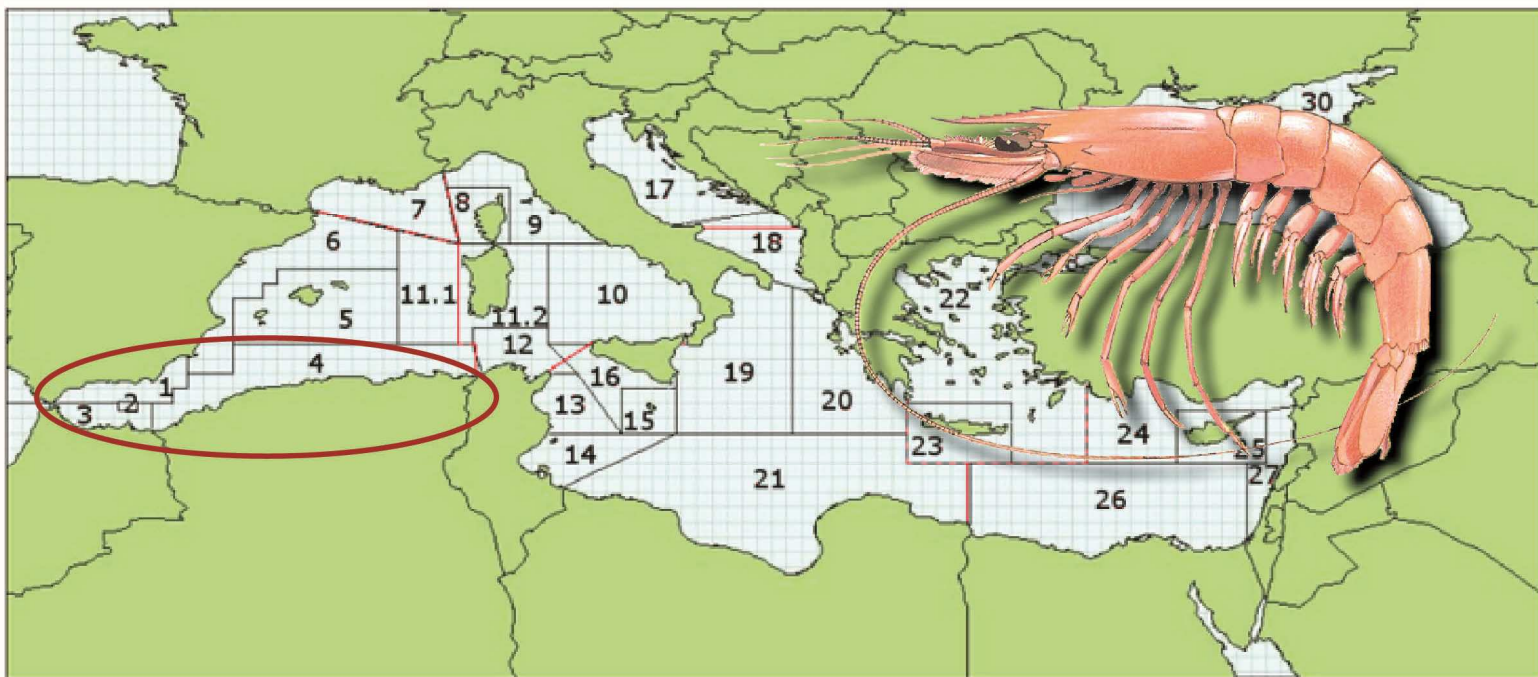


REPORT OF THE FIRST MEETING OF THE WORKING GROUP ON *PARAPENAEUS LONGIROSTRIS* STOCK FOR ALGERIA, MOROCCO AND SPAIN (GSAS 01, 02, 03 AND 04 OF THE GFCM)

**18-19 July 2011
Fuengirola, Malaga, Spain**



**CopeMed II – ArtFiMed Technical Documents N°19
(GCP/INT/028/SPA – GCP/INT/006/EC)**

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October 2011

The conclusions and recommendations given in this document and in other documents in the *Co-ordination to Support Fisheries Management in the Western and Central Mediterranean CopeMed II* Project 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 designation employed and the presentation of material in this publication do not imply the expression of any opinion on the part of Food and Agriculture Organization of the United Nations, FAO, the Government of Spain or the Commission of the European Union concerning the legal status of any country, territory, city or area, or concerning the determination of its frontiers or boundaries. This document has been financed by the European Union and the Government of Spain. The views expressed herein can in no way be taken to reflect the official opinion of the European Union or the Government of Spain.

Preface

The CopeMed II Project on *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 del Mar, and the European Union, represented by the European Commission (EC).

The objective of the project is to maintain the sustainability of the marine 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 supporting their participation in 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 involved 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 supporting the participation of the countries in relevant regional scientific organizations, such as the FAO's General Fisheries Commission for the Mediterranean and the International Commission for the Conservation of Atlantic Tunas (ICCAT). Secondary beneficiaries include the national research institutes, fishers and fishers' associations, and industrial organizations.


Project CopeMed II (FAO-FIRF)
Subdelegación del Gobierno en Málaga
Paseo de Sancha 64, Offices 305-307
29071 Málaga
España

Tel: (+34) 952 989299

Fax: (+34) 952 989252

E-mail: artfimed@fao.org

URL: <http://www.faoartfimed.org>

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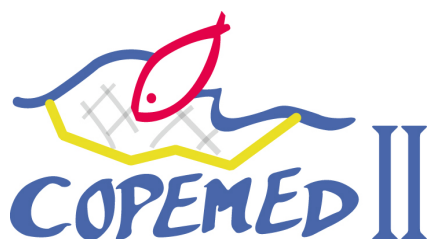
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Comments on this document would be welcomed and should be sent to the Project headquarters:

Project CopeMed II
Subdelegación del Gobierno en Málaga
Paseo de Sancha 64, Offices 305-307
29071 Málaga (España)
copemed@fao.org

Project ArtFiMed
Subdelegación del Gobierno en Málaga
Paseo de Sancha 64, Offices 305-307
29071 Málaga (España)
artfimed@fao.org



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Preparation of this document

This document is the final version of the meeting report of the Working Group on *Parapenaeus longirostris* stock for Algeria, Morocco and Spain prepared by the Project CopeMed II.

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CopeMed II acknowledges the participation of Mediterranean experts from fisheries administrations and fisheries research institutions from Algeria, Morocco, Tunisia and Spain in the meeting for improving knowledge on *Parapenaeus longirostris* stock in the Alboran Sea.

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ABSTRACT

Demersal species represent an important fishery activity for the countries bordering the Alboran Sea and deep-water pink shrimp (*Parapenaeus longirostris*) has great importance in terms of both total landings and economic value. According to the recommendations of the meeting on the definition of priority topics related to demersal and pelagic shared resources in the subregion (Málaga, April 2010) the meeting of the working group on *Parapenaeus longirostris* stock for Algeria, Morocco and Spain was held in Fuengirola (Spain) on July 18-19, 2011.

This meeting aims at contributing to reinforce the subregional collaboration for the identification of the most relevant characteristics of *P. longirostris* stock and the national fleets involved in its fishery in Algeria, Morocco and Spain.

As a first result of this cooperation among research institutions, experts prepared data sets according to formats agreed in the framework of the SAC-SCSA, to identify if there is a single *P. longirostris* stock for GSAs 01, 02, 03 and 04 and to the election of the most appropriate approach and methodology that will allow, for the first time, to conduct a preliminary joint assessment of *P. longirostris* stock among Algeria, Morocco and Spain.

INDEX

1. Background and Introduction	1
2. Opening of the meeting, election of chairman and adoption of the Agenda	1
3. Objectives of the meeting	2
4. National information on <i>Parapenaeus longirostris</i> stock	3
5. Data compilation and <i>Parapenaeus longirostris</i> stock assessment	8
6. Conclusions and recommendations	13
7. Closure of the Working Group	14
Annex I. List of participants.....	16
Annex II. Agenda of the meeting.....	17
Annex III. Terms of Reference of the Working Group on <i>Parapenaeus longirostris</i> shared stock for Algeria, Morocco and Spain (GSA 01, 02, 03 and 04).....	18
Annex IV. Data compilation and <i>Parapenaeus longirostris</i> stock assessment.....	22
Annex V. References.....	70

1. Background and Introduction

The sub-regional working groups (WGs) on Mediterranean shared stocks, organized by CopeMed II project, are of major importance for the reorientation of approaches (moving from single country analysis to joint sub-regional analysis) to stock assessments and the possibility of implementing management plans for the fisheries targeting these shared stocks in the project area.

Due to its high market value, production and its wide distribution in several Mediterranean countries, the deep-water pink shrimp (*Parapenaeus longirostris*) is a major shared resource in the Mediterranean, mainly in Algeria, Spain and Morocco (GSAs 01, 02, 03 and 04 of the GFCM).

P. longirostris is a demersal species characterised by a wide depth distribution, being found at depths ranging from 20 to 700 m. Juveniles and adults of this species have different depth distributions, with the former more abundant on the outer shelf (50-200m) and the latter mainly distributed along the upper slope up to 500 m depth. *P. longirostris* is caught mainly by trawlers on sandy–muddy bottoms, and peaks of abundance have been recorded between 70 and 400 m depth (Fischer et al., 1987). In the central and western Mediterranean, *P. longirostris* has been of great importance in terms of both total landing and economic value. In the Alboran Sea, as a transition area between the Atlantic and the Mediterranean, the influence of Atlantic waters is related with the high richness in crustacean species and is considered (Abelló, Carbonell and Torres, 2002) a possible independent management area for demersal fisheries.

During a first meeting in 2009 (Mazara del Vallo, Italy, 5-7 October 2009), MedSudMed and CopeMed II projects started to conduct joint activities on *P. longirostris* in the Strait of Sicily region. In 2010, a workshop was jointly organized to assess the stock of *P. longirostris* in the Sicily Strait area (Mazara del Vallo, Italy, 13-15 September 2010), with the participation of experts from Italy, Malta, Libya, Tunisia and Algeria. The assessment was presented to the SAC-SCSA in November 2010.

The Sub-regional Demersal Working Group (SRDWG)¹, following the recommendation derived from the 4th CopeMed II Coordination Committee meeting², decided to organize a meeting in Spain on *Parapenaeus longirostris* stock assessment in Fuengirola (Spain) on July 2011.

2. Opening of the meeting, election of chairman and adoption of the Agenda

The first meeting of the working group on *Parapenaeus longirostris* stock for Algeria, Morocco and Spain was held in Fuengirola (Spain) on July 18-19, 2011, kindly hosted by the Instituto Español de Oceanografía, Centro Oceanográfico de Málaga (IEO).

The meeting was called to order by Mr. Juan A. Camiñas, Coordinator of FAO-CopeMed II project, who welcomed and thanked the participation of experts from Algeria, Morocco,

¹ The meeting was the result of CopeMed II cooperation with the FAO Regional Project MedSudMed in the framework of the joint SRDWG created in 2010 by the two projects.

² CopeMed II. 2011. Report of the Fourth Meeting of the CopeMed II Coordination Committee. Madrid, Spain, 28-29 April 2011. CopeMed II – ArtFiMed Technical Documents N°17 (GCP/INT/028/SPA - GCP/INT/006/EC). Málaga, 2011. 56 pp.

Tunisia and Spain research centres: the National Research Centre for the Development of Fisheries and Aquaculture (CNRDPA) of Algeria; the National Institute of Fisheries Research (INRH) of Morocco; the National Institute of Marine Sciences and Technologies (INSTM) of Sfax (Tunisia); the Spanish Institute of Oceanography (IEO) and Project's staff (see list of participants, Annex I). He reminded that the meeting was a recommendation from the CopeMed II Coordination Committee and the GFCM-SAC for the joint stock assessment of the deep-water pink shrimp stock, between Algeria, Morocco and Spain.

He highlighted that the meeting was the result of cooperation with MedSudMed in the framework of the joint SRDWG and of the recommendation coming from the 4th CopeMed II Coordination Committee meeting. He called the attention on the importance to progress in the joint data analysis for fishery target species, particularly on shared stocks because, in his opinion, this is one of the main gaps in fisheries management in the GFCM region.

Mr. O. Jarboui (INSTM), chairperson of the joint CopeMed II-MedSudMed SRDWG was elected chairman of the meeting and Mr. I. Fernández (CopeMed II consultant) as rapporteur.

Finally, the annotated Agenda was presented by the chairperson and unanimously adopted (Annex II). The Terms of Reference for the meeting (Annex III) were also adopted.

3. Objectives of the meeting

The WG meeting aimed to the identification of the most relevant characteristics of the exploited resource and the fleets involved in this fishery in each country and the preparation of data sets according to needs and formats agreed in the framework of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) as well as the reinforcement of the sub-regional scientific synergies and coordination on *P. longirostris* stock assessment within the cooperative framework of the CopeMed II Project and in close collaboration with the twin WG for *P. longirostris* in the Sicily channel.

The main questions identified during the meeting of the WG: need to harmonize data in the countries involved in the assessment; lack of data on *P. longirostris* stock in Algeria; identification of the Operational Units targeting *P. longirostris* according to the GFCM-SAC categories; and the way to work with the demographic structure on *P. longirostris* for better results were recalled.

The WG stressed to bear these problems in mind and with the aim of strengthening regional scientific cooperation, joint research and sub-regional management on *P. longirostris*, in order to solve these problems, agreed on:

- Compile and review all information available on the biological and ecological characteristics of the *P. longirostris* stock.
- Compile and review the information available on this fishery, including defining the relevant Operational Units.
- Appraise the *P. longirostris* stock to identify if it can be considered a shared stock (e.g. movement across the region, fleets exploring common grounds, distribution of eggs and larvae, etc.) and decide if it should be assessed as a shared stock.
- Define the data and information required for the *P. longirostris* stock assessment and decide the units and format to be submitted, according to the SAC-GFCM standards.
- Identify the gaps of the scientific knowledge necessary for carrying out joint assessments of this stock.

- Prepare a scientific programme to address these gaps, in such a way that joint assessments of the *P. longirostris* stock can be carried out in a reasonable time-frame.
- Identify the methods that can be used for the *P. longirostris* stock assessment, given the types of information currently available or to become available in the sequence of the planned scientific programme.
- Identify possible activities to conduct on this shared stock, based on their relative socio-economic importance and total landings in the countries involved, so as to develop a feasible work programme.

4. National information on *Parapenaeus longirostris* stock

National experts presented information currently available on *P. longirostris* landings and fishing effort to achieve the most appropriate methodology to conduct a joint preliminary assessment of *P. longirostris* stock among Algeria, Spain and Morocco.

Fisheries related issues at the sub-regional level, the Operational Units and other elements of the GFCM scientific framework were deeply analyzed by the WG. For the standardization of fishing effort of vessels targeting deep-water pink shrimp the classification of vessels adopted by GFCM was considered.

Information and data available on *P. longirostris* biology, spatial distribution and abundance in the CopeMed II project area was presented by the experts from Morocco and Spain (Fig. 1) in the meeting.

Relevant issues discussed were trends in landing and data quality, availability and frequency of national landings statistics, the importance of species accompanying the targeted resource and fleets characteristics targeting *P. longirostris* in Algeria, Spain and Morocco.

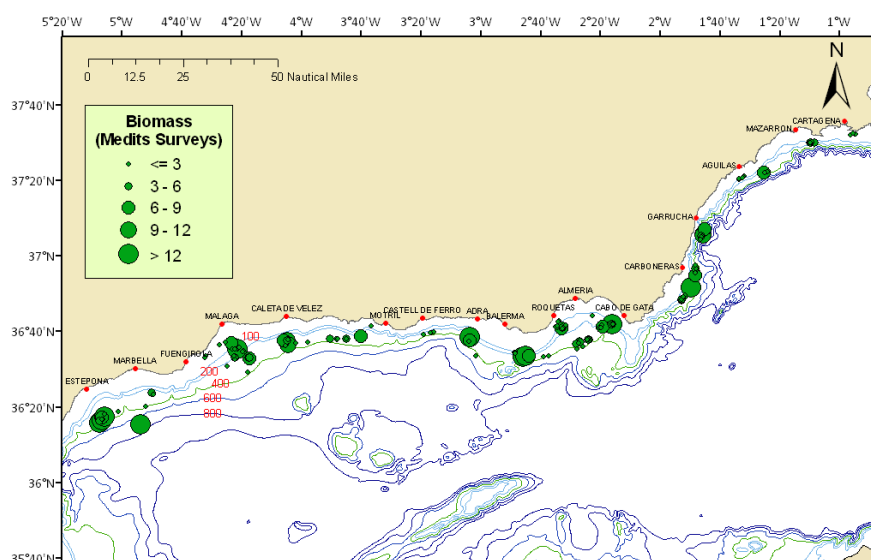


Fig. 1. *P. longirostris* abundance (Biomass) in GSA01 (northern Alboran Sea) based in MEDITS surveys.

4.1. Algeria

Data of total catch and fishing effort in 2000-2010 of the Algerian trawling fleet in GSA04 were presented. Abundance based on survey data, biological parameters, landings and

samplings in 2010 were presented, confirming that with a similar fishing effort there was a great decrease in *P. longirostris* landings from 2002 to 2010 (Table 1 and 2).

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total catch (tonnes)	2696'4	2107'4	1653'6	1383'9	1134	1151'7	849'54	638'49	760	1204	719

Table 1. *P. longirostris* catches (tonnes) in GSA04.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fishing effort (fishing days)			23	151	154	133	113	97	130	130	120

Table 2. *P. longirostris* fishing effort in GSA04.

The demersal species with great commercial interest in Algeria are *Aristeus antennatus* and *Parapenaeus longirostris*, being *P. longirostris* the main commercial species in 19 Algerian fishing ports. *Parapenaeus longirostris* is present throughout the Algerian coast from east to west. Sizes range from 13 to 41 mm in cephalothorax length, with an average catch of 25.27mm. The minimum size of the deep-water pink shrimp is set to 20 mm cephalothorax length. Sex ratio is slightly in favor of females (54.06%). Landings are made in 32 fishing ports. In terms of regulation, namely in Algeria trawling is prohibited from 0-50m depth.

In 2009, the deep-water pink shrimp catches were estimated at around 1204 tons while the following year the production decreased (719 tons). CPUE showed a slight decline between 2009 and 2010 when the catch per unit effort decreased from near 3 kg/vessel to 2kg/vessel. In 2010, 358 trawlers worked in total with the following average characteristics: 19 meters length, 449 hp boat power and tonnage of 45 GRT.

Discussion stressed on completion of the main characteristics of the Algerian fleet (number of vessels, fishing gears used, etc) and defining the fishing areas. Samplings of the last years and catch and fishing effort by fishing port should also be completed.

4.2. Morocco

Main characteristics of the trawling fleet targeting *P. longirostris* in GSA 03 were presented as well as information on distribution of the GSA 03 stock (SIG), fishing gears regulations, protection of sensible areas, catch and fishing effort, landings and samplings, legal landing size regulations, biological parameters and surveys in the period 2000-2010.

The fishing activity in Morocco plays important social and economical roles. Landings are made in 7 fishing ports and 86 artisanal fishery sites. *Parapenaeus longirostris* main landings ports in GSA03 are Nador, Al Hoceima and M'diq (Fig. 2).

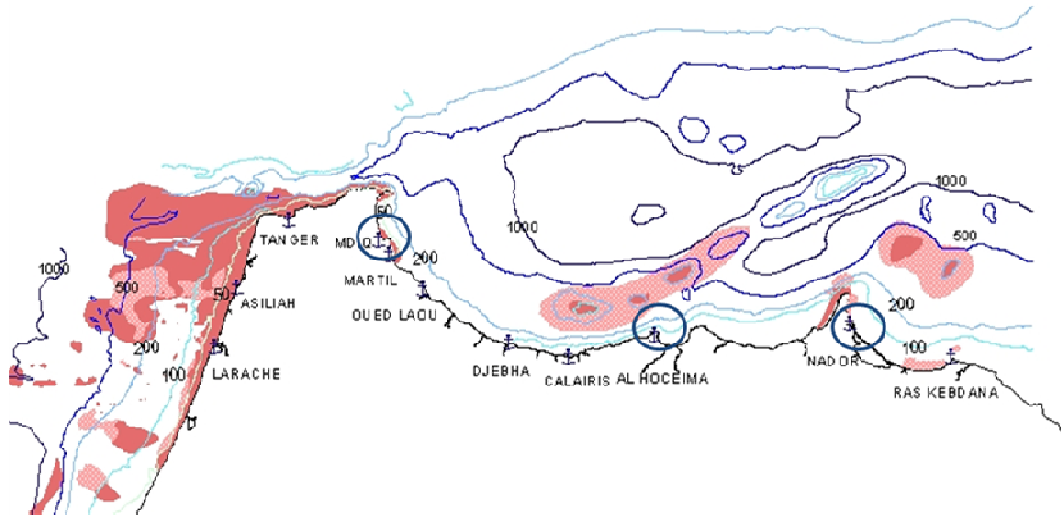


Fig. 2. Map of spatial distribution of *P. longirostris* and main landings ports in GSA03 (Moroccan Alboran Sea).

Moroccan multispecific trawling fleet operates in the whole GSA 03 and *P. longirostris* represents 9 % of the total catch. The *P. longirostris* distribution appears to be homogenous with high concentrations in eastern Nador and around M'diq (Fig. 3).

