SOUTH EAST ATLANTIC FISHERIES ORGANIZATION (SEAFO)

REPORT OF SEAFO SCIENTIFIC COMMITTEE 2007

Scientific Committee of SEAFO
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1. Opening of the Meeting

The 3rd Annual Meeting of the SEAFO Scientific Committee (SC) was convened on 04-05 October 2007 at National Marine Information and Research Centre (NatMIRC), Swakopmund, Namibia. The Meeting was opened by the Vice-Chairperson of the Scientific Committee, Dr. B. van Zyl who extended a warm welcome to attending participants. He highlighted the importance of the work of the Committee and expected outcomes of the Meeting.

2 . Adoption of the Agenda and Arrangements

The agenda was accepted and adopted without any change and is appended as Annex I.

The Executive Secretary informed the Meeting of practical organisation and arrangements.

3. Appointment of rapporteurs

The Chair proposed to the Meeting that all participants should contribute to the writing of the report and as such there is no need to appoint a rapporteur. The Meeting accepted the Chair's suggestion.

4. Introduction of participants

In response to the Chair, participants introduced themselves. A total of sixteen scientists representing Angola, EU, Namibia, South Africa and the BCLME Programme attended the Meeting. Participants and their addresses are listed in Annex II.

5. Report of the SSC

Mr. Titus Iilende, who chaired the Scientific Sub Committee (SSC) presented its report. Considerable time was spent to examine the report, section by section. The report is attached as Annex III.

6. Consideration of the report of SSC

The Scientific committee acknowledged the work done by the SSC regarding the limited information available for the sub committee for answering the TORs in a proper way.

In general, the quality and quantity of data available was of still poor although a slight improvement was observed. However, there is still a need for improvement.

The terms of reference for the SSC are given in the report (Annex III), and the Sub Committee responded to all points. In this report, the discussions are summarised.

a. Compilation and Analysis of Catch and CPUE Data

The following countries are known to have been fishing in the SEAFO Area viz. Spain, Portugal, Russia, Cyprus, Mauritius, Japan, Korea, Poland, Norway, South Africa and Namibia. Catch analyses were made on the most recent catch statistics provided to the Secretariat. Most countries have provided incomplete statistics over years and therefore an estimate of total annual catches is currently not possible with the available data. The amount of Illegal, Unreported and Unregulated (IUU) fishing in the Area is unknown.

b. Main SEAFO Species and By-catch and Evaluation of Trends in the Total catches

The commercially most important species are Patagonian toothfish, orange roughy, alfonsino and deep-sea red crabs. Horse mackerel and hake are not normally caught in the SEAFO Area and mackerel and pelagic sharks are the responsibility of ICCAT and should therefore be removed from the existing SEAFO species list (Annex III, Table I). According to the available data, octopus and squid seem to be a minor bycatch species. Wreckfish can be found in the SEAFO Area, but have only been caught in very small quantities. Table 1 is the new proposed SEAFO species list.

Table I: Proposed SEAFO species List.

FAO 3 Alfa Code	Common name	Scientific Name	Transboundary
TOP	Patagonian toothfish	*Dissostichus eleginoides*	Yes
ORY	Orange Roughy	*Hoplosthethus atlanticus*	Unknown
ALF	Alfonsinos	*Beryx spp*	Unknown
CGE	Deep-sea Red Crabs	*Chaceon spp*	Unknown
EDR	Armourhead / Boarfish	*Pseudopentaceros richardsoni*	Unknown
ORD	Oreo dories	Family Oreosomatidae	Unknown
CDL	Cardinal Fish	*Epigonus spp.*	Unknown
OCZ	Octopus	Family Octopodidae	Unknown
SQC	Squid	Family Loliginidae	Unknown
WRF	Wreckfish	*Polyprion americanus*	Unknown
SKA	Skates	Family Rajidae	Unknown
SKH	Sharks (deep-sea)	Order Selachomorpha	Unknown

Catch statistics for the SEAFO Area are incomplete. A table with the available data from 1995 to 1998 was listed in the report of the 1st Annual Meeting of the Commission (2004), Appendix III (Table II). The Sub-Committee recommends that effort should be made by the various countries to obtain the outstanding information to be able to complete the tables with the required information.

c. Reference Points for Deep Sea Fish Resources.

