
Tangier, Morocco, 19-21 March 2012
REPORT OF THE SECOND MEETING OF THE CopeMed II WORKING GROUP BETWEEN SPAIN AND MOROCCO ON BLACKSPOT SEABREAM (PAGELLUS BOGARAVEO) OF THE STRAIT OF GIBRALTAR AREA

Tangier, Morocco, 19-21 March 2012
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Preface

The CopeMed II Project, *Co-ordination to Support Fisheries Management in the Western and Central Mediterranean* is executed by the Food and Agriculture Organization of the United Nations (FAO) and funded by the Government of Spain, represented by the Secretaría General de Pesca, and the European Union, represented by the European Commission (EC).

The objective of the project is to maintain the sustainability of the marine fisheries, including artisanal fisheries, in the central and western Mediterranean Sea and its ecosystem, taking into consideration environmental, biological, economic, social and institutional issues. In addition, the project will continue to reinforce the collaboration among the participating countries of the sub-region by promoting common activities and databases creation, experts’ exchange of information, by supporting their participation in joint activities, mainly those related to shared and/or stranded stocks and its fisheries and by facilitating the participation of national experts on the activities of the Scientific Advisory Committee (SAC) of the General Fisheries Commission for the Mediterranean (GFCM).

Regions covered by CopeMed II are the western and central sub-regions of the Mediterranean. Countries participating and with representation in the Coordination Committee of the project are Algeria, France, Italy, Libya, Malta, Morocco, Tunisia and Spain. The main beneficiaries are the fishery policy-makers, managers and fishery administrations in the western and central Mediterranean countries. The project is also contributing to the strengthening of regional collaboration, by cooperating with the other FAO subregional projects, AdriaMed, MedSudMed and EastMed and by supporting capacity-building, standard methodologies, joint stocks assessment and the participation of the countries in relevant regional scientific organizations, such as the FAO’s General Fisheries Commission for the Mediterranean (GFCM). Secondary beneficiaries include the national research institutes, fishers and fishers’ associations, and industrial organizations.

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Preparation of this document

This document is the final version of the report of the second meeting of the CopeMed II Working Group between Morocco and Spain on Pagellus bogaraveo of the Strait of Gibraltar area, prepared by the participants and reviewed by the Project.

Acknowledgements

CopeMed II acknowledges the participation and valuable contributions of all experts from Tangier and Casablanca Centers of the INRH (Morocco), the IEO (Spain) experts from the Centers of Málaga, Cádiz and Vigo and the Fisheries Department of the Junta de Andalucía (Sevilla, Spain) in the ad hoc scientific Working Group between Morocco and Spain on Pagellus bogaraveo in the Strait of Gibraltar area.


ABSTRACT

The second meeting of the FAO CopeMed II Working Group between Spain and Morocco on blackspot seabream (Pagellus bogaraveo) of the Strait of Gibraltar area was held in the Atlas Rif Hotel in Tangier (Morocco) from 19 to 21 March 2012.

The main objective of this CopeMed II Working Group was to update the existing data and information on this stock shared by the two countries and to carry out a new joint assessment of the stock. The results of the assessment were prepared to its presentation to the CGPM, (General Fisheries Commission for the Mediterranean Working Group on Demersal, Subcommittee on Stocks Assessment, Scientific Advisory Committee) and to the ICES (International Council for the Exploration of the Sea, Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources).

The WG revised the assessments prepared in 2010 and conducted three different assessment models with the new available data. The first one was an update of assessment made in 2010 with the VIT model, the group accepted to take the VIT results to undertake a Yield per Recruit and Spawning Stock Biomass per Recruit analysis to calculate the biological reference points And finally the WG runned an assessment using the Depletion-Corrected Average Catch (DCAC), a method to estimate sustainable yields for data-poor fisheries.

The results of the assessments showed that the actual level of fishing mortality (Fbar = 0.19) is higher than the values calculated for the Fmsy proxies (F0.1 or F40% = 0.12). The WG recommended that the actual effort level should be reduced to set the fishing mortality level to a more sustainable value.
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1. Opening of the meeting and organizational issues, election of chairperson, rapporteurs and adoption of the Agenda.

The second meeting of the FAO CopeMed II working group on blackspot seabream (*Pagellus bogaraveo*) of the Strait of Gibraltar area between Spain and Morocco (WGPG) was held at the Atlas Rif Hotel in Tangier (Morocco) from 19 to 21 March 2012. Mr. Juan A. Camiñas, Coordinator of the FAO-CopeMed II project and organizer called to order and welcomed the participants from Morocco and Spain (Annex I) to the meeting.

Mr. Camiñas thanked the directors and experts of Morocco’s Institut National de Recherche Halieutique (INRH), Spain’s Instituto Español de Oceanografía (IEO) and the Dirección General de Pesca y Acuicultura of the Junta de Andalucía for their participation and for the preparation of the documents and data for the meeting.

Mr Fernando González (IEO) was elected chairperson of the meeting and Mr José L. Pérez Gil (IEO) and Mr Aziz Lamtai (INRH) were elected rapporteurs.

The provisional agenda of the meeting was adopted, with small changes (Annex II).

2. Objectives of the meeting and background information.

Mr Camiñas recalled that this Working Group between Morocco and Spain on *Pagellus bogaraveo* of the Strait of Gibraltar area came to proceed with the first WG held in Fuengirola (Spain) on September 21-22, 2010. Also, Mr Camiñas noted that the meeting was a recommendation of the GFCM’s Scientific Advisory Committee (Budva, Montenegro, 25-29 January 2010) for the joint assessment of the Strait of Gibraltar blackspot seabream stock by Morocco and Spain.

The CopeMed II Coordinator underlined that the main objective of this Working Group is to carry out an update joint assessment of the blackspot seabream of the Strait of Gibraltar area to present it to the General Fisheries Commission for the Mediterranean (CGPM).

Additionally the results will be also presented by the Spanish experts to the International Council for the Exploration of the Sea (ICES), considering that expert participating in the CopeMed II WG work in collaboration with the two regional fisheries organisations.

3. Overview of new available data and progress made on *P. bogaraveo* stock knowledge

Six Working Papers (WPs) prepared in the two countries and by CopeMed II were provided to the WG presenting the new fishery and biological information available from Spain and Morocco. All the WPs and Presentations carried out during the WGPG are available in the CopeMed web page (http://www.faocopemed.org/html/events.html).

3.1. Fisheries and fleet dynamics and biological information. Tabulation of all assessment information available.

Table 3.1.1 shows the available data for the assessment based on the information presented at this WG:

<table>
<thead>
<tr>
<th>Country</th>
<th>Metier/Gear</th>
<th>Port</th>
<th>Period with Available Information</th>
<th>Length Distribution</th>
<th>Biological Information</th>
</tr>
</thead>
</table>
Table 3.1.1.- Landing, effort, length distributions and biological information available for the assessment by country, gear and port.

3.1.1. Fishery from Morocco and Spain targeting P. bogaraveo in the Strait of Gibraltar area: Catch and effort data; Control systems (at sea and in landing ports) and its related legislation. Biological data and information.

Mr. Gil Herrera made a presentation of the document “Updated information from the Spanish blackspot seabream (Pagellus bogaraveo) fishery in the Strait of Gibraltar area”. This presentation is available at the COPEMED web page (http://www.faocopemed.org/pdf/occasional_papers/CopeMedII_ArtFiMed_OP10.pdf).

Since the early 1980s, an artisanal hand line fishery has targeted P. bogaraveo, known locally as “voraz”, in the Strait of Gibraltar (ICES sub-area IXa south). The fishing gear, known locally as “voracera” is a mechanized hand line baited with sardine. In the early years, there were only twenty-five small vessels, whereas currently there are around 94 boats. The main base ports are Tarifa and Algeciras.

Data available are catches (1984-2011), landings length distributions (1995-2011), fishery footprint and CPUE from observers (2005-2009) and from the Location and Track System for Andalusian Fishing Vessels (SLSEPA) of the Junta de Andalucía.

Landings are usually distributed in several commercial categories, owing to the wide range of sizes and for market reasons. Nowadays, this Spanish fishery represents almost 70% of the total landings for the species in the ICES sub-area IX. Information available has been presented to the ICES’s Working Group on the Biology and Assessment of Deep Sea Fisheries Resources (WGDEEP) from 2000 onwards. Landings information showed a continuous increase from 1983 to a maximum in 1994. Since 1994 landings have decreased, except in 1996 and 1997, reaching the lowest value of the recent years in 2002. Then, from 2003 onwards it showed an increasing trend setting the highest value of the last years in 2009, when landings started to decrease again.

