, the shelf is generally very limited with the shelf break located at a depth varying between 30 and 100 m. Many submarine canyons are located along these coasts (Rossi and Gabbianelli, 1978), playing an important role in the transport of terrigenous debris from coastal waters to deeper grounds. The canyons are sites of vertical displacement for megafauna (D’Onghia et al., 2010), some species of which have a commercial interest, such as the deep-water shrimps *Aristeus antennatus* and *Aristaeomorpha foliacea* (Matarrese et al., 1995; Relini et al., 2000). These habitats are unsuitable for trawling and represent a sheltered site for species during sensitive phases of their life cycle. The canyons can act as “ecological refuge” for many bathyal and endemic species constituting “hot-spots” of biodiversity in the Mediterranean Sea, where conservation measures are needed (Gili et al., 1998). Different biocoenoses are distributed along the very long Ionian arc from the coastal to the bathyal grounds. Along the Apulia coast, rocky bottoms dominate on the shelf, rich in marine caves of high ecological importance. In addition, *Posidonia oceanica* meadows and biocoenosis of coralligenous are widespread in this geographic sector, making it a priority habitat for conservation purposes. The former extends, mostly from Gallipoli and Torre Ovo, from a few meters to about 30 m in depth. The coralligenous bottoms occur mainly from 40 to 80 m in depth. In shallower waters, some sites are characterized by the biocoenoses of coarse-grained sands and fine gravels under bottom currents (SGCF) and superficial muddy sands in sheltered areas (SVMC). On the shelf edge, in both sectors of the North-Western Ionian Sea, there are some areas with the biocoenosis of the shelf-edge detritic often characterized by the dominance of the sea-lily *Leptometra phalangium*, while over the continental slope the biocoenosis of the bathyal mud extends in the whole Ionian Sea.

The most important resources in the North-Western Ionian Sea are represented by the red mullet (*Mullus barbatus*) on the continental shelf, hake (*Merluccius merluccius*), deep-water rose shrimp (*Parapenaeus longirostris*) and Norway lobster (*Nephrops norvegicus*) on a wide bathymetric range and by the deep-water shrimps (*Aristeus antennatus* and *Aristaeomorpha foliacea*) on the slope. In the North-Western Ionian Sea fishing occurs from coastal waters to about 800 m. The most important fisheries occur in Gallipoli, Taranto, Crotona and Reggio Calabria although with a different distribution of the fishing effort (Maiorano et al., 2010). The national official statistics (Mipaaf_Irepa Font) report the highest percentage of big gross tonnage vessels (≥ 10 GRT) in Crotona (42%) followed by Gallipoli (33%), while Taranto and Reggio Calabria fisheries are mainly made up by small vessels. In the whole GSA19 different fishing techniques are used. Small scale fishing, which utilizes mostly trammel nets, longlines and traps, is widespread in the North-Western Ionian Sea. Trawlers represent about 21% in number, 64% in gross tonnage and 56% in engine power in the whole GSA19. However, in all GSA 19, fishing boats registered as polyvalent fishing vessels, often change type of fishing according to the season and sea-weather conditions as well as to the changing availability of resources and market demand. Information on the time series of the main descriptive parameters of demersal resources were collected in the framework of MEDITS (1994-2012), GRUND (2000-2006) and DCF (2006-2012) projects.

Biomass and density index of the European hake, the red mullet, the blue and red shrimp, the deep-water rose shrimp and the Norway lobster are reported in Figures 1 and 2. The European hake did not show any significant trend over time. A significant increase of both indices was shown for red mullet. The highest values of biomass and density were observed during 2007 due to a relevant catch of juveniles. No significant trend over time were observed for the horned octopus (*Eledone cirrhosa*) as well as for the red shrimps and Norway lobster, while the deep-water rose shrimp showed a significant increase only in the density index.

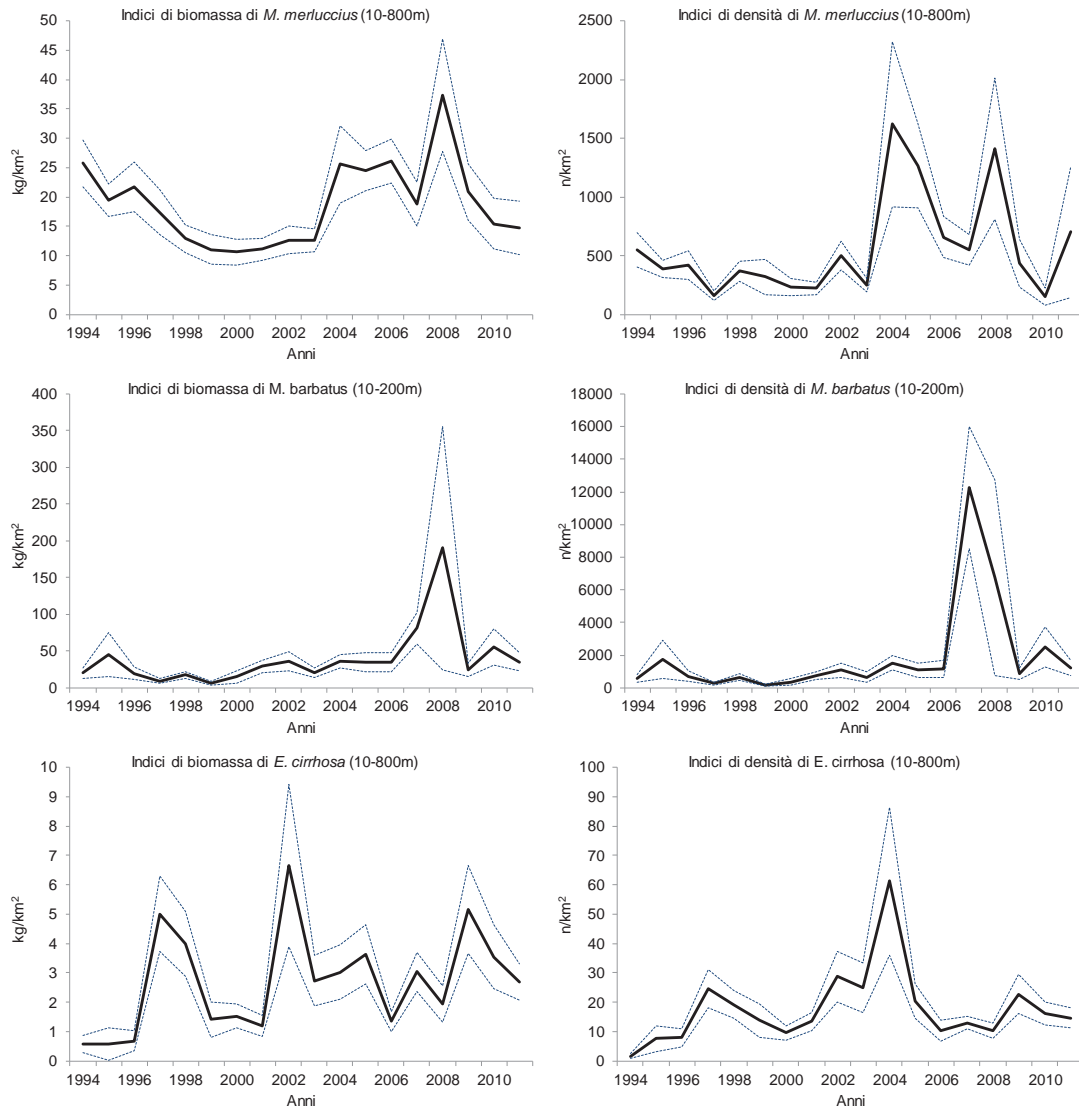


Fig. 1 - Biomass index (kg/km²) and density index (N/km²) for *M. merluccius*, *M. barbatus* and *E. cirrhosa* (time series Medits 1994-2011).

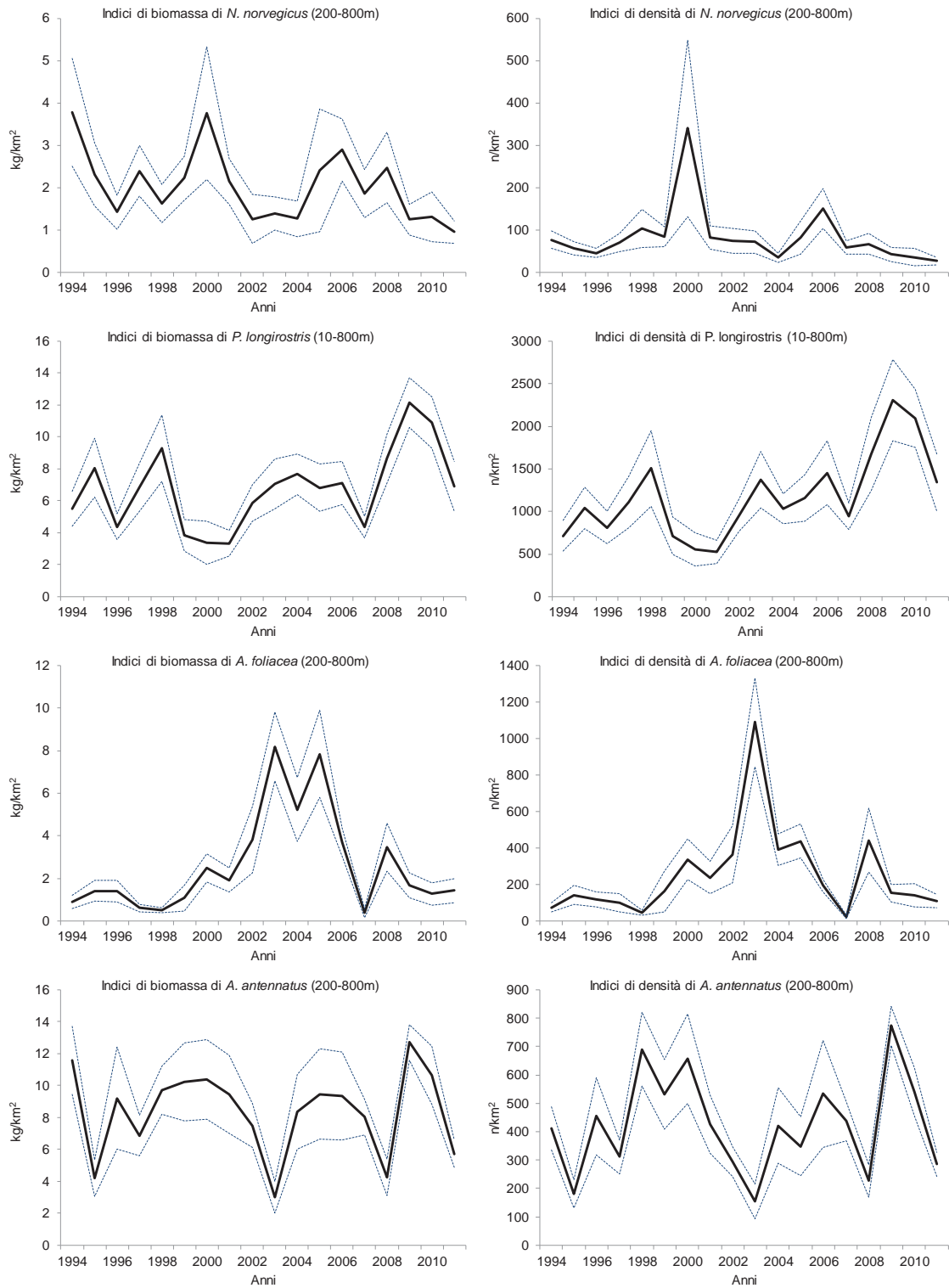


Fig. 2 - Biomass index (kg/km²) and density index (N/km²) for *N. norvegicus*, *P. longirostris*, *A. foliacea* and *A. antennatus* (time series Medits 1994-2011).

Overview on Mediterranean Egyptian fisheries – Fisheries dependent data collection projects
(*Hatem Hanafy Mahmoud*)

The continental shelf in Egypt is narrow in the east and west when compared with the wider Delta region in the middle of the Egyptian Coast. The seabed is flat, mostly muddy and/or sandy in the middle and eastern coast. The Mediterranean catch consists the 5.71% of the total catch in the country including the aquaculture. Fishery in general is operated by trawlers, purse seines, long lines and trammels nets. The records for 2012 were respectively 1098 trawlers, 237seines, 1233 long lines and 478 nets.