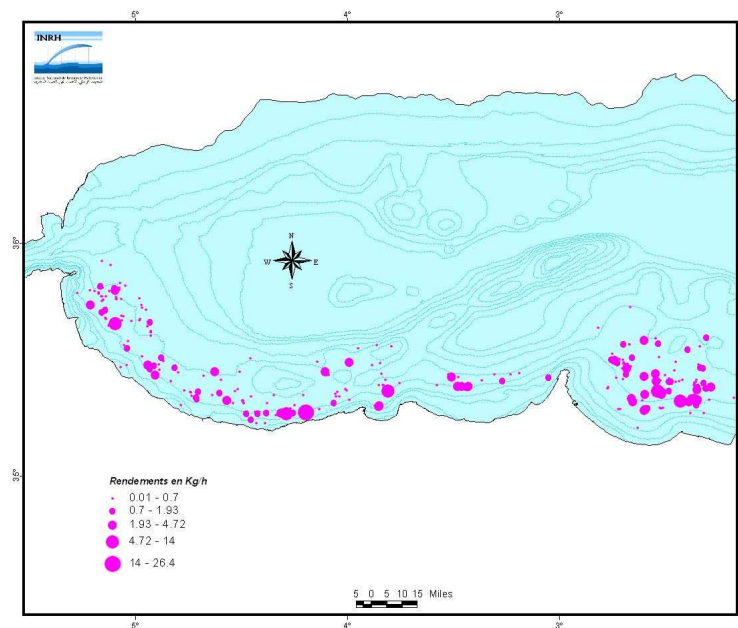


Fig. 3: *Parapenaeus longirostris* yield (Kg/h) in GSA 03.

P. longirostris is targeted by 114 trawlers, 51% based in Nador, 19% in Al Hoceima, 17% in Tangier, 12% in M'diqu and 1% in Rass Kebdana, however, the Tangier trawlers are mostly operating in Atlantic side. The average power of the Moroccan trawlers is about 325 HP and the mean tonnage about 50 TJB. Annual catch of *P. longirostris* turned around 600 tons for an average of 117 million dirhams in value. The catch in 2010 is about 358 tones, the fishing effort is 12636 (nb of trips = fishing days) and the CPUE is about 28 kg/nb trips for the same year. The catch and CPUE trends show a decline from 2000 to 2010 (Tables 3, 4 and 5). The most species targeted with the deep water pink shrimp are *Pagellus acarne*, *Mullus spp*, *Merluccius merluccius*, *Boops boops*, *Gadus poutassou*, *Octopus vulgaris* and *Sepia spp*.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Trawling fleet total catches (tonnes)	1051	965	767	686	515	468	201	185	336	596	358

Table 3. *P. longirostris* catches (tonnes) in GSA03.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Trawlers fishing effort (fishing days)	9472	10773	11739	11569	10331	10111	9070	9647	11345	12705	12636

Table 4. *P. longirostris* fishing effort in GSA03.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPUE	111	90	65	59	50	46	22	19	30	47	28

Table 5. *P. longirostris* CPUE in GSA03.

P. longirostris length-size distribution in 2009 and 2010 show a large wide distribution starting from 13 to 42 mm of the carapace length. The mean carapace size is about 24mm in 2009 and about 28mm in 2010.

The regulation in Morocco prohibits fishing under 80m depth from Tangier to Al Hoceima and under 3 nautical miles from Al Hoceima to Saidia. The trawlers stretched diamond mesh size is 50mm and the minimal landing size (carapace length) is 25mm. The fisheries regulation include a gel of investment since 1992, a marine protected area in Al Hoceima and 2 antitrawling artificial reefs in Cala Iris and in Martil areas.

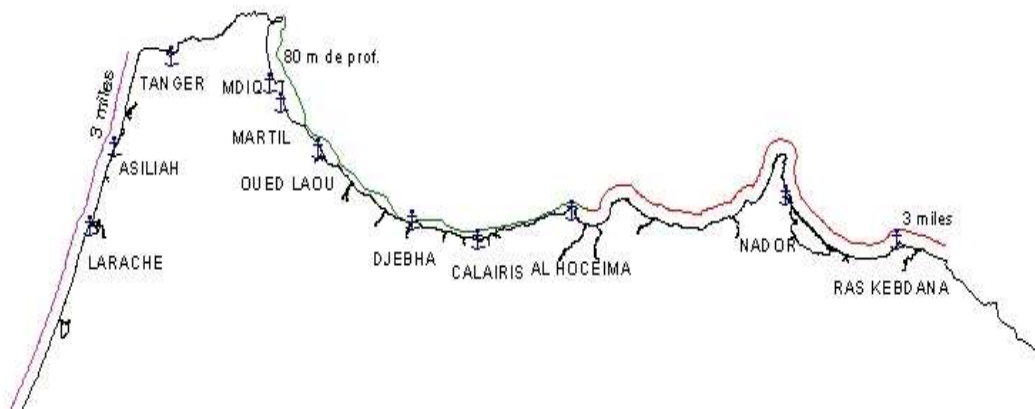


Fig. 4. Regulation map in Moroccan GSA03.

4.3. Spain

Deep-water pink shrimp is a target species for around 170 trawling vessels (2010) which operate on the upper slope and one of the most important crustaceans species for the trawl fisheries deployed in GSA01 (northern Alboran Sea).

Northern Alboran Sea corresponds to FAO area 37 and to Management Unit 1 (GSA01) of the General Fisheries Commission for the Mediterranean. It constitutes a living resources exploitation area characterized by a great diversity of fish, crustaceans and molluscs of commercial interest. Landings are made in 15 fishing ports in GSA01.

The fleet with the largest GRT corresponded to the ports of Garrucha (55.3 t), Motril (44.7 t) and Almería (43.1 t). Engine power is corresponded with the size of the fishing vessel. Highest engine power was associated with those vessels based in the ports of Garrucha (289.8 HP), Almería (205.7 HP) and Motril (190.7 HP). Fishing vessels HP is directly related to the distance to the fishing grounds where they normally operate.

Landings trend (Fig. 5) have two peaks, one around 190 t (corresponding to 2003) decreasing to a minimum of 64 t in 2006, increasing from 2007 to a new maximum of 250 t in 2009 to decrease again to 96 t in 2010.

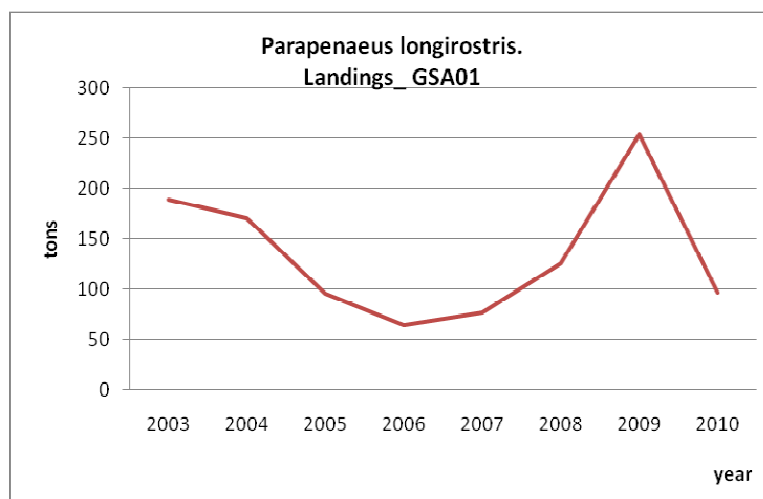


Fig. 5. *P. longirostris* landings in the period 2003-2010 (GSA01).

Abundance indices from MEDITS surveys and CPUE show similar trends during the last years (Fig. 6).

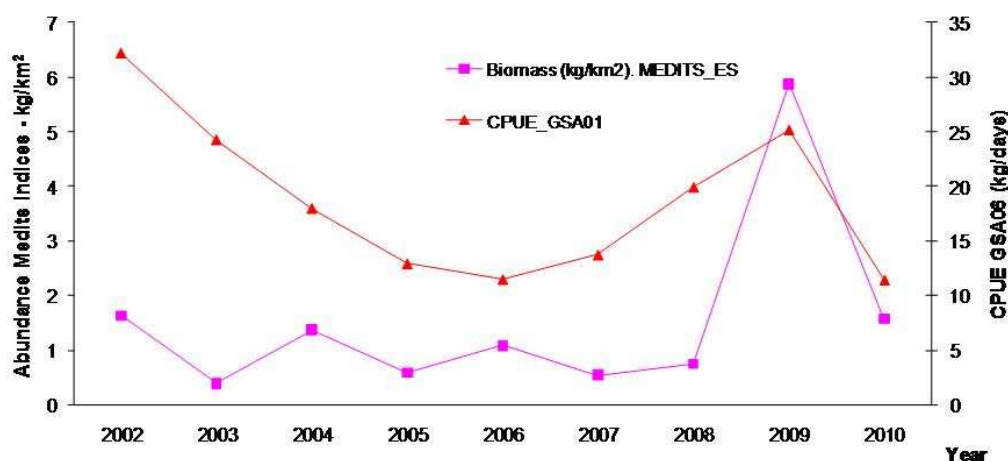


Fig. 6. Abundance indices (Biomass;kg/km²) from Medits surveys and CPUE(kg/day) from commercial fleet.

Operational Units main characteristics (number boats/year, CPUE, mean length of boats, mean HP, type of gear, fishing days, etc.) targeting *P. longirostris* and management regulation in force in GSA 01 were presented. Information on landings (2003-2010), fishing effort (2002-2010), samplings (abundance indices from surveys and landings 2002-2010), biological parameters (sex ratio by size class, size dimorphism, etc.) and assessments of deep-water pink shrimp from the trawl fishery (2001-2009) of GSAs 05 and 06 was also shown. There was a progressive reduction in the number of trawlers during the period 2002-

2010 but the fishing effort increased from 2006 to 2008 because of the increase in vessel mean power (Fig. 7).

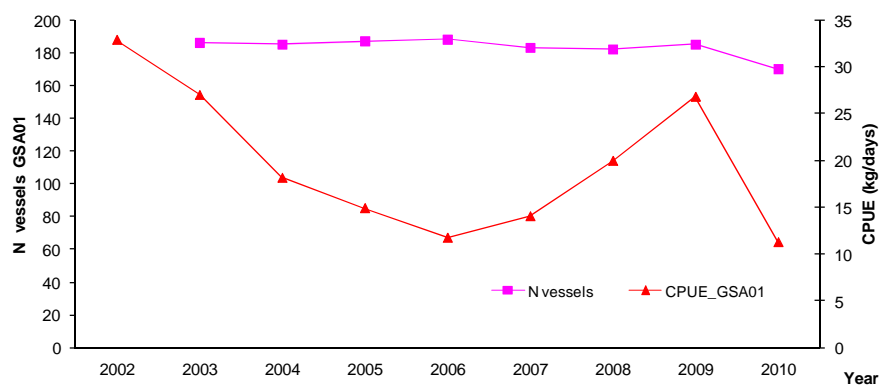
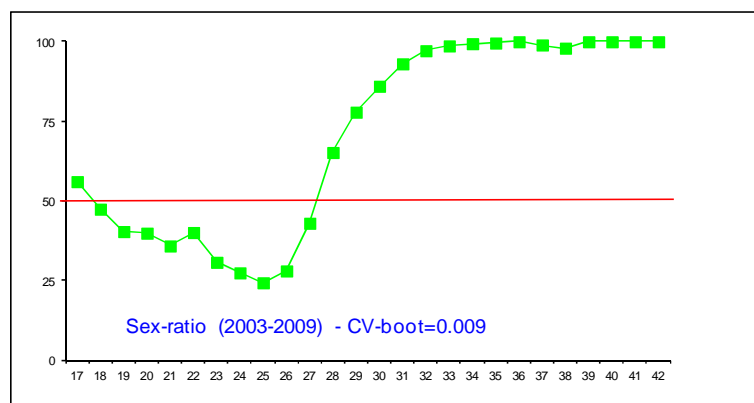


Fig. 7. Number of trawlers targeting *P. longirostris* and Fishing effort (Kg/day) in the period 2002-2010.

Sex ratio by size class for the period 2003-2009 shows that the females start to prevail above 28 mm CL, and from there in all sizes (Fig. 8).



The presentation made clear that in the Spanish Mediterranean Sea (GSA 01 and 02), *P. longirostris* is caught almost exclusively by trawl as a by-catch in the deep continental shelf and the upper slope (100 – 400 m). No artisanal boats targeting *P. longirostris* are found in Spain. In GSA 02 (Alboran Island) there is a fleet of 30 boats targeting almost exclusively *Aristeus antennatus* and *P. longirostris* as by-catch. In GSA 01 abundance indices from surveys and landings show similar trends from 2002-2010.

5. Data compilation and *Parapenaeus longirostris* stock assessment

According to the Mazara del Vallo report (September 2010 meeting), the experience earned and lessons learnt during the 2-year joint analysis of data on *P. longirostris* were highlighted as an example of joint stock assessment befitted for Algeria, Morocco and Spain. All the steps which led to the final joint data analysis were summarised: investigation on the spatial distribution of species' nurseries and spawning grounds; discussion on the national fishing fleet characteristics and fishing grounds; description of data available; identification of the assessment methods and biological parameters; joint analysis and discussion of the results. The WG also stressed the importance of the compromise of the national experts on the use of the results and on the technical management advice based on them to be provided during the appropriate FAO-GFCM related meetings.

After analyzing all information and data provided by the experts, the WG pointed out that trends in Morocco and Spain are similar in terms of catch and fishing effort, with a strong decrease from 2002-2010. In Morocco there is only one “métier” targeting *P. longirostris* in GSA 03 and in Spain (GSAs 01 and 02) as well. Morocco has data on the samplings and landings since 2008 while Spain has data since 2002. Deliberations on how to analyze data for the stock assessment stressed the importance of taking only the GSAs areas with information of the 3 countries.

A single common shared stock for Algeria, Morocco and Spain can be likely identified although more studies are needed to correctly identify this shared stock. The WG discussed on how to identify if there is a single *P. longirostris* stock or not for GSAs 01,02,03 and 04. A common stock could be assumed as *P. longirostris* is an offshore species and due to reproduction pattern and larvae characteristics, but it has to be verified particularly with joint genetic analysis.

To accomplish the CopeMed II objective of supporting the establishment and implementation of scientific management plans for relevant specific fisheries, both in each specific country and at sub-regional level, the WG proposed a multidisciplinary analysis and started a joint evaluation of *P. longirostris* stock (see Annex IV).

After analyzing all available data, the WG decided to start the assessment with data series from Morocco and Spain (2009-2010), as Algeria had no record data in 2009. The stock assessment was carried out with the “combined sexes” assumption.

In Algeria, a virtual population analysis of *P. longirostris* was carried out by separated sexes based on the length (VPA) and conducted by the VIT program (Lleonart and Salat, 1992), that permitted an assessment of the level of exploitation of the stock to an optimal level.

The available information on growth parameters was chosen with two assumptions: separated sexes and/or combined sexes parameters. The WG worked considering both options to analyze data from Morocco and Spain separately; and also varying the “F terminal” (FT), considering two values (0.5 and 1.0). A matrix with information of the 3 countries was prepared, starting with the biological parameters.

5.1. Biological parameters.

Growth parameters from GSAs 01 and 03 were presented. As data from Morocco is not published, it was strongly recommended to publish it to strengthen the assessment. The WG agreed on using growth parameters from GSAs 05 (Balearic Islands) and 06 (northern Spain), contiguous to GSA01, and north of the limit of the area defined by the WG (see biological parameters in Table 6). Differences in growth parameters values among Algeria, Morocco and Spain opened a discussion on how to present data to the SAC-SCSA. Size class fishing mortality was also analyzed for the Spanish and Moroccan fleet. The stock assessment was carried out using two parameters set: fast growth (GSA05) and low growth (GSA06).

GSA _s	GSA03	GSA04	GSA05	GSA06
Country	Morocco	Algeria	Spain1	Spain 2
l_{∞} (mm)	40,01	38,1325	40	45
K	0,497	0,7	0,89	0,3903
t₀	-0,31	-0,169	-0,49	0,1019
a	0,0027	0,003175	0,0022	0,0019
b	2,5187	2,4457	2,6113	2,5682

Table 6. Biological parameters used in the *P. longirostris* joint stock assessment (l_{∞} : asymptotic length. K: instant growth tax. t_0 : age corresponding $L=0$. a,b: length-weight relationship parameters).

5.2. Length sampling distribution (LSD), growth and natural mortality (M).

Data from Spain and Morocco were presented (GSAs 01 and 03) and the WG agreed to include the Algerian length sampling distribution in the final report. LSD (LC (mm)) and growth parameters were selected. Length beyond 38 was considered 38+. An Excel tool for M calculations (Probiom, Abella et al, 1997) was explained and used to calculate the vector M. The results of the analysis confirmed that in a small interval of age (between 0 and 1), the natural mortality decreased.

5.3. Data analysis

The state of exploitation was assessed applying a length cohort (LCA), VPA by slicing and yield per recruit (Y/R) analysis on a mean pseudo-cohort (2009-2010) for Spain and Morocco in GSAs 01 and 03, based on size composition of trawl catches (obtained from on board and on port monthly sampling) and official landings, using VIT program (Leonart and Salat, 1992).

M vector calculated by Abella Excel tool and F terminal value (0.5) were adopted. The exercise includes a yield per recruit (Y/R) model from the assessment estimates. Analysis by size (LCA) and age (VPA) showed the same trend with $FT=0.5$ and 1. The WG agreed to adopt the 0.5 fishing terminal value. The results of this evaluation are shown in a in the graphic and a tables showed below.

Class	Mean Age	Lower Length	Mean Length	Mean Weight	Maturity ratio	Total F	Z
0	0.346	14.138	20.491	5.583	0.313286	1.144	1.964
1	1.378	29.38	32.195	16.496	0.8088861	1.133	1.523
2	2.415	35.639	36.893	23.281	0.9275836	0.757	1.037
3	3.439	38.209	38.75	26.392	1	0.5	0.74

Table 7-a. Joint assessment exercise of the *Parapenaeus longirostris* fishery in GSAs 01 and 03. Length classes considered in the analysis with their mortality rates estimates (fast growth).

Class	Mean Age	Lower Length	Mean Length	Mean Weight	Maturity ratio	Total F	Z
0	0.398	1.755	7.768	0.65	0	0	1.25
1	1.389	15.729	19.71	4.821	0.15359	0.121	1.371
2	2.372	25.188	27.77	11.307	0.496532	0.353	1.603
3	3.373	31.59	33.345	17.989	0.7722	0.331	1.581
4	4.356	35.923	37.058	23.553	0.8918	0.574	1.824
5	5.37	38.857	39.653	28.007	0.97	0.383	1.633
6	6.361	40.842	41.369	31.22	1	0.5	1.75

Table 7-b. Joint assessment exercise of the *Parapenaeus longirostris* fishery in GSA01 and GSA03. Length classes considered in the analysis with their mortality rates estimates (low growth).

	Critical age	Critical length
Current stock	0	14.138
Virgin stock	2	35.639

Total Biomass balance (D): 1027452594.94		
	Biomass	Percentage
Recruitment	281907648.9	27.44
Growth	745544946.1	72.56
Natural death	375765154.9	36.57
Fishing	651687440	63.43

Table 8-a. VPA summary results using fast growth hypothesis.

F current	1.2281
F 0.1	0.3317
F max	2.4447

Table 9-a. F estimation as reference using fast growth hypothesis.

	Critical age	Critical length
Current stock	0	14.138
Virgin stock	2	35.639

Total Biomass balance (D): 1027452594.94		
	Biomass	Percentage
Recruitment	281907648.9	27.44
Growth	745544946.1	72.56
Natural death	375765154.9	36.57
Fishing	651687440	63.43

Table 8-b. VPA summary results using low growth hypothesis.

F current	1.3
F 0.1	0.2825
F max	0.5085

Table 9-b. F estimation as reference using low growth hypothesis.