The effort unit chosen (number of sales) is not an appropriate instrument, as the missing effort (fishing boats with no sales) is not considered. This problem will be solved with the information obtained from the Junta de Andalucía produced by a VMS, Vessel Monitoring System (called “green boxes”) installed in the Spanish voracera fleet since 2008.

More information on the Spanish fishery and its target species, already broadly described in several papers, was also the main focus of a PhD Thesis (Gil, 2006).

The former management plan for this fishery was based on the ARM/3536/2009 Order of 23 December, establishing a plan for blackspot seabream fishery in certain areas of the Strait of Gibraltar. This Order, that expired on December 31, 2011, regulated the area, gear (voracera) and fleet authorized to fish. Among other technical measures, the fishing plan included the minimum landing size (total length: 33 cm) and weight (350 gr), the regulation of the effort by...
week, the seasonal closure of the fishery between February 1st and March 15th and establishment of an annual Total Allowable Catch (TAC).

Ms Sadia Belcaid (INRH) presented the document “Actualisation des donnés sur la pêche de la dorade rose (Pagellus bogaraveo) dans le Détroit de Gibraltar” (http://www.faoopemed.org/pdf/events/EV_12_03_19_Actualisation des données sur la pêcherie du Pagellus bogaraveo dans le Détroit de Gibraltar (Maroc).pdf). The most important Moroccan fleets targeting blackspot seabream are the long-liners based at Tangier and the artisanal fleet of the Strait of Gibraltar area. In the past years the long-liners fleet was more or less stable (around 98 vessels) while the artisanal fleet has increased in the 2009-2011 period (69 fishing boats).

There are four main fishing grounds for the Moroccan fleet: Bakhat, Imakhwen, Cabo and Ploné. The fishery is carried out at 200-700 m depth and the gear used is the long-line known as “voracera”. The number of hooks by boat is between 200 and 2000 and the size of the hooks is between 8 and 11.

Since 2001, the effort (in number of sales) and catches are available at the port of Tangier and both have increased until 2011 (catches represented 136 tons). CPUE increased until 2005 and in the period 2005-2009 was more or less stable. From 2010 onwards, a decrease of CPUE was observed.

The WG discussed the possibility to extrapolate the artisanal Tangier catches to all the other artisanal ports and landing sites but finally this possibility was discarded given that the number of artisanal boats by year and site was not available.

Length distribution catches from the Tangier fleet are available since 2005. Length catches range is 24-67 cm (total length) and the majority of the catches range 29-38 cm. Length samples were recorded to the fork length and subsequently transformed to the total length through the relationship estimated by Czerwinski et al. (2008): FL=-0.731 + 0.910*TL.

Mr Saïd Benchoucha (INRH) presented the main regulations enforced by Morocco in the Mediterranean Sea for all fisheries, including the P. bogaraveo fishery that are the following: the gel of investment since 1992; the interdiction of fishing beyond 80 m depth in the area between Tangier and Al Hoceima and below 3 miles in the area between Al Hoceima and Saidia; the minimal landing size (25 cm fork length); the trawls mesh size \(50 \text{ mm}\); the nets regulations (\(L = 1000 \text{ m}, \text{ mesh size = 70 mm}\)) and, the protection of sensible areas (marine protected area: Al Hoceima; and antitrawling artificial reefs: Cala Iris and Martil).

3.1.2. Other national fishery targeting the species in Morocco and Spain: Catch and effort data. Biological data and information.

Ms Habiba Hamdi (INRH) reported on the blackspot seabream catches, per type of fleet, in several ports of Morocco in the Mediterranean Sea and the Atlantic Ocean (Annex 5). There are three different fleets targeting P. bogaraveo in the area: long-liners, artisanal boats and bottom trawlers. Long-liners and artisanal boats target this species while the trawlers catches of blackspot seabream are less important, representing part of the by-catch.

Long-liners and artisanal fleets from Tangier constitute the most important fleets targeting this species, 96 and 69 units respectively in 2011. Other important artisanal landing site is in Ksar Sghir. There is information for catches and effort of these fleets from 2009. Table 3.1.2.1 presents the Moroccan landings by year, gear and landing point for the study area and Figure 3.1.2.1 presents the situation of the main landing points of the area.
Figure 3.1.2.1- Localization of the main landing sites and ports of the Moroccan Strait of Gibraltar area.

<table>
<thead>
<tr>
<th></th>
<th>CHALUTIERS</th>
<th>PALANGRIERS</th>
<th>BARQUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL HOCEIMA</td>
<td>0.888  0.278  0.373</td>
<td>2.958  3.112  6.678</td>
<td>0.163  0.292</td>
</tr>
<tr>
<td>NADOR</td>
<td>5.261  4.794  8.376</td>
<td>0.145  0.057  0.728</td>
<td>0.000  0.017</td>
</tr>
<tr>
<td>FNIDEQ</td>
<td>0.000  0.000  0.000</td>
<td>0.000  0.000  0.000</td>
<td>0.929  0.170</td>
</tr>
<tr>
<td>JEBHA</td>
<td>0.000  0.000  0.034</td>
<td>0.000  0.000  0.000</td>
<td>0.008  0.000</td>
</tr>
<tr>
<td>M’DIQ</td>
<td>0.240  0.232  0.082</td>
<td>1.498  0.897  2.129</td>
<td>0.000  0.000</td>
</tr>
<tr>
<td>KSSAR SGHIR</td>
<td>0.000  0.000  0.000</td>
<td>0.000  0.000  0.000</td>
<td>40.012 17.708</td>
</tr>
<tr>
<td>TANGER</td>
<td>0.046  0.103  0.095</td>
<td>90.272 93.826 102.075</td>
<td>7.885  17.165</td>
</tr>
</tbody>
</table>

Table 3.1.2.1- Morocco landings (tons) for blackspot seabream by fleet and year.

Mr José Luis Pérez Gil (IEO) gave a summary presentation ([http://www.faocopemed.org/pdf/events/EV_12_03_19_Spanish information about the red seabream (Pagellus bogaraveo) trawl fishery in the GSA01 (Northern Alboran Sea).pdf](http://www.faocopemed.org/pdf/events/EV_12_03_19_Spanish information about the red seabream (Pagellus bogaraveo) trawl fishery in the GSA01 (Northern Alboran Sea).pdf)) on the blackspot seabream (Pagellus bogaraveo) Spanish trawl fishery in the GFCM GSA 01 (Geographical Sub-Area 01, Northern Alboran Sea). In this GSA, blackspot seabream is a by-catch for the mix trawl fishery targeting Merluccius merluccius, Parapeneaus longirostris and Aristeus antennatus. Trawl fleet only caught 6% in weight of blackspot seabream in the period 2009-2011 in the Northern Alboran area (GSA01). Taking into account the features of the trawl fishery, the blackspot seabream trawl catches in GSA01 are not relevant for assessment purposes. However, it represents a target species for the long-line “voracera” in the Algeciras port (around 75% of the total long-liners catches in GSA01). In the other ports of this area, long-liners use different gear for different target species and their catches are a mix of species.
Available information on *P. bogaraveo* from the Spanish trawl survey MEDITS was also presented. Abundance indices for this species are very variable from year to year owing to most of catches of this species are related to specific subtracts and the annual indices depend on the presence of these subtracts in the survey hauls.

3.1.3. **FAO-ArtFiMed monitoring system on artisanal fisheries in Dikky (Morocco): main results on the *P. bogaraveo* fishery in the Strait of Gibraltar area: Captures, CPUE, size distribution in the samples.**

Mr Juan A. Camiñas, introduced the document prepared by CopeMed II entitle “*Analyse de la base de données, du projet FAO-ArtFiMed, sur le suivi de l’activité de la pêche à Dikky (Maroc), La pêche de la dorade rose Pagellus bogaraveo*” ([http://www.faocopemed.org/pdf/occasional_papers/CopeMedII_ArtFiMed_OP09.pdf](http://www.faocopemed.org/pdf/occasional_papers/CopeMedII_ArtFiMed_OP09.pdf)). He underlined that this document is the first of a series in preparation analysing the database performed by the ArtFiMed project in Morocco and Tunisia that contains the data carried out by fishermen and other professionals in the two countries. The ArtFiMed database for Dikky includes data from the fisheries, boats and gears characteristics and economic data concerning the fishing activity and the marketing of the captures.