As a first step, the Sub-Committee agreed to categorise the commercially most important species in the SEAFO Convention Area into two categories (A and B) on the basis of available information of life history characteristics, perceived vulnerability to fishing and the fishing gear used. Table 10 of the Sub-Committee report shows life history characteristics and vulnerability to fishing of commercially important species.

The Sub-Committee attempted to identify reference points for all species. The only data available for use were CPUE data and these were sparse for most species and were considered unreliable especially where species were taken as by-catch.

An alternative option available was to develop reference points based on catch thresholds. However, while there was agreement that these should be precautionary it was not possible to agree thresholds for all species.

For Patagonian toothfish, the Sub-Committee took account of current CCAMLR Conservation Measure 41-04 from 2006 relating to toothfish. For toothfish in SEAFO Division D, it was agreed to recommend a catch limit of 260 tonnes. The Sub-Committee, when addressing TOR d, agreed to again recommend closure of the area 13 in Sub-Division D1 and if this is accepted the catch limit of 260 tonnes should relate to the area in Division D outside the proposed closure area.

For deep-sea red crab spp, there is no evidence to suggest that this species is depleted. The Sub-Committee recommended a catch limit of 200 tonnes in Sub-Division B1 (average of recent catch levels) and 200 tonnes in the remainder of the SEAFO Area until such time as when additional information becomes available.

Given the vulnerability to fishing of some of remaining species, the paucity of data available for assessments, and the likely impact of trawls on vulnerable habitats on seamounts that remain open to fishing and elsewhere in the SEAFO Area, the Sub-Committee agreed to take a precautionary view and to recommend a ban on all forms of trawling in the SEAFO Area.

The Sub-Committee recommended that for trawling to resume there should be mapping of vulnerable habitats (corals, sponges) and that if trawling is resumed it should be at a low level until it can be demonstrated that higher levels of fishing are sustainable. Proposals for mapping of resources, exploratory fishing and resumed commercial fishing should be submitted to the SEAFO Scientific Committee for consideration before any activity takes place.

d. Recommending Areas that Could be Fished on Each Seamount

The Sub-Committee recognised that there is currently no information available on the spatial distribution of vulnerable habitats and fishing activity on individual seamounts within existing closed areas. Given this, the Sub-Committee considered that it would be

inappropriate at the present time to recommend areas that could be opened to fishing. It should be noted that a recommendation to ban trawling in the SEAFO Area addresses the concern regarding the impact of trawling on vulnerable habitats on seamounts. Notwithstanding, the closure areas should remain in place to prevent damage to vulnerable habitats caused by other types of fishing gear e.g. gill nets and long-lines.

The Sub-Committee recommended that for fishing to resume in closed areas there should be mapping of vulnerable habitats (corals, sponges) and that research proposals should be submitted to the SEAFO Scientific Committee for consideration before any activity takes place.

e. Recommending Protocol for Data Collection

Scientific Sub-Committee agreed that exploratory fishing surveys in unexplored areas should not be permitted since they may cause irreversible damage to the seamounts. In alternative the Sub-Committee agreed that on these areas a preliminary evaluation of the habitat vulnerability to exploitation, as well as, mapping must be carried out using tools with minor impact effect over the bottom (e.g. multibeam sonars). At already exploited areas the Sub-Committee agreed that plans for exploratory fisheries should be reported to the SEAFO Secretariat and analysed by the Scientific Committee that would evaluate the adequacy of the proposal.