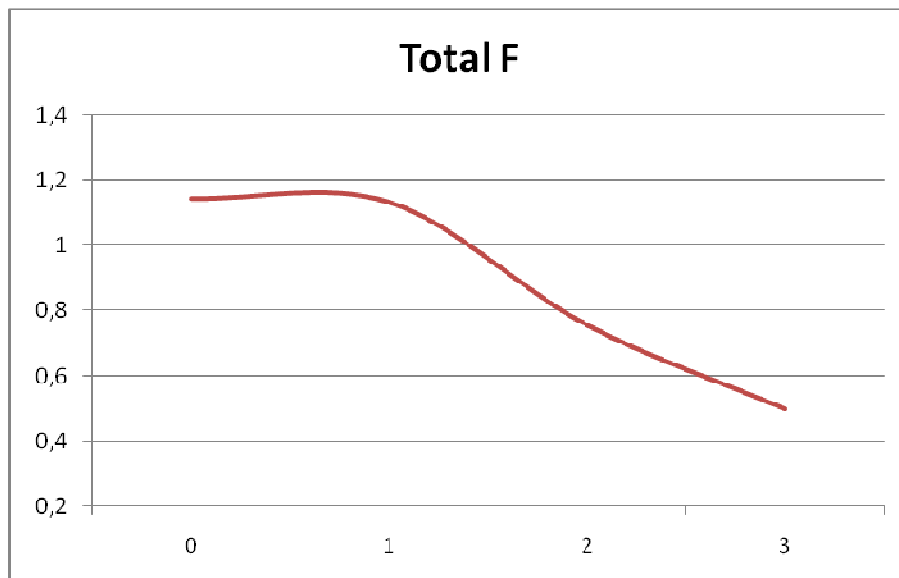


Table 10-a. Fishing mortality vector using low growth hypothesis

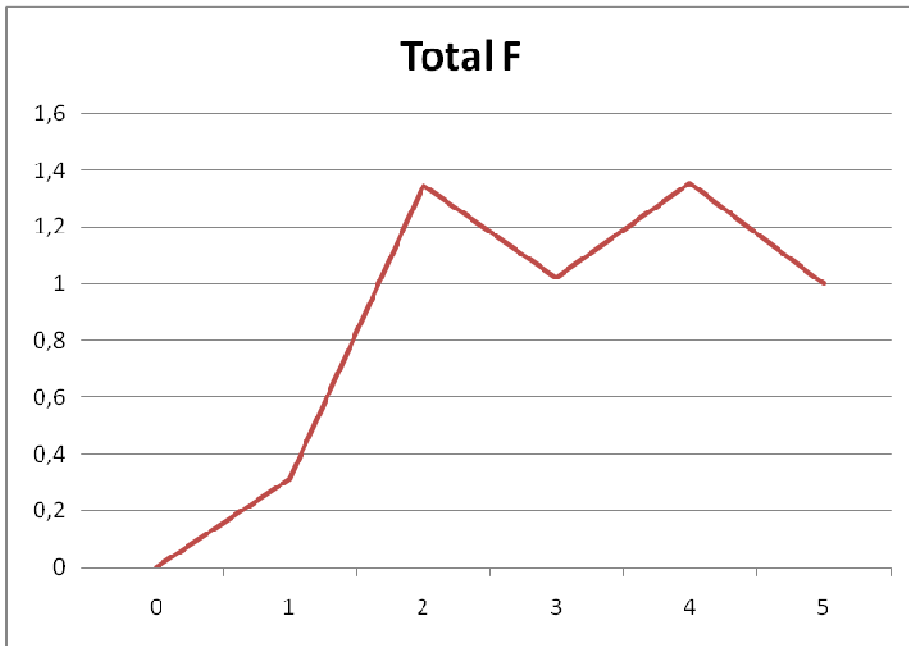


Table 10-b. Fishing mortality vector using fast growth hypothesis

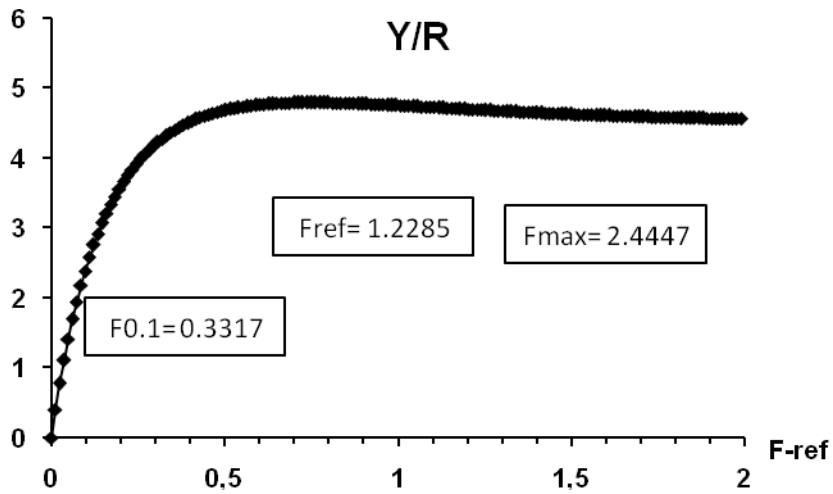


Fig. 11-a. Y/R curve using low growth hypothesis.

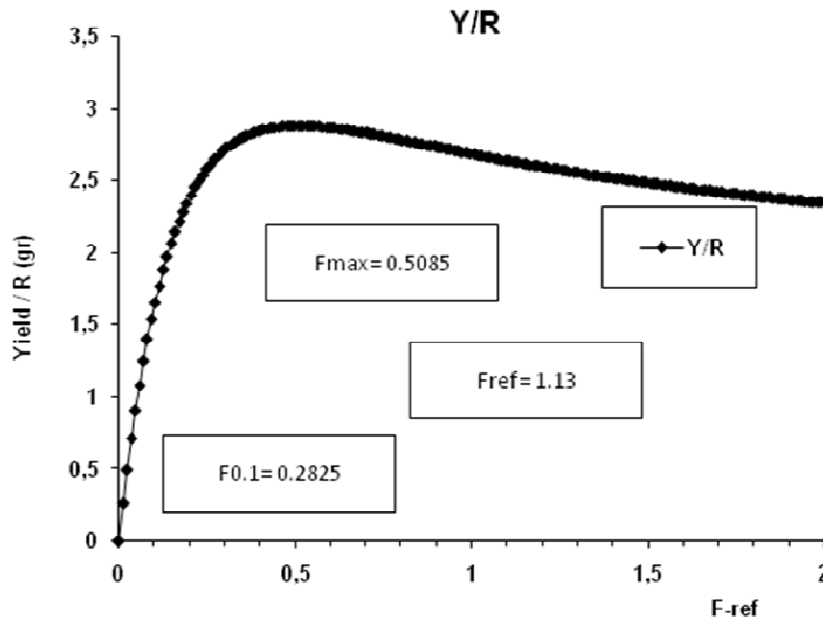


Fig. 11-b. Y/R curve using fast growth hypothesis.

The results of the Y/R analysis (Fig. 9) show a pattern not close to the overexploitation, as in others short-living species, such as it occurs with the deep-water shrimp *Aristeus antennatus*, it occurs. Yield reach asymptotic values at an effort level double than the current one. Nevertheless, SSB values decrease quickly above actual effort level and the Frefs (1.22 and 1.13) exceeds the Y/R F0.1 reference point (0.33 and 0.28).

Although fishing mortalities obtained during this joint assessment exercise showed anomalous trends, they should be considered as preliminary and not used for management advice.

The WG agreed to fill the SAC-SCSA forms to be presented in the SRDWG meeting (September 12-16, Tunis) for discussion. Mr. Jarboui was nominated by the WG for presenting the assessment to the SRDWG. CopeMed was requested to support the participation of Mr. Jarboui in the mentioned Sub-regional CopeMed-MedSudMed meeting.

6. Conclusions and recommendations

Once analyzing *Parapenaeus longirostris* data compilation from Morocco and Spain and based on the joint stock assessment carried out, the WG recommended:

- To perform joint genetic analysis and research on *Parapenaeus longirostris* in Algeria, Morocco and Spain (GSAs 01, 02, 03 and 04) to identify if there is a single common *P. longirostris* stock.
- To perform research and experimental surveys on *P. longirostris* in the Strait of Gibraltar area to find out if it can be considered part of the GSAs 01-03 stock.
- To complete information on the Algerian *P. longirostris* stock (GSA04) in 2011 to join Algerian data to the current stock assessment to cover all the study area.
- To finalize the *P. longirostris* stock assessment to present the conclusions to the Working Group of Demersal Species when ready and if possible this year.
- To continue with the CopeMed II support in order to produce a scientific paper with all the information related to *P. longirostris* and finish the first joint stock assessment among Algeria, Morocco and Spain.

7. Closure of the Working Group

With the gratitude of participants to CopeMed II for organizing the meeting and to IEO for hosting it, the meeting was closed. All participants agreed to celebrate a new meeting, with the support of CopeMed, in order to make progress on the *Parapenaeus longirostris* stock assessment. Mr. Jarboui, chairperson of the meeting, in close collaboration with the experts of the three countries, will prepare a draft Agenda that will be sent to CopeMed II. According to the budget availability the coordinator will request the approval of the national delegates for the next meeting of the WG.

ANNEXES

Annex I: List of participants.

Name	Institution	Country	Contact
Nawal AINOUCHE	National Research Centre for the Development of Fisheries and Aquaculture (CNRDPA)	Algeria	ainouchenawel@yahoo.fr
Saïd BENCHOUCHA	National Institute of Fisheries Research (INRH), Tanger	Morocco	bench2468@yahoo.fr
Najib ELOUAMARI	National Institute of Fisheries Research (INRH), Nador	Morocco	azir46@hotmail.com
Othman JARBUI	National Institute of Marine Science and Technology (INSTM)	Tunisia	othman.jarboui@instm.rnrt.tn
Jorge BARO	Spanish Institute of Oceanography (IEO)	Spain	jorgebaro@ma.ieo.es
José Luis PÉREZ	Spanish Institute of Oceanography (IEO)	Spain	joseluis.perez@ma.ieo.es
Teresa GARCÍA	Spanish Institute of Oceanography (IEO)	Spain	teresa.garcia@ma.ieo.es
Juan A. CAMIÑAS	FAO CopeMed II (FIRF)	Spain	juanantonio.caminas@fao.org
Matthieu Bernardon	FAO CopeMed II (FIRF)	Spain	matthieu.bernardon@fao.org
Ignacio FERNÁNDEZ	FAO CopeMed II consultant	Spain	ignacio.fernandez@fao.org

Annex II: Agenda of the meeting.

1^{ier} Jour : Lundi 18 juillet 2011 (09H-17h30)

09 H : Allocution d'ouverture

09H30 : Présentation des participants, election of the Chairman and nomination du rapporteur

10H-10H15 : Adoption de l'agenda

10H15-10H45 : Etat des connaissances actuelles sur le stock de *P. longirostris* (Discussion des connaissances et informations disponibles sur sa biologie, sa distribution spatiale et son abondance de *P. longirostris* au niveau de la région du projet COPEMED II)

10H45-11H : Pause café

11H-13H : Exploration et visualisation des données disponibles (Présentation sur Data-show des données disponibles au niveau de chaque pays sur *P. longirostris*, discussion des tendances et de la qualité des données, choix de l'approche la plus adéquate pour mener une première évaluation conjointe de ce stock entre l'Algérie, l'Espagne et le Maroc)

13H : Déjeuner

14H-15H45 : Compilation des données de l'Algérie, de l'Espagne et du Maroc (préparation d'une seule matrice de données rassemblant les données des 3 pays)

15H45-16H : Pause café

16H-17H30: Initiation à l'évaluation (choix des modèles, évaluation préliminaire conjointe du stock de *P. longirostris*)

2^{ième} jour : Mardi 19 juillet 2011 (09H-17H30)

09H : Suite des évaluations (évaluation conjointe du stock de *P. longirostris*)

10H45 : Pause café

11H-13H : Suite des évaluations (discussion des résultats)

13H : Déjeuner

14H-15H45: Suite des évaluations (discussion des résultats et élaboration de recommandations)

15H45-16H : Pause café

16H-17H : Présentation et adoption des résultats des évaluations et des recommandations

17H-17H30 : Adoption du rapport du Groupe de Travail

Annex III: Terms of Reference of the Working Group on *Parapenaeus longirostris* shared stock for Algeria, Morocco and Spain (GSA 01, 02, 03 and 04).

CONTEXTE

Les groupes de travail, organisés par COPEMED II, sur les stocks partagés en Méditerranée revêtent une importance majeure en matière de la réorientation des approches des évaluations des stocks et de la mise en œuvre de plans d'aménagement adéquats pour les pêcheries ciblant ces stocks partagés. De part sa production, sa grande valeur commerciale et sa distribution large englobant plusieurs pays méditerranéens, la crevette rose du large (*Parapenaeus longirostris*) est l'une des principales ressources partagées en Méditerranée, principalement entre l'Algérie, l'Espagne et le Maroc (GSA 04, 02 et 03).

L'évaluation de l'état du stock de la crevette rose du large passe nécessairement par la réalisation d'une étude multidisciplinaire dont l'objectif est d'élaborer d'une part les connaissances de base sur cette espèce, les principaux traits relatifs à sa bio-écologie et la variabilité spatio-temporelle qui la caractérise, et d'autre part de générer les principaux indicateurs sur les tendances de l'état d'exploitation de cette ressource.

Les connaissances bio-écologiques et les indicateurs d'exploitation du stock de la crevette rose du large dans les GSA 04, 02 et 03 peuvent être déclinés en axes prioritaires ayant trait aux thématiques suivantes :

1. La caractérisation de l'exploitation de cette ressource;
2. L'état des connaissances biologiques et écologiques sur ce stock au Maroc, en Espagne et en Algérie;
3. Les résultats des évaluations antérieures de l'état d'exploitation de ce stock au niveau de ces pays.

Ces thématiques seront abordées à travers l'analyse des données collectées au niveau des différentes administrations de la pêche et à travers les études scientifiques qui ont été réalisées au niveau des pays concernés par ce stock. Des études scientifiques combleront les lacunes qui paraîtront lors de l'analyse des paramètres biologiques disponibles sur cette espèce.

I- CARACTERISATION DE L'EXPLOITATION DE LA CREVETTE ROSE DU LARGE DANS LES GSA 3, 2 ET 4 (MAROC, ESPAGNE ET ALGERIE)

I-1- Objectifs

Le but est l'élaboration de matrices de données relatives à la production et à l'effort de pêche exercé sur la crevette rose du large, ce qui permettra de déterminer le schéma d'exploitation de cette ressource dans le temps et dans l'espace ainsi que l'analyse des stratégies et des tactiques de pêche au Maroc, en Espagne et en Algérie.

Deux principales actions seront traitées dans cette thématique à savoir ; les statistiques des pêches (production et effort de pêche) et les caractéristiques des navires de pêche.

I-2- Méthodologies

Pour aborder cette thématique, il importe d'une part de rassembler les données relatives à la production (tonnage) et à l'effort de pêche (en jours de pêche) exercé sur la crevette rose globalement et par point de débarquement au Maroc, en Espagne et en Algérie et d'analyser les données sur les caractéristiques physiques des unités de pêche (Puissance, Tonnage de Jauge Brute JB, Age, Longueur).

Les données relatives aux enquêtes de terrain sur l'activité des unités de pêche à savoir: les zones fréquentées, les engins utilisés, les profondeurs de pêche et la durée des marées, permettent de générer des indicateurs et des informations supplémentaires sur l'exploitation de cette ressource. Une cartographie des zones de pêche sera alors possible moyennant le Système d'information Géographique (SIG).

Pour standardiser les efforts de pêche des navires de pêche ciblant la crevette rose du large au niveau de l'Algérie, de l'Espagne et du Maroc, la classification des bateaux de pêche adoptée par la CGPM sera considérée.

I-3- Résultats attendus

Ces résultats concernent l'étude de la flotte de pêche par pays, par zone de pêche, les interactions avec les autres flottilles de pêche, ainsi que la saisonnalité dans l'exploitation de cette ressource. Pour se faire, il est nécessaire d'aboutir aux résultats suivants:

I-3-1- Caractéristiques des unités de pêche (en Espagne, en Algérie et au Maroc)

- La détermination du nombre d'unités de pêche par type de flottille ciblant la crevette rose du large;
- L'analyse des caractéristiques techniques des unités de pêche (Puissance, TJB, Age, Longueur ...);
- La classification sur la base de la segmentation CGPM (Rec. GFCM/33/2009/3 (Annexe 1));
- La durée des marées.

I-3-2- Indicateurs de l'exploitation

- La détermination de l'effort de pêche exercé sur cette espèce (par pays et par port de pêche);
- La production en tonnes;
- L'analyse des principales tendances sur l'état d'exploitation de cette ressource (tendance des captures et de l'effort de pêche);
- Les zones et les profondeurs de pêche;
- L'étude de la distribution géographique de cette espèce.

II- L'ETAT DES CONNAISSANCES BIO-ECOLOGIQUES SUR LE STOCK DE LA CREVETTE ROSE DU LARGE (*PARAPENAEUS LONGIROSTRIS*) EN ESPAGNE, EN ALGERIE ET AU MAROC

II-1- Objectifs

Ce Terme de Référence a pour objet de fournir une synthèse sur les informations existantes et disponibles sur la biologie et l'écologie de cette espèce au niveau de l'Espagne, de l'Algérie et du Maroc. Il permet d'élaborer les paramètres biologiques de la crevette rose du large (*Parapenaeus longirostris*) pouvant être incorporés dans les modèles des évaluations de l'état de son stock (croissance, relation taille-poids, maturité, mortalité...) ainsi que son régime alimentaire.

Cette thématique est inclinée en deux principales actions; le recueil des paramètres bio-écologiques et l'identification des zones de ponte et de recrutement de cette ressource.

II-2- Méthodologies

Pour aborder cette action de recherche, il importe d'établir un état de lieu sur les données et les paramètres biologiques de la crevette rose du large à partir de l'échantillonnage biologique des

captures de cette espèce, à partir des campagnes scientifiques en mer et à partir des enquêtes de terrain au niveau des ports de débarquement de cette espèce.

Les données issues des campagnes scientifiques en mer fournissent des données complémentaires sur les indices d'abondance, les structures démographiques et la biologie de cette ressource. Ces données peuvent être aussi utilisées dans les modèles globaux et analytiques pour l'évaluation de ce stock.

II-3- Résultats attendus

Ce terme de référence devra aboutir aux points suivants:

II-3-1- Paramètres biologiques

- La compilation des données disponibles sur les principales caractéristiques biologiques de cette espèce (maturité sexuelle, fécondité cycle biologique, régime alimentaire, croissance, régime alimentaire...);
- L'élaboration de matrices de données relatives aux structures démographiques de ce stock en Espagne, en Algérie et au Maroc;
- L'étude de sa distribution spatio-temporelle;
- La détermination des périodes et des zones de ponte et de recrutement de cette ressource.

II-3-2- Paramètres écologiques

- La distribution spatiale de cette espèce;
- La cartographie des zones de ponte et de recrutement de cette ressource.

III- EVALUATION DE L'ETAT DU STOCK DE LA CREVETTE ROSE DU LARGE CONJOINTEMENT PAR L'ALGERIE, L'ESPAGNE ET LE MAROC

III-1- Objectifs

Ce terme de référence a pour objectif de mettre à profit l'ensemble des données rassemblés en Algérie, en Espagne et au Maroc (Captures, effort de pêche, CPUE, indices d'abondance, composition démographique, paramètres biologiques) pour faire une évaluation conjointe de l'état du stock de la crevette rose du large.

Les actions entreprises sont le diagnostic de l'état d'exploitation du stock de la crevette rose du large et la préparation de recommandations conjointes pour l'Algérie, l'Espagne et le Maroc dans le but d'une gestion adéquate de ce stock.

III-2- Méthodologies

L'évaluation conjointe de l'état du stock de la crevette rose du large passe par les étapes suivantes:

- La description préliminaire des informations disponibles sur les pêcheries ciblant *P. longirostris* au niveau de la région;
- La préparation d'un état de lieu sur les informations (publiées et non publiées) ainsi que les études réalisées sur *P. longirostris* au niveau de la région;
- La description des tendances et de la qualité des données disponibles au niveau de l'Algérie, de l'Espagne et du Maroc;
- L'identification de l'approche qui doit être utilisée pour une évaluation conjointe préliminaire de *P. longirostris* au niveau régional;

- Initiation à l'évaluation conjointe du stock de *P. longirostris* en joignant les données disponibles au niveau des trois pays.

III-3- Résultats attendus

Les résultats escomptés peuvent être déclinés en deux actions:

III-3-1- Le diagnostic de l'état du stock de *P. longirostris*

Ce diagnostic peut être opéré sur la base de l'établissement des indicateurs suivants:

- La répartition spatiale de la ressource;
- Les tendances des indices d'abondance;
- Les structures démographiques;
- La taille moyenne;
- La production actuelle;
- L'effort actuel;
- La production optimale équilibrée (MSY);
- La mortalité naturelle et par pêche;
- L'effort optimal;
- Les points de références cibles ($B_{0,1}$, $F_{0,1}$, F_{max}).

III-3-2- La représentation spatiale des résultats obtenus par SIG

- La cartographie de la ressource (répartition spatio-temporelle des ressources, des nourriceries et des zones de ponte);
- La répartition spatio-temporelle de l'effort de pêche et les interactions avec les autres flottilles de pêche.

IV- RESPONSABILITES

La supervision et la coordination de ces études et la collecte des données disponibles sur la crevette rose du large au niveau du Maroc et de l'Algérie seront assurées conjointement et respectivement par M. Saïd BENCHOUCHA, Biologiste et Chef du Laboratoire des Ressources Halieutiques au Centre Régional de l'INRH à Tanger, Maroc et Mme. Nawal AINOUCHE, Ingénieur Halieute, Alger, Algérie.

Des chercheurs espagnols qui travaillent sur *P. longirostris* au niveau de la mer d'Alboran participeront à ce groupe de travail. Ces chercheurs apporteront les données disponibles sur cette espèce et animeront les débats sur les méthodologies et sur les résultats de l'évaluation conjointe du stock de *P. longirostris* au niveau de la région.

V- CALENDRIER DU GROUPE DE TRAVAIL

Le groupe de travail relatif à l'évaluation conjointe du stock de *Parapenaeus longirostris* est prévu du 18 et 19 juillet 2011 à Fuengirola (Málaga), Espagne.

Annex IV. Data compilation and *Parapenaeus longirostris* stock assessment.

1) Biological parameters.

	GSA05	GSA06	GSA03	GSA04
	Spain1	Spain 2	Morocco	Algerie
loo (mm)	40	45	40,01	38,1325
K	0,89	0,3903	0,497	0,58
to	-0,49	0,1019	-0,31	0,009
a	0,0022	0,0019	0,0027	0,003175
b	2,5682	2,6113	2,5187	2,4457

M0	0,82		0,40	1,118
M1	0,39			
M2	0,28			
M3	0,24			
M4	0,22			
M5	0,21			

	L50(mm)	25,65	ojiva-2 (25.65)	23,44	17,25
0	0,00489606	9	0		
1	0,15359809	10	0		
2	0,49653223	11	0		
3	0,77229538	12	0		
4	0,89152784	13	0,03		
5	0,97631747	14	0,05		
6	1	15	0,07		
		16	0,1		
		17	0,12		
		18	0,15		
		19	0,18848262		
		20	0,225674261		
		21	0,267782994		
		22	0,31455701		
		23	0,365423707		
		24	0,419482047		
		25	0,475544529		
		26	0,532230248		
		27	0,588096027		
		28	0,641780404		
		29	0,692130813		
		30	0,738290062		
		31	0,779731092		
		32	0,816243319		
		33	0,847883942		
		34	0,874911363		
		35	0,897715954		
		36	0,916758648		
		37	0,932522558		
		38	0,945478705		
		39	0,956064385		
		40	0,964671581		
		41	0,971642599		
		42	1		

Length-size distribution in GSAs 01 and 03.