The document represents the first attempt of analysis of the daily activity of the artisanal fleet from Dikky (Morocco) targeting blackspot seabream, *P. bogaraveo* in the Strait of Gibraltar area. The original idea of this analysis is to improve the joint database prepared by the Moroccan and Spanish experts for the assessment of this stock by adding new catch and effort data from the whole artisanal fleet from Morocco based on the results in Dikky. At the same time, by using the data collected in the framework of ArtFiMed, it is possible to evaluate the quality of the sampling methodology implemented by FAO-ArtFiMed and the usefulness of the data collected directly by the artisanal fishermen and other stakeholders under the supervision of the FAO project.

The artisanal fleet from Dikky is composed by about 50 active boats built on wood, ranging 7 m average length and with onboard engines from 20 to 40 HP. The fleet uses only hook gears all along the year and the average number of gears by boat is 5. “*Le palangre à la dorade rose*” is the name of the specific gear used by the local fleet to target blackspot seabream. Moreover, the characteristics of this fleet are similar to the fleets in others Moroccan sites in the Strait of Gibraltar area (Oued Aliane, Ferdioua, Ksar Sghir, Oued Dalia, Oued Marsa and Benyounech) targeting the species. So data and results obtained during a year of sampling at Dikky could be used to extrapolate to the rest of the mentioned Moroccan artisanal fleets.

Main results of the analysis of the Dikky SSF FAO-ArtFiMed database for the period March - December 2010 are:

- Total fishing effort targeting blackspot seabream was 404 effective days over 1187 fishing days, representing 34.04% of the total fishing effort for the period.
- Fishing effort along the year has two maximum peaks in May and September.
- Total landing for the previous period was 5 983 kg, representing around 16% of the total production in Dikky (37 800 kg).
- Landings are sold in commercial categories following the same scheme that the semi-industrial fleet of Tangier and that in the Spanish ports.
- CPUE in kg presents two maximums: spring (May) and autumn (October).
- The average blackspot seabream value (Dhs/kg) increases from March to December with a maximum at the end of the year (November-December).
• Total value of blackspot seabream in Dikky reaches 433 990 Dhs (equivalent to 51 000 $), representing 20.85 % of the total landings in Dikky (2.081.815 Dhs, ~247 000 $) for all landed species.

The document conclusions underline the value of the ArtFiMed monitoring system for biological and economic objectives attaining accuracy in data and information on SSF activities on target species and the key participation of stakeholders, mainly fishermen. Mr. Camiñas mentioned that replication of the FAO-ArtFiMed monitoring system in other artisanal sites in Morocco could improve the data needed to perform stocks assessment on blackspot seabream from Strait of Gibraltar area with data from all the artisanal fleets.

3.1.4. Analysis of the commercialization of P. bogaraveo from Dikky (Morocco).

Mr Lamtai (INRH) gave a presentation “Analysis of the chain value of the blackspot seabream (Pagellus bogaraveo) in Dikky (Morocco)” http://www.faocopemed.org/pdf/events/Ev_12_03_19_Analyse_Chaine_Valeur_Dorade_Rose _Dikky.pdf). This document is part of the Master thesis prepared by the author in collaboration with the FAO-CopeMed experts with data of 2009. The blackspot seabream fishery in Dikky (Morocco) was carried out by 45 boats and it offered employment to 250 fishermen. In 2009, the production of blackspot seabream in Dikky was approximately 20 tonnes with a value of 1.8 million dirhams (~ 170 000 euros). That represented around 43% of the total production of the boats of Dikky and 57% of the total value of landings.

The inquiries with fishermen showed that 100% of the owners are linked by a delivery commitment with traders (4 traders in Dikky). This type of commitment is based on the fact that fishermen go into debt to merchants to cover the removal costs, the purchase of fishing equipment. In exchange, fishermen are committed to offering their catch in priority to this trader therefore becoming in their creditor. Reimbursement is mainly offered in kind (90% of situations in fish), without interest.

The catch consists of approximately 42% of commercial categories 1 and 2 (≥ 800g), with 59% of the total value of red seabream. Around 58% of the landings of this species are over 33 cm (the minimum legal size in the Mediterranean). Approximately 98% of blackspot seabream production is exported to the Spanish market.

The exportation prices of blackspot seabream in Tangier are strongly linked to the prices of blackspot seabream at fish market in Tangier and Mercamadrid, being the coefficient of determination r = 79%, and the elasticity price transmission of 79% in the case of Tangier fish market and 18% in the case of Mercamadrid. Gross margins to consumers are the highest achieved: 213% (gross margin in percentage of the purchase price) reached by traders of Dikky, 119% reached by restaurants of Tangier and 83% reached by Spanish restaurants.

The main priorities identified by the author in Dikky are the adaptation and the diversification of the production to the market, the transformation of artisanal products, the creation of a label and the organization of fishermen under a cooperative of associated workers.

Mr Juan Gil stressed that the fishing’s strategy of the owners in Tarifa port is the same of that in Dikky, due to boats fish red tuna whenever it become accessible in its season. He also underlined that the price of the blackspot seabream in Spain is arranged in the fish market in the port and not by the trader.
3.1.5. Information on stock identification, migration and interactions with other stocks in the Strait of Gibraltar and surrounding areas. Geographic representation (Maps) of survey and catch data.

There is not much information available on the stock structure of *P. bogaraveo* in the area. Migration patterns have been studied using tagging surveys in the GSA01 Spanish Southern Mediterranean region and the Strait of Gibraltar (Gil et al., 2001; Sobrino and Gil, 2001). Since 1997, total 7,066 individuals were tagged (juveniles + adults) and, at the moment, 396 recaptures were notified. Recaptures from juveniles showed significant displacements from GSA01 breeding areas towards the Strait of Gibraltar. However, recaptures from tagged adults did not reflect big displacements, which are limited to feeding movements among the different fishing grounds where the “voracera” fleet works (Gil, 2006).

In line with the discussions on this item, the WG recommended carrying out a joint study to establish the *P. bogaraveo* stock structure in the GFCM Alboran Sea areas and in the ICES area IXa. This study should be the base to delimit the stock area and determine the management area.

Mr S. Benchoucha remarked that the long-line fishery in the Moroccan coast is the major activity in the Strait of Gibraltar. This fleet is mainly based in the port of Tangier. The number of long-liners targeting blackspot seabream in the Strait of Gibraltar is around 102. There are nearly 435 artisanal boats that also targeting *Pagellus bogaraveo* in the strait of Gibraltar. The following two main fishing areas (Figure 3.1.5.1) were identified in the Strait of Gibraltar from the investigations with fishermen: West of Cap Spartel to the East of Benyounech and Fnideq to Martil.

![Figure 3.1.5.1- Map of the main Morocco’s fleet fishing grounds. The circles present the most important fishing grounds of the Morocco long-liners and artisanal fleets in the Strait of Gibraltar.](image)

Six main blackspot seabream fishing areas (Figure 3.1.5.2) were identified for the Spanish fleet based on the information provided by the Location and Track System for Andalusian Fishing Vessels (SLSEPA) of the Junta de Andalucía of in the period August 2007-December 2009.
INRH experts identified the areas 02, 03, 04 and 06 of the Spanish fishing grounds as the main important fishing areas for the Morocco fleets (figures 3.1.5.1 and 3.1.5.2).

Based on the available information and awaiting new information on the species stock identity, the WG agreed to delimit the area for the joint assessment around the Strait of Gibraltar area where 90% of the landings come from.

3.2. **Sampling methodology:**

3.2.1. **Improvement in Morocco (random sampling in different boats).**

Ms S. Belcaid (INRH) outlined the Morocco’s sampling plan main characteristics. The sampling plan adopted by the Laboratory of the Fisheries Resources of the INRH Regional Center in Tangier use as sample unit the catch per boat at fishing port. The boat’s sampling is done randomly (1 out of 10 boats, once a week). Total length distributions in each sampled vessels is performed with a unique random sample on the total catches of the chosen vessel. Fork length samples were taken with an ictiometer. Since March 2012, two fish lengths samplings are taken (fork and total lengths) to standardise sampling measures with the Spanish samples. The WG agreement is that the Spanish and Morocco’s length samplings will be carried out to the total length in the near future. However, Mr S. Benchoucha stressed that some human and logistic constraints hinder the proper sampling of this species.

