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منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Organización de las Naciones Unidas para la Agricultura y la Alimentación

FISHERY COMMITTEE FOR THE EASTERN CENTRAL ATLANTIC

Scientific Sub-Committee

Seventh Session

Tenerife, Spain, 14–16 October 2015

STATUS SUMMARY FOR DEMERSAL STOCKS IN THE NORTHERN AREA OF THE EASTERN CENTRAL ATLANTIC - CECAF

SUMMARY

The first meeting of the FAO/CECAF Working Group on the Assessment of Demersal Resources – Subgroup North, was organized in Sally, Senegal, from 14 to 23 September 2004. The second meeting of Subgroup North was organized in Banjul, Gambia, 6–14 November 2007, the third meeting in Agadir, Morocco, 8-17 February 2010 and the fourth meeting was organized in Fuengirola, Spain, 18-27 November 2013.

The overall objective of the Group is to contribute to the improvement of the management of demersal resources in Northwest Africa through assessment of the state of stocks and fisheries to ensure the best sustainable use of the resources for the benefit of coastal countries.

The study zone for the Working Group is the CECAF zone of the Central-East Atlantic Ocean between Cap Spartel and the south of Senegal. For reasons of heterogeneity, the species and stocks assessed by the Working Group were divided into four groups: hake, other demersal fish, shrimps and cephalopods.

For each of these groups information is provided on the fisheries: sampling schemes and sampling intensity, biological characteristics, stock identity, trends in catch, effort, biological data and abundance indices, assessment of the stocks, management measures recommendations and future research.

Approximately twenty eight different stocks-units were analysed and the results discussed.

The models provided reliable results for twenty two of them, of which **ten are overexploited** and **twelve seem not to be fully exploited**.

For five stocks, the results obtained by the models from the available data were not conclusive. Although the model did not give reliable results for these stocks, other information from fisheries and surveys indicate that many of them are overexploited.

The results of the assessments confirm the conclusion reached at the last 2010 meeting that most of the stocks assessed are overexploited. A summary of the assessments and management measures is given at the end of this report (Table 2).

INTRODUCTION

1. The FAO/CECAF Working Group on the assessment of demersal resources in the Northern CECAF area was held in Fuengirola, Spain, from 18 to 27 November 2013.

2. The general aim of the Working Group is to contribute to the improved management of demersal resources in Northwest Africa through the assessment of the state of the stocks and fisheries in order to ensure a sustainable use of these resources for the benefit of coastal countries.

3. The results of the analyses are presented under four subgroups: hake, other demersal fish, shrimp and cephalopods. A total of 28 stocks and groups of species were analysed by the Working Group.

4. The meeting was financed by the FAO and the EAF-Nansen project and organized by the Spanish Institute of Oceanography (IEO) through its Centro Oceanográfico de Málaga, Spain.

5. The working area for the Working Group is defined as the waters between the southern border of Senegal and southern border of Angola, including Cape Verde and S. Tome and Principe Iles.

6. A total of 19 researchers from five different countries in the Subregion and FAO participated in the meeting. The Working Group was chaired by Saïd Benchoucha from the INRH of Morocco.

Methodology and software

The three assessment categories adopted by the CECAF scientific working groups include:

- **Non-fully exploited:** The stock is in good condition and fishing pressure can be increased without affecting the sustainability. All increases must be seen in the context of the general environmental situation.

- **Fully Exploited:** The fishery operates within the limits of sustainability. Current fishing pressure seems sustainable and can be maintained,

- **Overexploited:** The fishery is in an undesired state both in terms of biomass and fishing mortality. Fishing pressure should be reduced to allow the stock to grow.

Global models

7. Consistent with previous years, the main assessment model used by the Working Group was the dynamic version of the Schaefer (1954) model. When the model provided inconclusive results for a stock or when stocks could not be assessed due to limited data, the Working Group made recommendations based on previous assessments and trends in available data.

8. The data required are annual estimates (or quarterly estimates if possible) of total catch by stock, as well as reliable stock abundance indices. In general, the Working Group adopted the abundance estimates from the surveys, or from commercial CPUEs - even though the reliability of some of these still has to be verified.

Analytical models

9. For certain stocks, it was possible to use length-based models. Analysis of cohorts based on length frequencies (length composition analysis [LCA], Jones, 1984) was used to estimate the current level of F (mortality rate by fishery), as well as the exploitation pattern by fishery over the last years. A length-based Yield per Recruit Analysis was then run on these estimates, to calculate the Biological

Reference Points F_{max} and $F_{0.1}$. Both the LCA and the Yield-per-Recruit analysis were implemented on Excel spreadsheets.

Reference points for management recommendations

10. In order to guarantee coherent management recommendations, the 2013 Working Group decided to use the biological reference points (BRP) adopted by the FAO Working Group on the Assessment of Small Pelagic fish off Northwest Africa. The B_{cur}/B_{MSY} and F_{cur}/F_{MSY} indices were therefore used as limit reference points (LRP) while the $B_{cur}/B_{0.1}$ and $F_{cur}/F_{0.1}$ indices were selected as target reference points (TRP). A detailed explanation of these points of reference is given in FAO, 2006

Projections

11. In keeping with predefined scenarios using the Schaefer model adjusted to the time series data, medium term projections of future yields and the development of the state of the stocks were carried out using a spreadsheet which allowed the standardization of the data and results of all stocks (Appendix II, FAO, 2012), For these projections, a period of five years was used.