SPAIN GSA01				
Lc (mm)	2009	2010	AVERAGE SPAIN 2009-2010	L/W
9	14872	3604	9238	5717
10	14872	3604	9238	7527
11	14872	3604	9238	9653
12	22914	3604	13259	17386
13	79210	3604	41407	66911
14	59104	5457	32280,5	63294
15	99316	7929	53622,5	125885
16	87252	9679	48465,5	134653
17	63125	31509	47317	153999
18	44615	86082	65348,5	246903
19	235520	200376	217948	948265
20	655881	432053	543967	2705770
21	1386502	504750	945626	5342466
22	2271838	555205	1413521,5	9016866
23	2412130	651585	1531857,5	10973825
24	2790367	685358	1737862,5	13912230
25	3346432	788123	2067277,5	18409932
26	3144940	793169	1969054,5	19425320
27	2153577	957608	1555592,5	16935002
28	2127275	657044	1392159,5	16664852
29	1548627	462535	1005581	13191854
30	1159288	529773	844530,5	12104081
31	798414	519785	659099,5	10290465
32	550000	469227	509613,5	8643952
33	240820	355858	298339	5483545
34	297881	195640	246760,5	4903042
35	167609	122841	145225	3112354
36	104101	51072	77586,5	1789640
37	18893	19255	19074	472583
38	14872	6590	10731	285040
39	14872	3604	9238	262595
40				
41				
42				
Kgs_GSA_01	253477,29	96655,09		
grs gsa01	253477290	96655090	175066190	175705607

MOROCCO GSA03

Années			Average			
Lc (mm)	2009	2010		L/W		
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	284795	260319	123693	199879	123692,85	123692,85
14	284795	147864	98175	192498	98175,3992	98175,3992
15	0	668502	151691	356113	151691,134	151691,134
16	854384	851774	387148	1075623	387147,803	387147,803
17	569589	2389755	671511	2185519	671510,764	671510,764
18	258304	1851413	478720	1808726	478719,927	478719,927
19	854384	2774004	823325	3582186	823324,805	823324,805
20	4503732	2058619	1489076	7406878	1489076,2	1489076,2
21	21591411	1833708	5315441	30030435	5315440,63	5315440,63
22	29512679	703911	6856507	43737716	6856506,68	6856506,68
23	28545723	2277300	6994114	50103993	6994113,76	6994113,76
24	22995562	2442868	5772285	46209270	5772285,01	5772285,01
25	18796508	2478277	4827504	42990852	4827503,96	4827503,96
26	12842312	2147140	3401287	33554723	3401286,56	3401286,56
27	9378401	3069732	2824631	30750424	2824630,77	2824630,77
28	4649464	4826394	2150186	25738809	2150185,78	2150185,78
29	4907768	4418211	2116176	27761353	2116176,35	2116176,35
30	1549821	3294642	1099267	15755045	1099266,95	1099266,95
31	1033214	2667779	839800	13111721	839799,666	839799,666
32	774911	2650074	777170	13182190	777170,177	777170,177
33	1291518	2241891	801773	14736786	801772,924	801772,924
34	774911	2952032	845688	16803513	845687,905	845687,905
35	0	2360576	535643	11479503	535643,068	535643,068
36	0	3011374	683317	15761650	683316,889	683316,889
37	258304	1952393	501634	12428627	501633,639	501633,639
38	0	1041276	236278	6276083	236278,113	236278,113
39	0	260319	59070	1679083	59069,5283	59069,5283
40	0	390479	88604	2690676	88604,2925	88604,2925
41	0	130160	29535	956598	29534,7642	29534,7642
42	0	520638	118139	4074780	118139,057	118139,057
			0	476621250	0	0
Nombre Total	166512488	58673424				
Captures (Kg)	595648	357595	476621			
Lc moy (mm)	23,81	27,65				
Pds moy (g)	3,58	6,09				
Captures (gr)			476621250			

	2009-2010	2009-2010	2009-2010
Lc (mm)	Av.Spain	Av. Morocco	Global average GSAs 01-03
9	9238	1	9238
10	9238	1	9238
11	9238	1	9238
12	13259	1	13259
13	41407	123693	165100
14	32281	98175	130456
15	53623	151691	205314
16	48466	387148	435613
17	47317	671511	718828
18	65349	478720	544068
19	217948	823325	1041273
20	543967	1489076	2033043
21	945626	5315441	6261067
22	1413522	6856507	8270028
23	1531858	6994114	8525971
24	1737863	5772285	7510148
25	2067278	4827504	6894781
26	1969055	3401287	5370341
27	1555593	2824631	4380223
28	1392160	2150186	3542345
29	1005581	2116176	3121757
30	844531	1099267	1943797
31	659100	839800	1498899
32	509614	777170	1286784
33	298339	801773	1100112
34	246761	845688	1092448
35	145225	535643	680868
36	77587	683317	760903
37	19074	501634	520708
38	19969	3368054	247009
39	39+ (39, 40, 41, 42)		68308
40			88604
41			29535
42			118139
grs GSA	175066190	476621250	651687440
	Spain GSA01	Morocco GSA03	GSAs 02-03
	26,8635206	73,13647935	
	27	73	

2) Length Cohort Analysis (LCA)-FT1.

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	-0,204	-0,185	9	9,499	0,621	0,715	0
2	-0,167	-0,148	10	10,499	0,814	0,924	0
3	-0,129	-0,109	11	11,499	1,04	1,167	0
4	-0,089	-0,069	12	12,499	1,3	1,445	0
5	-0,048	-0,027	13	13,499	1,597	1,761	0,03
6	-0,006	0,016	14	14,499	1,932	2,115	0,05
7	0,038	0,061	15	15,499	2,306	2,51	0,07
8	0,084	0,108	16	16,498	2,722	2,947	0,1
9	0,132	0,156	17	17,498	3,18	3,427	0,12
10	0,182	0,208	18	18,498	3,683	3,953	0,15
11	0,234	0,261	19	19,498	4,232	4,524	0,19
12	0,289	0,317	20	20,497	4,828	5,144	0,23
13	0,346	0,376	21	21,495	5,472	5,811	0,27
14	0,407	0,439	22	22,493	6,166	6,53	0,31
15	0,471	0,505	23	23,492	6,912	7,3	0,37
16	0,54	0,575	24	24,491	7,71	8,125	0,42
17	0,612	0,65	25	25,491	8,563	9,003	0,48
18	0,69	0,73	26	26,491	9,47	9,939	0,53
19	0,773	0,816	27	27,491	10,434	10,931	0,59
20	0,863	0,91	28	28,491	11,455	11,981	0,64
21	0,961	1,012	29	29,49	12,536	13,089	0,69
22	1,068	1,125	30	30,491	13,676	14,261	0,74
23	1,186	1,25	31	31,491	14,878	15,493	0,78
24	1,318	1,39	32	32,49	16,142	16,787	0,82
25	1,468	1,551	33	33,489	17,469	18,144	0,85
26	1,642	1,738	34	34,485	18,861	19,563	0,87
27	1,846	1,963	35	35,485	20,319	21,052	0,9
28	2,097	2,243	36	36,476	21,843	22,596	0,92
29	2,42	2,618	37	37,468	23,436	24,207	0,93
30	2,876	3,157	38	38,417	25,097	25,812	1
+	3,655	---	39	---	26,828	---	

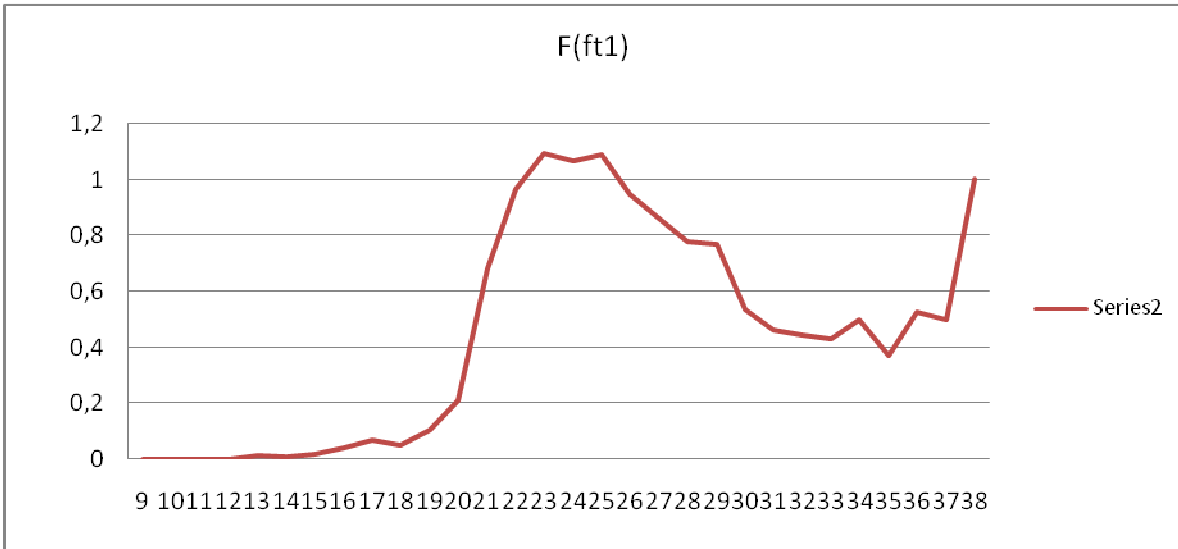
Catch in Numbers		
Class	Total catch	Catch of gear 1
1	9195,28	9195,28
2	9195,28	9195,28
3	9195,28	9195,28
4	13197,69	13197,69
5	164336,54	164336,54
6	129852,74	129852,74
7	204364,58	204364,58
8	433598,62	433598,62
9	715503,97	715503,97
10	541552,1	541552,1
11	1036457,9	1036457,9
12	2023641,72	2023641,72
13	6232114,32	6232114,32
14	8231785,41	8231785,41
15	8486544,86	8486544,86
16	7475419,27	7475419,27
17	6862897,88	6862897,88
18	5345507,25	5345507,25
19	4359967,8	4359967,8
20	3525964,35	3525964,35
21	3107321,25	3107321,25
22	1934808,42	1934808,42
23	1491967,73	1491967,73
24	1280833,6	1280833,6
25	1095024,82	1095024,82
26	1087396,26	1087396,26
27	677719,5	677719,5
28	757384,4	757384,4
29	518300,12	518300,12
30	549044,29	549044,29
Total	68310093,2	68310093,2
Mean Age	0,725	0,725
Mean Length	25,518	25,518

Catch in Weight		
Class	Total catch	Catch of gear 1
1	6571,35	6571,35
2	8494,64	8494,64
3	10727,73	10727,73
4	19070,47	19070,47
5	289314,6	289314,6
6	274625,34	274625,34
7	512905,35	512905,35
8	1277651,69	1277651,69
9	2452049,19	2452049,19
10	2140512,27	2140512,27
11	4689337,45	4689337,45
12	10409430,5	10409430,5
13	36216899,6	36216899,6
14	53750689,1	53750689,1
15	61954228,6	61954228,6
16	60735740	60735740
17	61788808,7	61788808,7
18	53126848,5	53126848,5
19	47656876,8	47656876,8
20	42243546,2	42243546,2
21	40673228,2	40673228,2
22	27592720,8	27592720,8
23	23115136,9	23115136,9
24	21501010,1	21501010,1
25	19867906,7	19867906,7
26	21272831,1	21272831,1
27	14267489	14267489
28	17113992,8	17113992,8
29	12546593,9	12546593,9
30	14172202,7	14172202,7
Total	651687440	651687440
Percentage	---	100

VPA Results--Numbers		
Class	Initial number	Mean number
1	327339765	11786360,1
2	312597620	11628144,1
3	298053245	11466700,6
4	283710674	11301765,6
5	269570269	11129960,5
6	255493482	10951817,1
7	241673858	10768524,3
8	228008838	10573592,9
9	214358248	10361241
10	200691193	10140706,9
11	187473757	9905052,52
12	174055984	9620813,87
13	160006324	9172277,39
14	142308863	8518840,09
15	123428528	7771282,14
16	105227880	7024727,2
17	88971552,1	6308186,18
18	74223421,5	5648159,92
19	61817714,3	5063724,72
20	51128090,6	4534308,45
21	41934240,7	4038341,32
22	33778992,8	3604219,23
23	27338910,3	3237702,52
24	21799814,5	2888293,5
25	16908614	2540820,4
26	12637563,7	2175686,95
27	8830558,71	1819005,13
28	5879082,79	1446340,5
29	3313772,76	1040828,21
30	1494437,38	549044,29
Total	---	207016468
Stock Mean Age	---	0,347
Stock Mean Length	---	19,328

VPA Results--Weight		
Class	Initial Weight	Mean Weight
1	203285808	8423043,46
2	254453453	10742131,1
3	309899752	13377691,9
4	368851566	16330887,6
5	430451267	19594304,1
6	493501557	23161979,7
7	557301134	27026375
8	620576465	31156392,5
9	681713351	35508220,4
10	739165763	40081660,9
11	793337826	44814298,3
12	840266159	49488598,6
13	875554980	53303170,1
14	877535228	55625056,1
15	853154446	56732604,2
16	811357050	57073990
17	761839310	56794566,4
18	702907542	56134791,8
19	645006428	55349332
20	585697690	54324221,6
21	525680664	52859799,4
22	461968308	51400549,1
23	406741966	50161900,6
24	351885728	48485008,2
25	295378031	46100126,4
26	238358252	42563160,1
27	179426429	38294066,5
28	128418721	32681767,4
29	77660659,2	25195535
30	37505990,2	14172202,7
Total	---	1166957431
SSB	---	569702595

VPA Results--Mortalities			
Class	Z	Total F	F of gear 1
9	1,251	0,001	0,001
10	1,251	0,001	0,001
11	1,251	0,001	0,001
12	1,251	0,001	0,001
13	1,265	0,015	0,015
14	1,262	0,012	0,012
15	1,269	0,019	0,019
16	1,291	0,041	0,041
17	1,319	0,069	0,069
18	1,303	0,053	0,053
19	1,355	0,105	0,105
20	1,46	0,21	0,21
21	1,929	0,679	0,679
22	2,216	0,966	0,966
23	2,342	1,092	1,092
24	2,314	1,064	1,064
25	2,338	1,088	1,088
26	2,196	0,946	0,946
27	2,111	0,861	0,861
28	2,028	0,778	0,778
29	2,019	0,769	0,769
30	1,787	0,537	0,537
31	1,711	0,461	0,461
32	1,693	0,443	0,443
33	1,681	0,431	0,431
34	1,75	0,5	0,5
35	1,623	0,373	0,373
36	1,774	0,524	0,524
37	1,748	0,498	0,498
38	2,25	1	1
Mean Mort. rates	1,851	0,601	0,601
Global Fs	---	0,33	0,33
---	Critical age	Critical length	
Current stock	0,407	22	
Virgin stock	0,612	25	
Total Biomass balance (D): 2110384228.77			
---	Biomass	Percentage	
Recruitment	203285808	9,63	
Growth	1907098421	90,37	
Natural death	1458696789	69,12	
Fishing	651687440	30,88	
R/B(mean)	17,42		
D/B(mean)	180,85		
B(max)/B(mean)	75,2		
B(max)/D	41,58		



3) Yield per Recruit analysis (Y/R).

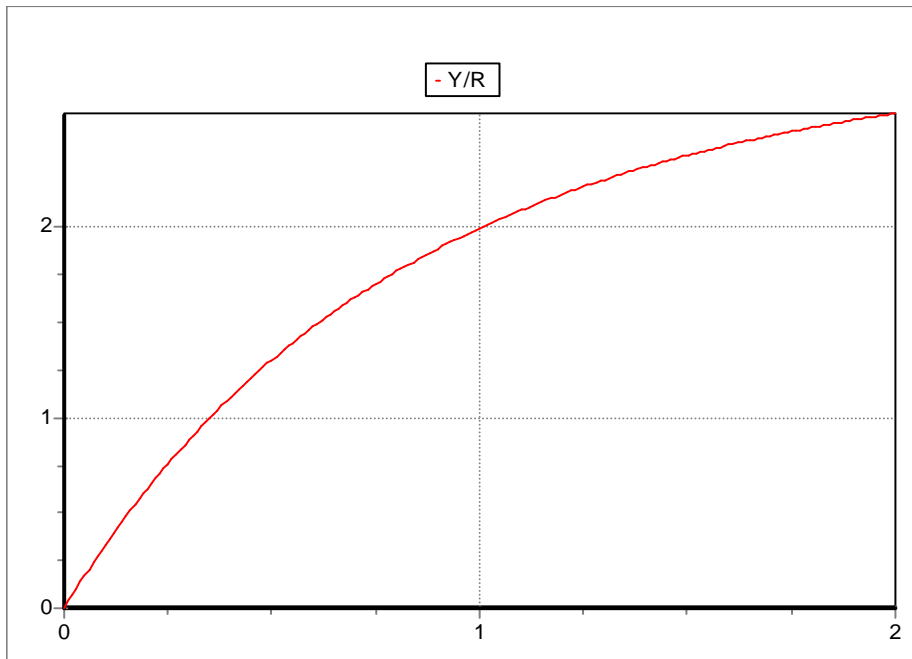
Slope at origin	Virgin biomass	Method	Num_points	Resolution
3,5749	2002816766	Calc. Mean wt.	200	0,01
Factor	Y/R	B/R	SSB	Y/R Gear 1
0	0	6,118	3,777	0
0,01	0,036	6,079	3,744	0,036
0,02	0,071	6,039	3,712	0,071
0,03	0,105	6	3,679	0,105
0,04	0,139	5,962	3,648	0,139
0,05	0,173	5,923	3,616	0,173
0,06	0,206	5,886	3,585	0,206
0,07	0,239	5,848	3,555	0,239
0,08	0,271	5,811	3,524	0,271
0,09	0,303	5,774	3,494	0,303
0,1	0,334	5,738	3,465	0,334
0,11	0,365	5,702	3,435	0,365
0,12	0,395	5,666	3,406	0,395
0,13	0,426	5,631	3,377	0,426
0,14	0,455	5,596	3,349	0,455
0,15	0,485	5,562	3,321	0,485
0,16	0,514	5,528	3,293	0,514
0,17	0,542	5,494	3,266	0,542
0,18	0,57	5,46	3,238	0,57
0,19	0,598	5,427	3,211	0,598
0,2	0,626	5,394	3,185	0,626
0,21	0,653	5,362	3,158	0,653
0,22	0,679	5,33	3,132	0,679
0,23	0,706	5,298	3,107	0,706
0,24	0,732	5,266	3,081	0,732
0,25	0,757	5,235	3,056	0,757
0,26	0,783	5,204	3,031	0,783
0,27	0,808	5,174	3,006	0,808
0,28	0,832	5,143	2,982	0,832
0,29	0,857	5,113	2,957	0,857
0,3	0,881	5,083	2,933	0,881
0,31	0,904	5,054	2,91	0,904
0,32	0,928	5,025	2,886	0,928
0,33	0,951	4,996	2,863	0,951
0,34	0,974	4,967	2,84	0,974
0,35	0,996	4,939	2,817	0,996
0,36	1,018	4,911	2,795	1,018
0,37	1,04	4,883	2,773	1,04
0,38	1,062	4,856	2,751	1,062
0,39	1,083	4,828	2,729	1,083
0,4	1,105	4,801	2,707	1,105
0,41	1,125	4,775	2,686	1,125
0,42	1,146	4,748	2,665	1,146
0,43	1,166	4,722	2,644	1,166
0,44	1,186	4,696	2,623	1,186
0,45	1,206	4,67	2,603	1,206
0,46	1,226	4,645	2,582	1,226

0,47	1,245	4,62	2,562	1,245
0,48	1,264	4,595	2,543	1,264
0,49	1,283	4,57	2,523	1,283
0,5	1,301	4,545	2,503	1,301
0,51	1,32	4,521	2,484	1,32
0,52	1,338	4,497	2,465	1,338
0,53	1,356	4,473	2,446	1,356
0,54	1,373	4,449	2,428	1,373
0,55	1,391	4,426	2,409	1,391
0,56	1,408	4,403	2,391	1,408
0,57	1,425	4,38	2,373	1,425
0,58	1,442	4,357	2,355	1,442
0,59	1,459	4,335	2,337	1,459
0,6	1,475	4,312	2,319	1,475
0,61	1,491	4,29	2,302	1,491
0,62	1,507	4,268	2,285	1,507
0,63	1,523	4,246	2,268	1,523
0,64	1,538	4,225	2,251	1,538
0,65	1,554	4,203	2,234	1,554
0,66	1,569	4,182	2,217	1,569
0,67	1,584	4,161	2,201	1,584
0,68	1,599	4,141	2,185	1,599
0,69	1,614	4,12	2,169	1,614
0,7	1,628	4,1	2,153	1,628
0,71	1,642	4,079	2,137	1,642
0,72	1,657	4,059	2,121	1,657
0,73	1,671	4,04	2,106	1,671
0,74	1,684	4,02	2,091	1,684
0,75	1,698	4	2,075	1,698
0,76	1,712	3,981	2,06	1,712
0,77	1,725	3,962	2,046	1,725
0,78	1,738	3,943	2,031	1,738
0,79	1,751	3,924	2,016	1,751
0,8	1,764	3,905	2,002	1,764
0,81	1,776	3,887	1,988	1,776
0,82	1,789	3,869	1,973	1,789
0,83	1,801	3,85	1,959	1,801
0,84	1,814	3,832	1,946	1,814
0,85	1,826	3,815	1,932	1,826
0,86	1,838	3,797	1,918	1,838
0,87	1,849	3,779	1,905	1,849
0,88	1,861	3,762	1,891	1,861
0,89	1,873	3,745	1,878	1,873
0,9	1,884	3,728	1,865	1,884
0,91	1,895	3,711	1,852	1,895
0,92	1,906	3,694	1,839	1,906
0,93	1,917	3,677	1,826	1,917
0,94	1,928	3,661	1,814	1,928
0,95	1,939	3,645	1,801	1,939
0,96	1,95	3,628	1,789	1,95
0,97	1,96	3,612	1,777	1,96
0,98	1,97	3,596	1,764	1,97
0,99	1,981	3,581	1,752	1,981