The Sub-Committee agreed that data log sheets must include an additional item where information of lost gear can be included, namely, gear type, geographical co-ordinates and time and date of loss.

f. Examining and Reviewing the Effects of Lost, Abandoned or Discarded Fishing Gear and Their Adverse Impacts

In the absence of relevant data, the Sub-Committee expressed its concern on the potential and actual ghost fishing of lost, abandoned and discarded bottom gillnets and traps / pots. The Sub-Committee recommended that flag States should report any lost fishing gear to the Secretariat. Consideration should be given to retrieval of lost gear by flag State.

g. Examining Assessments and Research Done By Neighbouring Assessments and Management Organisations

The research results, obtained by various commissions and other research & management organizations, were considered in the course of the meeting. These results were used to reach solutions of various problems and tasks at hand. For example, CCAMLR data for toothfish were used to resolve recommendations for Division D.

h. Reviewing the Distribution of Reported Catches of Benthic Organisms

The Sub-Committee recommended that the protocol for the collection of information on benthos including corals and sponges be developed. Consideration should be given to the already existing NAFO proposal on this subject.

i. Reviewing of the Submitted SEAFO Research Documents

i(1). Proposal for a Revision of FAO Fishing Area 47 Statistical Divisions and Collaboration with SEAFO

The Sub-Committee recommends that the Scientific Committee considers the proposal and, if appropriate, forward it to the Commission for its possible endorsement.

i(2). MAR-ECO Proposal

The Sub-Committee considered the "Research proposal on the patterns and processes of the Mid-Atlantic Ridge". The Sub-Committee found this proposal to be of great interest to SEAFO and coastal states in the region, especially concerning proposed research on and around Walvis Ridge. The Sub-Committee supported the proposal and expressed the interest in contributing towards the proposal's objectives.

At the same time, the Sub-Committee has noted with concern the lack of suitable resources in the region to conduct such difficult research, where various sampling gears will be used at depths well exceeding 1000 m. In the Sub-Committee's opinion, the best option to extend this research from the north Atlantic (the previous phase of the project), will be to conduct fieldwork on the same vessel as used previously, i.e. the Norwegian R/V G.O. Sars. This approach is vital for the success of the project for the following reasons:

- To ensure continuity, compatibility and same reference points for all the data: biological and oceanographic;
- This vessel has a known track record in deep water research and is one of the few research vessels in the world which are potentially available.
- Logistics of the cruise (or cruises) may draw directly from the previous experience;
- However it is recognized that there are other vessels available and capable of carrying out this work and should G.O Sars not be available, their participation should be encouraged

i(3). FIRMS Stock Inventories

The Sub-Committee also considered FIRMS stock inventories and referred the issue to the SC for further consideration.

7. Any Other Matters

The following points for discussion were added to the agenda. The SC considered the following issues and has made recommendations on these, which are included under Item 8: "Advice and Recommendations to the Commission"

a. FIRMS classifications template. The SC attempted to draft a template and agreed to complete it by correspondence by November 2007.
b. Protocol on collection of information on corals and sponges.
c. MAR-ECO proposal.
d. Submission of zero fishing.
e. Collection of environmental data.
f. The creation of a SEAFO database.
g. Chairs of the SSC and the SC

8. Advice and recommendations to the Commission

This year the SC has agreed to identify the responsible entities to take action under each recommendation. These should not be interpreted as instructions, but are provided to facilitate responses and needs in a non-prescriptive manner.

a. The Scientific Committee recommends that the Contracting Parties should fulfil their obligations and obtain and submit to the Secretariat the outstanding information required for assessments (e.g. presence or absence of fishing, total catches including zero catches, catches by species, discards, by-catch and effort). This recommendation also applies to Non-contracting Parties. **ACTION: Commission, Contracting Parties and Non-contracting Parties**

b. Given the vulnerability to fishing of some of remaining species, the paucity of data available for assessments, and the likely impact of trawls on vulnerable habitats on seamounts that remain open to fishing and elsewhere in the SEAFO Area, the SC takes a precautionary view and recommends a ban on all forms of trawling in the SEAFO Area. **ACTION: Commission**

c. The SC recommends that for trawling to resume there should be mapping of vulnerable habitats (corals, sponges) and that if trawling is resumed it should be at a low level until it can be demonstrated that higher levels of fishing are sustainable. Proposals for mapping of resources, exploratory fishing and resumed commercial fishing should be submitted to the SEAFO Scientific Committee for consideration before any activity takes place. **ACTION: SC**