12. All projections took as their departure point the estimated stock status in the last year of the data available. Future management strategies were defined based on changes in fishing mortality and/or catch with respect to the data estimates of the last available year.

13. For each stock, two scenarios were considered. The first is the *status quo* which considers future yields and stock development in the case where fishing mortality remains unchanged in respect to that of the data series used for the assessments of the previous year. The second scenario takes into consideration a constant level of fishing mortality corresponding to the recommended catch level for the following year for each stock.

Results

14. The results of the assessments show that of the 28 stocks analyzed ten stocks were found to be overexploited whereas eighteen were found to be fully exploited or non-fully exploited (Table 2).

Management Recommendations

15. Fishing effort should be reduced for the overexploited stocks or not increased for the other stocks, to avoid further depletion. When possible, recommendations on catch levels are also indicated for each stock. Given that most fisheries in the region are multispecific, an overall reduction in fishing effort is necessary. There was uncertainty in the assessments carried out, mostly due to deficiencies in some of the data available.

Conclusions

16. In view of these results, it is necessary to ensure that current restrictions imposed on these fisheries are respected. Additional steps should be taken to prevent further deterioration of stocks. Moreover, most stocks in the region are shared between two or more countries. The Working Group strongly recommends strengthening regional cooperation in research and management. However, the adoption of new fishery management plans, strengthening of management measures and strict control of fishing zones in certain countries have contributed to the improvement of certain stocks in the region.

17. The members of the Working Group should urgently begin discussions with the authorities of their countries, on their concerns about scientific advice for a better management of the demersal fisheries and to ensure the sustainability of these fisheries. Working papers on this subject should be presented at the next meeting.

18. Although data related to catch, effort and biological parameters provided to the Working Group have increased in the last years, there are still gaps. Reliable catch data are still insufficient for certain demersal fish stocks. Catch and effort data are often incomplete for the last year (2012). Data on

length composition and surveys of certain stocks are available in the countries but are not available to the Working Group. Uncertainty about the series is due to unreported catches or misreporting, lack of information on discards, etc. Assessment of the state of stocks and their exploitation is highly dependent on estimates of catches, past and present. Therefore, the quality and reliability of the assessments and the recommendations of the Working Group are dependent on the reliability of catch data provided to the Working Group.

OVERALL REGIONAL TRENDS

Catch

19. The total catch of demersal resources analysed by the 2013 Working Group was 181 000 tonnes in 2012. Total catch of these resources has tended to decrease since 1999, but in 2012 the catch increased by 15 percent in relation to 2011. From 1990 to 2012, demersal catch has fluctuated around an average of 211 000 tonnes (Table 1, Figure 1).

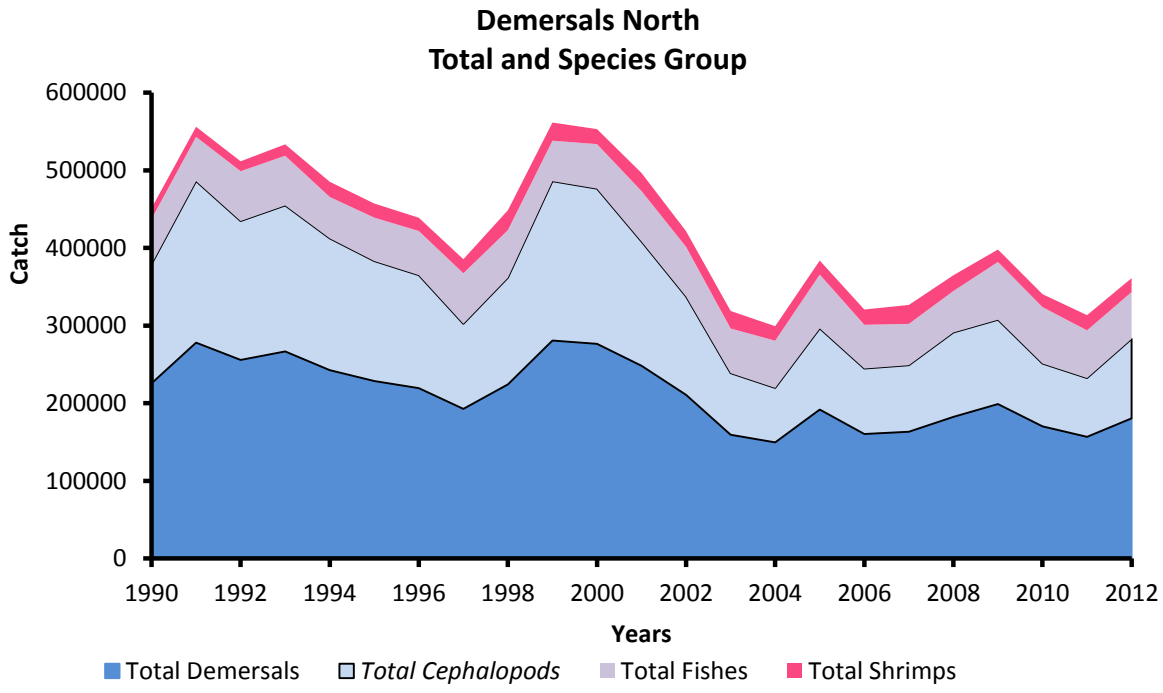

Figure. 1. Total Catch of Demersals studied by the DEMNORTH 2013 Working Group

Table1. Total Catch (tonnes) of the main demersal species analysed in 2012 Demersal South WG