At this moment only the Tangier port has length samples of the majority of the long-liners and few samples of the artisanal fleet. In April 2012, INRH will carry out length distributions samplings for the artisanal catches at the site of Dikky. These new samplings might allow extrapolating the length distributions to the total artisanal catches. Although biological sampling was not performed due to financial problems, Table 3.2.1 presents the length sampling intensity in Morocco by year.

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fish measured</td>
<td>274</td>
<td>65</td>
<td>145</td>
<td>635</td>
<td>156</td>
<td>184</td>
</tr>
<tr>
<td>Nº of samplings</td>
<td>23</td>
<td>6</td>
<td>5</td>
<td>15</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 3.2.1.1- *Pagellus bogaraveo* length samplings frequency by year in Morocco.
Mr Gil (IEO) outlined the Spanish length sampling protocol and the main characteristics. The sampling plan, adopted by IEO, uses as sampling units the commercial categories. The samplings of the different categories are done randomly, two times per month. Total length samples were taken with an ictiometer. Since 1997, ad hoc monthly length samplings from the different commercial sizes are performed to estimate the length distribution of landings (2 per month) in the most important fishing ports (Algeciras, Tarifa and Conil). Previous length distributions (1983-1996) were estimated by raising categorized length distribution to landings by commercial size. At the end of 1989 there was a change in the classification of commercial categories, so the first years (1983-1989) should be taken into account only as a proxy. Table 3.2.1.2 presents the length sampling intensity in Spain by year since 2001. Data between 1997 and 2000 were not available at this meeting. Since 2009, biological samples are not available due to financial problems.

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fish measured</td>
<td>7000</td>
<td>8390</td>
<td>6594</td>
<td>6530</td>
<td>6564</td>
<td>6722</td>
<td>6452</td>
<td>6669</td>
<td>5777</td>
<td>5652</td>
<td>6713</td>
</tr>
<tr>
<td>Nº of samplings</td>
<td>10</td>
<td>24</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>31</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 3.2.2.2: *Pagellus bogaraveo* length samplings frequency by year in Spain.

3.2.3. Needs and possibilities to the standardization of biological and statistical sampling protocols in Morocco and Spain.

The WG discussed on the problems to standardise the sampling protocols in Morocco and Spain. The sampling unit in Morocco is the vessel and in Spain the commercial category. A WD presented deals with the problems of the change of the commercial categories, www.fao.org/pdfs/occasional_papers/CopeMedII_ArtFiMed_OP11.pdf. The WG agreed that this issue should not become a problem as the samples are taken before the classification by commercial categories in Morocco and in the Spanish case all commercial categories are sampled at port.

The WG discussed on the best protocol to conduct the sampling process, the vessel or the commercial category, recognizing the difficulties to standardise the length samplings protocols since the commercial categories of blackspot seabream catch data in Morocco are not available. These data are necessary to raise the samplings based on the commercial categories to the total categories catches. The WG then recommended executing a joint study to evaluate which of both sampling methods is statistically more robust before take a decision.

From March 2012, Morocco started the process to change the length sampling measures from the fork length to the total length. This process will allow to transform all the Moroccan length samples series to the total length and a better comparison of the Spanish and Moroccan lengths distribution.

There is a big concern for the WG as, at present, there is not available biological sampling for this resource in Spain and Morocco.

3.2.4. Possibility of collecting new data for the future.

The WG, considering the acting level of data collection in both countries proposed two carry out joint activities to compile new data suitable in future stock assessments. These data
compilation aims to improve future assessment of this resource and, in consequence, its management. The WG recommend carrying out joint activities between the INRH and IEO as follow:

The first one is a Spanish – Morocco project to compile \textit{P. bogaraveo} biological data in the Strait of Gibraltar area. Given that the commercial value of blackspot seabream and therefore the high cost of the biological samples for both countries, the WG recommended to conduct joint biological sampling by the two research institutions (INRH and IEO) once a month. In order to complete an annual cycle, monthly sampling should be performed in an alternative way between the two institutes. Ultimately, both teams will exchange biological data in order to have a common biological database for blackspot seabream shared stock of the Strait of Gibraltar exploited by Morocco and Spain. This new joint activity would allow the two institutions (IEO and INRH) to have available biological data, at low cost for the countries.

The second activity is a Spanish – Morocco project to compile economic data to use in preparing management options for this stock. This kind of data should permit to better understand the social and economic consequences of the different management measures. In this sense, a socioeconomic data collection plan can be established along with the collection of biological data for blackspot seabream in the Strait of Gibraltar area. Data proposed to be collected for this fishery are:

- Data on catch (weight and value) and fishing effort (days at sea, number of months, etc.)
- Data on the social aspects (age composition, number of fishermen/vessel; etc.)
- Data on the economics (invested capital, prices, costs, benefits, revenues, etc.)
- Data on the means of production (boats, motors, gears, etc.)


4.1. Discussion on the stocks assessment already done for \textit{P. bogaraveo} and stocks assessment alternatives based on the previous discussed existing information in each country.

The WGs revised the assessments presented in ICES and GFCM-SAC meetings in 2010. The ICES assessment was based on the Virtual Population Analysis (VPA) and was carried out with Lowestoft Suit software (Darby and Flatman, 1994). This assessment was made with the Div IXa Spanish and Portuguese catch data. This analytical assessment has the disadvantage of using a single (combined) age-length key (ALK) for all series analyzed. Hence a constant growth is assumed for the whole period, thus producing not realistic or appropriate results. The WG decided not to update this assessment because of the previous exposed reason and the lack of biological and tuned data for the last few years.

The GFCM-SAC assessment was based on a Length–Cohort Analysis (LCA) and was carried out with the VIT software (Lleonart and Salat, 1992). Moroccan and Spanish length distributions data in 2005-2007 were used in the assessment and the biological parameters were obtained from the Spanish information. This model assumed equilibrium conditions. The use of this software is only recommended when the model is applied to short time series of consecutive annual data and the resulting variation in the estimated stock parameters appears reasonably low. (H.J.Ratz et al, 2010).

Based on the data assessment available at this meeting (Table 3.1.1), the WG decided to update the LCA assessment with the Moroccan and Spanish length frequencies (2009-2011) using the VIT software. The biological parameters were the same used in the 2010 assessment (Gil, 2006) because there was no new information available for these data.

The WG agreed to run an assessment using the Depletion-Corrected Average Catch (DCAC). This is a method to estimate sustainable yields for data-poor fisheries (MacCall, A. D. 2009).
This method is based on the idea that the average catch has been sustainable if abundance has not changed. DCAC corrects that average if abundance has increased or decreased. The magnitude of the correction depends on the approximate natural mortality rate, which should be around 0.2 or smaller to apply this model. Uncertainty is recognized in all of the parameters of the model, and is reflected in the output probability distribution.

The WG decided to run a Yield Per Recruit analyses (YPR) (Beverton and Hold, 1957) and Spawning Stock Biomass per Recruit (Gabriel et al, 1989) to calculate the biological reference points $F_{\text{max}}$, $F_{0.1}$ and $F_{40\%}$ with the output results of the VIT, by using the NOAA Yield Per Recruits 2.7 software (NOAA Fisheries Toolbox).

In the future it will be interesting to explore other alternative assessment methods for the blackspot seabream in the Strait of Gibraltar area such as non equilibrium production models, using available catch and effort data for this species. This will enable us to make comparison with the assessment methods currently used.

4.2. Data preparation for the P. bogaraveo joint assessment exercise.

4.2.1. Preparation of common data base.

The WG decided to create a database with the available Moroccan and Spanish assessment data. The created database has information on total catches, length distribution and effort by country. This database will allow future Working Groups to save time in preparing data to carry out the assessments. All data used in the different assessments made during this WG were stored in this database. The WG proposed that this database could be stored in the CopeMed web page under some restrictions (see point 6 of this report).