1	1,991	3,565	1,74	1,991
1,01	2,001	3,549	1,729	2,001
1,02	2,011	3,534	1,717	2,011
1,03	2,021	3,519	1,705	2,021
1,04	2,03	3,504	1,694	2,03
1,05	2,04	3,489	1,682	2,04
1,06	2,049	3,474	1,671	2,049
1,07	2,059	3,459	1,66	2,059
1,08	2,068	3,444	1,649	2,068
1,09	2,077	3,43	1,638	2,077
1,1	2,086	3,416	1,627	2,086
1,11	2,095	3,401	1,616	2,095
1,12	2,104	3,387	1,606	2,104
1,13	2,112	3,373	1,595	2,112
1,14	2,121	3,359	1,585	2,121
1,15	2,129	3,345	1,574	2,129
1,16	2,138	3,332	1,564	2,138
1,17	2,146	3,318	1,554	2,146
1,18	2,154	3,305	1,544	2,154
1,19	2,162	3,291	1,534	2,162
1,2	2,17	3,278	1,524	2,17
1,21	2,178	3,265	1,514	2,178
1,22	2,186	3,252	1,504	2,186
1,23	2,194	3,239	1,494	2,194
1,24	2,202	3,226	1,485	2,202
1,25	2,209	3,214	1,475	2,209
1,26	2,217	3,201	1,466	2,217
1,27	2,224	3,188	1,457	2,224
1,28	2,232	3,176	1,448	2,232
1,29	2,239	3,164	1,438	2,239
1,3	2,246	3,152	1,429	2,246
1,31	2,253	3,139	1,42	2,253
1,32	2,26	3,127	1,411	2,26
1,33	2,267	3,116	1,403	2,267
1,34	2,274	3,104	1,394	2,274
1,35	2,281	3,092	1,385	2,281
1,36	2,287	3,08	1,377	2,287
1,37	2,294	3,069	1,368	2,294
1,38	2,301	3,057	1,36	2,301
1,39	2,307	3,046	1,351	2,307
1,4	2,313	3,035	1,343	2,313
1,41	2,32	3,024	1,335	2,32
1,42	2,326	3,013	1,327	2,326
1,43	2,332	3,002	1,319	2,332
1,44	2,338	2,991	1,311	2,338
1,45	2,344	2,98	1,303	2,344
1,46	2,35	2,969	1,295	2,35
1,47	2,356	2,959	1,287	2,356
1,48	2,362	2,948	1,279	2,362
1,49	2,368	2,938	1,272	2,368
1,5	2,374	2,927	1,264	2,374
1,51	2,379	2,917	1,256	2,379
1,52	2,385	2,907	1,249	2,385

1,53	2,391	2,896	1,242	2,391
1,54	2,396	2,886	1,234	2,396
1,55	2,401	2,876	1,227	2,401
1,56	2,407	2,866	1,22	2,407
1,57	2,412	2,857	1,213	2,412
1,58	2,417	2,847	1,206	2,417
1,59	2,423	2,837	1,199	2,423
1,6	2,428	2,827	1,192	2,428
1,61	2,433	2,818	1,185	2,433
1,62	2,438	2,808	1,178	2,438
1,63	2,443	2,799	1,171	2,443
1,64	2,448	2,79	1,164	2,448
1,65	2,452	2,78	1,158	2,452
1,66	2,457	2,771	1,151	2,457
1,67	2,462	2,762	1,144	2,462
1,68	2,467	2,753	1,138	2,467
1,69	2,471	2,744	1,131	2,471
1,7	2,476	2,735	1,125	2,476
1,71	2,48	2,726	1,119	2,48
1,72	2,485	2,717	1,112	2,485
1,73	2,489	2,709	1,106	2,489
1,74	2,494	2,7	1,1	2,494
1,75	2,498	2,691	1,094	2,498
1,76	2,503	2,683	1,088	2,503
1,77	2,507	2,674	1,082	2,507
1,78	2,511	2,666	1,076	2,511
1,79	2,515	2,658	1,07	2,515
1,8	2,519	2,649	1,064	2,519
1,81	2,523	2,641	1,058	2,523
1,82	2,527	2,633	1,052	2,527
1,83	2,531	2,625	1,046	2,531
1,84	2,535	2,617	1,041	2,535
1,85	2,539	2,609	1,035	2,539
1,86	2,543	2,601	1,03	2,543
1,87	2,547	2,593	1,024	2,547
1,88	2,551	2,585	1,018	2,551
1,89	2,554	2,578	1,013	2,554
1,9	2,558	2,57	1,008	2,558
1,91	2,562	2,562	1,002	2,562
1,92	2,565	2,555	0,997	2,565
1,93	2,569	2,547	0,992	2,569
1,94	2,572	2,54	0,986	2,572
1,95	2,576	2,532	0,981	2,576
1,96	2,579	2,525	0,976	2,579
1,97	2,583	2,518	0,971	2,583
1,98	2,586	2,51	0,966	2,586
1,99	2,59	2,503	0,961	2,59
2	2,593	2,496	0,956	2,593

Factor	Y/R	B/R	SSB	Y/R Gear 1
0	0	6,118	3,777	0
1,01	1,991	3,565	1,74	1,991
1,93	2,569	2,547	0,992	2,569
2	2,593	2,496	0,956	2,593



4) Virtual Population Analysis (VPA)-FT1

A) VPA results (Fast Growth)

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	0	0.346	14.138	20.491	1.981	5.583	0.313286
2	1	1.378	29.38	32.195	12.962	16.496	0.8088861
3	2	2.415	35.639	36.893	21.285	23.281	0.9275836
4	3	3.439	38.209	38.75	25.453	26.392	1

	Catch in Numbers	Catch in Weight
Age	Total catch	Total catch
0	71267731.9	397914181.5
1	11613830.23	191585777.2
2	2053057.52	47797682.37
3	545240.7	14389799
Total	85479860.35	651687440
Mean Age	0.556	
Mean Length	22.592	

VPA Results - Numbers		
Age	Initial number	Mean number
0	142320498.1	62298855.59
1	19967704.57	10252902.07
2	4355242.53	2710398.25
3	1543273.5	1090481.41
Total		76352637.32
Stock Mean Age		0.602
Stock Mean Length		22.906

VPA Results--Weight		
Age	Initial Weight	Mean Weight
0	281907648.9	347837618.3
1	258812429.9	169135433.6
2	92699942.44	63101375.99
3	39281058.31	28779597.99
Total	---	608854025.9
SSB	---	333095369.6

VPA Results--Mortalities		
Age	Z	Total F
0	1.964	1.144
1	1.523	1.133
2	1.037	0.757
3	0.74	0.5
Mean Mort. rates	1.316	0.884
Global Fs	---	1.12

	Critical age	Critical length
Current stock	0	14.138
Virgin stock	2	35.639
Total Biomass balance	Biomass	Percentage
Recruitment	281907648.9	27.44
Growth	745544946.1	72.56
Natural death	375765154.9	36.57
Fishing	651687440	63.43

B) VPA results (Low Growth).

Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
0	0.398	1.755	7.768	0.009	0.65	0
1	1.389	15.729	19.71	2.605	4.821	0.15359
2	2.372	25.188	27.77	8.729	11.307	0.496532
3	3.373	31.59	33.345	15.616	17.989	0.7722
4	4.356	35.923	37.058	21.724	23.553	0.8918
5	5.37	38.857	39.653	26.576	28.007	0.97
6	6.361	40.842	41.369	30.204	31.22	1

Age	Catch in Numbers	Catch in Weight (g)
0	540929.24	351654.96
1	40817836.54	196781223.3
2	27635782.71	312490897
3	5253562.49	94505560.94
4	1719065.87	40489063.01
5	198387.45	5556305.94
6	48453.66	1512734.87
Total	76214017.96	651687440
Mean Age	1.956	
Mean Length	23.945	

VPA Results--Numbers		
Age	Initial number	Mean number
0	2161991802	1233841081
1	619149520.6	336944720.6
2	157150783.3	78303721.95
3	31635348.14	15895221.97
4	6512758.19	2994240.62
5	1050891.54	517798.51
6	205255.96	96907.33
Total	---	1668593693
Stock Mean Age	---	0.728
Stock Mean Length	---	11.426

VPA Results--Weight		
Age	Initial Weight	Mean Weight
0	20154572.83	802112922.2
1	1612869349	1624397566
2	1371772612	885417307.4
3	494018573.8	285936804
4	141485009.3	70523182.97
5	27928129.53	14502161.57
6	6199504.95	3025469.75
Total	---	3685915413
SSB	---	989914789.7

VPA Results--Mortalities		
Age	Z	Total F
0	1.25	0
1	1.371	0.121
2	1.603	0.353
3	1.581	0.331
4	1.824	0.574
5	1.633	0.383
6	1.75	0.5
Mean Mort. rates	1.573	0.323
Global Fs	---	0.046

	Critical age	Critical length
Current stock	1	15.729
Virgin stock	1	15.729

Total Biomass balance	Biomass	Percentage
Recruitment	20154572.8	0.38
Growth	5238927134	99.62
Natural death	4607394267	87.61
Fishing	651687440	12.39
R/B(mean)	0.55	
D/B(mean)	142.68	
B(max)/B(mean)	43.76	
B(max)/D	30.67	

5) Length Cohort Analysis (LCA)-FT5.

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	-0,204	-0,185	9	9,499	0,621	0,715	0
2	-0,167	-0,148	10	10,499	0,814	0,924	0
3	-0,129	-0,109	11	11,499	1,04	1,167	0
4	-0,089	-0,069	12	12,499	1,3	1,445	0
5	-0,048	-0,027	13	13,499	1,597	1,761	0,03
6	-0,006	0,016	14	14,499	1,932	2,115	0,05
7	0,038	0,061	15	15,499	2,306	2,51	0,07
8	0,084	0,108	16	16,498	2,722	2,947	0,1
9	0,132	0,156	17	17,498	3,18	3,427	0,12
10	0,182	0,208	18	18,498	3,683	3,953	0,15
11	0,234	0,261	19	19,498	4,232	4,524	0,19
12	0,289	0,317	20	20,497	4,828	5,144	0,23
13	0,346	0,376	21	21,495	5,472	5,812	0,27
14	0,407	0,439	22	22,494	6,166	6,53	0,31
15	0,471	0,505	23	23,493	6,912	7,301	0,37
16	0,54	0,575	24	24,492	7,71	8,126	0,42
17	0,612	0,65	25	25,492	8,563	9,004	0,48
18	0,69	0,73	26	26,492	9,47	9,94	0,53
19	0,773	0,817	27	27,492	10,434	10,932	0,59
20	0,863	0,91	28	28,492	11,455	11,982	0,64
21	0,961	1,012	29	29,491	12,536	13,091	0,69
22	1,068	1,125	30	30,492	13,676	14,263	0,74
23	1,186	1,25	31	31,492	14,878	15,495	0,78
24	1,318	1,39	32	32,491	16,142	16,789	0,82
25	1,468	1,551	33	33,49	17,469	18,146	0,85
26	1,642	1,738	34	34,488	18,861	19,567	0,87
27	1,846	1,964	35	35,487	20,319	21,056	0,9
28	2,097	2,245	36	36,481	21,843	22,604	0,92
29	2,42	2,622	37	37,475	23,436	24,219	0,93
30	2,876	3,18	38	38,446	25,097	25,864	1
+	3,655	---	39	---	26,828	---	

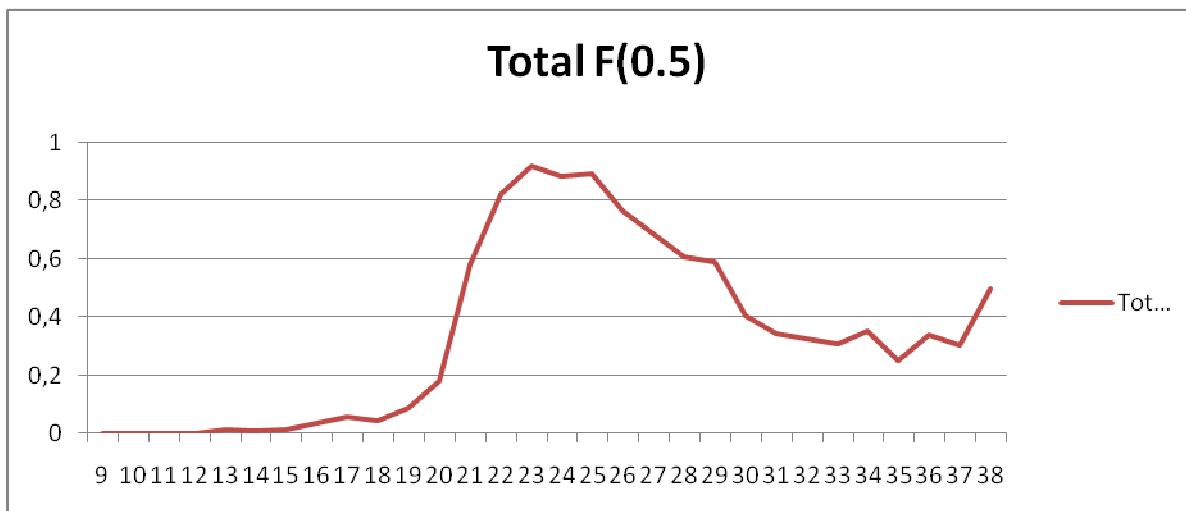
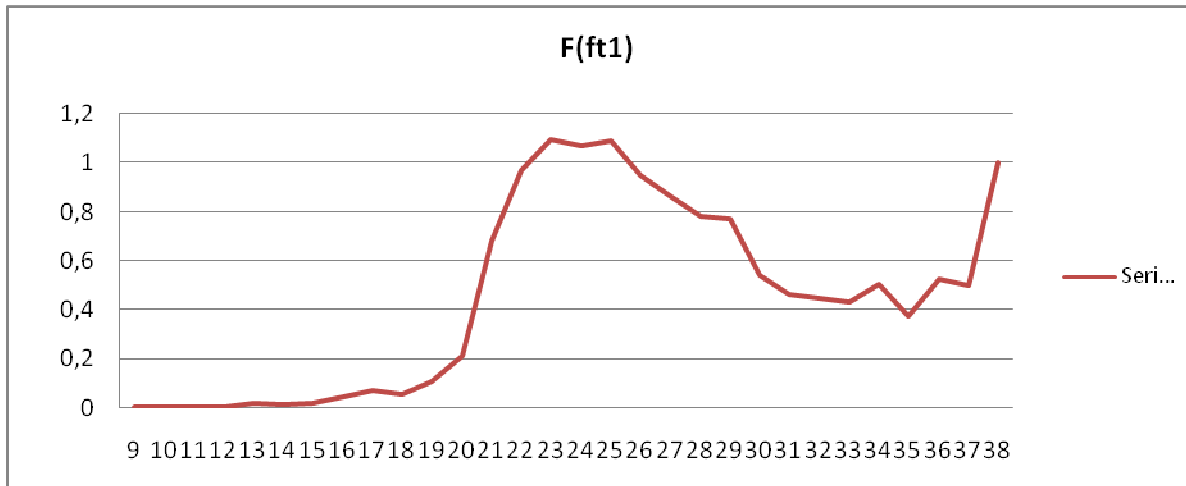
Catch in Numbers		
Class	Total catch	Catch of gear 1
1	9193,75	9193,75
2	9193,75	9193,75
3	9193,75	9193,75
4	13195,49	13195,49
5	164309,17	164309,17
6	129831,11	129831,11
7	204330,54	204330,54
8	433526,41	433526,41
9	715384,8	715384,8
10	541461,91	541461,91
11	1036285,29	1036285,29
12	2023304,7	2023304,7
13	6231076,4	6231076,4
14	8230414,45	8230414,45
15	8485131,48	8485131,48
16	7474174,29	7474174,29
17	6861754,9	6861754,9
18	5344616,99	5344616,99
19	4359241,67	4359241,67
20	3525377,12	3525377,12
21	3106803,74	3106803,74
22	1934486,19	1934486,19
23	1491719,25	1491719,25
24	1280620,29	1280620,29
25	1094842,45	1094842,45
26	1087215,16	1087215,16
27	677606,63	677606,63
28	757258,26	757258,26
29	518213,8	518213,8
30	548952,85	548952,85
Total	68298716,6	68298716,6
Mean Age	0,725	0,725
Mean Length	25,519	25,519

Catch in Weight		
Class	Total catch	Catch of gear 1
1	6570,25	6570,25
2	8493,23	8493,23
3	10725,94	10725,94
4	19067,29	19067,29
5	289266,81	289266,81
6	274579,89	274579,89
7	512820,76	512820,76
8	1277443,32	1277443,32
9	2451654,89	2451654,89
10	2140165,21	2140165,21
11	4688596,88	4688596,88
12	10407878,5	10407878,5
13	36212968	36212968
14	53746416,5	53746416,5
15	61950467,9	61950467,9
16	60732440,1	60732440,1
17	61786300,1	61786300,1
18	53124430,2	53124430,2
19	47654754,1	47654754,1
20	42241697,7	42241697,7
21	40672014,2	40672014,2
22	27591100,5	27591100,5
23	23113713,3	23113713,3
24	21499929,5	21499929,5
25	19867242,6	19867242,6
26	21273297,4	21273297,4
27	14267660,2	14267660,2
28	17116979,4	17116979,4
29	12550748	12550748
30	14198017,4	14198017,4
Total	651687440	651687440
Percentage	---	100

VPA Results--Numbers		
Class	Initial number	Mean number
1	378535184	13629754,4
2	361488797	13446846,9
3	344671045	13260208,1
4	328086591	13069545,7
5	311736463	12871450,3
6	295482841	12666419,2
7	279519986	12455603,3
8	263746151	12232472,5
9	248022034	11991199,8
10	232317650	11740967,6
11	217099979	11474785,1
12	201720212	11159133,8
13	185747990	10678383,4
14	166168934	9991740,18
15	145448845	9209751,86
16	125451523	8427345,41
17	107443167	7673595,49
18	90989418,1	6974587,02
19	76926567,3	6349469,28
20	64630489	5777375,06
21	53883393,1	5236541,91
22	44230912	4754640,25
23	36353125,5	4337449,21
24	29439594,7	3933733,49
25	23241807,5	3527439,34
26	17737665,9	3097938,43
27	12778027,7	2669014,18
28	8764153,37	2214491,27
29	5238781,02	1710752,34
30	2582126,79	1097905,7
Total	---	247660540
Stock Mean Age	---	0,383
Stock Mean Length	---	19,726

VPA Results--Weight		
Class	Initial Weight	Mean Weight
1	235079385	9740413,71
2	294250713	12422257,9
3	358370436	15470099
4	426544590	18885306,4
5	497782474	22660228,7
6	570743492	26788216,8
7	644574497	31260583,4
8	717843466	36044609,9
9	788772691	41094364
10	855649172	46406977,2
11	918707918	51916824,6
12	973816954	57402579,7
13	1016413434	62059254,2
14	1024666280	65248260,9
15	1005361813	67240965,9
16	967290965	68477564,3
17	920006750	69096474,7
18	861684182	69326008,2
19	802652298	69411705
20	740374375	69225538,8
21	675473250	68552996,9
22	604910859	67814264,1
23	540853368	67207390
24	475204650	66042208,9
25	406013133	64009660,2
26	334551750	60616672,9
27	259634295	56198663,9
28	191438257	50056107,9
29	122774619	41433133,4
30	64803800,7	28396034,8
Total	---	1480505366
SSB	---	763324598

VPA Results--Mortalities			
Class	Z	Total F	F of gear 1
9	1,251	0,001	0,001
10	1,251	0,001	0,001
11	1,251	0,001	0,001
12	1,251	0,001	0,001
13	1,263	0,013	0,013
14	1,26	0,01	0,01
15	1,266	0,016	0,016
16	1,285	0,035	0,035
17	1,31	0,06	0,06
18	1,296	0,046	0,046
19	1,34	0,09	0,09
20	1,431	0,181	0,181
21	1,834	0,584	0,584
22	2,074	0,824	0,824
23	2,171	0,921	0,921
24	2,137	0,887	0,887
25	2,144	0,894	0,894
26	2,016	0,766	0,766
27	1,937	0,687	0,687
28	1,86	0,61	0,61
29	1,843	0,593	0,593
30	1,657	0,407	0,407
31	1,594	0,344	0,344
32	1,576	0,326	0,326
33	1,56	0,31	0,31
34	1,601	0,351	0,351
35	1,504	0,254	0,254
36	1,592	0,342	0,342
37	1,553	0,303	0,303
38	1,75	0,5	0,5
Mean Mort. rates	1,646	0,396	0,396
Global Fs	---	0,276	0,276
---	Critical age	Critical length	
Current stock	0,407	22	
Virgin stock	0,612	25	
Total Biomass balance (D): 2502319147.61			
---	Biomass	Percentage	
Recruitment	235079385	9,39	
Growth	2267239763	90,61	
Natural death	1850631708	73,96	
Fishing	651687440	26,04	
R/B(mean)	15,88		
D/B(mean)	169,02		
B(max)/B(mean)	69,21		
B(max)/D	40,95		