Main Species	**Catch contribution 2011(%)**	**Catch contribution 2012(%)**	**Catch 2011(t)**	**Catch 2012(t)**	**Percentage Change %**	**Average Catch (t) (2008-2012)**
Octopus vulgaris	32%	37%	50127	66460	33%	65856
Sepia spp	12%	16%	18753	28741	53%	23391
Parapenaeus lon,girostris	10%	8%	14977	14351	-4%	5980
Pseudotholithus spp	4%	5%	5767	9676	68%	14054
Loligo vulgaris	4%	4%	6800	7129	5%	4037
Merluccius spp	5%	4%	7763	6883	-11%	4458
Pagrus caeruleostictus	5%	3%	7886	6308	-20%	7541
Pagellus bellottii	4%	3%	5679	5675	0%	6981
Arius spp	4%	3%	6233	5657	-9%	2743
Merluccius merluccius	2%	3%	3722	5137	38%	3318
Sparus spp	2%	2%	3312	4484	35%	5738
Plectorhynchus mediterraneus	5%	2%	8105	4387	-46%	8119
Pagellus spp	2%	2%	3556	4079	15%	3496
Dentex macrophthalmus	3%	2%	4960	4032	-19%	6754
Penaeus notialis	3%	2%	4602	3558	-23%	6059
Epinephelus aeneus	2%	2%	2715	3413	26%	2655
Pagellus acarne	1%	0.3%	1750	569	-67%	6586
TOTAL DEMERSALS (studied by the WG)	**100%**	**100%**	**156708**	**180539**	**15%**	**177765**

20. The most important species group in the region in terms of catch is the cephalopods, particularly octopus (*Octopus vulgaris*) which represented around **37 percent** of total demersal catches during the study period. Total catch of octopus has decreased, albeit with some fluctuations, from 159 000 tonnes in 1999 to 66 000 tonnes in 2012. Annual catch of cuttlefish (*Sepia* spp.) shows a decreasing trend over the last few years. During the period 1990-2001, catches have varied around an average value of 31 000 tonnes whereas they fluctuated around an average of 19 000 tonnes in the last five years. Catches of *Loligo vulgaris* have seen a sharp decline, from 18 000 tonnes in 2001 to 7 000 tonnes in 2012 with an average of 5 000 tonnes in the last five years.

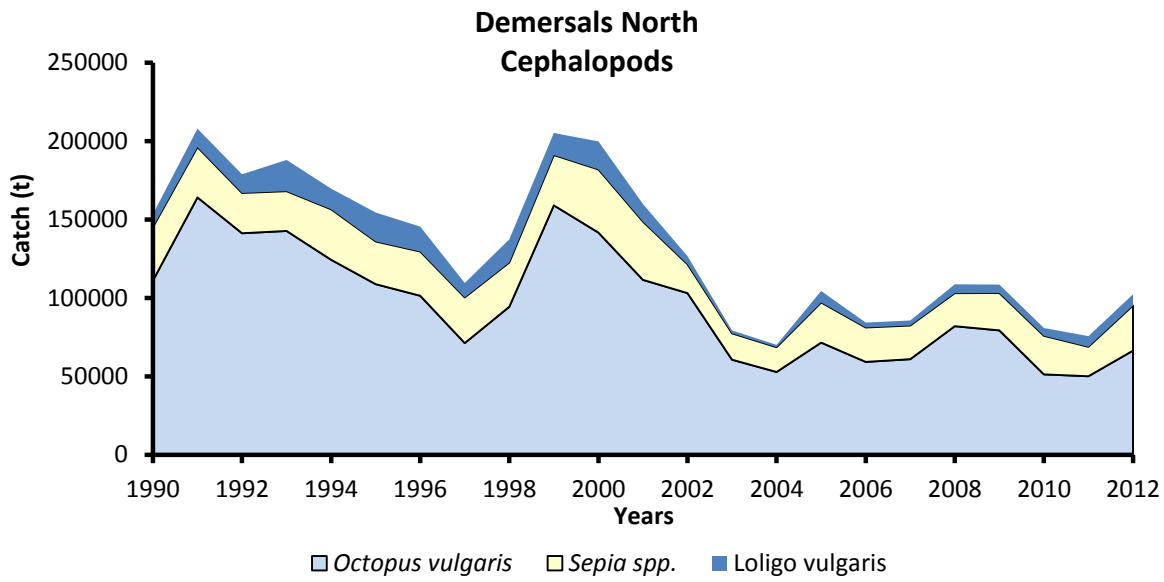

Figure 2. Cephalopods-the most important species group in the region in terms of weight

21. Catches of deepwater rose shrimp *Parapenaeus longirostris* have shown a decreasing trend, from 20 000 tonnes in 2007 to 14 000 tonnes in 2012 with an average of around 12 000 tonnes over the last 5 years. Catches of Southern Pink Shrimp (*Penaeus notialis*) have decreased over the last ten years, from 5 800 tonnes in 1999 to 2 600 tonnes in 2008, and since then catches have remained stable with an average of 3 400 tonnes in the last 5 years (Figure3).