4.2.2. Assessment methodologies and ad hoc software.

The WG decided to update the LCA assessment with the Moroccan and Spanish length frequencies (2009-2011) using the VIT software. VIT is a program created for the analysis of fisheries where information is limited. VIT program was designed to analyze exploited marine populations based on catch data, structured by ages or sizes, from one or several gears. The main assumption is that of the steady state because the program works with pseudo-cohorts, therefore it is not suitable for historic series. From the catch data with some auxiliary parameters and using VPA, the program rebuilds the population and mortality vectors. After this first step, the user has several analysis tools and reporting options available: obtaining comprehensive VPA results, Yield-per-Recruit analyses based on the fishing mortality (F) vector, analyses of sensitivity to parameters inputs, and transition analyses - outside the equilibrium - due to changes in the pattern of exploitation or recruitment. All these analyses are applicable to studies of competition among different kinds of gears. The VIT software and manual used in this WG can be downloaded in the following address: http://www.faocepemed.org/old_copemed/en/activ/infodif/vit.htm.

The DCAC formula is an extension of the potential-yield formula, and it provides useful estimates of sustainable yield for data-poor fisheries on long-lived species. Over an extended period (e.g. a decade or more), the catch is divided into a sustainable yield component and an unsustainable “windfall” component associated with a one-time reduction in stock biomass. The size of the windfall is expressed as being equivalent to a number of years of sustainable production, in the form of a “windfall ratio”. The DCAC is calculated as the sum of catches divided by the sum of the number of years in the catch series and this windfall ratio. Input information includes the sum of catches and associated number of years, the relative reduction in biomass during that period, the natural mortality rate and the assumed ratio of FMSY to M. These input values are expected to be approximate, and based on the estimates because of their imprecision. Uncertainty can be integrated by Monte Carlo exploration of DCAC values.
The DCAC software and manual used in this WG can be downloaded in the following address: http://nft.nefsc.noaa.gov/Download.html.

The WG decided to run a Yield Per Recruit analyses (YPR) (Beverton and Hold, 1957) and Spawning Stock Biomass per Recruit (SPR) (Gabriel et al, 1989) to calculate the biological reference points $F_{\text{max}}$, $F_{0.1}$ and $F_{40\%}$ with the output results of the VIT. The YPR and SPR software and manual used in this WG can also be downloaded in the following address: http://nft.nefsc.noaa.gov/Download.html.

### 4.2.3. Selection of biological data and parameters.

Catch data, length distributions, VIT age distributions, mean weights, maturity ogive and natural mortality used in the assessment are presented in Annex III.

The WG decided to update the LCA assessment with the Tangier (Morocco) and the Spanish total length frequencies (2009-2011) to make a pseudo-cohort (Annex III, Table 2).

The biological parameters were the same used in the 2010 assessment because there is not new biological information available for these data. For the length-weight relationship and for the von Bertalanffy growth function, the parameters values used are presented in Table 4.2.3.1:

<table>
<thead>
<tr>
<th>Length-weight relationship</th>
<th>von Bertalanffy</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>0.014</td>
</tr>
<tr>
<td>b</td>
<td>3.014</td>
</tr>
<tr>
<td>K</td>
<td>0.162 year$^{-1}$</td>
</tr>
<tr>
<td>Linf</td>
<td>62 cm</td>
</tr>
<tr>
<td>$t_0$</td>
<td>-0.34</td>
</tr>
</tbody>
</table>

Table 4.2.3.1- Length-weight relationship and von Bertalanffy growth function parameters values used in the assessment.

Female $L_{50}$ maturity was assumed = 35.73 cm. This value comes from fitting the observed values to a logistic function. The values of the parameters of the logistic function were the following (Table 4.2.3.2):

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>-14.47</td>
</tr>
<tr>
<td>b</td>
<td>0.40</td>
</tr>
<tr>
<td>R square</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Table 4.2.3.2- Parameters’ values of the logistic function fitted to the observed maturity data and $R^2$.

Natural mortality was assumed constant for all ages, length classes and years. The value assumed in this assessment was 0.2. Three different values for the terminal fishing mortality in the VIT program were tried: 0.3, 0.5 and 0.8. The DCAC was run for the catches from 1983 to 2011 (Annex III, Table 1). The values of the parameters being used and their variability are presented in Table 4.2.3.3:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Distribution</th>
<th>STD Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Mortality</td>
<td>0.2</td>
<td>Lognormal</td>
<td>0.5</td>
</tr>
<tr>
<td>FMSY to M</td>
<td>0.8</td>
<td>Lognormal</td>
<td>0.2</td>
</tr>
<tr>
<td>Depletion Delta</td>
<td>0.47</td>
<td>Lognormal</td>
<td>0.3</td>
</tr>
<tr>
<td>BMSY / B0</td>
<td>0.4</td>
<td>Beta</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 4.2.3.3- Parameters values used in the DCAC model and their assumed variability distribution.
The input values used in the YPR and SPR analysis for the exploitation pattern were obtained from the VIT results. Exploitation patterns, weights and maturities by age are presented in Table 4.2.3.4 (weights are kg):

<table>
<thead>
<tr>
<th>Age</th>
<th>Select. F</th>
<th>Select. M</th>
<th>Stock Weight</th>
<th>Catch Weight</th>
<th>SSB Weight</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.002</td>
<td>1</td>
<td>0.175</td>
<td>0.175</td>
<td>0.175</td>
<td>0.010</td>
</tr>
<tr>
<td>2</td>
<td>0.160</td>
<td>1</td>
<td>0.345</td>
<td>0.345</td>
<td>0.345</td>
<td>0.044</td>
</tr>
<tr>
<td>3</td>
<td>0.610</td>
<td>1</td>
<td>0.553</td>
<td>0.553</td>
<td>0.553</td>
<td>0.228</td>
</tr>
<tr>
<td>4</td>
<td>0.548</td>
<td>1</td>
<td>0.794</td>
<td>0.794</td>
<td>0.794</td>
<td>0.612</td>
</tr>
<tr>
<td>5</td>
<td>0.346</td>
<td>1</td>
<td>1.048</td>
<td>1.048</td>
<td>1.048</td>
<td>0.869</td>
</tr>
<tr>
<td>6</td>
<td>0.278</td>
<td>1</td>
<td>1.301</td>
<td>1.301</td>
<td>1.301</td>
<td>0.958</td>
</tr>
<tr>
<td>7</td>
<td>0.370</td>
<td>1</td>
<td>1.544</td>
<td>1.544</td>
<td>1.544</td>
<td>0.981</td>
</tr>
<tr>
<td>8</td>
<td>0.480</td>
<td>1</td>
<td>1.773</td>
<td>1.773</td>
<td>1.773</td>
<td>0.992</td>
</tr>
<tr>
<td>9</td>
<td>1.000</td>
<td>1</td>
<td>1.979</td>
<td>1.979</td>
<td>1.979</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 4.2.3.4- Input values by age used in the YPR and SPR analysis. F and M selectivity, stock, catch and Spawning Stock Biomass (SSB) weights in kg and maturity proportion.

4.3. Assessment exercise.

4.3.1. Main results, conclusions and recommendations.

With the available data, the WG tried different assessment models. The first one was an update of assessment made in 2010 with the VIT model. The values of the different parameters used in this model were presented in Tables 4.2.3.1 and 4.2.3.2. The analytical assessment exercise was carried out using pseudo-cohorts (2009-2011) with the VIT software. The data used to make the pseudo-cohort were the Tangier and the total Spanish length distributions (Annex III, Table 2). Biological input data for weight, natural mortality (M) and maturity at age were also adopted from the working group (Annex III. Table 4).

LCA and VPA were performed in a first step for all size length composition. Figure 4.3.1.1 presents the F values obtained by length. Taking into account the anomalous F variation obtained in the older length classes and the small number of fish in these classes, the WG decided to make a plus group from the size class = 50 cm.

![Figure 4.3.1.1- VIT results for F, by length classes.](image-url)
After this first step, the WG suggested to carry out the analysis using three different terminal F values: 0.3, 0.5 and 0.8. To point out that ages are relative to the first length of the analyses. Figure 4.3.1.2 shows the results for F, by age and by length, of the three different values of terminal F.

Figure 4.3.1.2- VIT results for F by length classes and age for three different levels of terminal F (0.3, 0.5 and 0.8).

It can be observed that with the new plus group, F values for the older ages and length groups are more stable and the F values for most important lengths (30-45) and ages (3-7) present in the catches are quite similar and independent of the terminal F assumed. The VIT estimates of fishing mortality at age and the fishing mortalities averaged over the ages 2-6 (Fbar) are listed in Table 4.3.1.1.