Slope at origin	Virgin biomass	Method	Num_points	Resolution
2,6865	2316054121	Calc. Mean wt.	200	0,01
Factor	Y/R	B/R	SSB	Y/R Gear 1
0	0	6,118	3,777	0
0,01	0,027	6,087	3,751	0,027
0,02	0,053	6,056	3,726	0,053
0,03	0,079	6,025	3,701	0,079
0,04	0,105	5,995	3,676	0,105
0,05	0,131	5,965	3,651	0,131
0,06	0,156	5,934	3,627	0,156
0,07	0,182	5,905	3,602	0,182
0,08	0,207	5,875	3,578	0,207
0,09	0,231	5,846	3,554	0,231
0,1	0,256	5,816	3,531	0,256
0,11	0,28	5,787	3,507	0,28
0,12	0,304	5,759	3,484	0,304
0,13	0,328	5,73	3,461	0,328
0,14	0,351	5,702	3,438	0,351
0,15	0,375	5,674	3,415	0,375
0,16	0,398	5,646	3,393	0,398
0,17	0,42	5,618	3,37	0,42

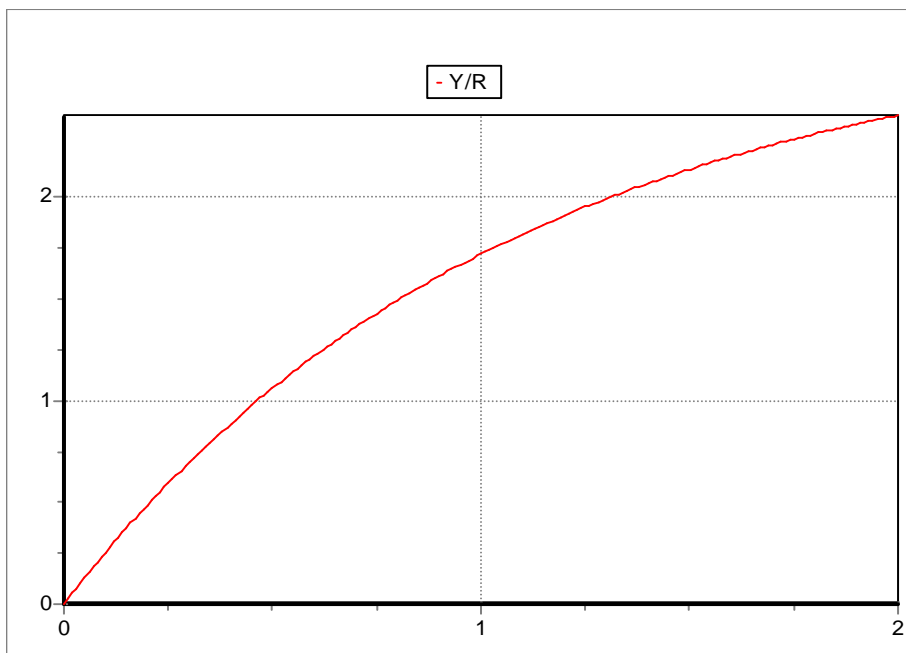
0,18	0,443	5,591	3,348	0,443
0,19	0,465	5,564	3,326	0,465
0,2	0,488	5,537	3,304	0,488
0,21	0,51	5,51	3,282	0,51
0,22	0,531	5,483	3,261	0,531
0,23	0,553	5,457	3,24	0,553
0,24	0,574	5,431	3,219	0,574
0,25	0,595	5,405	3,198	0,595
0,26	0,616	5,379	3,177	0,616
0,27	0,637	5,353	3,156	0,637
0,28	0,657	5,328	3,136	0,657
0,29	0,678	5,303	3,115	0,678
0,3	0,698	5,277	3,095	0,698
0,31	0,718	5,253	3,075	0,718
0,32	0,738	5,228	3,055	0,738
0,33	0,757	5,203	3,036	0,757
0,34	0,776	5,179	3,016	0,776
0,35	0,796	5,155	2,997	0,796
0,36	0,815	5,131	2,978	0,815
0,37	0,833	5,107	2,959	0,833
0,38	0,852	5,084	2,94	0,852
0,39	0,871	5,06	2,921	0,871
0,4	0,889	5,037	2,903	0,889
0,41	0,907	5,014	2,884	0,907
0,42	0,925	4,991	2,866	0,925
0,43	0,943	4,968	2,848	0,943
0,44	0,96	4,946	2,83	0,96
0,45	0,978	4,923	2,812	0,978
0,46	0,995	4,901	2,794	0,995
0,47	1,012	4,879	2,777	1,012
0,48	1,029	4,857	2,759	1,029
0,49	1,046	4,835	2,742	1,046
0,5	1,062	4,814	2,725	1,062
0,51	1,079	4,792	2,708	1,079
0,52	1,095	4,771	2,691	1,095
0,53	1,111	4,75	2,674	1,111
0,54	1,127	4,729	2,657	1,127
0,55	1,143	4,708	2,641	1,143
0,56	1,159	4,688	2,624	1,159
0,57	1,174	4,667	2,608	1,174
0,58	1,19	4,647	2,592	1,19
0,59	1,205	4,627	2,576	1,205
0,6	1,22	4,606	2,56	1,22
0,61	1,235	4,587	2,544	1,235
0,62	1,25	4,567	2,529	1,25
0,63	1,264	4,547	2,513	1,264
0,64	1,279	4,528	2,498	1,279
0,65	1,293	4,508	2,483	1,293
0,66	1,308	4,489	2,468	1,308
0,67	1,322	4,47	2,453	1,322
0,68	1,336	4,451	2,438	1,336
0,69	1,35	4,432	2,423	1,35
0,7	1,363	4,414	2,408	1,363

0,71	1,377	4,395	2,394	1,377
0,72	1,391	4,377	2,379	1,391
0,73	1,404	4,358	2,365	1,404
0,74	1,417	4,34	2,351	1,417
0,75	1,43	4,322	2,337	1,43
0,76	1,443	4,304	2,323	1,443
0,77	1,456	4,287	2,309	1,456
0,78	1,469	4,269	2,295	1,469
0,79	1,482	4,252	2,281	1,482
0,8	1,494	4,234	2,268	1,494
0,81	1,506	4,217	2,254	1,506
0,82	1,519	4,2	2,241	1,519
0,83	1,531	4,183	2,227	1,531
0,84	1,543	4,166	2,214	1,543
0,85	1,555	4,149	2,201	1,555
0,86	1,567	4,132	2,188	1,567
0,87	1,579	4,116	2,175	1,579
0,88	1,59	4,1	2,163	1,59
0,89	1,602	4,083	2,15	1,602
0,9	1,613	4,067	2,137	1,613
0,91	1,624	4,051	2,125	1,624
0,92	1,636	4,035	2,112	1,636
0,93	1,647	4,019	2,1	1,647
0,94	1,658	4,003	2,088	1,658
0,95	1,669	3,988	2,076	1,669
0,96	1,679	3,972	2,064	1,679
0,97	1,69	3,957	2,052	1,69
0,98	1,701	3,941	2,04	1,701
0,99	1,711	3,926	2,028	1,711
1	1,722	3,911	2,017	1,722
1,01	1,732	3,896	2,005	1,732
1,02	1,742	3,881	1,993	1,742
1,03	1,752	3,866	1,982	1,752
1,04	1,762	3,852	1,971	1,762
1,05	1,772	3,837	1,959	1,772
1,06	1,782	3,823	1,948	1,782
1,07	1,792	3,808	1,937	1,792
1,08	1,802	3,794	1,926	1,802
1,09	1,811	3,78	1,915	1,811
1,1	1,821	3,766	1,905	1,821
1,11	1,83	3,752	1,894	1,83
1,12	1,839	3,738	1,883	1,839
1,13	1,849	3,724	1,873	1,849
1,14	1,858	3,71	1,862	1,858
1,15	1,867	3,697	1,852	1,867
1,16	1,876	3,683	1,841	1,876
1,17	1,885	3,67	1,831	1,885
1,18	1,894	3,656	1,821	1,894
1,19	1,902	3,643	1,811	1,902
1,2	1,911	3,63	1,801	1,911
1,21	1,92	3,617	1,791	1,92
1,22	1,928	3,604	1,781	1,928
1,23	1,937	3,591	1,771	1,937

1,24	1,945	3,578	1,761	1,945
1,25	1,953	3,565	1,751	1,953
1,26	1,961	3,553	1,742	1,961
1,27	1,97	3,54	1,732	1,97
1,28	1,978	3,528	1,723	1,978
1,29	1,986	3,515	1,713	1,986
1,3	1,994	3,503	1,704	1,994
1,31	2,001	3,491	1,695	2,001
1,32	2,009	3,479	1,686	2,009
1,33	2,017	3,467	1,676	2,017
1,34	2,025	3,455	1,667	2,025
1,35	2,032	3,443	1,658	2,032
1,36	2,04	3,431	1,649	2,04
1,37	2,047	3,419	1,641	2,047
1,38	2,054	3,407	1,632	2,054
1,39	2,062	3,396	1,623	2,062
1,4	2,069	3,384	1,614	2,069
1,41	2,076	3,373	1,606	2,076
1,42	2,083	3,361	1,597	2,083
1,43	2,09	3,35	1,589	2,09
1,44	2,097	3,339	1,58	2,097
1,45	2,104	3,328	1,572	2,104
1,46	2,111	3,317	1,563	2,111
1,47	2,118	3,306	1,555	2,118
1,48	2,125	3,295	1,547	2,125
1,49	2,131	3,284	1,539	2,131
1,5	2,138	3,273	1,531	2,138
1,51	2,145	3,262	1,523	2,145
1,52	2,151	3,252	1,515	2,151
1,53	2,158	3,241	1,507	2,158
1,54	2,164	3,231	1,499	2,164
1,55	2,17	3,22	1,491	2,17
1,56	2,177	3,21	1,483	2,177
1,57	2,183	3,2	1,476	2,183
1,58	2,189	3,189	1,468	2,189
1,59	2,195	3,179	1,461	2,195
1,6	2,201	3,169	1,453	2,201
1,61	2,207	3,159	1,446	2,207
1,62	2,213	3,149	1,438	2,213
1,63	2,219	3,139	1,431	2,219
1,64	2,225	3,129	1,423	2,225
1,65	2,231	3,119	1,416	2,231
1,66	2,236	3,11	1,409	2,236
1,67	2,242	3,1	1,402	2,242
1,68	2,248	3,09	1,395	2,248
1,69	2,253	3,081	1,388	2,253
1,7	2,259	3,071	1,381	2,259
1,71	2,264	3,062	1,374	2,264
1,72	2,27	3,053	1,367	2,27
1,73	2,275	3,043	1,36	2,275
1,74	2,281	3,034	1,353	2,281
1,75	2,286	3,025	1,346	2,286
1,76	2,291	3,016	1,34	2,291

1,77	2,296	3,007	1,333	2,296
1,78	2,302	2,998	1,326	2,302
1,79	2,307	2,989	1,32	2,307
1,8	2,312	2,98	1,313	2,312
1,81	2,317	2,971	1,307	2,317
1,82	2,322	2,962	1,3	2,322
1,83	2,327	2,953	1,294	2,327
1,84	2,332	2,945	1,287	2,332
1,85	2,336	2,936	1,281	2,336
1,86	2,341	2,928	1,275	2,341
1,87	2,346	2,919	1,269	2,346
1,88	2,351	2,911	1,262	2,351
1,89	2,356	2,902	1,256	2,356
1,9	2,36	2,894	1,25	2,36
1,91	2,365	2,885	1,244	2,365
1,92	2,369	2,877	1,238	2,369
1,93	2,374	2,869	1,232	2,374
1,94	2,378	2,861	1,226	2,378
1,95	2,383	2,853	1,22	2,383
1,96	2,387	2,845	1,214	2,387
1,97	2,392	2,837	1,209	2,392
1,98	2,396	2,829	1,203	2,396
1,99	2,4	2,821	1,197	2,4
2	2,405	2,813	1,191	2,405

Factor	Y/R	B/R	SSB	Y/R Gear 1
0	0	6,118	3,777	0
1,01	1,722	3,911	2,017	1,722
2	2,405	2,813	1,191	2,405



6) Virtual Population Analysis (VPA)-FT5.

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	0	0,346	14,138	20,491	1,981	5,583	0,313286
2	1	1,378	29,38	32,195	12,962	16,496	0,8088861
3	2	2,415	35,639	36,893	21,285	23,281	0,9275836
4	3	3,439	38,209	38,75	25,453	26,392	1
+	4	---	39,265	---	27,298	---	

Catch in Numbers		
Class	Total catch	Catch of gear 1
0	71267731,9	71267731,9
1	11613830,2	11613830,2
2	2053057,52	2053057,52
3	545240,7	545240,7
Total	85479860,4	85479860,4
Mean Age	0,556	0,556
Mean Length	22,592	22,592

Catch in Weight		
Class	Total catch	Catch of gear 1
1	397914181	397914181
2	191585777	191585777
3	47797682,4	47797682,4
4	14389799	14389799
Total	651687440	651687440
Percentage	---	100

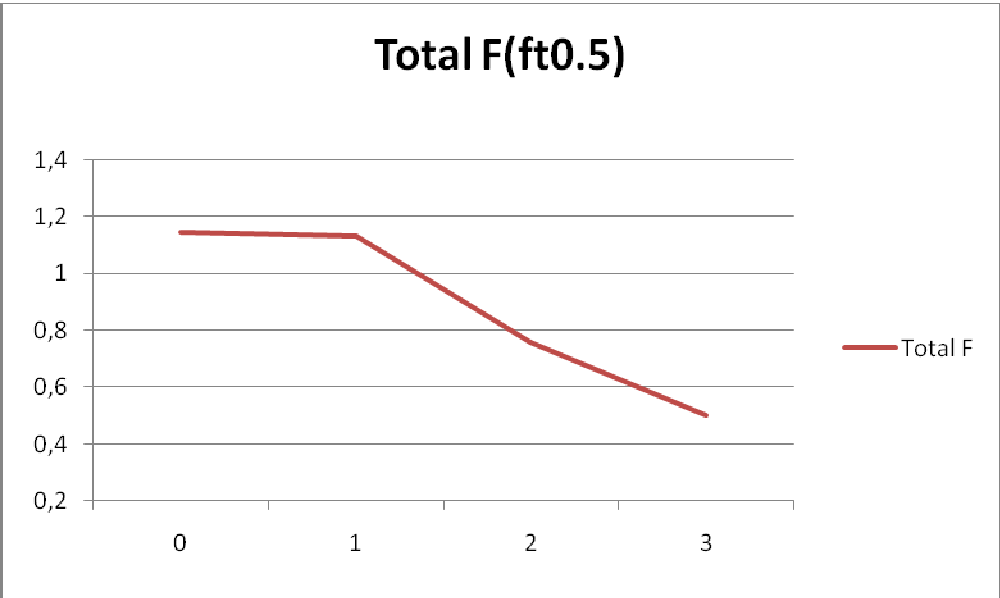
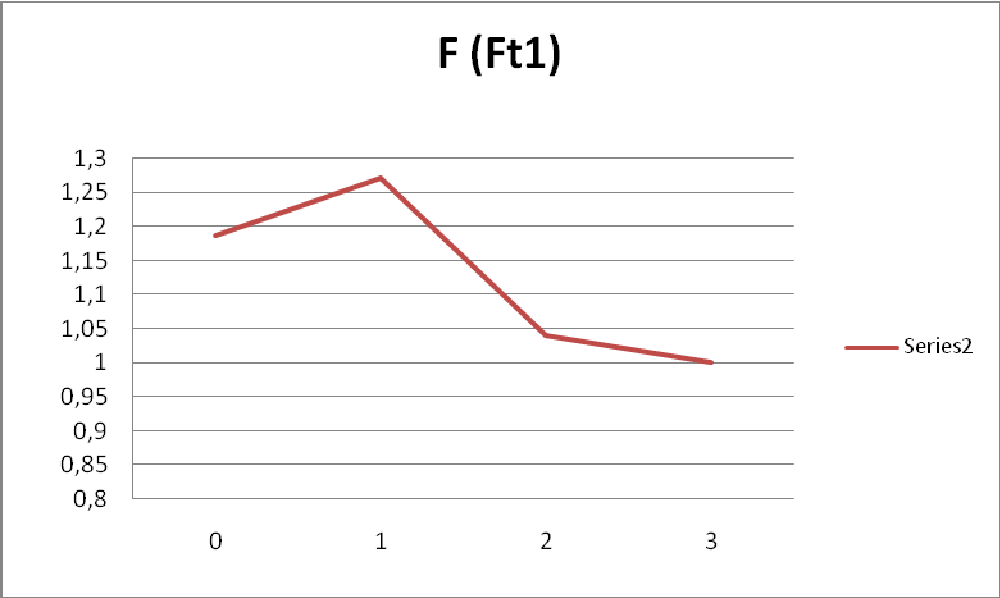
VPA Results--Numbers		
Class	Initial number	Mean number
1	142320498	62298855,6
2	19967704,6	10252902,1
3	4355242,53	2710398,25
4	1543273,5	1090481,41
Total	---	76352637,3
Stock Mean Age	---	0,602
Stock Mean Length	---	22,906

327339765,4

VPA Results--Weight		
Class	Initial Weight	Mean Weight
1	281907649	347837618
2	258812430	169135434
3	92699942,4	63101376
4	39281058,3	28779598
Total	---	608854026
SSB	---	333095370

203285808,1

VPA Results--Mortalities			
Age	Z	Total F	F of gear 1
0	1,964	1,144	1,144
1	1,523	1,133	1,133
2	1,037	0,757	0,757
3	0,74	0,5	0,5
Mean Mort. rates	1,316	0,884	0,884
Global Fs	---	1,12	1,12
---	Critical age	Critical length	
Current stock	0	14,138	
Virgin stock	2	35,639	
Total Biomass balance (D): 1027452594.94			
---	Biomass	Percentage	
Recruitment	281907649	27,44	
Growth	745544946	72,56	
Natural death	375765155	36,57	
Fishing	651687440	63,43	
R/B(mean)	46,3		
D/B(mean)	168,75		
B(max)/B(mean)	46,3		
B(max)/D	27,44		



7) Length Cohort Analysis 2

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	0,674	0,709	9	9,495	0,59	0,679	0
2	0,746	0,782	10	10,495	0,776	0,882	0
3	0,82	0,858	11	11,495	0,996	1,118	0
4	0,897	0,935	12	12,494	1,25	1,39	0
5	0,975	1,015	13	13,494	1,54	1,699	0,03
6	1,057	1,098	14	14,494	1,869	2,048	0,05
7	1,141	1,183	15	15,494	2,238	2,437	0,07
8	1,228	1,272	16	16,493	2,649	2,869	0,1
9	1,318	1,363	17	17,493	3,103	3,346	0,12
10	1,411	1,458	18	18,493	3,603	3,868	0,15
11	1,507	1,557	19	19,493	4,149	4,438	0,19
12	1,608	1,659	20	20,492	4,744	5,057	0,23
13	1,712	1,766	21	21,49	5,388	5,725	0,27
14	1,822	1,877	22	22,489	6,084	6,446	0,31
15	1,935	1,993	23	23,488	6,833	7,221	0,37
16	2,055	2,115	24	24,487	7,637	8,051	0,42
17	2,18	2,243	25	25,487	8,496	8,937	0,48
18	2,311	2,378	26	26,486	9,412	9,881	0,53
19	2,45	2,52	27	27,486	10,387	10,884	0,59
20	2,596	2,671	28	28,485	11,421	11,948	0,64
21	2,751	2,83	29	29,484	12,517	13,072	0,69
22	2,917	3,001	30	30,484	13,676	14,262	0,74
23	3,093	3,184	31	31,483	14,899	15,515	0,78
24	3,283	3,381	32	32,481	16,186	16,832	0,82
25	3,488	3,594	33	33,479	17,541	18,216	0,85
26	3,711	3,825	34	34,475	18,963	19,666	0,87
27	3,956	4,081	35	35,474	20,454	21,188	0,9
28	4,225	4,363	36	36,466	22,015	22,77	0,92
29	4,527	4,681	37	37,461	23,648	24,428	0,93
30	4,869	5,038	38	38,44	25,354	26,13	1
+	5,264	---	39	---	27,133	---	