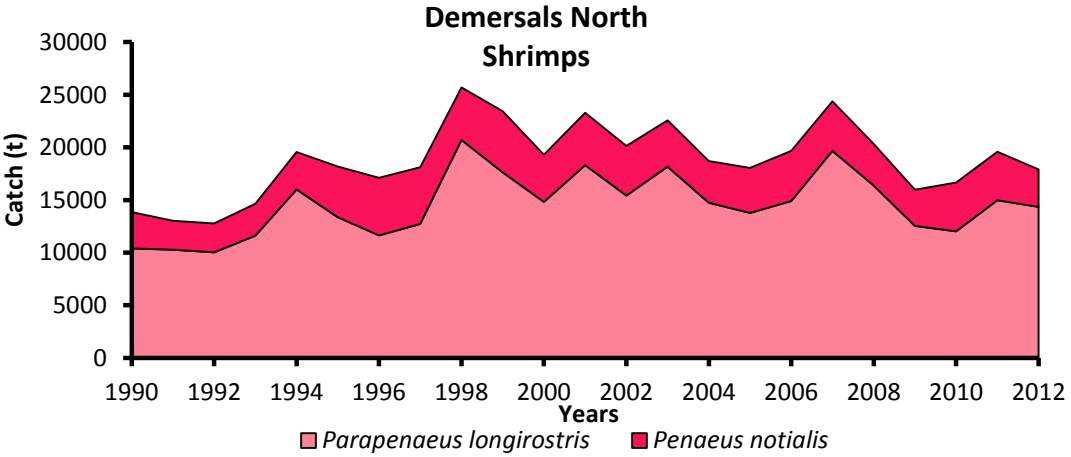

Figure 3. Catches of shrimps in CECAF North (1990-2012)

22. Catches of black hake (*Merluccius polli* and *Merluccius senegalensis*) decreased from 17 000 tonnes in 1999 to around 6 900 tonnes in 2012, while those of white hake (*Merluccius merluccius*) increased from 7 500 tonnes in 1997 to 11 300 tonnes in 2003, after which they fell to 5 000 tonnes in 2012. This could be due to departure of foreign fleets catching this species. Catches of other demersal fish species represent 27 percent of the total demersal fishes analysed by the 2013 Demersal Working Group. Catches of these species fluctuated between 30 000 and 60 000 tonnes in 1990-2012, with an average of around 44 000 tonnes in the last 5 years (Figure 4).

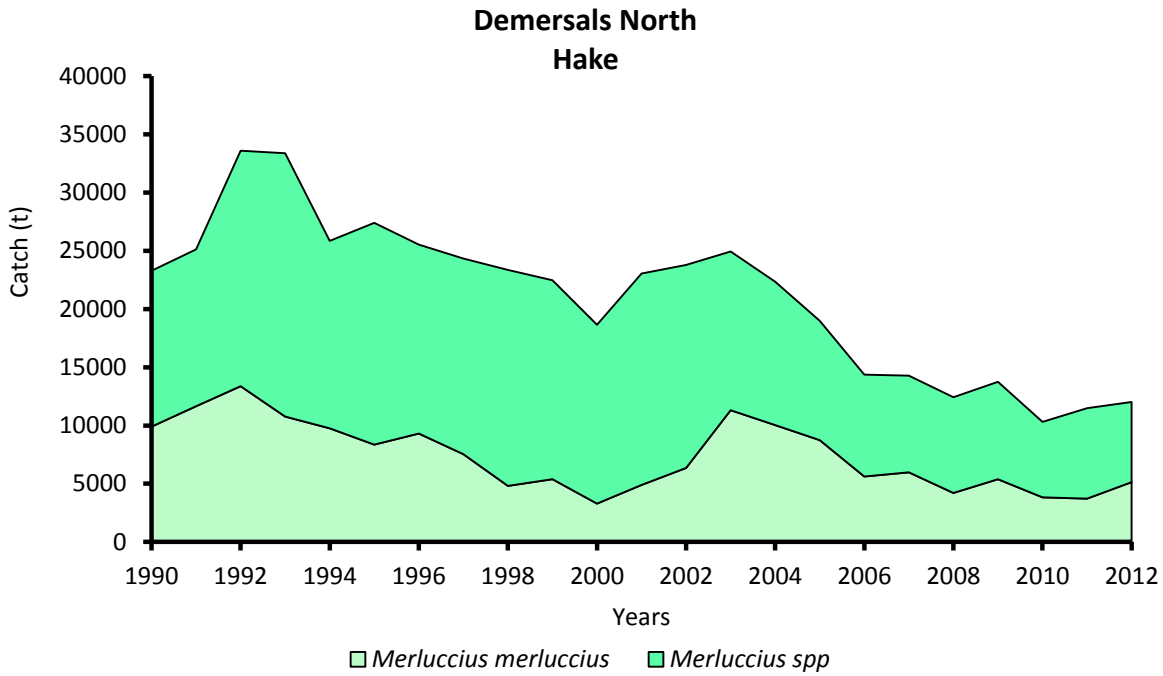

Figure 4. Catches of Hake in CECAF North (1990-2012)

Demersal surveys

23. In Morocco, for the period 2009-2012, the research vessel CHARIF AL IDRISSI carried out 21 scientific surveys to assess and monitor demersal resources.

24. In Mauritania, demersal surveys were carried out over the entire Mauritanian EEZ. Since 2009, six demersal surveys have been undertaken on board the R/V AL AWAM.