<table>
<thead>
<tr>
<th>Class age</th>
<th>Ft_0.8</th>
<th>Ft_0.5</th>
<th>FT_0.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>0.086</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td>3</td>
<td>0.336</td>
<td>0.305</td>
<td>0.262</td>
</tr>
<tr>
<td>4</td>
<td>0.312</td>
<td>0.274</td>
<td>0.225</td>
</tr>
<tr>
<td>5</td>
<td>0.204</td>
<td>0.173</td>
<td>0.136</td>
</tr>
<tr>
<td>6</td>
<td>0.169</td>
<td>0.139</td>
<td>0.105</td>
</tr>
<tr>
<td>7</td>
<td>0.234</td>
<td>0.185</td>
<td>0.135</td>
</tr>
<tr>
<td>8</td>
<td>0.322</td>
<td>0.24</td>
<td>0.164</td>
</tr>
<tr>
<td>9</td>
<td>0.8</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Fbar2-6</td>
<td>Ft_0.8</td>
<td>Ft_0.5</td>
<td>FT_0.3</td>
</tr>
<tr>
<td></td>
<td>0.2214</td>
<td>0.1942</td>
<td>0.1596</td>
</tr>
</tbody>
</table>

Table 4.3.1.1- VIT estimates of fishing mortality (F) by age and the fishing mortalities averaged over the ages 2-6 (Fbar) for the three different levels of terminal F (0.3, 0.5, 0.8).

The group accepted to take the VIT results for the terminal F = 0.5 as the best to try an YPR calculation with the NOAA software. The inputs for YPR analysis were presented in Table 4.2.3.4. In the Spawning Stock Biomass per Recruit (SSB/R) analyses, the WG decided to use, as biological reference point, 40% of the virgin SSB base on studies made by Mace and Sissenwine (1993). The results of this study showed that this level of virgin SSB appears to be precautionary and sustainable and can be used as F_{msy} proxy for most of the demersal species analyzed.
Results of the YPR and SSB/R analyses are showed in Figure 4.3.1.3 and Table 4.3.1.2. These results displayed that the YPR curve shape is quite flat on its maximum. The main problem of the flat top curves is related with the undefined $F_{max}$ value. Big F range gives similar yield per recruit as the maximum and small uncertainty in $F_{max}$ estimation can cause big problems. This is not currently considered precautionary because if the fishing effort increases, the Y/R curve does not show any increase, while the SSB/R curve shows a big decrease. The proposed proxy value for $F_{msy}$ in these cases is $F_{0.1}$. For the SSB/R analysis, $F_{40\%SSB}$ is usually adopted as $F_{msy}$ proxy in demersal species like the blackspot seabream.

Figure 4.3.1.3- Yield Per Recruit (YPR) and Spawning Stock Biomass (SSB) per Recruit by F. F values refers to F at age 9.

<table>
<thead>
<tr>
<th>Reference Points</th>
<th>F</th>
<th>YPR</th>
<th>SSBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>F Zero</td>
<td>0</td>
<td>0</td>
<td>4.32697</td>
</tr>
<tr>
<td>F-0.1</td>
<td>0.2903</td>
<td>0.315</td>
<td>1.80879</td>
</tr>
<tr>
<td>F-Max</td>
<td>0.7608</td>
<td>0.35819</td>
<td>0.77204</td>
</tr>
<tr>
<td>F at 40 %MSP</td>
<td>0.3102</td>
<td>0.32073</td>
<td>1.73116</td>
</tr>
</tbody>
</table>

Table 4.3.1.2- Fishing mortality Biological References Points values and their Yield Per Recruit (YPR) and Spawning Stock Biomass (SSB) per Recruit.

DCAC model was run with the parameter values presented in Table 4.2.3.3 and the catch in the period 1983-2011 (Annex III, Table 1). The parameter values were chosen based on the values proposed by MacCall (2009). Depletion Delta value was estimated based on the 2010 VPA results. The WG considered that the $P. bogaraveo$ fishery started in 1983 and that, at this moment, there was the virgin biomass level. The actual biomass level in percentage of the virgin biomass was considered that was equivalent to the 2010 VPA results. Maximum Sustainable Yield (MSY) and 10% percentile estimated by the DCAC are presented in Table 4.3.1.3.
Table 4.3.1.3- Maximum Sustainable Yield (MSY) and 10% percentile estimated by the DCAC.

<table>
<thead>
<tr>
<th>MSY (ton)</th>
<th>5%</th>
<th>median</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>198</td>
<td>329</td>
<td>474</td>
</tr>
</tbody>
</table>

Fbar for ages from 2 to 6 was calculated for all conducted models to compare the results among them. Yields for the different F Biological Reference Points were calculated based on the mean recruitment estimated by the VIT (1,500,764 recruits). Results of F and catches based on the mean recruitment are presented in the Table 4.3.1.4.

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean F 2009-2011</th>
<th>F-01</th>
<th>F-Max</th>
<th>F at 40% MSP</th>
<th>DCAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.080</td>
<td>0.046</td>
<td>0.122</td>
<td>0.050</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.305</td>
<td>0.177</td>
<td>0.464</td>
<td>0.189</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.274</td>
<td>0.159</td>
<td>0.417</td>
<td>0.170</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.173</td>
<td>0.100</td>
<td>0.263</td>
<td>0.107</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.139</td>
<td>0.081</td>
<td>0.212</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.185</td>
<td>0.107</td>
<td>0.281</td>
<td>0.115</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.240</td>
<td>0.139</td>
<td>0.365</td>
<td>0.149</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.500</td>
<td>0.290</td>
<td>0.761</td>
<td>0.310</td>
<td></td>
</tr>
<tr>
<td>Fbar (2-6)</td>
<td>0.194</td>
<td>0.113</td>
<td>0.295</td>
<td>0.120</td>
<td></td>
</tr>
<tr>
<td>Catches (ton)</td>
<td>411</td>
<td>473</td>
<td>538</td>
<td>481</td>
<td>331</td>
</tr>
</tbody>
</table>

Table 4.3.1.4- Exploitation pattern, mean F for 2 to 6 ages (Fbar 2-6), estimated catches based on the mean recruitment calculated by VIT for F (2009-2011), F Reference Points (F_max, F_0.1, F_40%), and MSY estimated by the DCAC model.

The mean catches in the 2009-2011 period was 543 tons. This catch level is greater than the MSY calculated by the DCAC (331 tons) and the estimated catches for the F_0.1 (473 tons) or F_40% (481 tons), considered by the WG as the best proxies for F_悉尼. The WG pointed out that the three catch values were estimated with different methods and assumptions. The differences between the DCAC and the VIT catch estimation could be related, among others, to the equilibrium assumption made in the VIT model.

The actual level of fishing mortality (Fbar = 0.19) is higher than the values calculated for the F_悉尼 proxies (F_0.1 or F_40% = 0.12). Based on these results, the WG recommended that the actual effort level should be reduced to set the fishing mortality level to a more sustainable value.

4.3.2. Management Plans: situation of recovery plans in which P. bogaraveo is included.

At present, there is not a specific management plan for this species. The Spanish P. bogaraveo management plan ended on 31 December 2011 and there has not been approved a new one. The main features of the old plan were presented in item 3.1.1. Being one of the measures of this plan the TAC and the WG stressed that in the last years, the catches exceeded the TAC. In
the Atlantic area, a minimum landing size of 35 cm (total length) shall be respected. However, 15% of landings may have a minimum landing size of 30 cm (total length).

Spanish regulation in the Mediterranean Sea: the minimum size of the specimens of blackspot seabream caught in the regulated area shall not be less than 33 centimeters in length or 350 grams. In any case, all the provisions of COUNCIL REGULATION (EC) No 1967/2006 of 21 December 2006, concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, and Royal Decree 560/1995 of 7 April 1995, setting out minimum sizes of certain fish species, compels to fulfill the previous regulations. Blackspot seabream specimens undersized cannot be retained on board, transhipped, landed, downloaded or deposit but to be returned to sea immediately after capture.

In Morocco there is not a specific management plan for this species. There are only general measures for the different fisheries carried out in the Strait of Gibraltar area. The unique direct measure for *P. bogaraveo* is the minimum landing size of 25 cm fork length, equivalent to 28 cm total length. This minimum landing size is inferior to the measure set by Spain.