A pilot study on biological and fisheries data collection in Egypt (GSA 26) was scheduled and started to be implemented by General Authority for Fish Resources Development (GAFRD) with the support of the FAO EastMed Project. The primary objective of the Pilot study is to establish and implement an accurate monitoring system for fisheries along the Mediterranean coast. A sampling protocol was provided by the Eastmed project regarding the collection of catch and fishing effort data as well as biological sampling and analysis. The collection of socio economic indices was also added in the pilot activity.

The species composition of the total landed catch in GSA 26 during 2011 (GAFRD, 2012) showed that shrimps are the most dominant in the total landed catch. They represent the 13.88 % of the catch, followed by sardine (10.13%), ing Grey Mullet group (*Mugil cephalus*, *Liza ramada*, *Mugil seheli*, *Liza aurita* and *Liza saliens*: 5.39%), Bogue group (*Boops boops*, *Spicara mina* and *Spicara smaris*: 5.34%), Mulletts group (*Mullus barbatus*, *Mullus surmuletus* and *Upeneus moluccensis*: 5.30%) and Red porgy group (*Pagrus pagrus*, *Pagellus acarne* and *pagellus erythrius* : 5.13%), while the rest of the fish families were represented each by less than 5% of the total landed catch.

The Egyptian Mediterranean coast are officially divided into four sectors, the East sector, which extends from El-Arish to port Said, Damietta sector, Mid Delta sector (Burullus) and the west sector, which extends from Rashid to the border with Libya including Alexandria landing site. The landed catch of each sector was represented based on the licensed fishing vessels and gear categories.

A series of training courses has been run in regards the sampling scheme, the biological process and the identification of species. Fish identification plates with species names in English and Arabic were produced by the EastMed support and were circulated for the needs in the field. Five economic species (*Mullus surmuletus*, *Saurida undosquamis*, *Sardinella aurita*, *Sepia officinalis* and *Metapenaeus stebbingi*) were selected for biological sampling to represent the Egyptian fisheries. They were selected on the basis of the importance they have in the total catch either in terms of price or catch as well as on the need to represent all the taxonomic classes. Sampling was agreed to be carried out in five fishing harbors (El-Maadia, Damietta (Ezbet El Borg), Burullus (Kafr Alshaikh), Port Said and El-Arish) (Fig 1). Fourteen collectors have been nominated by GAFRD to be responsible for data collection, while scientists from the National Institute of Oceanographic and Fisheries and the College of Fisheries Technology and Aquaculture- Arab Academy for Science, Technology & Maritime Transport were collected to supervise the data collection and the data analysis.

ToR II. To provide advice on how to increase the standardization between surveys and to discuss the possibility and technical requirements to expand the MEDITS survey to the other countries in the region

After a presentation provided by the consultant, participants asked questions and addressed general issues concerning the importance of the standardization between surveys at sea. The possibility to carry out inter-calibration studies for the estimates of abundance indices of shared stocks has been also discussed, but considering the lack of survey activities and the poor knowledge about the presence of shared resources, such attempt was postponed for the future. The main actions that at the moment could assist increase the standardization are as follows:

1. Exchange of personnel during the surveys at sea.
2. Circulate the new sampling protocols of Medits/Medias and the sampling protocols of other survey carried out in the EatMed region uploading them in the project website.
3. Compile a list of sampling gears utilized during the different surveys providing the design of the net, the material used and the other technical details.

ToR III. To process with the raw data as collected through the pilot activities supported by the project and/or supported by the countries in the framework of the DCF, in order to produce stock assessments aiming to be presented in the GFCM WGs

The 2nd EastMed PWGSA processed and analysed data for 6 demersal and 1 small pelagic stocks. On the base of the outcomes of those analyses, stock assessment was finally performed on 5 demersal stocks. The group discussed about the reference points to be used in order to provide a diagnosis of the stock status. Based on the recommendation of GFCM WG on stock assessment (Split, Croatia, Nov 2012), the PWGSA in order to assess the status of the stock, agreed to use $F_{0.1}$ calculated with the Yield/Recruit approach as a proxy of F_{MSY} , and the ratio of F current (F_c) over $F_{0.1}$ according to which, when $F_c/F_{0.1} \leq 1.33$, the stock is in light overfishing status; when $1.3 < F_c/F_{0.1} > 1.66$, the stock is in intermediate overfishing status and when $F_c/F_{0.1} \geq 1.66$, the stock is in high overfishing status (http://151.1.154.86/GfcmWebSite/SAC/SCSA/WG_Demersal_Species/2012/WGSA_Demersal_Split_Report.pdf). It is worth noting that out of the five species assessed two were Lessepsian: *Saurida undosquamis*, already assessed in 2012 and *Metapenaeus stebbingi*, first time assessed.

With the exception of picarel (*Spicara smaris*) in GSA 25, all the stocks assessed were classified as being subject to overfishing as summarized in table II. The abstracts of the assessed stocks including preliminary exploration on data and parameters are given below.

Table II – Results of the stock assessment analyses with 2012 data.

Stock	F_{current}	$F_{0.1}$	Ratio $F_{\text{current}}/F_{0.1}$	Diagnosis
Red mullet GSA 19	1.17	0.38	3.13	High overfishing
Picarel GSA 25	0.09	0.14	0.64	Underexploited
Brushtooth lizardfish GSA 26	0.36	0.23	1.54	Medium overfishing
Peregrine shrimp GSA 26	0.44	0.28	1.59	Medium overfishing
Striped mullet GSA 26	0.43	0.22	1.96	High overfishing

Stock assessments

Red mullet, *Mullus barbatus*, GSA 19

Mr. Carlucci presented results on the stock assessment carried out on the red mullet (*Mullus barbatus*) in GSA19. Analysis covered a period of 7 years from 2006 to 2012. Abundance indices of *M. barbatus* were calculated from commercial landings and discards through the framework of the DCF project (2006-2012) by the use of data coming from bottom otter trawl, gillnet and trammel net. Biological parameters were derived from the data series provided by the MEDITS (1994-2012) and GRUND (2000-2006) experimental surveys. The natural mortality M was calculated by means of Prodbiom (Abella *et al.*, 1997) using growth parameters estimated for the species in the area (Sion *et al.*, 2012). Stock assessment was conducted using the VIT model. Results showed adequate fitting of the model. The fishing mortality in 2012 ($F_c = 1.17$) resulted higher than the target reference ($F_{0.1} = 0.38$). According to the $F_c/F_{0.1}$ ratio ($F_c/F_{0.1} = 3.13$), the stock of red mullet in GSA19 is considered in high overfishing status indicating that the fishing mortality should be reduced. The detailed assessment of red mullet in GSA 19 can be found in ANNEX IV of this report.

Picarel, *Spicara smaris*, in GSA 25

Mr. Josephides presented results from stock assessment of picarel (*Spicara smaris*) in GSA 25, covering an 8 year period (2005-2012) using data from commercial trawlers and artisanal fisheries (DCF data). The data used were catch at age, total landings, catch per unit effort (CPUE) as an abundance index from the otter trawl, maturity ogive, mean individual weight per age and natural mortality estimated with Prodbiom. The method used to conduct the analysis was Extended Survivor Analysis (XSA) in R statistical language, using the Fisheries Library in R (FLR). The results showed adequate fitting of the model, and the comparisons of the fishing mortalities (F) with the reference points indicated that the current F ($F_c = 0.09$) is close to $F_{0.1}$ ($F_{0.1} = 0.14$), while the F_{max} is 0.26. According to the ratio of F current over the reference point $F_{0.1}$, ($F_c/F_{0.1} = 0.70$), the stock of picarel in GSA 25 is considered to be underexploited. The detailed assessment of picarel in GSA 25 can be found in ANNEX IV of this report.

Brushtooth lizardfish, *Saurida undosquamis*, GSA 26

Mr. Hanafy presented the assessment of brushtooth lizard fish, *Saurida undosquamis* in GSA 26. The species is considered one of the most important demersal target species of the commercial fishery in Egypt. It represented about 70% (912 tons) of the total landing of the family Synodontidae during 2012, which is nearly equal to 2% of the total Egyptian Mediterranean landed catch.

The size of the fish samples ranged between 9 and 36 cm and the information used for the assessment of the stock included catch length structure, length weight relationship, total length

at the end of each year of life, Von Bertalanffy growth parameters, sex ratio, values of total (Z) and fishing mortalities (F), survival rates, length at first sexual maturity, yield per recruit, biomass per recruit and biological reference points. The vector of natural mortality by age was calculated from Caddy's formula, using the PRODBIOM Excel spreadsheet. For the period of study (2012), the methodology applied indirect methods: Length cohort analysis and Beverton & Holt Yield per recruit analysis were performed in order to estimate the limit and target reference points by using the FiSAT, LFDA, Vit 4 win and ProdBiom, 2009 softwares.

According to the results obtained, the current fishing mortality of the lizard fish is higher than the biological reference points ($F_{0.1}$) and according to their ratio ($F_{\text{current}}/F_{0.1} = 1.54$), it seems that the lizard fish *Saurida undosquamis* in GSA 26 is in a state of medium overfishing. Based on the fact that the length at first capture ($L_c = 15.75$ cm) is almost equal with the length at first maturity ($L_{50} = 15$ cm), it seems that fishery is focused on spawners. The detailed assessment of brushtooth lizard fish in GSA 26 can be found in ANNEX IV of this report.

Peregrine shrimp, *Metapenaeus stebbingi*, in GSA26

Ms. El Ganainy presented the assessment of peregrine shrimp, *Metapenaeus stebbingi* in GSA26. The shrimps form an important demersal fishery resource off the Egyptian Mediterranean coast (GSA 27). Six Penaeid species contribute to the shrimp fishery of which, *Metapenaeus stebbingi* forms about 24% of the shrimp landings. Samples from the landings were collected monthly during the period from January 2012 till December 2012 within a pilot study in the framework of EastMed project. The length-weight relationship was studied and the parameters calculated were found equal to $a=0.0015$, $b=2.739$ for the sexes combined. The study of the maturity ogive gave $L_{m50\%} = 18.0$ mm of carapace length. The monthly length frequency distributions were raised to the monthly landings and analysed by ELEFAN program incorporated in FiSAT software for the estimation of growth parameters. The estimated mean monthly growth rate was about 2.313 mm CL. A value of L_{∞} was first determined by the Wetherall (1987) method and a scan of K was performed to compute a prime value of K. Since the species is characterized by high growth rate and short life span, Pauly (1983) empirical equation was applied to estimate natural mortality. LFDA was used for age slicing, and VIT software for the pseudocohort analysis using the sliced age. VIT results showed that mortality in age group one is high. The Y/R analysis by the use of the VIT software was applied for the calculation of the reference point $F_{0.1}$. The Y/R analysis indicated a current level of fishing mortality equal to $F_c = 0.436$, while the target reference point $F_{0.1}$ was 0.275. The ratio $F_c/F_{0.1}$ was 1.587 indicating that the peregrine shrimp stock in the eastern Mediterranean is in a medium overfishing status and needs a considerable reduction of the fishing mortality to allow the achievement of $F_{0.1}$. The detailed assessment of peregrine shrimp in GSA 26 can be found in ANNEX IV of this report.

Striped mullet, *Mullus surmuletus*, GSA 26

Mr. Hanafy presented the assessment of striped mullet, *Mullus surmuletus* in GSA 26. The striped mullet is one of the most important commercial species in the eastern Mediterranean coast of Egypt. Its landings were 2,268 tons during 2011 and 1,443 tons during 2012. Four species (*Mullus surmuletus*, *Mullus barbatus*, *Upeneus moluccensis* and *Upeneus asymmetricus*) of Mullidae were recorded in the catch of the GSA 26. Samples were collected monthly for two consecutive years; the bulk of the landed catch of striped mullet came from the trawl vessels. It is noted that the catch from the artisanal fishery is of minor percentage (less than 10%) and for this reason it was not taken into account in the assessment. *Mullus surmuletus* constituted about 55% of Mulletts group in GSA 26. Samples were collected

monthly from the landings during the period from January 2011 till December 2012 within a pilot study in the framework of EastMed project. Growth parameters were calculated for the sexes combined. Length-weight relationship, maturity ogive with $L_{m50\%}$ and the sex ratio were studied. The values of total and fishing mortalities, natural mortality as vector by age, length at first maturity, yield per recruit, biomass per recruit and biological reference points were finally estimated. The assessment showed that the stock is in overfishing ($F_c / F_{0.1} = 1.54$). Advices and recommendations were provided. The detailed assessment of striped mullet in GSA 26 can be found in ANNEX IV of this report

Preliminary analyses

Information to be used on stock assessment of giant red shrimp (*Aristomorpha foliacea*, Risso 1827) in the Gulf of Antalya, eastern Mediterranean, GSA 24.