25. Spain carried out three scientific surveys between 2007 and 2009 in Mauritania on board the R/V VIZCONDE DE EZA.

26. The CCLME Project in collaboration with the EAF-Nansen project conducted two ecosystem surveys with the R/V DR. FRIDTJOF NANSEN in the waters off Northwest Africa from Guinea in the South to Morocco in the north.

ASSESSMENTS

27. The assessment results show that several stocks are showing signs of recovery. The majority of the stocks are not fully exploited. A summary sheet with the complete results of the assessments and management recommendations is given in Table 2. In the same table a column indicate the management advise given by the Demersal North Working Group in 2010.

Ten stocks were found to be overexploited:

28. **Thiof (*Epinephelus aeneus*),** the model does not reflect the state of the fishery in recent years. The Senegalese ice canoes could operate in Guinea-Bissau and probably exploit other populations or sub-stock of this species. The stock could be about to collapse in Mauritania, Senegal and The Gambia. As with the previous assessment, the results from the fit indicate that the stock is overexploited. The current biomass is below that corresponding to the biomass $B_{0.1}$. The current fishing effort is far

higher than that which would produce a sustainable yield at the current biomass level This critical situation had already been observed in 2004, 2007 and 2010. (Figure 5).

29. Southern rose shrimp (*Penaeus notialis*) in Senegal-Gambia, octopus (*Octopus vulgaris*) in Cap Blanc, octopus (*Octopus vulgaris*) in Dakhla, white hake (*Merluccius merluccius*) in Morocco, *Pagrus* spp. in Morocco, axillary seabream (*Pagellus acarne*) in Morocco, sea breams (*Pagellus* spp.) in Morocco, rubber-lip grunt (*Plectorhynchus mediterraneus*) in Morocco and deepwater rose shrimp (*Parapenaeus longirostris*) in Morocco.

Twelve stocks are considered non-fully exploited:

30. Black hake (*Merluccius* spp.) in Mauritania, catfish (*Arius* spp.) in Senegal-Gambia, red pandora (*Pagellus bellotti*) in Mauritania-Senegal-Gambia, deepwater rose shrimp (*Parapenaeus longirostris*) in Mauritania-Senegal-Gambia, southern pink shrimp (*Penaeus notialis*) in Mauritania, octopus (*Octopus vulgaris*) in Senegal-Gambia, cuttlefish (*Sepia officinalis*) in Dakhla, cuttlefish (*Sepia officinalis*) in Cap Blanc, cuttlefish (*Sepia officinalis*) in Senegal-Gambia and squid (*Loligo vulgaris*) in Dakhla (Figure 6).

Five stocks are considered fully exploited:

31. The assessment results were not satisfactory for five stocks due to uncertainties about the data available. These are *Pseudotolithus* spp. (Senegal-Gambia), *Pagellus* spp. (Morocco), *Dentex macrophtalmus* (Mauritania-Senegal-Gambia), *Pagrus caeruleostictus* (Mauritania, Senegal, and The Gambia), *Loligo vulgaris* (Dakhla stock) and *Loligo vulgaris* (Senegal-Gambia stock). However, although the model did not provide reliable results for these stocks/groups of species, other information from the fisheries and scientific surveys indicates that they are fully exploited (Figure 7).

GENERAL CONCLUSIONS

32. The assessment results show that several stocks are showing signs of recovery. The majority of the stocks are not fully exploited. A summary sheet with assessment results and recommendations is presented in Table 2.

33. During this year's meeting, simple medium-term projections of future yields and stock development were made based on predefined scenarios using the Schaefer model fitted to the historical data series. The results of the projections were included in the assessment process and in the formulation of management recommendations.

34. In view of these results, it is necessary to ensure that current restrictions imposed on these fisheries are respected. Additional steps should be taken to prevent further deterioration of stocks.

35. Most stocks in the region are shared between two or more countries. The Working Group strongly recommends strengthening regional cooperation in research and management. However, the adoption of new fishery management plans, strengthening of management measures and strict control of fishing zones in certain countries have contributed to the improvement of certain stocks in the region.

36. The members of the Working Group should urgently begin discussions with the authorities of their countries, on their concerns about scientific advice for a better management of the demersal fisheries and to ensure the sustainability of these fisheries. Working papers on this subject should be presented at the next meeting.

37. Although data related to catch, effort and biological parameters provided to the Working Group have increased in the last years, there are still gaps. Reliable catch data are still insufficient for certain demersal fish stocks.

38. Catch and effort data are often incomplete for the last year (2012). Data on length composition of certain stocks are available in the countries but are not available to the Working Group. Uncertainty about the series is due to unreported catches or misreporting, lack of information on discards, etc. Assessment of the state of stocks and their exploitation is highly dependent on estimates of catches, past and present. The results of the recent surveys in the region are not available for some countries to the Working Group.

RECOMENDATIONS

39. Inform managers of the poor state of certain demersal stocks in their countries so that they can implement the recommendations made by the CECAF/COPACE Working Groups organised by the FAO.

40. Prospect and examine the possibility of using other models for the assessment of stocks in the northern CECAF region.

41. Respect the recommendation by CECAF to prepare all the databases necessary for the assessment so that they can be sent to all participants, FAO and the chairperson of the Working Group at least one month before the start of the Working Group.

42. Present in time all the data available in the countries to the Working Group (i.e. catch, corresponding effort, abundance indices [from scientific surveys and others], and length and age composition of the catches).