The WG recommended to rationalize the management of this resource by establishing the same or similar management measures in both countries.

4.4. Preparation of results of the assessment for the two countries administrations and the GFCM.

4.4.1. Responsible expert to prepare/distribute the information in each country.

The WG appointed Ms Sadia Belcaid as the Morocco expert and Mr Juan Gil as the Spanish expert to prepare and distribute the information in both countries.

4.4.2. Responsible to present the results to the demersal WG of the SAC-GFCM.

The WG elected Ms Sadia Belcaid to present the assessment results of this WG to the demersal SAC-GFCM after the acceptance of the INRH Direction and Secretariat.

4.4.3. Responsible to present the results to the ICES WG on P. bogaraveo.

The WG appointed Mr Juan Gil to present the assessment results of this WG to the ICES Working Group on the Biology and Assessment of Deep Sea Fisheries Resources (ICES WGDEEP).

4.4.4. Dates to draft documents for distribution and revision.

The WG agreed to distribute the first draft of the WG report before April 10th and all the comments regarding this draft should be made before April 13th. The final version of the WG report should be finished by April 16th.

The Working Documents with the assessment results to present in the ICES and GFCM meetings should be delivered to all participants by the responsible before presenting them.

5. Draft of the five years joint workplan between the Moroccan and Spanish institutes (INRH and IEO) for *P. bogaraveo* stock in the Strait of Gibraltar area.

5.1. ToRs for a Research Agreement on *P. bogaraveo* of the Strait of Gibraltar area between INRH and IEO.

The WG recommended that to establish a joint work plan between the two institutions, experts on this issue should be identified. Although the WG acknowledged that INRH and the IEO
should collaborate in diverse scientific activities, most of them are presented in this report as WG recommendations. This collaboration would allow saving money and time and it should be a good way to improve the collaboration and formation of the staff of both institutions. The WG agreed that different training courses for the scientists involved in this fishery is essential. The WG appointed the responsible to draft the general lines and objectives of the main areas identified. Ms Sadia Belcaid was elected to draft the biological sampling plan and Mr Aziz Lamtai to draft the socio-economic data collection plan.

5.2. Responsible experts from each Institution.

The WG designated Mr Said Benchoucha (INRH) and Mr Juan Gil (IEO) as representatives of both institutions to encourage and coordinate the collaboration between the IEO and INRH in blackspot seabream fishery matters.

6. Creation of an area for documentation and networking in the CopeMed II webpage.

The WG recommended the creation of an area for documentation (documents generated in the WGs and useful and/or published information) for this stock under the CopeMed II webpage. It was also suggested to create a common database with all the assessment information but with restricted access to the two institutions involved (INRH and IEO) data.

7. Other matters.

The WG suggested to organize training courses on stock assessment’s models for scientists working on blackspot seabream in order to improve their knowledge on assessment and biology of this species. The experts of the INRH expressed the convenience of harmonizing the working methods and the biology studies on *P. bogaraveo* with the IEO experts by carrying out a workshop. The WG recommended that this training should be accomplished in the frame of the CopeMed II project. The ToRs of this training course should be drawn up by the experts of the IEO and the INRH with technical support of CopeMed II.

7.1. Other Activities related.

Mr Fernando García presented the Location and Track System for Andalusian Fishing Vessels (SLSEPA) [http://www.faocopemed.org/pdf/events/EV_12_03_19_Location and Track System for Andalusian Fishing Vessels.pdf](http://www.faocopemed.org/pdf/events/EV_12_03_19_Location and Track System for Andalusian Fishing Vessels.pdf). The SLSEPA has two main features: low cost transmission of location data and high frequency in sending location data (every three minutes). The SLSEPA was created in order to achieve three basic objectives: evaluation and monitoring of the fishery resources, monitoring compliance with legal provisions and safety of life at sea.

The operation of SLSEPA is based on the location data (latitude, longitude and time) provided by GPS satellites. The control centre is based at the competent authority at regional level in fisheries (Consejería de Agricultura y Pesca) of the Junta de Andalucía and its subsequent interpretation is conducted by the appropriate computer applications. The SLSEPA allows a high frequency in sending location data (via GPRS every three minutes) and it is essential, at very low cost compared with other similar systems. The device receives the vessel location signals (called Satellite-tracking Devices On-board, ERE).

The interpretation of the data received may represent a cartographic display of the vessels’ position, both in real time and in an early time range. At the same time, we may infer if fishing operations are carried out in prohibited areas or in closed seasons and the departure and arrival time of ships from the fishing port, among other parameters. By crossing these data
with those collected by the Andalusian Fisheries Statistics, related to landings at the fish market, the wealth of the fisheries, where they operate, and its evolution and influence of certain factors in a certain time period can be determined.

The third objective is related to the Safety of Life at Sea. SLSEPA, through an emergency button, connects with the 112 Andalusian Emergency Service, activating a protocol for emergency and rescue at sea, with accurate information on the position and coordinates of the emergency situation and the itinerary followed by the boat in the event of a ship break.

In early July 2006, 103 vessels included in the census were controlled by the Location and Track System for Andalusian Fishing Vessels (SLSEPA) of the Department of Agriculture and Fisheries. In 2010, 95 Andalusian fishing vessels targeting blackspot seabream have installed the device ERE: 61 of them based in Tarifa, 23 in Algeciras and the remaining 13 in Conil and Barbate. In Ceuta (Spain), 8 boats (2011) were included in the census of authorized fishing vessels targeting blackspot seabream in the Strait of Gibraltar area, which has no control procedure.

SLSEPA have different applications for the management of fishery resources. Its general purpose is the collection of data to be informed of the current status of the fishery related to the blackspot seabream fleet in the Strait of Gibraltar area, from the analysis of the fishing effort and its relation to fish production landed (catches). Other purposes are the following:

- Location and demarcation of the main fishing areas.
- Assessment of fish and economic production for target species and main accessory species.
- Estimated effort expended by the fleet in each fishing area and its temporal evolution.
- Estimation of fishing and economic performance in each fishing area for the blackspot seabream and main accessory species and their evolution over time.
- Estimation of the degree of compliance with current regulations by the fleet associated with this fishery.

The main management results achieved by the SLSEPA have been the following:

Six fishing areas for the Andalusian Fleet have been identified in the Strait of Gibraltar area (Figure 3.1.5.2). The area with greater surface, fishing effort and fish production has been V-04. Both the fish yield (kg/fishing trip) and economic yield (€ / fishing trip) is larger in area V-06. It has been detected a clear segregation of fishing area bounded by the fleet of each port. The performance shows a clear seasonality, being higher at summer months and at the end of the year. In 2009, the fishing effort was greater in all fishing areas. Catches have increased in 2009, but economic performance has been negatively affected in 2009, particularly in major areas where blackspot seabream is captured (V-06).

Mr Fernando García also presented the general lines of the new project “ALBORAN”. The Agriculture and Fishery Department of the Junta de Andalucía is one of the partners of this European project called Project Alboran (Outside boundaries). The budget is 183.000 euros and part of this amount is assigned to the installation of around ten green boxes. Morocco is participating in this project and can provide some vessels as a new experience.

The WG discussed about the new project “ALBORAN” and the possibility of installing the green boxes in the Moroccan fleet with the project funding. **The WG recommended that the green boxes should be installed in the most important Moroccan fleets targeting blackspot seabream.** In order to achieve this objective, the WG proposed to install the green boxes in the long-line and artisanal Tangier fleet and in the artisanal Ksar Sghir fleet.
8. Compilation of conclusions and recommendations

The second meeting of the FAO CopeMed II working group on blackspot seabream (*Pagellus bogaraveo*) of the Strait of Gibraltar area between Spain and Morocco (WGPG) was held in the Atlas Rif Hotel in Tangier (Morocco) from 19 to 21 March 2012. The main objective of this Working Group was to carry out a joint assessment of the red seabream in the Strait of Gibraltar area to present it to the International Council for the Exploration of the Sea (ICES) and to the General Fisheries Commission for the Mediterranean (CGPM). 4.3.1. The main WGPB results, conclusions and recommendations were the following:

The WG recommended carrying out a joint study to establish the *P. bogaraveo* stock structure in the ICES area IXa and in the GFCM Alboran Sea areas. This study should be the base to delimit the stock area and to determine the management area.