From monthly surveys carried out during one year (July 2010-June 2011), a total of 8,916 specimens of *Aristomorpha foliacea* were sampled. The dominant classes of abundance (N/km^2) and biomass (kg/km^2) were found in the 500–700 m depth zones. The study of the monthly length frequency distributions for each sex of *A. foliacea*, showed that the males exhibited 2-3 year cohorts, while females showed more (3–4 year cohorts). The main reproductive period is expected to be between June and September.

Pooling together the monthly length frequency distributions of the surveys, catch curve method has been applied in order to estimate a value of Z for each sex (for male: $Z = 2.37$, for female: $Z = 1.42$). The natural mortality (M) was calculated using the Pauly equation (sea water temperature $14^\circ C$) for each sex (for male: $M = 0.70$, for female: $M = 0.69$), thus F values have been estimated as 0.73 and 1.63 for female and male, respectively. Reference points in terms of $F_{0.1}$ were estimated using Yield software, where the size at first capture, taken from commercial fishery, was equal to 20 mm of carapace length. The ratios between current F and $F_{0.1}$ ($F_c / F_{0.1} = 0.94$ for female and 1.89 for male) indicated a state of fully exploitation for female and high overfishing for male. The lack of landings data which prevented to make comparisons with those coming from surveys was the reason to consider the current assessment as preliminary.

Comparison of *Sardinella aurita* length frequency distributions and Weight-Length relationships between Lebanon, Egypt, and Gaza Strip in order to explore the possibility of defining stock boundaries

An attempt was made to analyse the monthly length frequency distributions (LFD) in order to find similarities among the countries catches. In Lebanon, the data were collected during one year using gillnets and purse seines, while in Egypt and Gaza Strip using only purse seines. The study of the length-weight relationship in Lebanon showed positive allometric growth ($b > 3$), while in the case of Egypt and Palestine it was shown negative allometric growth ($b < 3$), (Fig 3). Comparing the length-weight relationships from data collected during one year in Egypt and two months in Palestine, it was shown that b was not significantly different [t-test, $p = 0.958$ (Sokal and Rohlf, 1987)]. It is noted however, that the length structure from Lebanon data included larger specimens, coming from gill nets and thus the LFD among the countries do not represent similar length ranges, which further restricts the comparisons. Finally, the results obtained neither declare nor exclude the possibility of *Sardinella aurita* to be a shared stock between Lebanon, Egypt and Palestine. It should be concluded that a more intense data collection is needed in order to obtain larger data series that can allow better comparisons aiming in shared stock identification.

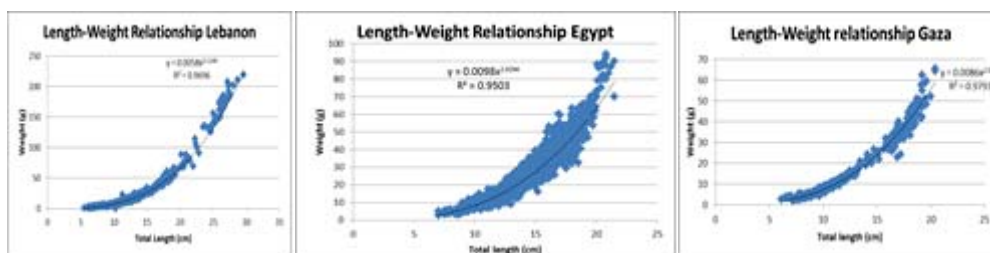


Fig. 3 – Length-Weight relationships of *Sardinella aurita* from Lebanon Egypt and Gaza Strip

During the discussion that followed the two presentations, two major actions were proposed:

1. The need of applying specific database, such as AtriS (AdriaMed Trawl Surveys Information Systems, Gramolini *et al.*, 2005), in order to simplify and ameliorate the process of trawl survey data extraction and standardization, as it was done in the case of *A. foliacea* in Antalya bay. To this line, the coordinator of the project agreed to facilitate AtriS installation in the PCs of counterparts through the collaboration with the AdriaMed project.
2. The need to use otolith reading and biometry analyses from the specimens of *Sardinella aurita* collected under the different pilot activities implemented by the project in order to provide more evidence about the stock boundaries.

Following the presentations and discussion on the data analyses and stock assessments, the chairman presented the new stock assessment forms developed by GFCM ([http://www.gfcm.org/gfcm/topic/16086/en/Stock Assessment Form version 0.1](http://www.gfcm.org/gfcm/topic/16086/en/Stock%20Assessment%20Form%20version%200.1)) in order to be used in the next GFCM WGs of stock assessment on demersal and small pelagic. The discussion was then focused on the importance to provide clear explanation on the choice of parameters and inputs for the analyses, which have to be clearly stated in the stock assessment forms. Moreover the coordinator of the project highlighted the importance to use Task 1 source data especially for the compilation of efforts per operational unit. The group suggested requiring from the GFCM secretariat the most updated versions of Task 1 data in order to use them during the next GFCM WGs.

ToR IV. To make an effort to define a few shared stocks in order to monitor through the GFCM management plans

The chairman of the meeting presented the main achievements of the 1st EastMed PWGSA about the shared stocks. After the presentation, participants asked questions and addressed general issues concerning the identification of shared stocks in the region. The main focus of the discussion was on which criteria could be used to identify shared stocks in the region as well as the revision of the shared stocks list, which had been produced in the 1st PWGSA. In particular, the effectiveness of the genetic criteria for stock identification for fisheries management purposes was widely discussed in order to better define stock boundaries. The coordinator of the project considered the possibility to employ genetic analyses for specific case studies (e. g. deep sea resources in the Ionian Sea) in the EastMed region, starting a collection of sampling also from the pilot activities. In view however of the high cost needed for such analyses, she postponed the activity till funds are available.

The only modification in the list of candidate shared stocks came for the Egyptian proposal to include *Saurida undosquamis* and *Etrumeus teres* between GSA 26 and 27 (Table III).

Table III – Revised list of shared stocks and candidate shared stocks in EastMed region

Species	GSA	Country	Candidate shared stock	GFCM shared stock
<i>Sardinella aurita</i>	26	Egypt	x	
	27	Gaza Strip	x	
		Lebanon	x	
<i>Saurida undosquamis</i>	26	Egypt	x	
	27	Gaza Strip	x	
		Lebanon	x	
<i>Etrumeus teres</i>	26	Egypt	x	
	27	Gaza Strip	x	
		Lebanon	x	
<i>Boops boops</i>	26	Egypt	x	
	27	Gaza Strip	x	
	22+23	Greece	x	
	22	Turkey	x	
<i>Engraulis encrasicolus</i>	22	Greece		x
		Turkey		x
<i>Sardina Pilchardus</i>	22	Greece		x
		Turkey		x
<i>Merluccius merluccius</i>	22+23	Greece	x	
		Turkey	x	
<i>Parapenaeus longirostris</i>	22+23	Greece	x	
		Turkey	x	
<i>Illex coindettii</i>	22	Greece	x	
		Turkey	x	
<i>Aristeomorpha foliacea</i>	20	Greece	x	
		Italy	x	
	22	Greece	x	
		Italy	x	
		Turkey	x	
	24	Italy	x	
<i>Aristeus antennatus</i>	20	Greece	x	
		Italy	x	
	22	Greece	x	
		Italy	x	
		Turkey	x	
	24	Italy	x	
<i>Pagellus erythrinus</i>	22	Greece	x	
		Turkey	x	
<i>Mullus surmuletus</i>	22	Greece	x	
		Turkey	x	
<i>Nephrops norvegicus</i>	22	Greece	x	
		Turkey	x	

ToR V. To discuss the possibility of establishing two WGs on stock assessment, one for demersal and one for small pelagic

Due to the lack of experts in small pelagic stocks, it was not possible to accomplish such term of reference. The discussion has been postponed in the framework of other meetings in order to decide about the opportunity and feasibility to separate the WG in two, one focusing on demersal and one for small pelagic.

ToR VI. To define gaps existed in the sampling protocol which is used during the implementation of the pilot activities on data collection and decide on amendments

The main gaps in data availability that can undermine the assessment of the most important commercial stocks in the region were discussed, taking also into account the results of the assessments carried out thus far. Countries involved in the Data Collection Framework (Cyprus, Italy and Greece) of the European Commission commented that they did not have particular gaps in data collection either coming from fisheries dependent or fisheries independent surveys. To this, the fact that among the 3 European countries, Greece has interrupted the national data collection started in 2007 from 2009 to 2012, has to be noticed.

In the non EU countries, there is no monitoring data collection system except for the pilot activities in Lebanon, Gaza Strip, Turkey and Egypt, implemented by the project.

Due to the absence of experts involved in the pilot activities in Turkey, Lebanon and Gaza Strip, it was not possible to identify the major gaps in data collection and sampling protocols. However considering that the pilot activities in these countries are in an early stage (few months), the weaknesses have not probably the chance to be formulated. On the contrary, in Egypt the pilot data collection, which is implemented since July 2011, some gaps have been identified and are described in the following paragraph.

Egypt. After running one year the pilot activity on biological sampling, gaps and needs were identified for amending the sampling. In particular, the number of samples was optimized by estimating the variance of the samples collected and then estimating the minimum sample size in order to obtain a predefined level of precision. It was shown that oversampling has been conducted and the number of samples had to be reduced. This was important in order to save time and costs for the continuation of the pilot study in 2013.

It was also mentioned that for stock assessment purposes length data can be collected every season, while age and maturity can be collected every three years, depending on the species. During the review of the biological data collection it was also noted that for some species there was a lack of sampling per specific fleet segments. Thus the need to include sampling for all the fleet segments was pointed out. The importance of the sample extrapolation to the catch of the respective period was also highlighted. One aspect that was also mentioned was the mixed composition for shrimps, which was due to the weakness of shrimp species identification particularly for small sizes. A training course was then proposed which was really implemented to the data collectors. The two sampling schemes are provided in ANNEX V.

During the discussion, the lack of fishery independent data taking into account the spatial and temporal scattered distribution of small pelagics consists one of the main shortcomings. Particularly for the evaluation of small pelagic stocks, the CPUE from purse seines targeting this species, which is exhibiting intense schooling behaviour, is a very poor index of abundance, because even when total abundance is low the fish re-form high density schools (Hilborn and Mangel, 1997).

Conclusions and recommendations

Six stocks assessment were carried out during the PWGSA. One of them was considered as preliminary (*Aristeomorpha foliacea* in GSA 24 - Antalya bay) because it was based only on fishery independent data. Five were validated by the working group, all of which were assessed as in overfishing status, with the exception of picarel in GSA 25. An exercise based on the comparison of biological characteristics of *Sardinella aurita* sampled in Egypt, Lebanon and Gaza Strip was also performed in order to uncover evidences that the stock can be considered as shared between the three countries, but due to the lack of enough and comparable data it was not possible to lead to a final decision.

During the presentation of the Stock Assessment Forms it was proposed to suggest to the GFCM secretariat the availability of Task 1 data during the next GFCM WGs (possibly using the GFCM SharePoint) in order to better complete the forms.

The group agreed to possibly run new assessments based on the experience taken throughout the present WG during the intersessional period until the next GFCM WGs on demersal and small pelagic.

The group made the following recommendations for the next PWGSA:

1. The group recommended to the next PWGSA to run specific simulation exercises, using free available software, in order to suggest more accurate management advices like minimum landing size and /or closure of period and area, especially in the countries where such actions are not yet enforced.
2. The group evidenced the difficulty to operate with trawl survey data in some areas (Antalya bay) due the lack of specific tools for the data standardization. The use of *ad-hoc* structured database (e.g. updated version of AtriS Ver. 2.1 for Eastmed region) is recommended in order to simplify and ameliorate the data elaboration. To this line the group suggested to the project to forward this proposal to the next CC through the focal points.
3. The group highlighted the need to proceed to otolith reading and morphometric analyses aiming in identifying whether the stock of *Sardinella aurita* is shared between Egypt, Lebanon and Gaza Strip. Furthermore the group pointed out the need of collection with basic life history parameters to improve the quality of the assessments both for demersal and small pelagic.

Draft ToRs for the next meeting of the EastMed PWGSA

1. Progress toward the assessment of the state of demersal fish and small pelagic stocks and fisheries in the EastMed Project area

The options to progress in the assessment of the state of stock already evaluated in the framework of previous meetings using all available data including survey, catch and socio-economic data will be identified, including simulations scenarios to develop fisheries management measures. Consideration will be given to contribute to update and/or enhance the knowledge on the state of fish stocks in the Mediterranean by presenting results to GFCM-SAC meetings.