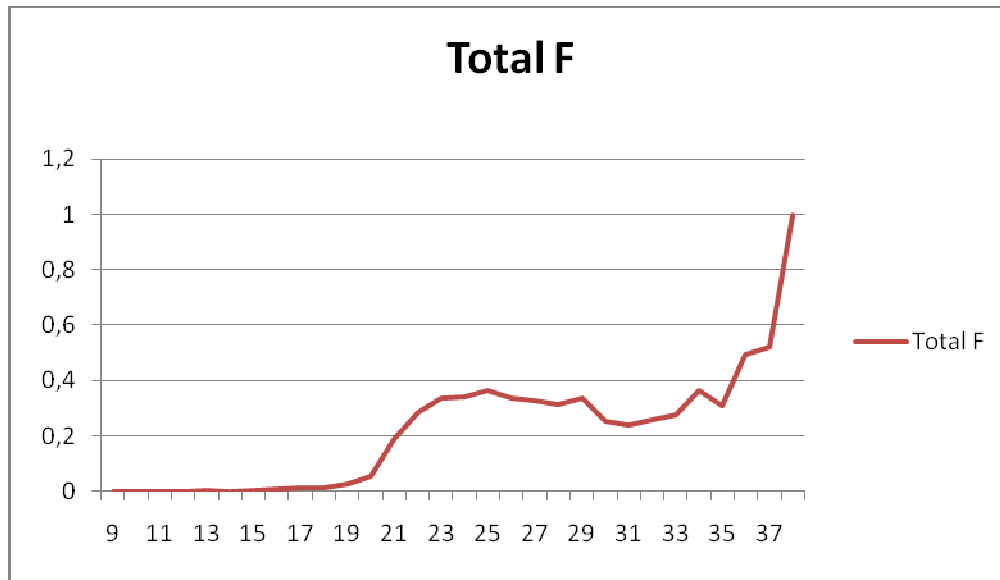
Catch in Numbers		
Class	Total catch	Catch of gear 1
1	9241,12	9241,12
2	9241,12	9241,12
3	9241,12	9241,12
4	13263,48	13263,48
5	165155,81	165155,81
6	130500,1	130500,1
7	205383,4	205383,4
8	435760,25	435760,25
9	719070,99	719070,99
10	544251,92	544251,92
11	1041624,99	1041624,99
12	2033730,25	2033730,25
13	6263183,49	6263183,49
14	8272823,6	8272823,6
15	8528853,12	8528853,12
16	7512686,73	7512686,73
17	6897111,71	6897111,71
18	5372156,39	5372156,39
19	4381703,69	4381703,69
20	3543542,46	3543542,46
21	3122812,28	3122812,28
22	1944454,08	1944454,08
23	1499405,69	1499405,69
24	1287218,98	1287218,98
25	1100483,88	1100483,88
26	1092817,29	1092817,29
27	681098,16	681098,16
28	761160,22	761160,22
29	520884,02	520884,02
30	551781,46	551781,46
Total	68650641,8	68650641,8
Mean Age	2,322	2,322
Mean Length	25,513	25,513

Catch in Weight		
Class	Total catch	Catch of gear 1
1	6278,19	6278,19
2	8151,28	8151,28
3	10335,08	10335,08
4	18439,41	18439,41
5	280682,17	280682,17
6	267260,61	267260,61
7	500601,13	500601,13
8	1250402,04	1250402,04
9	2405908,25	2405908,25
10	2105284,53	2105284,53
11	4622759,38	4622759,38
12	10284178,7	10284178,7
13	35859688	35859688
14	53329130,3	53329130,3
15	61585474,8	61585474,8
16	60481868,4	60481868,4
17	61636567,3	61636567,3
18	53081264,8	53081264,8
19	47690301,4	47690301,4
20	42336644,9	42336644,9
21	40822557,6	40822557,6
22	27731622,6	27731622,6
23	23262776,6	23262776,6
24	21666756,8	21666756,8
25	20046527,1	20046527,1
26	21490878,3	21490878,3
27	14431009,9	14431009,9
28	17331962,7	17331962,7
29	12724163,7	12724163,7
30	14417964,3	14417964,3
Total	651687440	651687440
Percentage	---	100

VPA Results--Numbers		
Class	Initial number	Mean number
1	1205979983	83233097,8
2	1101929369	78155801
3	1004225377	73252455,6
4	912650567	68521871,6
5	826984964	63956927,8
6	746873648	59558568,3
7	672294937	55328461,4
8	602928977	51254113,1
9	538425576	47325418
10	478549732	43560714,8
11	423554587	39946506,8
12	372579828	36424598,5
13	325015350	32796668,4
14	277756331	29023109,6
15	233204620	25325437,1
16	193018971	21877558,2
17	158159337	18723672,7
18	127857634	15899091
19	102611614	13418603,9
20	81456655,4	11231654,8
21	63873544,5	9290365,17
22	49137775,7	7626645,47
23	37660014,8	6227741,44
24	28375932,3	5005920,63
25	20831312,5	3935010,9
26	14812065	2988803,93
27	9983242,83	2199527,56
28	6552735,22	1537290,85
29	3869961,43	992396,68
30	2108581,56	551781,46
Total	---	909169814
Stock Mean Age	---	1,371
Stock Mean Length	---	16,788

VPA Results--Weight		
Class	Initial Weight	Mean Weight
1	711061501	56546468,4
2	855475073	68938567,1
3	999939010	81924036,3
4	1140575705	95261782,1
5	1273771390	108694749
6	1395998260	121974309
7	1504667521	134857488
8	1597122649	147072265
9	1670900352	158344050
10	1724144937	168502298
11	1757406662	177283658
12	1767472100	184192117
13	1751332947	187776439
14	1689996924	187091768
15	1593568183	182870902
16	1474005868	176128147
17	1343659355	167325535
18	1203372738	157095922
19	1065786750	146047590
20	930344816	134190739
21	799529531	121447091
22	672010141	108770506
23	561082700	96621320,6
24	459305746	84260771,5
25	365397597	71680561,4
26	280879541	58776542,2
27	204197359	46603273,8
28	144261001	35004808,6
29	91517763,8	24242283,1
30	53460487	14417964,3
Total	---	3503943952
SSB	---	1271714766

VPA Results--Mortalities			
Class	Z	Total F	F of gear 1
9	1,25	0	0
10	1,25	0	0
11	1,25	0	0
12	1,25	0	0
13	1,253	0,003	0,003
14	1,252	0,002	0,002
15	1,254	0,004	0,004
16	1,259	0,009	0,009
17	1,265	0,015	0,015
18	1,262	0,012	0,012
19	1,276	0,026	0,026
20	1,306	0,056	0,056
21	1,441	0,191	0,191
22	1,535	0,285	0,285
23	1,587	0,337	0,337
24	1,593	0,343	0,343
25	1,618	0,368	0,368
26	1,588	0,338	0,338
27	1,577	0,327	0,327
28	1,565	0,315	0,315
29	1,586	0,336	0,336
30	1,505	0,255	0,255
31	1,491	0,241	0,241
32	1,507	0,257	0,257
33	1,53	0,28	0,28
34	1,616	0,366	0,366
35	1,56	0,31	0,31
36	1,745	0,495	0,495
37	1,775	0,525	0,525
38	2,25	1	1
Mean Mort. rates	1,577	0,327	0,327
Global Fs	---	0,076	0,076
---	Critical age	Critical length	
Current stock	1,608	20	
Virgin stock	1,608	20	
Total Biomass balance (D): 5031617380.31			
---	Biomass	Percentage	
Recruitment	711061501	14,13	
Growth	4320555880	85,87	
Natural death	4379929940	87,05	
Fishing	651687440	12,95	
R/B(mean)	20,29		
D/B(mean)	143,6		
B(max)/B(mean)	50,44		
B(max)/D	35,13		



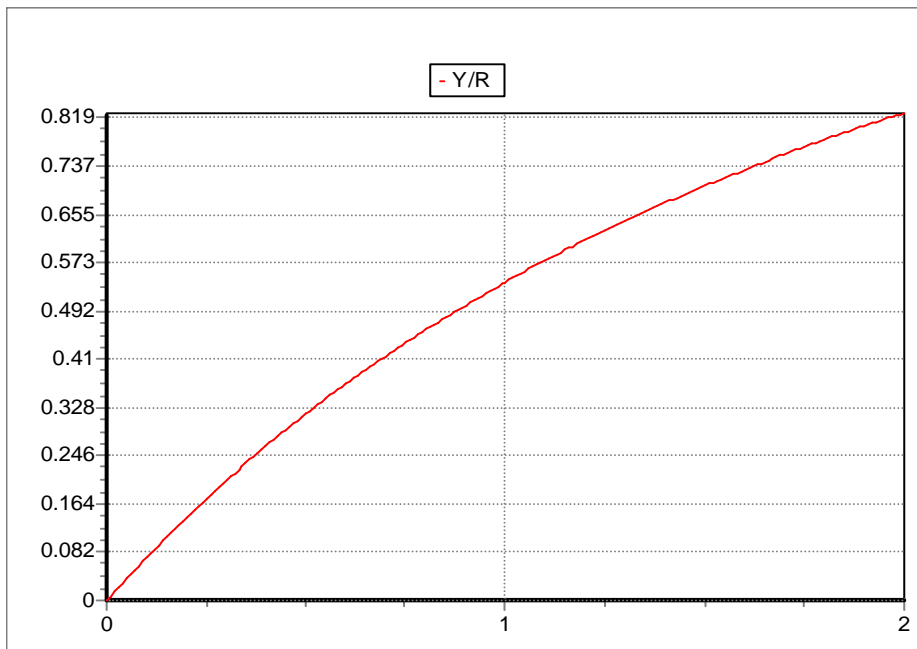
Slope at origin	Virgin biomass	Method	Num_points	Resolution
0,7613	4235933846	Calc. Mean wt.	200	0,01
Factor	Y/R	B/R	SSB	Y/R Gear 1
0	0	3,512	1,505	0
0,01	0,008	3,505	1,499	0,008
0,02	0,015	3,497	1,493	0,015
0,03	0,023	3,489	1,487	0,023
0,04	0,03	3,482	1,481	0,03
0,05	0,037	3,474	1,475	0,037
0,06	0,045	3,466	1,469	0,045
0,07	0,052	3,459	1,464	0,052
0,08	0,059	3,451	1,458	0,059
0,09	0,066	3,444	1,452	0,066
0,1	0,073	3,436	1,447	0,073
0,11	0,08	3,429	1,441	0,08
0,12	0,087	3,422	1,436	0,087
0,13	0,094	3,414	1,43	0,094
0,14	0,101	3,407	1,425	0,101
0,15	0,108	3,4	1,419	0,108
0,16	0,115	3,393	1,414	0,115
0,17	0,121	3,386	1,408	0,121
0,18	0,128	3,378	1,403	0,128
0,19	0,135	3,371	1,398	0,135
0,2	0,141	3,364	1,392	0,141
0,21	0,148	3,357	1,387	0,148
0,22	0,154	3,35	1,382	0,154
0,23	0,16	3,344	1,377	0,16
0,24	0,167	3,337	1,371	0,167
0,25	0,173	3,33	1,366	0,173
0,26	0,179	3,323	1,361	0,179
0,27	0,186	3,316	1,356	0,186
0,28	0,192	3,31	1,351	0,192

0,29	0,198	3,303	1,346	0,198
0,3	0,204	3,296	1,341	0,204
0,31	0,21	3,29	1,336	0,21
0,32	0,216	3,283	1,331	0,216
0,33	0,222	3,276	1,326	0,222
0,34	0,228	3,27	1,321	0,228
0,35	0,234	3,263	1,317	0,234
0,36	0,24	3,257	1,312	0,24
0,37	0,245	3,251	1,307	0,245
0,38	0,251	3,244	1,302	0,251
0,39	0,257	3,238	1,297	0,257
0,4	0,263	3,231	1,293	0,263
0,41	0,268	3,225	1,288	0,268
0,42	0,274	3,219	1,283	0,274
0,43	0,279	3,213	1,279	0,279
0,44	0,285	3,207	1,274	0,285
0,45	0,29	3,2	1,27	0,29
0,46	0,296	3,194	1,265	0,296
0,47	0,301	3,188	1,261	0,301
0,48	0,306	3,182	1,256	0,306
0,49	0,312	3,176	1,252	0,312
0,5	0,317	3,17	1,247	0,317
0,51	0,322	3,164	1,243	0,322
0,52	0,327	3,158	1,238	0,327
0,53	0,333	3,152	1,234	0,333
0,54	0,338	3,146	1,23	0,338
0,55	0,343	3,141	1,225	0,343
0,56	0,348	3,135	1,221	0,348
0,57	0,353	3,129	1,217	0,353
0,58	0,358	3,123	1,213	0,358
0,59	0,363	3,118	1,208	0,363
0,6	0,368	3,112	1,204	0,368
0,61	0,373	3,106	1,2	0,373
0,62	0,378	3,101	1,196	0,378
0,63	0,382	3,095	1,192	0,382
0,64	0,387	3,089	1,188	0,387
0,65	0,392	3,084	1,184	0,392
0,66	0,397	3,078	1,18	0,397
0,67	0,401	3,073	1,176	0,401
0,68	0,406	3,067	1,172	0,406
0,69	0,411	3,062	1,168	0,411
0,7	0,415	3,056	1,164	0,415
0,71	0,42	3,051	1,16	0,42
0,72	0,424	3,046	1,156	0,424
0,73	0,429	3,04	1,152	0,429
0,74	0,433	3,035	1,148	0,433
0,75	0,438	3,03	1,144	0,438
0,76	0,442	3,024	1,14	0,442
0,77	0,447	3,019	1,137	0,447
0,78	0,451	3,014	1,133	0,451
0,79	0,455	3,009	1,129	0,455
0,8	0,46	3,004	1,125	0,46
0,81	0,464	2,998	1,122	0,464

0,82	0,468	2,993	1,118	0,468
0,83	0,472	2,988	1,114	0,472
0,84	0,477	2,983	1,11	0,477
0,85	0,481	2,978	1,107	0,481
0,86	0,485	2,973	1,103	0,485
0,87	0,489	2,968	1,1	0,489
0,88	0,493	2,963	1,096	0,493
0,89	0,497	2,958	1,092	0,497
0,9	0,501	2,953	1,089	0,501
0,91	0,505	2,948	1,085	0,505
0,92	0,509	2,944	1,082	0,509
0,93	0,513	2,939	1,078	0,513
0,94	0,517	2,934	1,075	0,517
0,95	0,521	2,929	1,071	0,521
0,96	0,525	2,924	1,068	0,525
0,97	0,529	2,92	1,065	0,529
0,98	0,533	2,915	1,061	0,533
0,99	0,537	2,91	1,058	0,537
1	0,54	2,905	1,055	0,54
1,01	0,544	2,901	1,051	0,544
1,02	0,548	2,896	1,048	0,548
1,03	0,552	2,892	1,045	0,552
1,04	0,555	2,887	1,041	0,555
1,05	0,559	2,882	1,038	0,559
1,06	0,563	2,878	1,035	0,563
1,07	0,566	2,873	1,031	0,566
1,08	0,57	2,869	1,028	0,57
1,09	0,574	2,864	1,025	0,574
1,1	0,577	2,86	1,022	0,577
1,11	0,581	2,855	1,019	0,581
1,12	0,584	2,851	1,016	0,584
1,13	0,588	2,846	1,012	0,588
1,14	0,591	2,842	1,009	0,591
1,15	0,595	2,838	1,006	0,595
1,16	0,598	2,833	1,003	0,598
1,17	0,601	2,829	1	0,601
1,18	0,605	2,825	0,997	0,605
1,19	0,608	2,82	0,994	0,608
1,2	0,612	2,816	0,991	0,612
1,21	0,615	2,812	0,988	0,615
1,22	0,618	2,808	0,985	0,618
1,23	0,622	2,803	0,982	0,622
1,24	0,625	2,799	0,979	0,625
1,25	0,628	2,795	0,976	0,628
1,26	0,631	2,791	0,973	0,631
1,27	0,635	2,787	0,97	0,635
1,28	0,638	2,783	0,967	0,638
1,29	0,641	2,779	0,964	0,641
1,3	0,644	2,774	0,962	0,644
1,31	0,647	2,77	0,959	0,647
1,32	0,65	2,766	0,956	0,65
1,33	0,654	2,762	0,953	0,654
1,34	0,657	2,758	0,95	0,657

1,35	0,66	2,754	0,947	0,66
1,36	0,663	2,75	0,945	0,663
1,37	0,666	2,746	0,942	0,666
1,38	0,669	2,742	0,939	0,669
1,39	0,672	2,739	0,936	0,672
1,4	0,675	2,735	0,934	0,675
1,41	0,678	2,731	0,931	0,678
1,42	0,681	2,727	0,928	0,681
1,43	0,684	2,723	0,926	0,684
1,44	0,687	2,719	0,923	0,687
1,45	0,69	2,715	0,92	0,69
1,46	0,692	2,712	0,918	0,692
1,47	0,695	2,708	0,915	0,695
1,48	0,698	2,704	0,912	0,698
1,49	0,701	2,7	0,91	0,701
1,5	0,704	2,697	0,907	0,704
1,51	0,707	2,693	0,905	0,707
1,52	0,709	2,689	0,902	0,709
1,53	0,712	2,685	0,899	0,712
1,54	0,715	2,682	0,897	0,715
1,55	0,718	2,678	0,894	0,718
1,56	0,721	2,674	0,892	0,721
1,57	0,723	2,671	0,889	0,723
1,58	0,726	2,667	0,887	0,726
1,59	0,729	2,664	0,884	0,729
1,6	0,731	2,66	0,882	0,731
1,61	0,734	2,656	0,879	0,734
1,62	0,737	2,653	0,877	0,737
1,63	0,739	2,649	0,875	0,739
1,64	0,742	2,646	0,872	0,742
1,65	0,744	2,642	0,87	0,744
1,66	0,747	2,639	0,867	0,747
1,67	0,75	2,635	0,865	0,75
1,68	0,752	2,632	0,863	0,752
1,69	0,755	2,628	0,86	0,755
1,7	0,757	2,625	0,858	0,757
1,71	0,76	2,622	0,856	0,76
1,72	0,762	2,618	0,853	0,762
1,73	0,765	2,615	0,851	0,765
1,74	0,767	2,611	0,849	0,767
1,75	0,77	2,608	0,846	0,77
1,76	0,772	2,605	0,844	0,772
1,77	0,775	2,601	0,842	0,775
1,78	0,777	2,598	0,839	0,777
1,79	0,779	2,595	0,837	0,779
1,8	0,782	2,592	0,835	0,782
1,81	0,784	2,588	0,833	0,784
1,82	0,787	2,585	0,83	0,787
1,83	0,789	2,582	0,828	0,789
1,84	0,791	2,579	0,826	0,791
1,85	0,794	2,575	0,824	0,794
1,86	0,796	2,572	0,822	0,796
1,87	0,798	2,569	0,82	0,798

1,88	0,801	2,566	0,817	0,801
1,89	0,803	2,563	0,815	0,803
1,9	0,805	2,559	0,813	0,805
1,91	0,807	2,556	0,811	0,807
1,92	0,81	2,553	0,809	0,81
1,93	0,812	2,55	0,807	0,812
1,94	0,814	2,547	0,805	0,814
1,95	0,816	2,544	0,803	0,816
1,96	0,819	2,541	0,8	0,819
1,97	0,821	2,538	0,798	0,821
1,98	0,823	2,535	0,796	0,823
1,99	0,825	2,532	0,794	0,825
2	0,827	2,529	0,792	0,827



8) Virtual Population Analysis 2.

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	0	0,432	0	6,756	0	0,503	0,00489606
2	1	1,442	14,542	19,208	2,064	4,464	0,1535981
3	2	2,37	24,384	27,059	7,96	10,548	0,4965322
4	3	3,398	31,046	32,983	14,956	17,572	0,7722954
5	4	4,374	35,555	36,793	21,312	23,33	0,8915278
6	5	5,402	38,607	39,503	26,425	28,069	1
+	6	---	40,673	---	30,279	---	

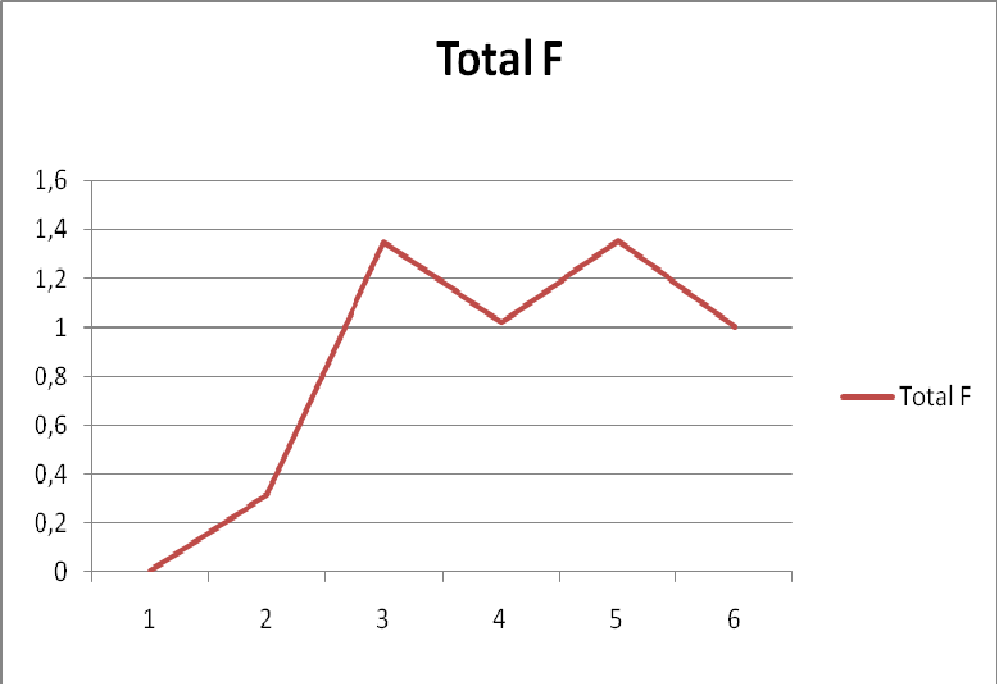
Catch in Numbers		
Class	Total catch	Catch of gear 1
1	91749,45	91749,45
2	24501221,8	24501221,8
3	35722320,7	35722320,7
4	6125747,58	6125747,58
5	2043731,49	2043731,49
6	360843,99	360843,99
Total	68845615	68845615
Mean Age	2,204	2,204
Mean Length	25,119	25,119

Catch in Weight		
Class	Total catch	Catch of gear 1
1	46145,88	46145,88
2	109377591	109377591
3	376811532	376811532
4	107642967	107642967
5	47680711,4	47680711,4
6	10128492,2	10128492,2
Total	651687440	651687440
Percentage	---	100

VPA Results--Numbers		
Class	Initial number	Mean number
1	246782744	168364972
2	108631718	77979027,3
3	53718675,5	26537164,3
4	10565948,8	6008004,85
5	2998280,06	1510937,15
6	622142,4	360843,99
Total	---	280760949
Stock Mean Age	---	0,987
Stock Mean Length	---	12,899

VPA Results--Weight		
Class	Initial Weight	Mean Weight
1	0	84680076,2
2	224201171	348111545
3	427593240	279923290
4	158029570	105573966
5	63899827,2	35250500,8
6	16440393,3	10128492,2
Total	---	863667871
SSB	---	315964384

VPA Results--Mortalities			
Class	Z	Total F	F of gear 1
0	0,821	0,001	0,001
1	0,704	0,314	0,314
2	1,626	1,346	1,346
3	1,26	1,02	1,02
4	1,573	1,353	1,353
5	1,21	1	1
Mean Mort. rates	1,199	0,839	0,839
Global Fs	---	0,245	0,245
---	Critical age	Critical length	
Current stock	2	24,384	
Virgin stock	0	0	
Total Biomass balance (D): 970486971.78			
---	Biomass	Percentage	
Recruitment	0	0	
Growth	970486972	100	
Natural death	318799532	32,85	
Fishing	651687440	67,15	
R/B(mean)	0		
D/B(mean)	112,37		
B(max)/B(mean)	49,51		
B(max)/D	44,06		



9) Length Cohort Analysis Spain (GSA01)-Morocco (GSA03).