The WG had some discussions about the problems to standardize the sample protocols in Morocco and Spain. The Moroccan sample unit is the vessel whereas in the Spanish case is the commercial category. The WG recommended performing a study to evaluate which of both sampling methods is statistically better before choosing one of them.

There was a big concern for the WG as, at present, there is not available biological sampling for this resource in Spain and Morocco.

The WG proposed two new activities between Spain and Morocco to compile updated data to use in future assessments. These data should improve the assessment and management of this resource.

The first one is a Spanish – Morocco project to compile *P. bogaraveo* biological data in the Strait of Gibraltar area. Given that the commercial value of blackspot seabream and therefore the high cost of the biological samples for both countries, the WG recommended to conduct joint biological sampling by the two research institutions (INRH and IEO) once a month. This new joint program would allow the two institutions (IEO and INRH) to have available biological data, is no available at this moment, at low cost for the countries.

The second activity is a Spanish – Morocco project to compile economic data to use in the management of this stock. This kind of data should permit to better understand the social and economic consequences of the different management measures. In this sense, a socioeconomic data collection plan can be established along with the collection of biological data for blackspot seabream in the Strait of Gibraltar area.

The WG appointed the responsible to draft the general lines and objectives of the main areas identified. Ms Sadia Belcaid was nominated to draft the biological sampling plan. Mr Aziz Lamtai was elected to draft the socio-economic data collection plan. The WG appointed Mr Said Benchoucha (INRH) and Mr Juan Gil (IEO) as representatives of both Institutions to encourage and coordinate the collaboration between the IEO and INRH in blackspot seabream fishery matters.

The WG recommended the creation of an area for documentation (documents generated in the WGs and useful and/or published information) for this stock under the CopeMed II webpage. It was also suggested to create a common database with all the assessment information but with restricted access to the two institutions involved (INRH and IEO) data.

The WG decided to create a database with the available Moroccan and Spanish assessment data. The created database has information on total catches, length distribution and effort by
country. This database will allow future Working Groups to save time in preparing data to carry out the assessments. All data used in the different assessments made during this WG were stored in this database. The WG proposed that this database could be stored in the CopeMed web page under some restrictions.

With the available data, the WG conducted three different assessment models. The first one was an update of assessment made in 2010 with the VIT model. The group accepted to take the VIT results to undertake a Yield per Recruit and Spawning Stock Biomass per Recruit analysis to calculate the biological reference points. The WG agreed to run an assessment using the Depletion-Corrected Average Catch (DCAC). This is a method to estimate sustainable yields for data-poor fisheries.

The actual level of fishing mortality ($F_{bar} = 0.19$) is higher than the values calculated for the $F_{msy}$ proxies ($F_{0.1}$ or $F_{40\%} = 0.12$). Based on these results, the WG recommended that the actual effort level should be reduced to set the fishing mortality level to a more sustainable value.

In the future it will be interesting to explore other alternative assessment methods for the blackspot seabream in the Strait of Gibraltar area such as non equilibrium production models, using available catch and effort data for this species. This will enable us to make comparison with the assessment methods currently used.

The WG suggested to organize training courses on stock assessment’s models for scientists working on blackspot seabream in order to improve their knowledge on assessment and biology of this species. The experts of the INRH expressed the convenience of harmonizing the working methods and the biology studies on *P. bogaraveo* with the IEO experts by carrying out a workshop. The WG recommended that this training should be accomplished in the frame of the CopeMed II project. The ToRs of this training courses should be drawn up by the experts of the IEO and the INRH with technical support of CopeMed II.

The WG recommended rationalizing the management of this resource establishing the same or similar management measures in both countries.

The WG discussed about the new project “ALBORAN” and the possibility of installing the green boxes in the Moroccan fleet with the project funding. The WG recommended that the green boxes should be installed in the most important Moroccan fleets targeting blackspot seabream. In order to achieve this objective, the WG proposed to install the green boxes in the long-line and artisanal Tangier fleet and in the artisanal Ksar Sghir fleet.

9. **Date and venue of a new meeting of the WGPG.**

The WGPG suggested to organize the next meeting in Spain in 2014. The WG considered that a three days meeting in March/July would be necessary to have enough time to prepare the results to the GFCM. The WGPG also recommended to prepare the assessment data before the meeting.

10. **Closure of the WG meeting.**

The Chairperson thanked the participants for their contributions and cooperation in the meeting. He thanked Mr Juan A. Camiñas, Coordinator of the FAO-CopeMed II project, for his invitation, his support and for hosting the meeting. The meeting was declared closed at 18:00 hours on 21 March 2012.
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Annex II: Agenda for the WGPG.

1. Opening of the meeting and organizational issues, election of chairperson, reporter and adoption of the Agenda. (14:30).

2. Objectives of the meeting and background information

3. Overview of new available data and progress made on *P. bogaraveo* stock knowledge: (Experts from each country will provide the meeting and the Secretariat (CopeMed) with a report on the progress from the last meeting or available documents, grey or published literature to facilitate the discussions)

   3.1. Fisheries and fleet dynamics and biological information. To tabulate all assessment information available.

      3.1.1. Fishery from Morocco and Spain targeting *P. bogaraveo* in the Gibraltar area: Catch and effort data. Control systems (at sea and in landing ports) and its related legislation. Biological data and information.

      3.1.2. Other national fishery fishing the species in Morocco and Spain: Catch and effort data. Biological data and information.

      3.1.3. FAO-ArtFiMed monitoring system on artisanal fisheries in Dikky (Morocco): main results on the *P. bogaraveo* fishery in the Strait of Gibraltar area: Captures, CPUE, size distribution in the samples.

      3.1.4. Analysis of the commercialisation of *P. bogaraveo* from Dikky (Morocco).

      3.1.5. Information on stock identification, migration and interactions with other stocks in the Strait of Gibraltar and surrounding areas. Geographic representation (Maps) of survey and catch data.

3.2. Sampling methodology:

   3.2.1. Improvement in Morocco (random sampling in different boats).

   3.2.2. Sampling results in Spain. Updating of the sampling database and methodology used.

   3.2.3. Needs and possibilities to the standardization of biological and statistical sampling protocols in Morocco and Spain.

   3.2.4. Possibility of collecting new data for the future.


   4.1. Discussion on the stocks assessment already done for *P. bogaraveo* and stocks assessment alternatives base on the previous discussed existing information in each country.

   4.2. Data preparation for the *P. bogaraveo* joint assessment exercise.

      4.2.1. Preparation of common database.

      4.2.2. Assessment methodologies and ad hoc software.

      4.2.3. Selection of biological data and parameters.
4.3. Assessment exercise.
   
   4.3.1. Main results, conclusions and recommendations.
   
   4.3.2. Management Plans: situation of recovery plans in which P. bogaraveo is included.

4.4. Preparation of results of the assessment for the two countries administrations and the GFCM
   
   4.4.1. Responsible expert in preparing/distributing the information in each country.
   
   4.4.2. Responsible in presenting the results to the demersal WG of the SAC-GFCM.
   
   4.4.3. Responsible in presenting the results to the ICES WG on P. bogaraveo.
   
   4.4.4. Dates for drafting documents for distribution and revision.

5. Draft five years joint work plan between the Moroccan and Spanish institutes (INRH and IEO) for P. bogaraveo stock in the Strait of Gibraltar.
   
   5.1. ToR for a Research Agreement on P. bogaraveo of the Strait of Gibraltar between INRH and IEO.
   
   5.2. Responsible experts from each Institution.

6. Creation of an area for documentation and networking in the CopeMed web page.

7. Other matters.
   
   7.1. Other Activities related.

8. Date and place of a new meeting of the WGPG.

9. Closure of the WG meeting.
Annex III: Catches, length and weight data used in the assessment.

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Table 1. Strait of Gibraltar area red seabream total catches by country and port for the period 1983-2011.
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Table 2. Red seabream total Length distribution (Spain and Morocco) for the period 2009-2011 in the Strait of Gibraltar area and 2009-2011 pseudo-cohort used in the VIT run.

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Table 3. Pseudo cohort age distributions estimated by slicing by VIT for Strait of Gibraltar area.
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</table>

Table 4. Mean weights (gr), maturity ratio a natural mortality by age used in the assessment.
Annex IV: References.


Mace, P. M., and Sissenwine, M. P. 1993. How much spawning per recruit is enough? Canadian Special Publication of Fisheries and Aquatic Sciences, 120: 101–118.


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