2. Progress toward joint assessment of deep sea resources of Ionian Sea.

Explore the possibility to jointly assess the data of deep sea resources of Ionian Sea, taking into account both the questionnaire of deep sea resources (EastMed TD15) and the main outcomes of StockMed project carried out in MAREA framework.

3. Other matters.

Adoption of the working group report and closure of the meeting

The report was adopted on Friday 13 September 2013.

References

- D'Onghia G., Maiorano P., Sion L., Giove A., Capezzuto F., Carlucci R., Tursi A. (2010). Effects of deep-water coral banks on the abundance and size structure of the megafauna in the Mediterranean Sea. *Deep-Sea Research, II*, 57: 397-411.
- Gili J.M., Bouillon J., Pages F., Palanques A., Puig P., Heussner S. (1998). Origin and biogeography of deep-water Mediterranean Hydromedusae including the description of two new species collected in submarine canyons of Northwestern Mediterranean. *Sci. Mar.*, 62(1-2): 113-134.
- Gramolini, R., Mannini, P., Milone, N. Zeuli, V. (2005). Developing a Regional Trawl Surveys Information System: ATrIS. Paper presented at the GFCM-SAC Sub-Committee on Statistics and Information Transversal workshop on GFCM Statistical Framework and Databases (including IUU white list) (Rome, 26th October 2005). FAO-MiPAF Scientific Cooperation to Support Responsible Fisheries in the Adriatic Sea. GCP/RER/010/ITA/OP-17. *AdriaMed Occasional Papers*, 17: 10 pp. Available from the World Wide Web at <http://www.faoadriamed.org/pdf/OP-17.zip>.
- Hilborn R. and Mangel M. (1997). *The ecological detective. Confronting models with data*, xvii, 315p. Princeton. New Jersey: Princeton University Press, 1997.
- ICES (2004). WKSCMFD. Report of the Workshop on Sampling and Calculation Methodology for Fisheries Data. 26–30 January 2004, Nantes, France. ICES CM 2004/ACFM:12
- Maiorano P., Sion L., Carlucci R., Capezzuto F., Giove A., Costantino G., Panza M., D'onghia G., Tursi A. (2010). The demersal faunal assemblage of the North-Western Ionian Sea (Central Mediterranean): present knowledge and perspectives. *Chemistry and Ecology*, Volume 26(1): 219-240.
- Matarrese A., D'onghia G., De Florio M., Panza M., Costantino G. (1995). Recenti acquisizioni sulla distribuzione batimetrica di *Aristaeomorpha foliacea* ed *Aristeus antennatus* (Crustacea, Decapoda) nel Mar Jonio. *Biol. Mar. Medit.* 2 (2): 299-300.
- Relini M., Maiorano P., D'Onghia G., Relini L.O., Tursi A., Panza M. 2000 A pilot experiment of tagging the deep shrimp *Aristeus antennatus* (Risso, 1816). *Scientia Marina* 64(3), 357-361.
- Rossi S. and Gabbianelli G. (1978) - Geomorfologia del Golfo di Taranto. *Boll. Soc. Geol. It.*, 97: 423-437.
- Sokal, R.R. and Rohlf, F.J. (1987). *Introduction to Biostatistics*, 2nd Edition. Freeman, New York.
- Vigneau J. and Mahevas G. (2004). Working document. Precision in catch-at-age data with regard to sampling design. WKSCMFD, Nantes

ANNEXES

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Annex II Terms of Reference

2nd Meeting of the FAO EastMed Permanent Working Group on Stock Assessment

The working group was requested to:

- I. compile a list of surveys and fishery-dependent data collection projects carried out in the last 10 years in each country, summarizing information on sampling area, periods, sampling design, type of data collected, data collection methodology, gear characteristics and stock assessments;
- II. provide advice on how to increase the standardization between surveys and to discuss the possibility and technical requirements to expand the MEDITS survey to the other countries in the region;
- III. process with the raw data as collected through the pilot activities supported by the project and/or supported by the countries in the framework of the DCF, in order to produce stock assessments aiming to be presented in the GFCM WGs;
- IV. make an effort to define a few shared stocks in order to monitor through the GFCM management plans;
- V. discuss the possibility of establishing two WGs on stock assessment, one for demersals and one for small pelagics;
- VI. define gaps existed in the sampling protocol which is used during the implementation of the pilot activities on data collection and decide on amendments.

Annex III Agenda

2nd Meeting of the FAO EastMed Permanent Working Group on Stock Assessment

9 – 14 September 2013

Kavala, Greece

Monday 9 September - Day 1

- 9.30- 10.30 Opening of the WG. Introduction focusing on the main aims and mandate of the Eastmed WG on stock assessment. Review of the WG ToRs
- 10.30-11.00 Coffee break
- 11.00-12.00 Presentations on ToR I
- 11.00-12.30 Discussion about ToR I
- 12.30-14.00 Lunch break
- 14.00-14.30 Revision of fishery independent surveys carried out in Eastmed Area.
- 14.30-15.30 Discussion about ToR II.
- 15.30-16.00 Coffee break
- 16.00-16.30 Use of raw data collected during pilot project for stock assessment - ToR III
- 16.30-17.30 Discussion about ToR III

Tuesday 10 September - Day 2

- 9.00-10.30 Open discussion about ToR IV and selection of shared stock to be monitored.
- 10.30-11.00 Coffee break
- 11.00-12.30 Open discussion about ToR IV and selection of shared stock to be monitored.
- 12.30-14.00 Lunch break
- 14.00-15.30 Open discussion about ToR V and selection of stocks by GSA to be assessed
- 15.30-16.00 Coffee break
- 16.00-17.00 Presentations on ToR VI (presentations from the participants).
- 17.00-17.30 Discussion about ToR VI

Wednesday 11 September - Day 3

- 9.00-10.30 Work in groups in order to arrange data and models to carry out assessments
- 10.30-11.00 Coffee break
- 11.00-12.30 Work in groups continued
- 12.30-14.00 Lunch break
- 14.00-15.30 Plenary to discuss data input to be utilized and results.

15.30-16.00 Coffee break
16.00-17.30 Work in groups continued

Thursday 12 September - Day 4

9.00-10.30 Work in groups continued
10.30-11.00 Coffee break
11.00-12.30 Work in groups continued
12.30-14.00 Lunch break
14.00-15.30 Plenary to discuss results from assessments
15.30-16.00 Coffee break
16.00-17.00 Work in groups continued

Friday 13 September - Day 5

9.00-10.30 Plenary to review of the stock assessments carried out during the meeting.
10.30-11.00 Coffee break
11.00-12.30 Plenary to review of the stock assessments carried out during the meeting.
12.30-14.00 Lunch break
14.00-15.30 Definition of TOR for the next WG
15.30-16.00 Coffee break
16.00-16.30 Adoption of the report and closure of the meeting.

Annex IV Stock assessment sheets

Stock: *Mullus barbatus*

GSA: 19

Authors: Carlucci R.¹, Scarcella G.², Sion L.¹, Maiorano P.¹, Tursi A.¹, D'Onghia G.¹, Riga C.³,

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Fishery: The red mullet (*Mullus barbatus*) is one of the most important commercial species exploited in the North-western Ionian Sea (Geographical Sub Area 19). In the contest of the Data Collection Framework (DCF), the landings and discards of the red mullet recorded for 3 fleet segments from 2006 to 2012 in the GSA19, as the bottom otter trawl (OTB), the set gillnet (GNS) and the trammel net (GTR), were analyzed showing abundance fluctuations from a minimum of 446 t (2008) to a maximum of 872 t (2006). In addition, in the framework of the MEDITS surveys (time series 1994-2012), the abundance indices calculated for the experimental survey indicated a significant increasing trend for *M. barbatus* in the depth range 10-200 m (Sion et al., 2012). However, the majority of the sampled specimens in both the experimental surveys MEDITS and GRUND as well in landing catches monitored by DCF, belonged to the 0 and 1 age classes showing sizes < 15 cm TL, providing thus elements to consider the current assessment of a certain concern (Sion et al., 2012).

Data and parameters: During the experimental surveys catches of red mullet occurred in the depth range from 14 to 342 m in the GSA19 (MEDITS data series 1994-2012) (Maiorano et al., 2010). The standardized LFD abundance indices (N/km²) were estimated and the minimum and maximum sampled sizes were 4.5 and 30.0 cm TL, respectively. The length structure of landings and production by fishing segment were analysed as well (Data Collection Framework data series 2006-2012). The growth parameters for sex combined ($L_{\infty} = 27.0$ cm TL, $k = 0.697$ and $t_0 = -0.39$), were taken from the otoliths readings in specimens collected in the framework of the MEDITS and GRUND surveys during 1994-2012 and 2000-2006 respectively (Tursi et al., 2010). The length-weight relationship for sex combined ($a = 0.0084$, $b = 3.09$), was taken from the analysis of lengths in specimens collected in the framework of the MEDITS and GRUND surveys. The natural mortality as vector by age classes was calculated by means of Prodbiom model (Abella et al., 1997) and growth parameters estimated for the species in the area. The smallest mature female and male were 9.5 and 9.0 cm TL, respectively. The length of first maturity in females was 11.7 cm TL. Reproduction of the red mullet occurred from May to August in the GSA19 and recruits were mostly found during late summer-autumn on the shelf (Carlucci et al., 2009a; Carlucci et al., 2009b). The sizes of recruitment ranged between 9.6 and 11.6 cm TL (Lembo, 2010).

Assessment method: : The VIT model for pseudocohort analysis was applied to the red mullet in the GSA19 from 2006 to 2012 as well as the Y/R analysis for the calculation of

the target reference point, $F_{0.1}$.

Model performance: The methods were applied testing different sets of growth parameters and consequent natural mortality values, as estimated by the Prodbiom model. Consistency between the life history parameters adopted as inputs in the VIT and Y/R models was checked comparing the reconstructing total catches and the landings recorded in the framework of the DCF program from 2006 to 2012 (Fig. 1).

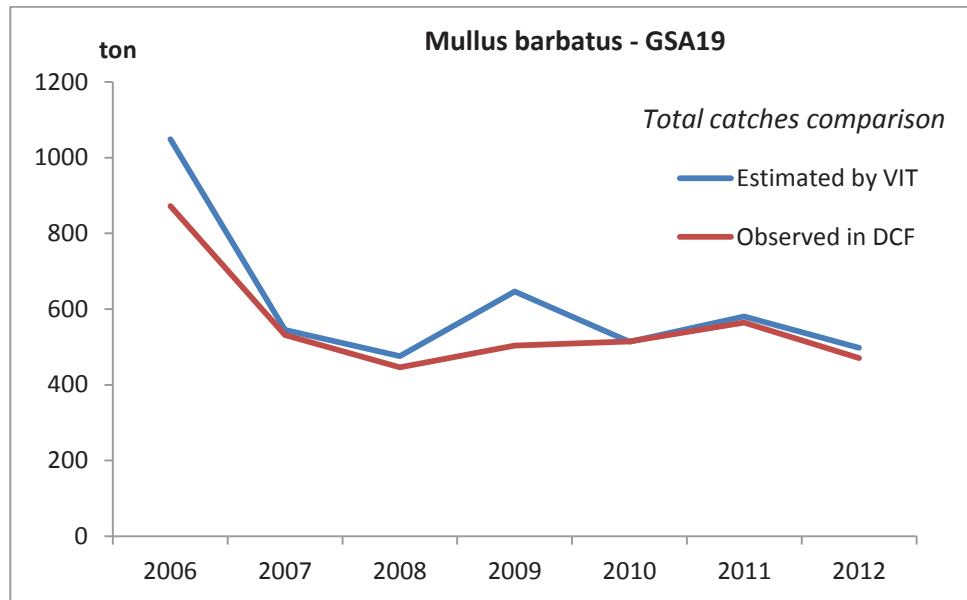


Fig. 1 - Comparison between the total catches of *Mullus barbatus* as estimated by VIT model and observed in the landings recorded in the GSA19 during the DCF program from 2006 to 2012.