d. The SC recommends that for fishing (longlining, traps / pots) to resume in closed areas there should be mapping of vulnerable habitats (corals, sponges) and that research proposals should be submitted to the SEAFO Scientific Committee for consideration before any activity takes place. **ACTION: SC**

e. The SC recommends that the Commission considers to empower the SC to make decisions on the scientific matters (such as accepting scientific proposals to undertake research). **ACTION: Commission**

f. For toothfish (which is a longline fishery) the SC recommends a catch limit of 260 tonnes which should relate to the whole SEAFO (Figure 1). The SC took account of current CCAMLR Conservation Measure 41-04 from 2006 relating to toothfish. **ACTION: Commission**

g. For deep-sea red crab spp. (which are caught with traps / pots), there is no evidence to suggest that this species is depleted. The SC recommends a catch limit of 200 tonnes in Sub-Division B1 (Figure 1) (average of recent catch levels) and 200 tonnes in the remainder of the SEAFO Area until such time as when additional information becomes available. **ACTION: Commission**

h. The SC recommends that areas proposed for closure last year (Meteor seamount assemblage (D1 Area 13), Valdivia Bank (B1 Area 4), Ewing seamount (B1 Area 3)), should be closed to prevent damage to vulnerable habitats caused by various types of fishing gear e.g. long-lines and traps / pots. **ACTION: Commission**

i. In the absence of relevant data, the SC expressed its concern on the potential and actual ghost fishing of lost, abandoned and discarded bottom gillnets and traps / pots. The SC recommends that flag States should report any lost fishing gear to the Secretariat. Consideration should be given to retrieval of lost gear by flag State. Therefore the SC agreed to update the logsheets to include additional information of lost gear such as gear type, geographical co-ordinates and time and date of loss. **ACTION: Contracting Parties and SC**

j. The SC recommends banning all gillnet fishing in the SEAFO Area until management measures relating to the total length of nets and soak times can be introduced and enforced. **ACTION: Commission**

k. The SC recommends that the protocol for the collection of information on benthos including corals and sponges be developed. The SC agreed to submit an existing NAFO guide on this subject to relevant SEAFO experts. **ACTION: SC**

l. The SC recommends that the Commission endorses the FAO-SEAFO proposal concerning data compatibility between FAO Area 47 and SEAFO Area. **ACTION: Commission**

m. The SC supports the MAR-ECO proposal and expressed interest in contributing towards the proposal's objectives (DOC/COMM/MEETING/18/2007). The SC notes that a letter should be sent by the Secretariat to MAR-ECO expressing SEAFO's position in this regard. **ACTION: Secretariat**

n. Concern was expressed at the paucity of observer data submitted to the Secretariat. The SC again recommends that each Contracting Party appoint 'designated scientist/s' responsible for the following:-

I. Establishment of sampling protocols and requirements, including fish identification keys, consistent with the agreed SC format.
II. Monitoring the performance of the scientific observer system, including the quality of data produced.
III. Provision of all historical fisheries data.
IV. Electronic transmission to the Secretariat of all observer data required for stock assessments, consistent with the agreed SC formats and deadlines.

Further to this, SC recommends that Parties independently forward observer reports to the Secretariat. <u>ACTION:</u> Contracting Parties

o. Regarding precautionary catch and effort limits, recommend the submission, by the fishing skipper independently of the scientific observer onboard, of a report of catch and effort from each fishing vessel operating in the Convention Area on a five-day basis to the SEAFO Secretariat. **<u>ACTION:</u> Contracting Parties and Secretariat**

p. The SC again requests the implementation of the VMS system to vessels where it is still not implemented and to assure the immediate establishment of the communication of VMS data to the SEAFO Secretariat. VMS data to be made available, according to agreed procedures, for the SC for stock assessment purpose. **To facilitate this, the SC recommends the recruitment of a VMS consultant on a short contract. <u>ACTION:</u> Commission and Secretariat**