43. Improve the system of data collection and carry out regional scientific surveys so that the species and catch origin can be better identified.

44. Study the effects of environmental factors on demersal stocks.

45. Study the effects of environmental factors on demersal stocks.

46. Carry out regular national and regional scientific surveys covering the entire distribution of the stocks to obtain more reliable abundance indices for each stock.

47. Carry out intercalibration exercises to assess performance of the trawl nets of the different research vessels in the region - Morocco, Mauritania and Senegal.

48. Organise regional seminars covering different subjects (shared stocks, environmental effects, biology, identification of stocks, etc.) between the members of the Working Group.

49. Organise a training course on assessment methods focusing on methods for short-lived species.

Table 2. Summary of the assessments and management recommendations in 2013 compared with 2010

Stock	Catch (1000 t) (2008–2012 avg.)	*$B_{cur}/B_{0.1}$	*$F_{cur}/F_{0.1}$	LCA/ Yield per recruit	Assessment	Management recommendations (A reduction in fishing mortality implies either: reduction in effort or introduction of a measure like the closed season	Management recommendations From DEMNWG 2010
DEMERSAL FISHES							
Hake *Merluccius merluccius* 	5137 (4458)	96%	109%	*v*	Overexploited	It is recommended to reduce the current fishing mortality by 10 percent compared with 2012 of the coastal trawler fishery which targets the juveniles.	•Reduce the current fishing effort (2008) •Close fishing during the months of June and July to protect the juveniles •Increase the mesh size of trawlers •Control and apply the existing regulations
Merluccius spp. Mauritania 	6883 (7541)	127%	50%		Non- Fully Exploited	It is recommended to reduce the current fishing mortality by 10 percent compared with 2012 of the coastal trawler fishery which targets the juveniles.	Fishing effort should not exceed the current level of 2008 until confirmation of the situation of the stock
Arius spp. Senegal/ The Gambia 	5657 (6754)	128%	69%	-	Non- Fully Exploited	As a precaution the Working Group recommends not to increase the fishing mortality above the 2012 level.	Fishing effort should not exceed the current level (2008).
Pseudotolithus spp. Senegal/ The Gambia	9674 (5967)				Not Conclusive	The assessment not being conclusive due to insufficient catch and effort data available to the Working Group, a precautionary approach is recommended and the fishing mortality should not exceed the 2012 level.	Fishing effort should not exceed the current level (2008).
Epineplehus aeneus Mauritania/Senegal/ The Gambia 	3413 (2605)	34%	762%		Overexploited	The working group recommends a reduction in fishing mortality.	Stop targeting this species and deacrese the fishing effort in the artisanal fisheries.

Stock	Catch (1000 t) (2008–2012 avg.)	*$B_{cur}/B_{0.1}$	*$F_{cur}/F_{0.1}$	LCA/ Yield per recruit	Assessment	Management recommendations (A reduction in fishing mortality implies either: reduction in effort or introduction of a measure like the closed season	Management recommendations From DEMNWG 2010
Pagrus caeruleostictus Mauritania, Senegal and The Gambia 	6308 (7483)	-	-	-	Not Conclusive	Considering the uncertainties about the origin of the catches and the representativeness of the CPUE of the stock abundance, as a precaution, the Working Group recommends not to exceed the 2008 fishing mortality.	Reduce the current (2008) fishing effort
Sparus spp. Morocco 	4484 (3496)	82%	187%	-	Overexploited	The sea breams are exploited by the deep-sea cephalopod, fisheries. The management measures applied to this species are valid for each of these fisherie, . this stock should have the same measure as those for cephalopods fisheries.	Fishing effort should not exceed the current level (2008). Fully exploited (uncertainty in the assessments).
Dentex macropthalmus Mauritania, Senegal and The Gambia 	4021 (5738)	-	-	-	Not conclusive	The quality of the fit does not allow for a very precise conclusion on the state of the stock. However, due to the low catches observed in recent years during the surveys in Mauritania, a precautionary approach would be not to exceed the 2012 fishing mortality.	Fishing effort should not exceed the current level (2008).
Plectorhynchus mediterraneus Morocco 	4387 (6586)	26%	381%		Overexploited	The sea breams are exploited by the deep-sea cephalopod, fisheries. The management measures applied to this species are valid for each of these fisherie, . this stock should have the same measure as those for cephalopods fisheries.	Fishing effort should not exceed the current level (2008). Fully exploited (uncertainty in the assessments).
Pagellus belottii Mauritania, Senegal and The Gambia 	5675 (6978)	158%	26%	x	Non-Fully Exploited	As a precaution, the Working Group recommends not to exceed the 2012 fishing mortality.	Fishing effort should not exceed the current level (2008). Overexploited
Pagellus acarne Maroc 	569 (243)	68%	7%		Overexploited	Considering that the besugue is taken as bycatch in several fisheries, it is important to monitor the application of the regulations in force in the different fisheries to ensure a stock recovery.	Reduce the current (2008) fishing effort. Monitor existing management measures. Overexploited