Results: The VIT model was applied considering the red mullet population in GSA19 structured in 4 age classes as derived from growth parameters. The contribution of each age class to the production by gear in the landings has been calculated (Fig. 2). As observed for the catches in the experimental surveys, the 0 and 1 age classes represent the bulk of the exploited population. The highest catches were generally provided by the bottom otter trawl (OTB), whilst the trammel net (GTR), with the exception of 2006 and 2007, mostly provided negligible contributions. The set gill net (GNS) provided quite stable catches throughout the investigated period. The VIT analysis gave as mean age in the catches about 1. The critical age and length were 1 and 17 cm TL respectively from 2008 to 2012. On the other side, due to a different fishing pattern in 2006 and 2007, the critical age was 2 corresponding to a critical length of 22 cm TL. Considering 2012, the mortalities on the age classes 1 ($F = 2.48$) and 2 ($F = 1.93$) were higher than in age class 0 ($F = 0.73$). The Y/R analysis for the complex of the different gears indicated a current level of fishing mortality equal to 1.17 corresponding to a yield of about 18 g/recruit (Fig. 3). The target reference point $F_{0.1}$ was estimated to be 0.38. According to the $F_{\text{current}}/F_{0.1}$ ratio equal to 3.13 the stock of red mullet in GSA19 is considered to be in high overfishing indicating that the fishing mortality should be reduced to the basin.

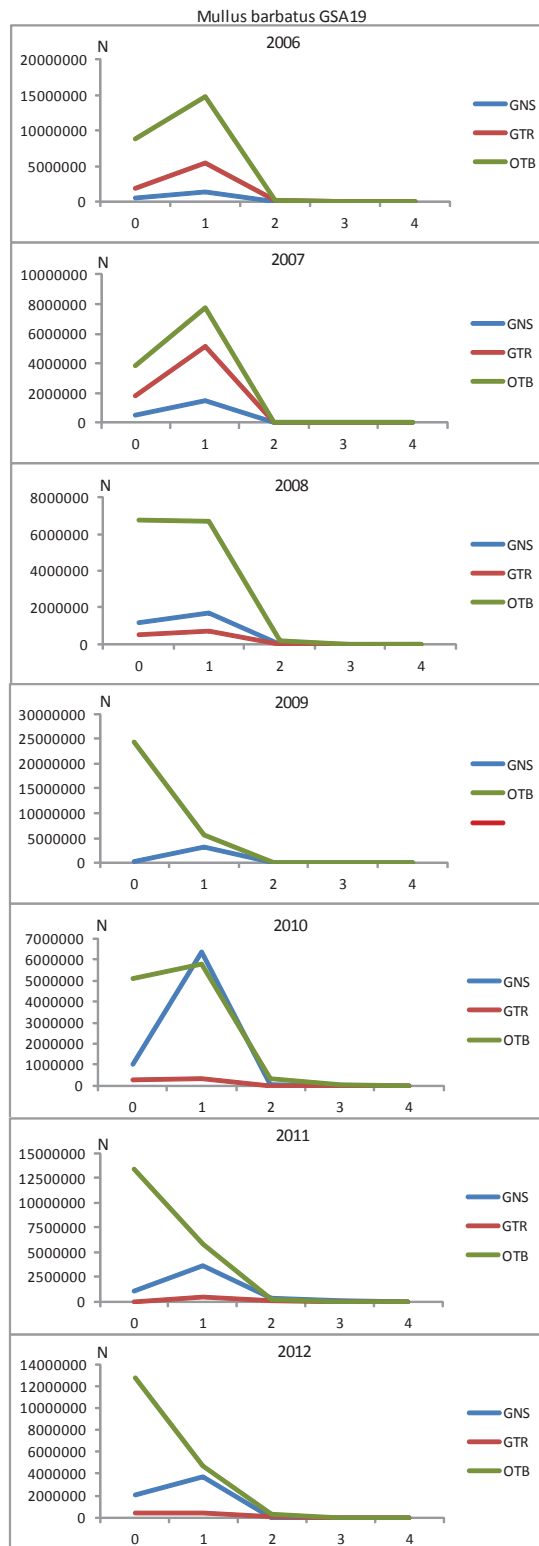


Fig. 2 - Production of *Mullus barbatus* by age classes and gears as reported in the DCF data series 2006-2012 for the GSA19.

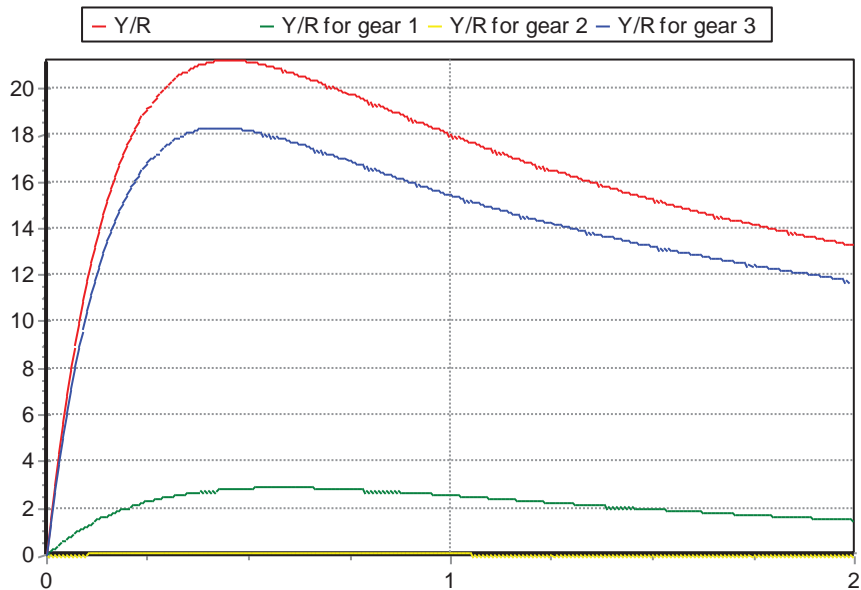


Fig. 3 -Yield per recruit estimated by different gears for *Mullus barbatus* for the GSA19 during 2012.

Diagnose of Stock status: The stock is in overfishing situation and thus it is necessary to consider a substantial reduction of the fishing mortality to allow the achievement of $F_{0.1}$.

Advices and recommendations: The objectives of a more sustainable harvest strategy could be achieved with a multiannual plan based on a reduction of the fishing mortality through fishing activity limitations and possibly fishing capacity decreasing.

Discussion: The discussion highlights that when the time series of landings is short and tools as VIT are used, it is preferable to apply the model year by year, as was done in the current assessment.

References

- Abella A., Caddy J.F., Serena F., 1997, Do natural mortality and availability decline with age? An alternative yield paradigm for juvenile fisheries, illustrated by hake fishery in the Mediterranean. *Aquatic Living Resources* 10, 257-269.
- Carlucci R., Capezzuto F., Sion L., Lembo G., Spedicato M.T., Tursi A., D'Onghia G. (2009b) - Aree di nursery di specie demersali nel Mar Ionio settentrionale.. *Biologia Marina Mediterranea*, 16:194-196.
- Carlucci R., Lembo G., Maiorano P., Capezzuto F., Marano C., Dion L., Spedicato M.T., Ungaro N., Tursi A., D'Onghia G. (2009a) - Nursery areas of red mullet (*Mullus barbatus*), hake (*Merluccius merluccius*) and deep-water rose shrimp (*Parapenaeus longirostris*) in the Eastern-Central Mediterranean Sea. *Estuarine Coastal Shellfish Science*, 83:529-538.

Lembo G. (2010). Identification of spatio-temporal aggregations of juvenile of the main demersal species and localization of nursery areas along the Italian seas – NURSERY. Società Italiana di Biologia Marina – S.I.B.M., Genova: pag. 1-119.

Maiorano P., Sion L., Carlucci R., Capezzuto F., Giove A., Costantino G., Panza M., D'Onghia G., Tursi A. (2010) - The demersal faunal assemblage of the north-western Ionian Sea (central Mediterranean): current knowledge and perspectives. *Chemistry and Ecology*, Volume 26: 1, 219-240.

Sion L., Carlucci R., Maiorano P., Capezzuto F., Giove A., Panza M., D'Onghia G., Tursi A., Bitetto I., Spedicato M.T., Carbonara P., Lembo G., (2012). In Mannini A., Relini G. - Rapporto Annuale sullo Stato delle Risorse Biologiche dei Mari Circostanti l'Italia. Anno 2012. *Biologia Marina Mediterranea*.

Stock: *Spicara smaris*

GSA: 25

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Fishery: Picarel (*Spicara smaris*) is the most important demersal fish targeted by bottom trawl fisheries in GSA 25 (Fig.1). It is exploited in depths ranging from 50-100 meters mainly along the southern coast of Cyprus (Fig. 2), and mostly distributed in depths less than 100 m. It inhabits sandy and muddy bottoms. The species in GSA 25 is considered as a single stock, though this has not been evidenced by studies on population structure.

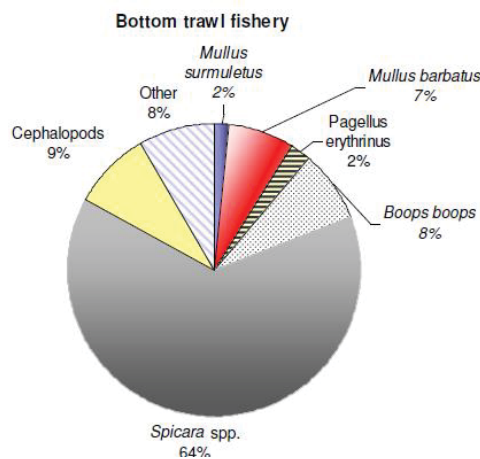


Fig.1: Composition of landings of the artisanal and trawl fishery in Cyprus for the period 2006-2008.

Landings fluctuated between 78 and 1030 t in the period 1970-2012 (data source: DCF, FAO-FishStat, DFMR reports; Fig.3).

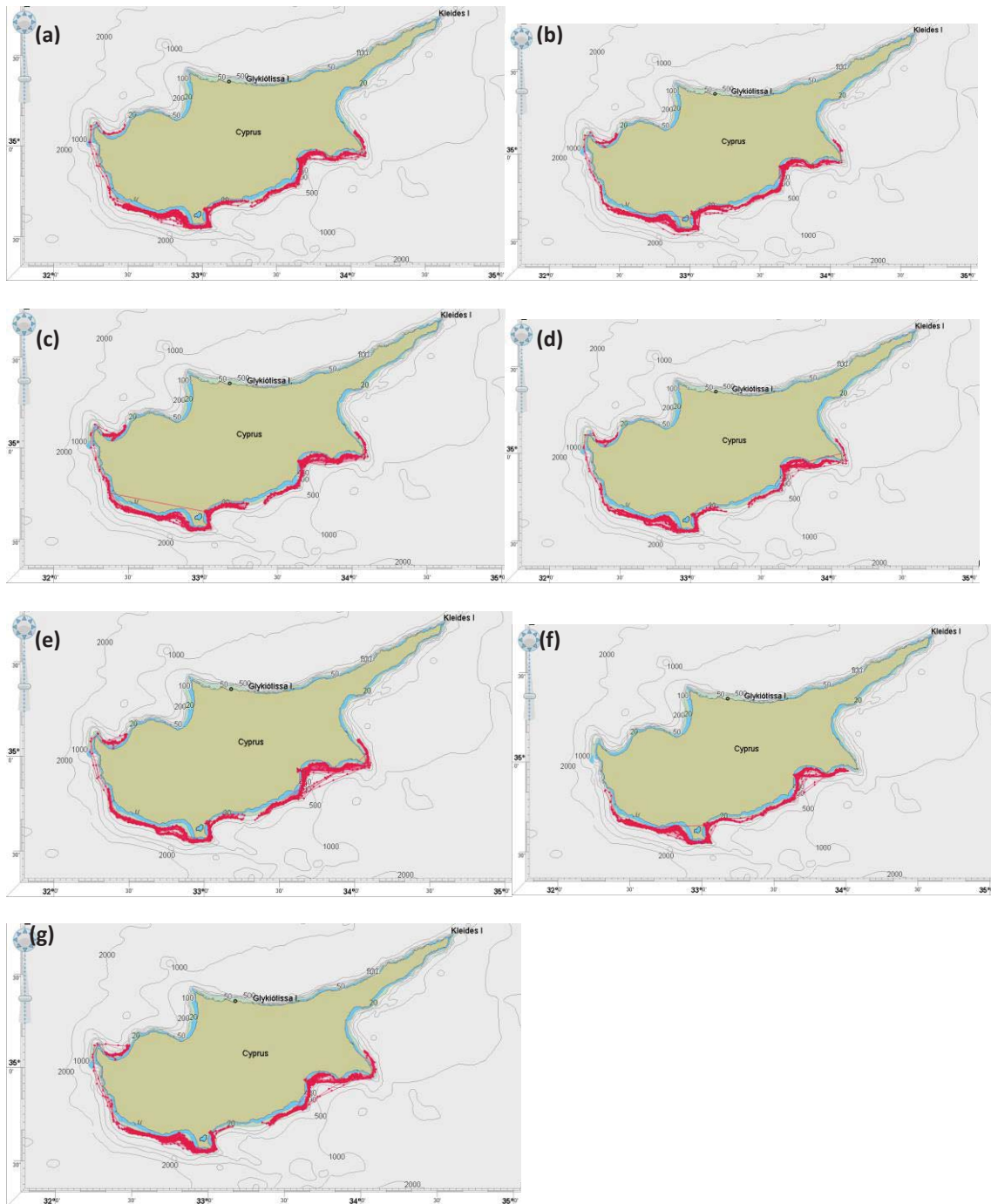


Fig. 2. Tracks of trawlers, activating along the southern coast of Cyprus for a) January, b) February, c) March, d) April, e) May, f) November and g) December.