q. The SC recommends the development of a SEAFO database to capture the following data: logsheets, environmental data, biological data, VMS data, all data required by the FIRMS agreement, vulnerable habitats, and to produce the necessary outputs. **To facilitate this, the SC recommends the recruitment of a Database consultant on a short contract. <u>ACTION:</u> Commission and Secretariat**

r. Taking into account that Reidar Toresen (Norway) and Ben van Zyl (Namibia) will not be available for re-election as a Chair and Vice-Chair respectively, the SC recommends Phil Large (EU) to serve as Chairman of the SC, pending approval by the European Commission and Cefas Senior Management. For the position of Vice Chairman the SC nominates Rudi Cloete (Namibia). **<u>ACTION:</u> Commission**

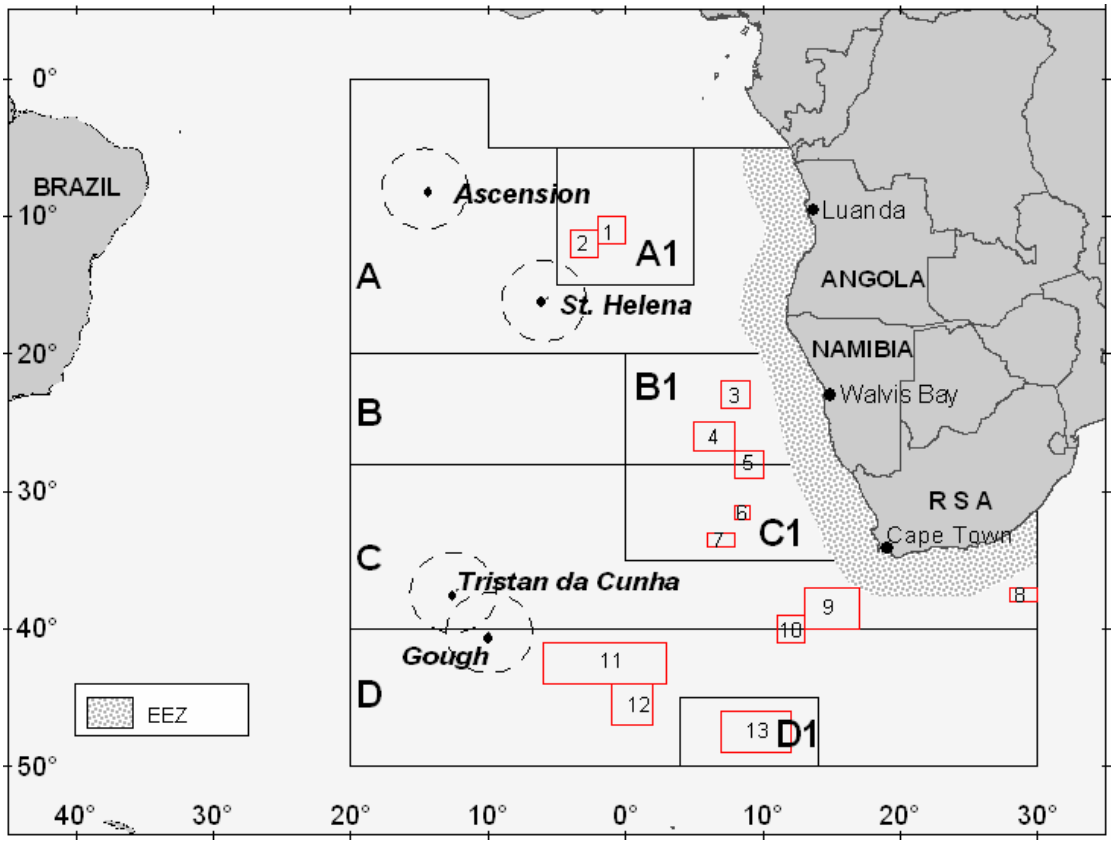

Figure 1. The SEAFO convention area with divisions and subdivisions and indications of areas with seamounts.