Stock	Catch (1000 t) (2008–2012 avg.)	*$B_{cur}/B_{0.1}$	*$F_{cur}/F_{0.1}$	LCA/ Yield per recruit	Assessment	Management recommendations (A reduction in fishing mortality implies either: reduction in effort or introduction of a measure like the closed season	Management recommendations From DEMNWG 2010
Pagellus spp. Morocco 	4079 (3318)	-	-	-	Overexploited (?)	Considering that the besugue is taken as bycatch in several fisheries, it is important to monitor the application of the regulations in force in the different fisheries to ensure a stock recovery.	Fishing effort should not exceed the current level (2008). Fully exploited (uncertainty in the assessments)
SHRIMPS							
Parapenaeus longirostris Morocco 	9597 (9078)	67%	164%	-	Overexploited	Considering that the pink shrimp is exploited by the same coastal trawler fleet which targets the white hake it is recommended to reduce actual fishing mortality of the coastal trawler fishery which targets the juveniles by 10%	Reduce significantly the current fishing effort (2008) to achieve a sustainable catch level allowing the recovery of the stock.Overexploited .
Parapenaeus longirostris Mauritania 	2086 (2082)	140%	44%		Non-Full Exploited	Considering the exceptional situation in 2012 (end of the EU-Mauritania Fisheries Partnership Agreement and closure of the fishery at the end of July 2012,) the Working Group recommends not to increase the 2011 fishing mortality.	Fishing effort should not exceed the current level (2008)
Parapenaeus longirostris Senegal and The Gambie 	2668 (2695)	116%	82%	-	Non-Fuly Exploited	Senegal-The Gambia- Considering that the 2012 effort data were not available, the Working Group recommends not to increase the 2011 fishing mortality	As a precautionary measure, do not increase fishing effort above current level (2008).
Parapenaeus longirostris Mauritania, Senegal, Gambia 	4754 (4977)	136%	51%		Non-Fully Exploited	The indicators on the state of the stock were particularly close to those obtained for the Mauritanian	
Penaeus notialis Mauritania 	679 (1135)	92%	29%	-	Non-Fully Exploited	Considering the exceptional situation in 2012 (end of the EU-Mauritania Fisheries Partnership Agreement and closure of the fishery at the end of July 2012) the Working Group recommends not to increase the 2011 fishing mortality	Fishing effort should not exceed the current level (2008), to achieve a sustainable catch level permitting recovery of the biomass of the stock. **Overexploited**

Stock	Catch (1000 t) (2008–2012 avg.)	*$B_{cur}/B_{0.1}$	*$F_{cur}/F_{0.1}$	LCA/ Yield per recruit	Assessment	Management recommendations (A reduction in fishing mortality implies either: reduction in effort or introduction of a measure like the closed season	Management recommendations From DEMNWG 2010
Penaeus notialis Senegal and The Gambia 	2879 (2787)	50%	191%	-	Overexploited	Considering that the 2012 effort data were not available, the Working Group recommends decreasing the 2011 fishing mortality	Reduce significantly the current fishing effort (2008).
Cephalopods							
*Octopus vulgaris Da*khla (26°N-20°50'N) 	27524 (31448)	58%	112%	-	Overexploited	Fishing effort should not exceed the current level (2012),	Reduce the current fishing effort of all fleets targeting octopus.. Strengthen control of management measures.
Octopus vulgaris Cap Blanc (20°N-16°N) 	29942 (27510)	84%	120%	-	Overexploited	The Working Group recommends not exceeding the 2012 fishing mortality	The Working Group recommends not exceeding the 2012 fishing mortality
Octopus vulgaris Senegal/ The Gambia 	8631 (6634)	115%	93%	-	Overexploited	As the 2012 statistics are average estimates for the last three years, the Group, as a precaution, recommends not to exceed the 2012 fishing mortality. Strengthen the control of management measures	Reduce the current fishing effort of all fleets targeting octopus. Strengthen control of management measures.
*Sepia officinalis Da*khla (26°N-20°50'N) 	24539 (18544)	124%	59%	-	Non-Fully exploited	Considering that this species is caught by the same fleets targeting octopus the same recommendations made for octopus are also valid for the cuttlefish fishery.	Reduce the current fishing effort. Catches of cuttlefish in the octopus fishery should be monitored to avoid that octopus fishing effort is redirected to cuttlefish. Overexploited

Stock	Catch (1000 t) (2008–2012 avg.)	*$B_{cur}/B_{0.1}$	*$F_{cur}/F_{0.1}$	LCA/ Yield per recruit	Assessment	Management recommendations (A reduction in fishing mortality implies either: reduction in effort or introduction of a measure like the closed season	Management recommendations From DEMNWG 2010
Sepia officinalis Cap Blanc (20°N-16°N) 	2539 (2630)	145%	47%	-	Non-Fully exploited	Considering that this species is caught by the same fleets targeting octopus the same recommendations made for octopus are also valid for the cuttlefish fishery.	Reduce the current fishing effort. Overexploited
Sepia officinalis Senegal and The Gambia 	3754 (3569)	117%	37%	-	Non-Fully exploited	Considering that this species is caught by the same fleets targeting octopus the same recommendations made for octopus are also valid for the cuttlefish fishery.	Fishing effort should not exceed the current level (2008).
*Loligo vulgaris Da*khla (26°N-20°50'N) 	5243 (4481)	-	-	-	Not Known	Considering that this species is caught by the same fleets targeting octopus and cuttlefish the same recommendations made for octopus and cuttlefish are also valid for the loligo fishery.	Reduce the current fishing effort.
Loligo vulgaris Cap Blanc (20°N-16°N) 	1848 (1396)	146%	37%		Not Fully exploited	Considering that this species is caught by the same fleets targeting octopus and cuttlefish the same recommendations made for octopus and cuttlefish are also valid for the loligo fishery.	
Loligo vulgaris Senegal and The Gambia 	103 (115)	-	-	-	-	Considering that this species is caught by the same fleets targeting octopus and cuttlefish the same recommendations made for octopus and cuttlefish are also valid for the loligo fishery.	