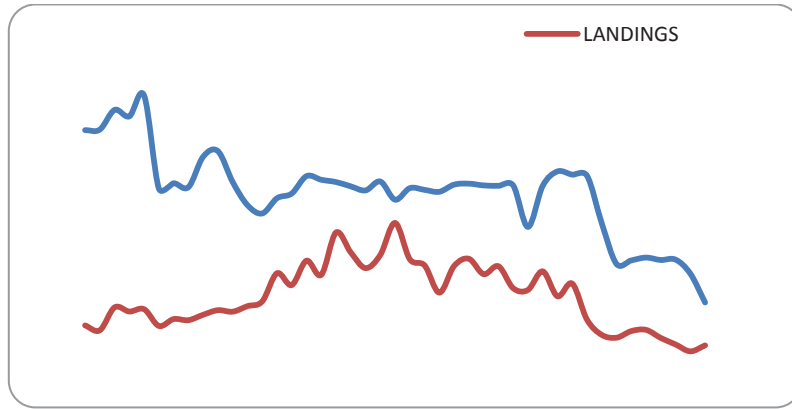


Fig. 3. Landings and effort time series for *S. smaris* in GSA 25 from bottom trawl for the period 1970-2012.

Data and parameters: Catch at age matrix, total landings, maturity ogive, natural mortality and CPUE as abundance index data series for picarel caught by commercial trawlers in GSA25, were used for the period 2005-2012. The data were collected in the Data Collection Framework (DCF) of the EU Regulation 199/2008. Growth parameters were obtained through the Von-Bertalanffy growth equation and the length-weight relationship in order to calculate natural mortality vector at age (M_a), using Caddy’s method (1991) (PROBIOM Excel spreadsheet; Caddy and Abella, 1999; Abella et al. 1997, 1998).

Assessment method: Considering the variability observed in the catches and effort, the assessment is based on non-equilibrium method. Fisheries Library in R statistical language was used to implement Extended Survivor Analysis (XSA) as an assessment method. For the XSA model, a shrinkage coefficient of variation (CV) was supplied in order to weight the fishing mortality (F) shrinkage by testing three values of 0.5, 1 and 2. The best model was chosen according to the diagnostics of the residuals. A plus age group was set in the assessment.

Biological reference points of $F_{0.1}$ and F_{max} were estimated from the FLBRP library in R using the Yield per Recruit analysis.

Model performance: Diagnostic plots of XSA show an adequate fitting of the models and did not show any trends in the residuals that were observed, excluding the age group of 0 (Fig. 4). The reason is that the available data for the particular age group does not give representative abundance indices of CPUE because the trawl fishery starts on November, a month later when the recruitment occurs (Demetropoulos, 1985). Also, the Mediterranean Trawl Survey takes place only in June, so the abundance indices do not cover adequately the age 0 group of the species.

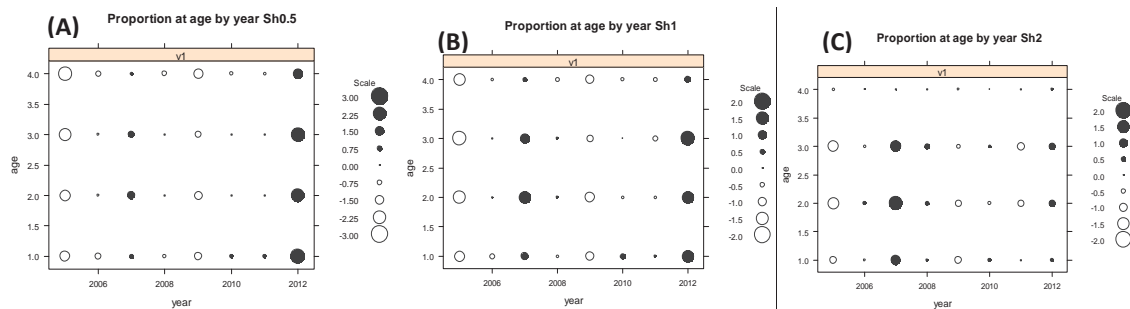


Fig. 4. Bubble plots of residuals from XSA models using shrinkage A) 0.5, B) 1 and C) 2.

Retrospective analysis showed a good agreement in the trend of spawning stock biomass (ssb) and harvest, indicating that the assessment was consistent (Fig. 5). A slight inconsistency for the recruitment was appeared in the year 2010 (red line).

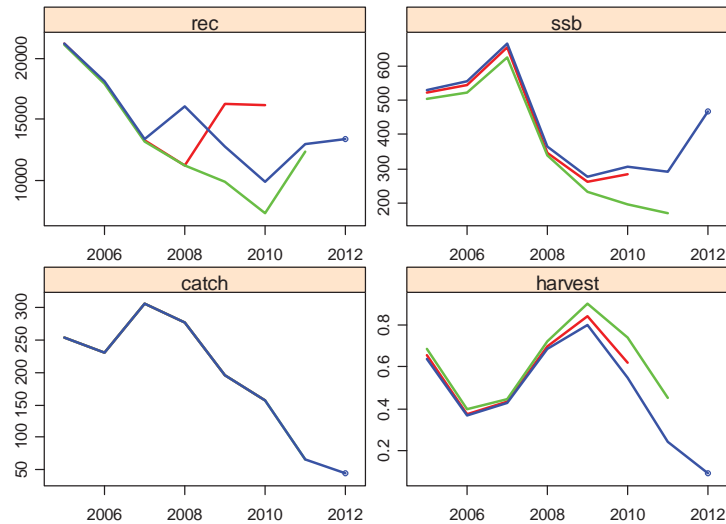


Fig. 5. Retrospective analysis for XSA model with shrinkage $f=2$.

Results:

State of exploitation: Exploitation showed an increase of fishing mortality from 2006 to 2009 with values of 0.38 to 0.8, while in the period from 2009 to 2012, harvest has decreased rapidly, with values from 0.8 to 0.1. The most recent estimate of fishing mortality ($F_{0.4}$) is 0.09 (Fig. 6).

State of the juveniles (recruits): Recruitment varied with a decreasing trend in the years 2005-2012, reaching a minimum in 2010.

State of the adult biomass: The SSB fluctuated reaching a maximum in 2007 and a minimum in 2009.

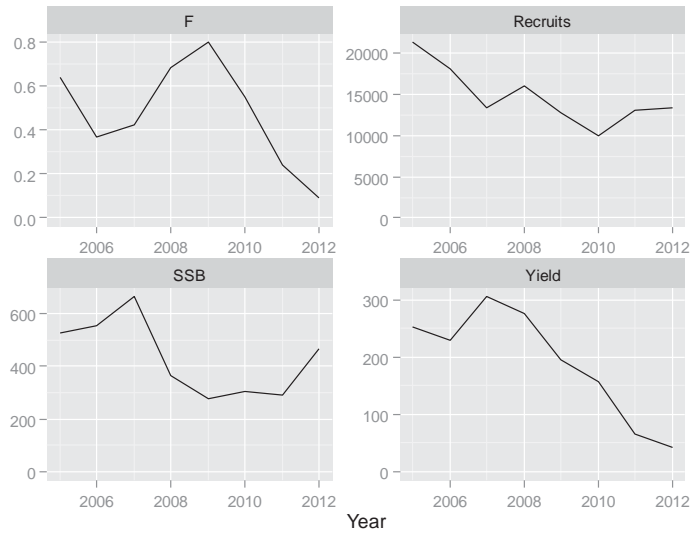


Fig. 6. Results of the XSA showing the trends of fishing mortality (F), recruits (thousands), spawning stock biomass – SSB (tonnes) and yield (tonnes).

Yield per Recruit Analyses

The reference points from Yield per Recruit analysis have values 0.14 and 0.25 for $F_{0.1}$ and F_{max} , respectively (Fig. 7).

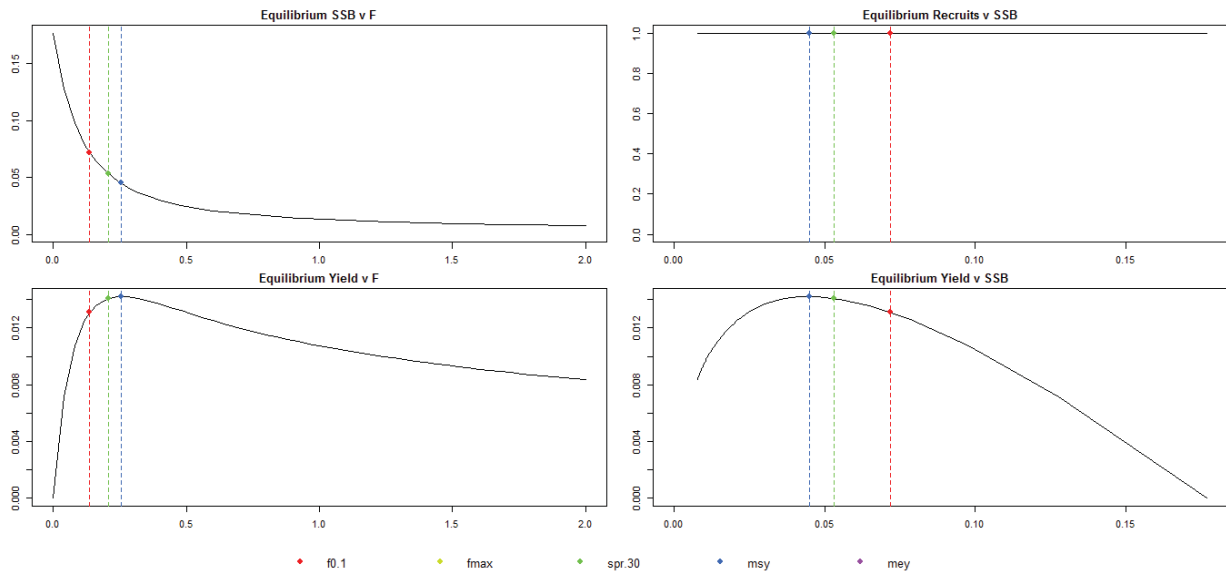


Fig. 7. Results of Yield per Recruit analysis showing the reference points.

Diagnose of Stock status: According to the ratio of F current over the reference point $F_{0.1}$, ($F_c/F_{0.1} = 0.70$), the stock of picarel in GSA 25 is considered to be underexploited. Therefore, it is recommended that fishing effort should not be increased.

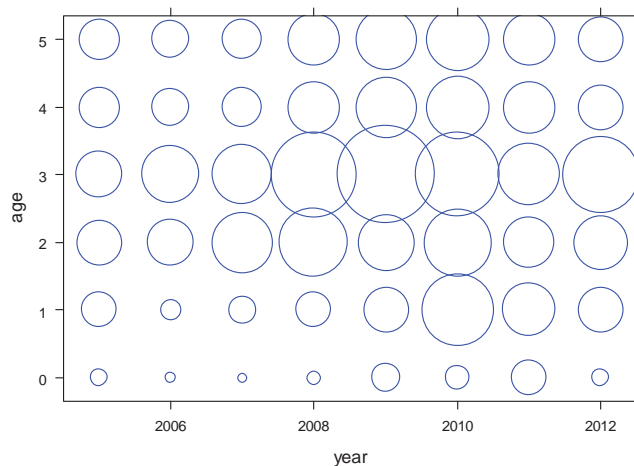


Fig. 8. Bubble plot of the amount of fishing mortality per age and year.