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	-0,204	-0,185	9	9,499	0,621	0,715	0
2	-0,167	-0,148	10	10,499	0,814	0,924	0
3	-0,129	-0,109	11	11,499	1,04	1,167	0
4	-0,089	-0,069	12	12,499	1,3	1,445	0,03
5	-0,048	-0,027	13	13,499	1,597	1,761	0,05
6	-0,006	0,016	14	14,499	1,932	2,115	0,07
7	0,038	0,061	15	15,499	2,306	2,51	0,1
8	0,084	0,108	16	16,498	2,722	2,947	0,12
9	0,132	0,156	17	17,498	3,18	3,427	0,15
10	0,182	0,208	18	18,498	3,683	3,953	0,19
11	0,234	0,261	19	19,498	4,232	4,525	0,23
12	0,289	0,317	20	20,498	4,828	5,144	0,27
13	0,346	0,376	21	21,497	5,472	5,813	0,31
14	0,407	0,439	22	22,496	6,166	6,532	0,37
15	0,471	0,505	23	23,495	6,912	7,303	0,42
16	0,54	0,575	24	24,495	7,71	8,128	0,48
17	0,612	0,65	25	25,495	8,563	9,007	0,53
18	0,69	0,73	26	26,495	9,47	9,943	0,59
19	0,773	0,817	27	27,495	10,434	10,935	0,64
20	0,863	0,91	28	28,495	11,455	11,985	0,69
21	0,961	1,013	29	29,495	12,536	13,095	0,74
22	1,068	1,125	30	30,495	13,676	14,266	0,78
23	1,186	1,25	31	31,495	14,878	15,498	0,82
24	1,318	1,391	32	32,494	16,142	16,792	0,85
25	1,468	1,552	33	33,493	17,469	18,15	0,87
26	1,642	1,739	34	34,492	18,861	19,573	0,9
27	1,846	1,965	35	35,491	20,319	21,061	0,92
28	2,097	2,247	36	36,488	21,843	22,614	0,93
29	2,42	2,625	37	37,483	23,436	24,233	1
30	2,876	3,24	38	38,525	25,097	26	0
+	3,655	---	39	---	26,828	---	

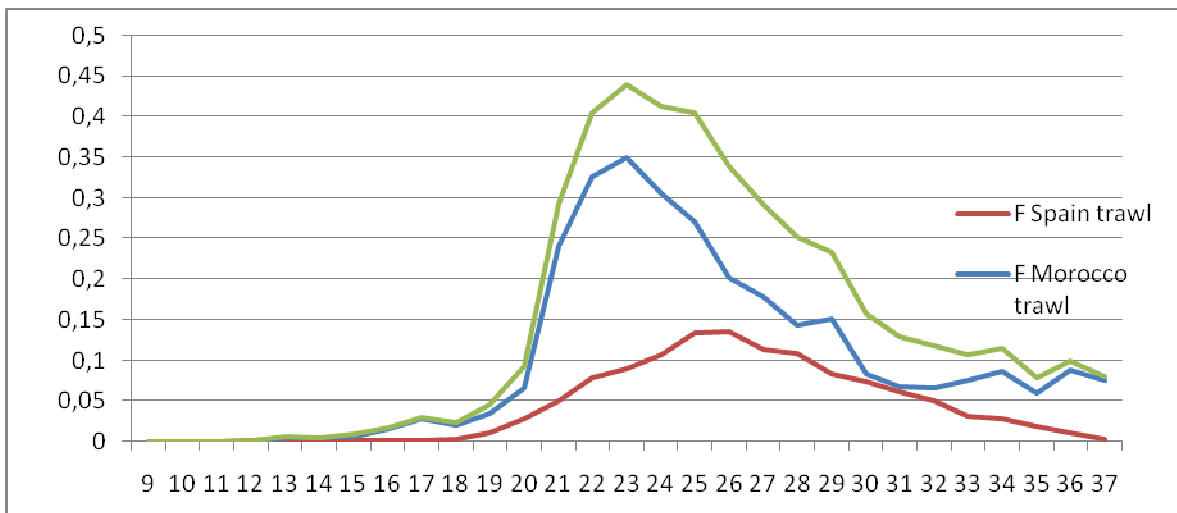
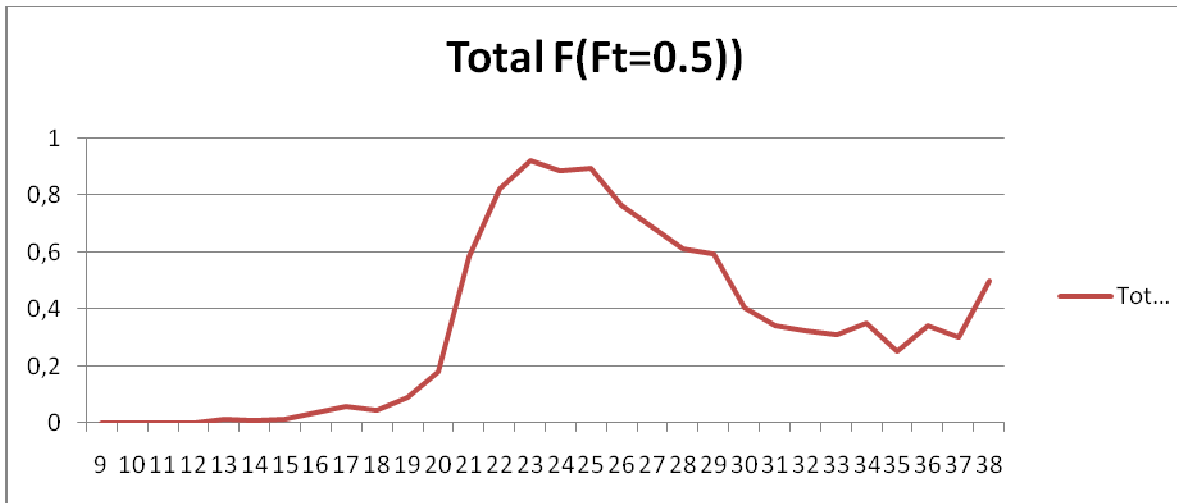
Catch in Numbers			
Class	Total catch	SPAIN	MOROCCO
1	9203,46	9202,6	0,86
2	9203,46	9202,6	0,86
3	9203,46	9202,6	0,86
4	13209,06	13208,19	0,86
5	147814,71	41248,34	106566,38
6	116738,92	32157,31	84581,62
7	184105,28	53417,53	130687,75
8	381823,49	48280,29	333543,2
9	625668,78	47135,69	578533,09
10	477534,67	65098,6	412436,07
11	926439,68	217112,87	709326,81
12	1824780,07	541882,64	1282897,43
13	5521463,66	942002,58	4579461,08
14	7315255,64	1408105,71	5907149,93
15	7551692,04	1525988,27	6025703,76
16	6704254,03	1731203,91	4973050,12
17	6218440,87	2059356,67	4159084,2
18	4891852,3	1961510,04	2930342,27
19	3983162,81	1549632,33	2433530,49
20	3239295,21	1386825,57	1852469,64
21	2824896,54	1001727,85	1823168,69
22	1788356,62	841294,95	947061,67
23	1380095,15	656574,48	723520,67
24	1177223,74	507661,28	669562,46
25	987954,75	297195,83	690758,91
26	974408,88	245815,47	728593,41
27	606146	144668,53	461477,47
28	665994,12	77289,7	588704,42
29	451178,3	19000,91	432177,38
30	2921603,22	19892,48	2901710,73
Total	63928998,9	17462895,84	46466103,09
Mean Age	0,823	0,758	0,848
Mean Length	26,044	26,198	25,986

Catch in Weight			
Class	Total catch	SPAIN	MOROCCO
1	6577,2	6576,58	0,62
2	8502,2	8501,41	0,8
3	10737,28	10736,27	1,01
4	19086,9	19085,66	1,24
5	260229,34	72618,13	187611,21
6	246892	68009,72	178882,28
7	462062,5	134065,88	327996,62
8	1125105,97	142265,85	982840,13
9	2144233,02	161539	1982694,02
10	1887514,42	257310,2	1630204,22
11	4191719,57	982337,33	3209382,24
12	9387164,82	2787591,65	6599573,17
13	32094592,5	5475575,1	26619017,4
14	47782473,4	9197597,04	38584876,35
15	55151855,1	11144665,83	44007189,27
16	54492728	14071367,73	40421360,25
17	56011435,5	18549267,52	37462167,97
18	48638047,8	19502636,82	29135410,95
19	43555535,7	16945093,44	26610442,2
20	38824029,1	16621565,05	22202464,01
21	36991827,8	13117557,91	23874269,86
22	25512177,1	12001669,86	13510507,21
23	21388258,8	10175374,46	11212884,32
24	19768086,6	8524710,96	11243375,69
25	17931667,7	5394191,33	12537476,36
26	19071742,5	4811254,72	14260487,73
27	12766342,3	3046935,87	9719406,46
28	15060938,5	1747846,48	13313091,98
29	10933457,8	460451,4	10473006,4
30	75962418,8	517209,57	75445209,25
Total	651687440	175955608,8	475731831,2
Percentage	---	27	73

VPA Results—Numbers		
Class	Initial number	Mean number
1	657185289	23663113,04
2	627597194	23345812,15
3	598405725	23022038,31
4	569618974	22691343,94
5	541241585	22350496,73
6	513155649	21999741,4
7	485539234	21639843,9
8	458305324	21264870,15
9	431342412	20869543,75
10	404629814	20461393,9
11	378575537	20033441,62
12	352607295	19555052,1
13	326338700	18924877,25
14	297161140	18105877,2
15	267213538	17193766,33
16	238169638	16270724,43
17	211126978	15360287,52
18	185708178	14484854,51
19	162710257	13664384,34
20	141646614	12879704,05
21	122307689	12110647,9
22	104344482	11378527,81
23	88332966	10685252,77
24	73596304,9	9982621,86
25	59940803,8	9252255,37
26	47387529,9	8468430,77
27	35827582,6	7639156,84
28	25672490,5	6725705,75
29	16599364,2	5672116,9
30	9058039,76	5843206,43
Total	---	475539089
Stock Mean Age	---	0,488
Stock Mean Length	---	20,853

VPA Results—Weight		
Class	Initial Weight	Mean Weight
1	408127752	16910691,01
2	510862088	21566971,45
3	622190126	26858800,85
4	740560262	32788676,93
5	864257497	39348282,5
6	991192065	46527414,35
7	1119655920	54311100,96
8	1247379270	62660452,17
9	1371777779	71522131,62
10	1490292129	80876171,98
11	1602028455	90642241,6
12	1702233797	100596504,7
13	1785726126	110004567,9
14	1832418320	118265668
15	1847015610	125570283,4
16	1836401284	132249786
17	1807823146	138354898,3
18	1758685819	144018053,2
19	1697719871	149418843
20	1622632367	154367531,2
21	1533228836	158588109,3
22	1427036155	162322778,5
23	1314197378	165596518,4
24	1187968336	167629421
25	1047111053	167931141,8
26	893780565	165749444,8
27	727973781	160892080,3
28	560772574	152096598,1
29	389018094	137453089,8
30	227330201	151924837,7
Total	---	3307043091
SSB	---	1892220810

VPA Results—Mortalities			SPAIN	MOROCCO
Class	Z	Total F	F Spain trawl	F Morocco trawl
9	1,25	0	0	0
10	1,25	0	0	0
11	1,25	0	0	0
12	1,251	0,001	0,001	0
13	1,257	0,007	0,002	0,005
14	1,255	0,005	0,001	0,004
15	1,259	0,009	0,002	0,006
16	1,268	0,018	0,002	0,016
17	1,28	0,03	0,002	0,028
18	1,273	0,023	0,003	0,02
19	1,296	0,046	0,011	0,035
20	1,343	0,093	0,028	0,066
21	1,542	0,292	0,05	0,242
22	1,654	0,404	0,078	0,326
23	1,689	0,439	0,089	0,35
24	1,662	0,412	0,106	0,306
25	1,655	0,405	0,134	0,271
26	1,588	0,338	0,135	0,202
27	1,541	0,291	0,113	0,178
28	1,502	0,252	0,108	0,144
29	1,483	0,233	0,083	0,151
30	1,407	0,157	0,074	0,083
31	1,379	0,129	0,061	0,068
32	1,368	0,118	0,051	0,067
33	1,357	0,107	0,032	0,075
34	1,365	0,115	0,029	0,086
35	1,329	0,079	0,019	0,06
36	1,349	0,099	0,011	0,088
37	1,33	0,08	0,003	0,076
38	0,5	0,5	0,003	0,497
Mean Mort. Rates	1,211	0,214	0,032	0,181
Global Fs	---	0,134	0,037	0,098
---	Critical age	Critical length		
Current stock	0,471	23		
Virgin stock	0,612	25		
Total Biomass balance (D): 4595585256.15				
---	Biomass	Percentage		
Recruitment	408127752	8,88		
Growth	4187457505	91,12		
Natural death	3943897816	85,82		
Fishing	651687440	14,18		
R/B(mean)	12,34			
D/B(mean)	138,96			
B(max)/B(mean)	55,85			
B(max)/D	40,19			



10) Virtual Population Analysis Spain (GSA01)-Morocco (GSA03).

Class	Lower Age	Mean Age	Lower Length	Mean Length	Lower Weight	Mean Weight	Maturity ratio
1	0	0,371	14,138	20,891	1,981	5,865	0,3563404
2	1	1,427	29,38	32,511	12,962	16,917	0,8414459
3	2	2,458	35,639	37,004	21,285	23,461	0,8802109
4	3	3,439	38,209	38,75	25,453	26,392	1
+	4	---	39,265	---	27,298	---	

Catch in Numbers

Class	Total catch	Spain	Morocco
1	60654420,8	17406080,3	43248340,5
2	10121097,8	4072011,55	6049086,2
3	2283515,26	190620,66	2092894,6
4	2697239,97	19639,82	2677600,14
Total	75756273,8	21688352,4	54067921,4
Mean Age	0,684	0,591	0,722
Mean Length	23,565	23,23	23,699

Catch in Weight

Class	Total catch	Spain	Morocco
1	355708197	102078057	253630140
2	171220637	68887034,8	102333602
3	53574006	4472189,32	49101816,7
4	71184599,3	518327,2	70666272,1
Total	651687440	175955609	475731831
Percentage	---	27	73

VPA Results--Numbers

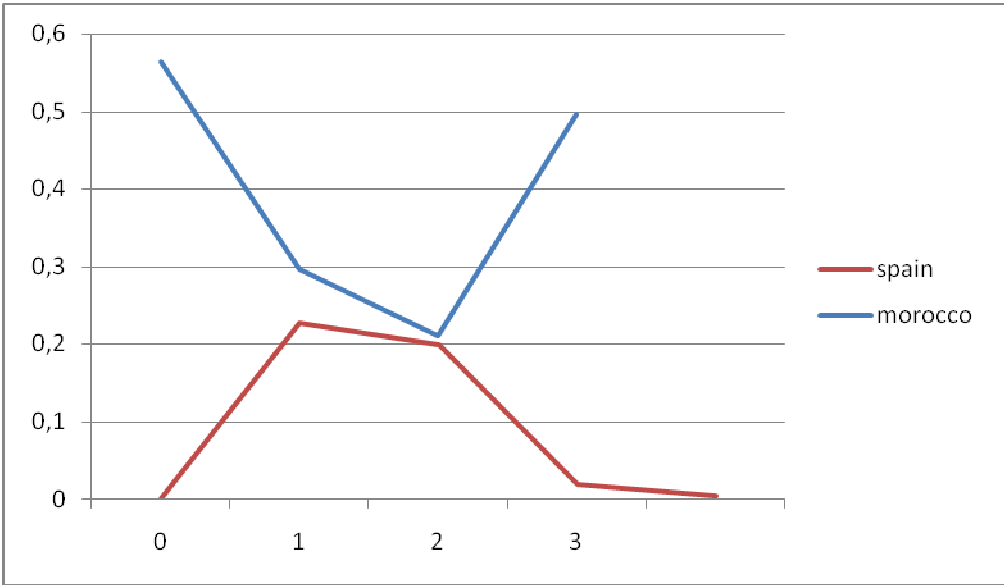
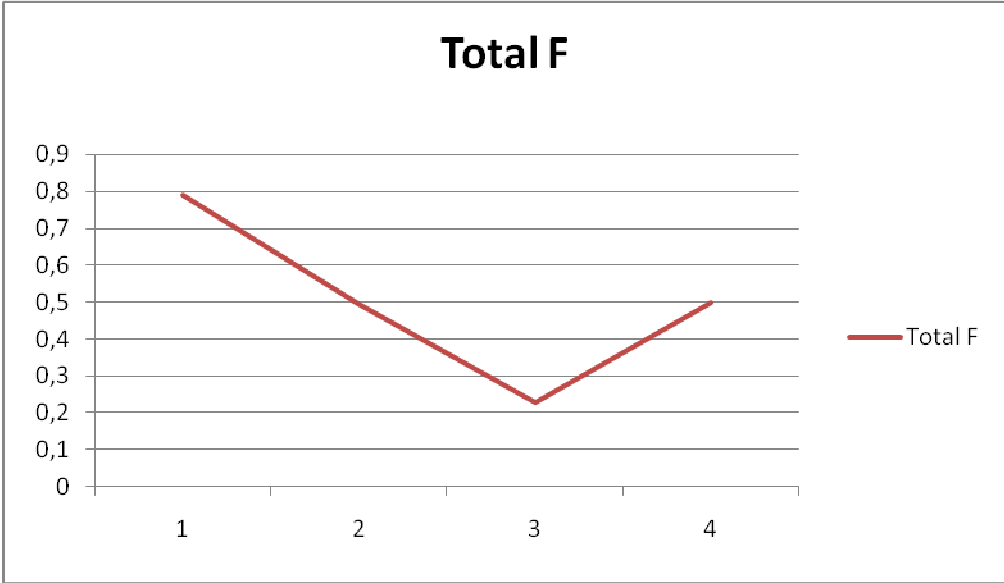
Class	Initial number	Mean number
1	154290515	76634983,3
2	30795407,8	20432920,7
3	12705471	9955599,74
4	7634387,81	5394479,93
Total	---	112417984
Stock Mean Age	---	0,895
Stock Mean Length	---	25,287

VPA Results--Weight

Class	Initial Weight	Mean Weight
1	305617792	449426298
2	399156263	345667811
3	270431881	233570307
4	194318656	142369199
Total	---	1171033614
SSB	---	798969813

VPA Results--Mortalities

Class	Z	Total F	Spain	Morocco
0	1,611	0,791	0,227	0,564
1	0,885	0,495	0,199	0,296
2	0,509	0,229	0,019	0,21
3	0,74	0,5	0,004	0,496
Mean Mort. rates	0,937	0,504	0,112	0,392
Global Fs	---	0,674	0,193	0,481
---	Critical age	Critical length		
Current stock	1	29,38		
Virgin stock	2	35,639		
Total Biomass balance (D): 1254595743.89				
---	Biomass	Percentage		
Recruitment	305617792	24,36		
Growth	948977952	75,64		
Natural death	602908304	48,06		
Fishing	651687440	51,94		
R/B(mean)	26,1			
D/B(mean)	107,14			
B(max)/B(mean)	34,09			
B(max)/D	31,82			



Annex V: References.

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in the Western and Central Mediterranean
copemed@fao.org
www.faocopemed.org
www.fao.org



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Mediterranean Fisheries in Morocco and Tunisia
artfimed@fao.org
www.faoartfimed.org
www.fao.org



Offices of the Projects
Subdelegación del Gobierno en Málaga
Paseo de Sancha 64, Oficinas 305-307
29071 Málaga (España)
Tel: (+34) 952989299 Fax: (+34) 952989252