OVEREXPLOITED

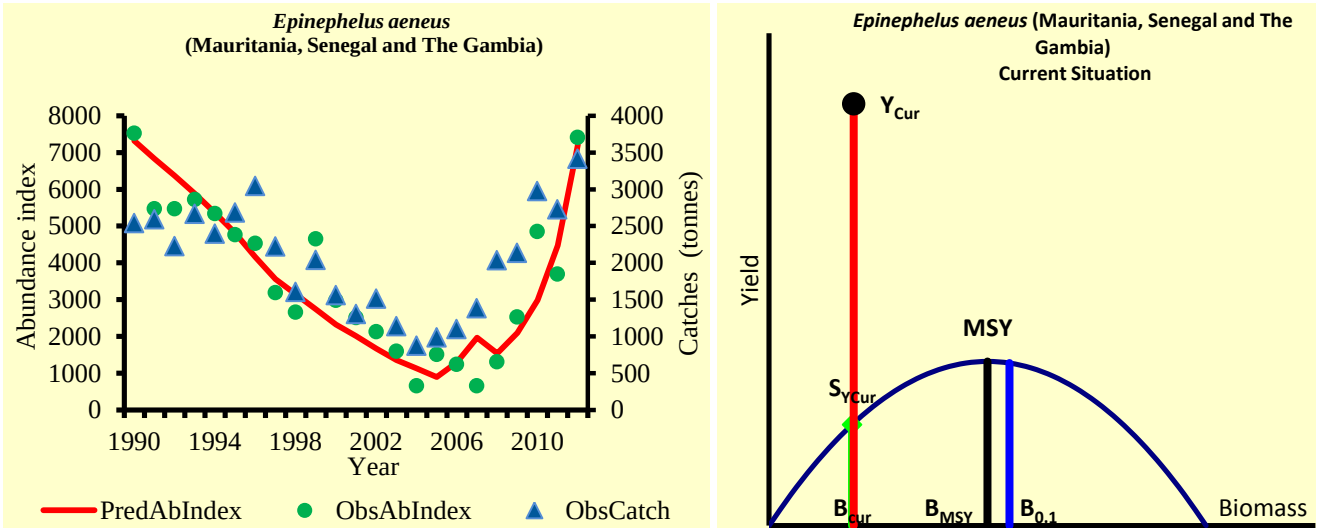

Figure 4. Stock of *Epinephelus aeneus* in Mauritania, Senegal and The Gambia.

NOT FULLY EXPLOITED

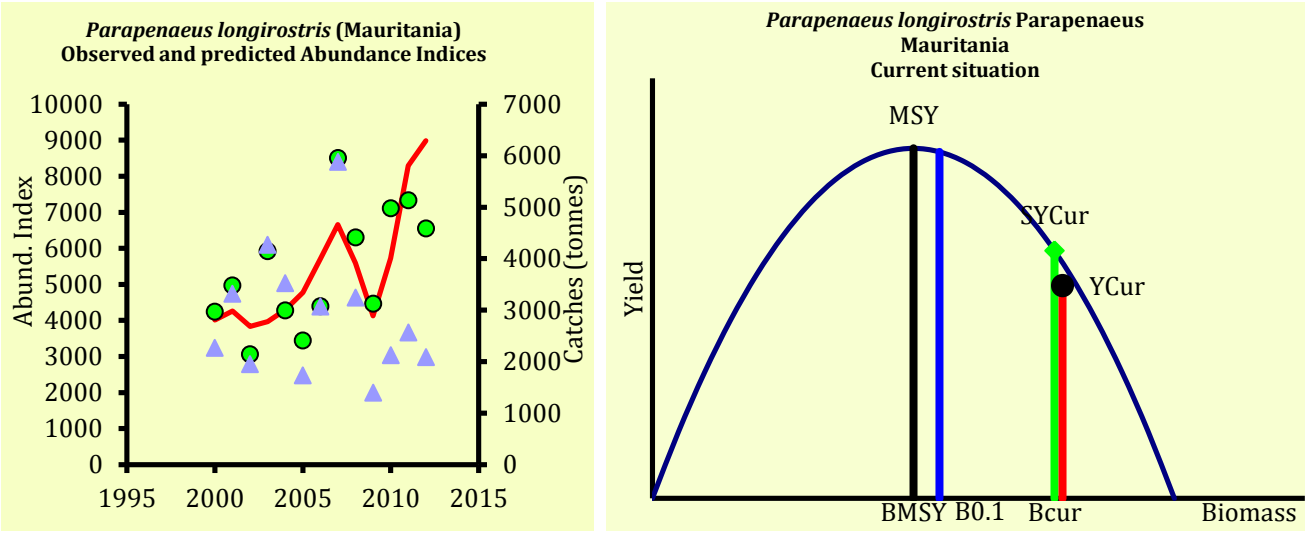

Figure 5. Stock of ***Parapenaeus longirostris*** in Mauritania.