Advices and recommendations: The adoption of larger mesh size of the codend (50mm diamond) in May of 2010 as well as the decrease of the number of vessels from 4 to 2 in 2011, apparently contributed to the recovery of the stock since 2010, considering the results presented at the GFCM Working Group for Stock Assessment in 2011 where the stock had been considered as overexploited. The five month closure of the fisheries (June-October) is important for the recovery of the stock as well as for the success of recruitment. However, specific studies on how the recruitment is affected by environmental factors, as well as stock-recruitment relationships are necessary to improve the assessments and predictions.

At this point, it should be mentioned that the improvement of the stock assessment method using XSA in FLR in this case study, came from the support for training of the regional project EastMed.

Discussion: The group highlighted the use of tuned CPUE data from the juveniles, and therefore the need for a second trawl survey in Cyprus in fall for the estimation of the abundance of recruits.

References

- Abella A., Caddy, J.F., Serena F., 1997. Do natural mortality and availability decline with age? An alternative yield paradigm for juvenile fisheries, illustrated by the hake *Merluccius merluccius* fishery in the Mediterranean. *Aquat. Living Resour* 10:257-269.
- Abella, A., Caddy, J. F. and Serena, F. (1998). Estimation of the parameters of the Caddy reciprocal M-at-age model for the construction of natural mortality vectors. *Marine populations dynamics. Cahiers Options Medit.*, **35**: 191-200.
- Caddy J.G. and Abella A.J. (1999). Reconstructing reciprocal m vectors from length cohort analysis (LCA) of commercial size frequencies of hake, and fine mesh trawl surveys over the same grounds. *Fish.Res.*:169-175.
- Demetropoulos A. (1985) Report. Cyprus fisheries. *Marine Policy* 9(1): 69-72

Stock: *Saurida undosquamis*

GSA: 26

Authors: Mahmoud H.H.¹, El-Haweet A.A.K.¹, Scarcella G.², and Riga C.³

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Fishery: Family Synodontidae is represented in the Egyptian Mediterranean waters (GFCM-GSA 26) by two species: *Saurida undosquamis* and *Synodus saurus*. Brush tooth lizard fish, (*Saurida undosquamis*) is considered one of the most important demersal target species of the commercial fishery in Egypt (GFCM-GSA 26). It represented about 70% (912 tons) of the total landings of the family Synodontidae during 2012, which is nearly equal to 2% of the total Egyptian Mediterranean landed catch. The demersal fishes of Egypt is exploited by 1095 fishing trawlers vessels (GAFRD, 2013 in press) with an average length of 19.2 m (from 12 to 30 m) and hp from 45 to 1150. In regards to the artisanal fisheries, the vessels are typical artisanal Mediterranean ranging from 4 to 15 m in length and are powered by small outboard or inboard engines from 6 to 150 hp (GAFRD, 2012). The main fishing gears in artisanal fishery include hand lines, long lines, gillnet and trammel nets. They target both demersal and pelagic species which change from seasonally.

The size of the fish samples ranged between 9 and 36 cm and the mean length was 19.8 cm. In figure 1 the trawl landings in 2012 and the price are shown. It seems that during the year the price is not affected by the catch variation.

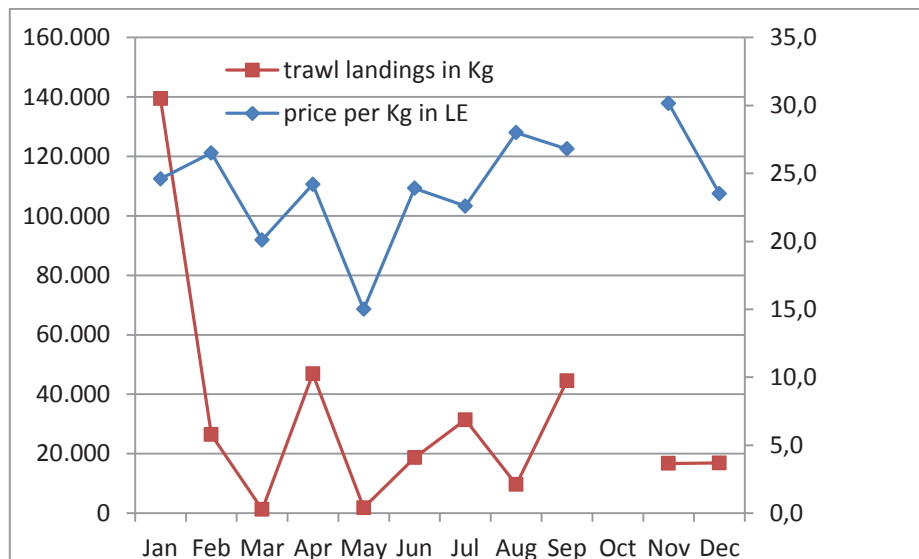


Fig. 1. Landings of *Saurida undosquamis* and price by month.

Data and parameters: The information used for the assessment of the stock consisted of catch length structure, length weight relationship, total length at the end of each year of life, Von Bertalanffy growth parameters, Sex ratio, the values of total (Z) and fishing mortalities (F), survival rates, length at first sexual maturity, yield per recruit, biomass per recruit and

biological reference points. The vector of natural mortality by age was calculated from Caddy's formula, using the PRODBIOM Excel spreadsheet (Abella et al., 1998).

Assessment method: For the period of study (2012), indirect methods were applied. The length cohort analysis (Kirkwood et al., 2001) and Beverton & Holt Yield per recruit analysis (Leonart and Salat, 1992) were performed for age slicing and the estimation of the limit and target reference points.

Results:

The results of the Vit model and the reference points from Yield per Recruit analysis are summarized in the following table I.

Table I . Main outcomes of the Vit model

Current Y/R	20.775
Maximum Y/R	20.801
Y/R _{0.1}	19.979
F _{current}	0.364
F _{max}	0.346
F _{0.1}	0.237
Current B/R	48.027
Maximum B/R	51.045
B/R _{0.1}	71.158
F _{current} / F _{0.1}	1.54

Diagnosis of stock status: According to the results obtained the current fishing level of the lizard fish is higher than the biological reference points (F_{0.1} & F_{max}) which shows that the lizard fish *Saurida undosquamis* resources in GSA 26 is in a state of medium overfishing (according to GFCM recommendations 2012). Based on the fact that the length at first capture (L_c= 15.75 cm) is almost equal with the length at first maturity (L₅₀= 15 cm), it seems that fishery is focused on spawners.

Advices and recommendation:

- Reduce the fishing mortality to F_{0.1} by limitation of trawl fishing activities.
- The scientific community should be encouraged to identify the spawning grounds, which have to be protected

References

Abella A., Caddy J.F., Serena F., (1998). Estimation of the parameters of the Caddy reciprocal M-at-age model for the construction of natural mortality vectors. Marine populations dynamics. *Cahiers Options Medit.*, **35**: 191-200.

GAFRD (2012 & 2013). Fish Statistics Book of General Authority for Fish Resources Development, Ministry of Agriculture and land Reclamation.

Kirkwood. P., Aukland R., Zaras, S.J. (2001) - Length Frequency Distribution Analysis (LFDA), version 5.0. MRAG Ltd, London, U.K.

Leonart J., J. SALAT (1992). VIT Programa de Analisis de Pesquerias. Inf. Tecn. Sci. Mar. 168- 169, 1 16 p.

Stock: *Metapenaeus stebbingi*

GSA: 26

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Fishery: The peregrine shrimp *Metapenaeus stebbingi* is a lessepsian species. It is one of the most important commercial shrimp species in the eastern Mediterranean coast of Egypt (GSA 26). Its landings were 1593 tons during 2012 (GAFRD, 2013). Six shrimp species (*Metapenaeus monoceros*, *Metapenaeus stebbingi*, *Marsupenaeus japonicus*, *Penaeus kerathurus*, *Penaeus latisulcatus*, *Penaeus semisulcatus*, *Trachypenaeus curvirostris*) were recorded in the trawl catch of eastern Mediterranean (GSA 26), of which *Metapenaeus stebbingi* constituted about 24%. The variations of catch and price are shown in figure 1. It seems that during the first semester the two variables have opposite trend, while during the second one similar.



Fig. 1. Landings of *Metapenaeus stebbingi* and price by month.

Data and parameters: Samples were collected monthly from the landings during the period from January 2012 till December 2012 within a pilot study in the framework of EastMed project. The study of growth for the sexes combined showed high growth rate and short life span. From the length-weight relationship, it was found: $a=0.0015$, $b=2.739$ for the sexes combined. The study of the maturity ogive gave $Lm50\%= 18.0$ mm.

Assessment method: ELEFAN program incorporated in FiSAT software was used to estimate the growth parameters. Since the species is characterized by high growth rate and short life span, Pauly (1983) empirical equation was applied to estimate natural mortality. LFDA was used for age slice (Kirkwood et al., 2001). VIT software was used for

pseudocohort analysis (Lleonart and Salat, 1992). In addition, the Y/R analysis implemented in the VIT was applied for the calculation of the reference point $F_{0.1}$.

Model performance: the methods were used in a complementary and integrated way. Consistency between results and inputs and life history parameters was cross-checked among methods and with inputs.

Results: The estimated mean monthly growth rate was about 2.313 mm CL. Females dominated in the catch all over the study period with a total sex ratio of 1 female to 0.18 male. The mortality was higher for the age group 1. The Y/R analysis indicated a current level of fishing mortality of 0.436 (Fig. 2). The target reference point $F_{0.1}$ was found equal to 0.275 and the ration $F_{cur}/F_{0.1}$ equal to 1.587.

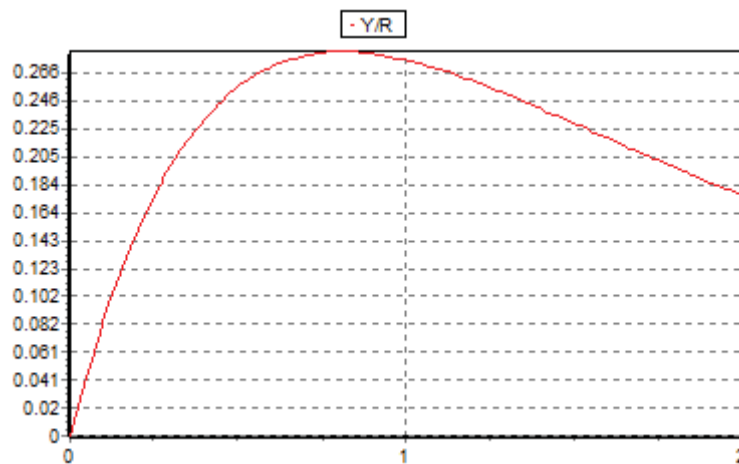


Fig. 2. Yield per recruit (g) related to factor of fishing mortality as estimated from VIT.

Discussion: The fishery depends on age group one. The high vulnerability of juvenile shrimp (length at first capture = 14 mm) to trawling may affect and reduce the future yield of the species. Thus, the protection of juveniles is probably the key factor for the sustainability of the resource; through the establishment of certain reserves in the eastern Mediterranean to protect the nursery grounds. However, also the protection of the parental stock is crucial in order to prevent stock collapse. In this context, a map for the spawning and nursery grounds of the peregrine shrimp should be prepared on the basis of sound biological research.

Diagnose of Stock status: The stock was found in a medium overfishing status. Thus it is necessary to consider a reduction of the fishing mortality to allow the achievement of $F_{0.1}$.

References

- GAFRD (2013). Fish Statistics Book of General Authority for Fish Resources Development, Ministry of Agriculture and land Reclamation.
- Kirkwood, P., Aukland R., Zaras, S.J. (2001) - Length Frequency Distribution Analysis (LFDA), version 5.0. MRAG Ltd, London, U.K.
- Lleonart J., J. SALAT (1992). VIT Programa de Analisis de Pesquerias. Inf. Tecn. Sci. Mar. 168- 169, 1 16 p.
- Pauly, D. (1983). Some simple methods for the assessment of tropical fish stocks. FAO Fish Tech. Pap., 234: 52 p.

Stock: *Mullus surmuletus*

GSA: 26

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Fishery: Striped mullet, *Mullus sermuletus* is one of the most important commercial species in the eastern Mediterranean coast of Egypt (GSA 26). Its landings were 2268 tons during 2011 and 1443 tons during 2012 (GAFRD, 2012, 2013). Four species (*Mullus surmuletus*, *Mullus barbatus*, *Upeneus moluccensis* and *Upeneus asymmetricus*) of Mullidae are recorded in the catch of the Mediterranean Egyptian coast (GSA 26). Samples were collected monthly for two consecutive years; the bulk of the landed catch of striped mullet came from the trawl vessels. Based on the existed sources, it seems that the catch coming from artisanal fishery (trammel nets) is of minor percentage (less than 10%). However it will be soon confirmed upon finalization and improvement of the data base in GAFRD. *Mullus sermuletus* constituted about 55% of Mulletts group in GSA 26. The monthly variations of catch and price are shown below, which indicate that they have opposite trend (Fig 1).

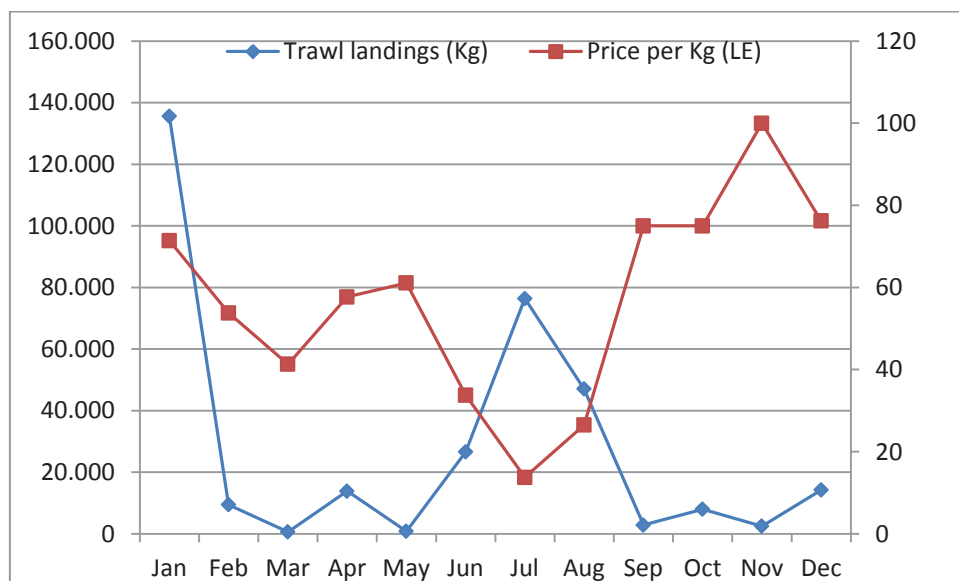


Fig. 1. Landings of *Mullus surmuletus* and price by month.

Data and parameters: Monthly samples were collected from landings during the period from January 2011 till December 2012 within the pilot study in the framework of EastMed project. The length frequency was constructed and modal analysis was followed by the use of the Bhattacharya method. The growth parameters then were estimated by the Ford & Walford method for the sexes combined. The length-weight relationship, the maturity ogive with $L_{m50\%}$, and the sex ratio were also studied. The total mortality was estimated by using the FiSAT software (length converted catch curve). The vector of natural mortality by age was calculated from Caddy's formula, using the PRODBIOM Excel spreadsheet (Abella et al., 1998), while LFDA was used for age slicing (Kirkwood et al., 2001).

Assessment method: VIT software was used for pseudo cohort analysis (Leonart and Salat, 1992). In addition, the Y/R analysis from the VIT software was applied for the calculation of the reference point $F_{0.1}$.

Model performance: The methods were used in a complementary and integrated way. Consistency between results and inputs and life history parameters was cross-checked among methods and inputs.

Results: Sex ratio (% females / total) was found equal to 0.555 during the study period. The stock of each year was assessed separately for results comparison. Age composition analysis indicated that the majority of the catch of this species is represented by the young ages especially in 2012. The Y/R analysis indicated a current level of fishing mortality of 0.351 during 2011 and 0.437 during 2012, while the target reference point $F_{0.1}$ was found equal to 0.228 and 0.223 in 2011 and 2012 respectively. Length at first capture ($L_c = 12.08$ cm in 2011 and 11.06 cm in 2012) was smaller than the length at first maturity ($L_{50} = 14.7$ cm) confirming that fishery is focused on young ages.

Diagnose of Stock status: according to the GFCM recommendation (Split, 2012), the value of $F_{cur}/F_{0.1}$ is used as reference point for the diagnosis of the status of the stock. Those values indicate that the stock of *Mullus surmuletus* is in a medium overfishing during 2011 ($F_{current} / F_{0.1} = 1.54$) and in high overfishing during 2012 ($F_{cur} / F_{0.1} = 1.96$).

Advices and recommendations: A more sustainable harvest strategy is advised, which can be achieved by the reduction of the fishing mortality. Such a reduction can be taken by fishing activity limitations. Among those limitations, the improvement of the selection pattern of the trawl fishery and the enforcement of the closed season can also be considered, which will help in protecting the younger individuals.

References

- Abella A., Caddy J.F., Serena F., (1998). Estimation of the parameters of the Caddy reciprocal M-at-age model for the construction of natural mortality vectors. Marine populations dynamics. *Cahiers Options Medit.*, **35**: 191-200.
- GAFRD (2012 & 2013). Fish Statistics Book of General Authority for Fish Resources Development, Ministry of Agriculture and land Reclamation.
- Kirkwood. P., Aukland R., Zaras, S.J. (2001) - Length Frequency Distribution Analysis (LFDA), version 5.0. MRAG Ltd, London, U.K.
- Leonart J., J. SALAT (1992). VIT Programa de Analisis de Pesquerias. Inf. Tecn. Sci. Mar. 168- 169, 1 16 p.

Annex V Egypt sampling schemes

Monthly samplings in kg for each species in each port and per each GFCM fleet segment during 2012

GFCM Fleet segment	GFCM Fishing gear class	Stock	GFCM Target species group	Port	Size category at landings	Quantity of Fish to be sampled		
Purse Seine 12-24	Seine Nets	Sardinella aurita	Small gregarious pelagic	El-Arish	Large specimens	2		
					Small specimens	2		
				Port Said	Large specimens	2		
					Small specimens	2		
				Damietta	Large specimens	2		
					Small specimens	2		
				Kafir-El-Sheikh	Large specimens	2		
					Small specimens	2		
				Maadia	Large specimens	2		
					Small specimens	2		
Trawl 12-24	Trawl	Mullus surmuletus	Demersal shelf Species	El-Arish	Large specimens	2		
					Small specimens	2		
				Port Said	Large specimens	2		
					Small specimens	2		
				Damietta	Large specimens	2		
					Small specimens	2		
				Kafir-El-Sheikh	Large specimens	2		
					Small specimens	2		
				Maadia	Large specimens	2		
					Small specimens	2		
				Saurida undosquamis	Demersal shelf Species	El-Arish	Large specimens	2
							Medium specimens	2
		Small specimens	2					
		Port Said	Large specimens			2		
			Medium specimens			2		
		Small specimens	2					
		Damietta	Large specimens			2		
			Medium specimens			2		
		Small specimens	2					
		Kafir-El-Sheikh	Large specimens			2		
			Medium specimens			2		
		Small specimens	2					
		Maadia	Large specimens	2				
			Medium specimens	2				
		Small specimens	2					
		Metapenaeus stebbingi	Demersal shelf Species	El-Arish	Large specimens	2		
					Medium specimens	2		
				Small specimens	2			
				Port Said	Large specimens	2		
					Medium specimens	2		
				Small specimens	2			
				Damietta	Large specimens	2		
					Medium specimens	2		
				Small specimens	2			
				Kafir-El-Sheikh	Large specimens	2		
					Medium specimens	2		
				Small specimens	2			
		Maadia	Large specimens	2				
			Medium specimens	2				
		Small specimens	2					
		Sepia officinalis	Demersal shelf Species	El-Arish	Large specimens	4		
					Medium specimens	4		
				Small specimens	4			
				Port Said	Large specimens	4		
					Small specimens	4		
				Damietta	Large specimens	4		
					Small specimens	4		
				Kafir-El-Sheikh	Large specimens	4		
Small specimens	4							
Maadia	Large specimens			4				
	Small specimens			4				
TOTAL						140		

Sampling every 2 months in kg for each species in each port and per GFCM fleet segment during 2013

GFCM Fleet segment		GFCM Fishing gear class	Stock	GFCM Target species group	Port	Size category at landings	Quantity of Fish to be sampled every 2 months (Kg)		
Purse Seine	12-24	Seine Nets	Sardinella aurita	Small pelagics	Port Said	One Size	1		
					Damietta	One Size	1		
					Kafr-El-Sheikh	One Size	1		
					Maadia	One Size	1		
					El Arish	One Size	1		
	> 24	Seine Nets	Sardinella aurita	Small pelagics	Port Said	One Size	1		
					Damietta	One Size	1		
					Kafr-El-Sheikh	One Size	1		
					Maadia	One Size	1		
					El Arish	One Size	1		
Trawl	12-18	Trawl	Mullus surmuletus	Miscellaneous demersal species	Port Said	One Size	1		
					Damietta	One Size	1		
					Kafr-El-Sheikh	One Size	1		
					Maadia	One Size	1		
					El Arish	One Size	1		
					Saurida undosquamis	Miscellaneous demersal species	Port Said	One Size	1
							Damietta	One Size	1
							Kafr-El-Sheikh	One Size	1
			Maadia	One Size			1		
			Metapenaeus stebbingi and all the other species present in the same box, including Metapenaeus monoceros, Metapenaeus stebbingi, Marsupenaeus japonicus, Penaeus kerathurus, Penaeus latisulcatus, Penaeus semisulcatus, Trachypenaeus curvirostris	Crustaceans	Port Said	Small specimen box	0.5		
						Medium specimen box	1		
						Large specimen box	1		
					Damietta	Small specimen box	0.5		
						Medium specimen box	1		
						Large specimen box	1		
					Kafr-El-Sheikh	Small specimen box	0.5		
Medium specimen box	1								
	Large specimen	1							

						box			
					Maadia	Small specimen box	0.5		
						Medium specimen box	1		
						Large specimen box	1		
					El Arish	Small specimen box	0.5		
						Medium specimen box	1		
						Large specimen box	1		
			Sepia officinalis	Molluscs	Port Said	One Size	2		
							Damietta	One Size	2
							Kafr-El-Sheikh	One Size	2
							Maadia	One Size	2
							El Arish	One Size	2
Trawl	> 18	Trawl	Mullus surmuletus	Miscellaneous demersal species	Port Said	One Size	1		
					Damietta	One Size	1		
					Kafr-El-Sheikh	One Size	1		
					Maadia	One Size	1		
					El Arish	One Size	1		
			Saurida undosquamis	Miscellaneous demersal species	Port Said	One Size	1		
					Damietta	One Size	1		
					Kafr-El-Sheikh	One Size	1		
					Maadia	One Size	1		
					El Arish	One Size	1		
			Metapenaeus stebbingi and all the other species present in the same box, including Metapenaeus monoceros, Metapenaeus stebbingi, Marsupenaeus japonicus, Penaeus kerathurus, Penaeus latisulcatus, Penaeus semisulcatus, Trachypenaeus curvirostris	Crustaceans	Port Said	Small specimen box	0.5		
						Medium specimen box	1		
						Large specimen box	1		
					Damietta	Small specimen box	0.5		
						Medium specimen box	1		
Large specimen box	1								
Kafr-El-Sheikh	Small specimen box	0.5							
	Medium specimen box	1							
	Large specimen box	1							

					Maadia	Small specimen box	0.5			
						Medium specimen box	1			
						Large specimen box	1			
					El Arish	Small specimen box	0.5			
						Medium specimen box	1			
						Large specimen box	1			
					Sepia officinalis	Molluscs	Port Said	One Size	2	
							Damietta	One Size	2	
							Kafr-El-Sheikh	One Size	2	
			Maadia	One Size			2			
			El Arish	One Size			2			
			Polyvalent small scale vessels with engine	< 12	Gillnets and entangling nets	Mullus surmuletus	Miscellaneous demersal species	Port Said	One Size	1
								Damietta	One Size	1
								Kafr-El-Sheikh	One Size	1
								Maadia	One Size	1
El Arish	One Size	1								
Saurida undosquamis	Miscellaneous demersal species	Port Said				One Size	1			
		Damietta				One Size	1			
		Kafr-El-Sheikh				One Size	1			
		Maadia				One Size	1			
		El Arish				One Size	1			
Sepia officinalis	Molluscs	Port Said	One Size	2						
		Damietta	One Size	2						
		Kafr-El-Sheikh	One Size	2						
		Maadia	One Size	2						
		El Arish	One Size	2						

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