9. Future work Programme

a. Source, analyse and compile catch and cpue data for the main fish stocks (e.g. orange roughy, alfonsino, armourhead, deep sea red crab, Patagonian toothfish) in terms of quantity and geographical positions for the SEAFO region using all existing information including observer data

b. Evaluate trends in the total catches and where possible cpue for the stocks as outlined under point (8.1), and undertake stock assessments when appropriate.

c. Examine, where appropriate, assessments and research done by neighbouring assessment and management organisations (such as BCLME/BCC, CCAMLR, GCLME, ICCAT, SWIOFC).

d. Evaluate and suggest reference points for deep sea fish resources.

e. Review the distribution of reported catches of benthic organisms (corals, sponges etc.).

f. Undertake review of submitted SEAFO research documents.

g. Establishment of sampling protocols and requirements, including fish identification keys.

h. The SC suggested participation in the upcoming symposium on Seamount Fisheries (From unregulated exploitation to sustainable use) in Japan on 20-24 October 2008.

10. Budget for 2008

The Meeting recommended that the Commission approve an allocation to cater for the 3-days Sub-Committee meeting and for the 2-days Scientific Committee meeting in 2008.

11. Cooperation with other organisations

Recognising the importance of cooperation with other organisations in respect of information exchange on fisheries and environment, the SC again recommends that this cooperation should be promoted.

12. Adoption of the Report

The report was presented and adopted by the Meeting.

13. Date and Venue of Next Meeting

The next Meeting of the Sub-Committee will be on 29 September to 1 October 2008. The annual Meeting of the SC will be on 2-3 October 2008. All meetings will be held in Windhoek.

14. Appointment of Chair and Vice-Chair

The Meeting nominated Mr. Phil Large of European Union (based at Lowestoft Laboratory, UK) to be Chair of the Scientific Commission for the next three years and Mr. Rudolf Cloete of Namibia (based at National Marine Information and Research Centre, Swakopmund) as his Vice-Chair. Both have accepted the nominations and they were elected.

15. Closure of Meeting

On Friday 05 October at 13h00 the Chairperson declared the closure of the Meeting after all items have been completed. In his closing remarks, the Chair expressed his satisfaction for the work accomplished and thanked all participants for their valuable contributions.

ANNEX I

Agenda for the 3rd Annual Meeting of the SEAFO Scientific Committee

1. Opening and welcome remarks by the Chair
2. Adoption of the agenda
3. Appointment of rapporteurs
4. Introduction of participants
5. Report by the Chair of the SC
6. Consideration of the report of SC
7. Any other matters
8. Advice and recommendations to the Commission
9. Future work program
10. Budget for 2007
11. Cooperation with other organisations
12. Adoption of the report
13. Date and place of the next Meeting
14. Appointment of Chair and Vice-chair
15. Close of the Meeting

Annex II

List of Particiapants to the 3rd Annual Meeting of SEAFO Scientific Committee

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Annex III

REPORT OF THE SUB-COMMITTEE OF SEAFO SCIENTIFIC COMMITTEE

1-3 OCTOBER 2007

NATIONAL MARINE INFORMATION AND RESEARCH CENTRE
SWAKOPMUND, NAMIBIA

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1. INTRODUCTION

As recommended by the Scientific Committee (SC), the Commission decided during its 3rd Annual Meeting in 2006 to establish a Sub-Committee of the SC. The main objective of the Sub-Committee was to carry out, among others, the analyses of existing fisheries data within the SEAFO Convention Area. Titus Iilende (Namibia) was nominated to chair the Sub-Committee. The Meeting took place at the National Marine Information and Research Centre (NatMIRC), Swakopmund, Namibia from 1-3 October 2007. The Meeting was attended by 19 scientists from Angola, EU (Portugal, Spain and UK), Namibia, Norway and South Africa. The Benguela Current Large Marine Ecosystem Program (BCLME) as well as FAO was also represented (Appendix I).

2. WORKING PROCEDURE

The Chairperson opened the Meeting by welcoming all the participants. The agenda (Appendix II) was adopted after the Sub-Committee decided to work as a single group. The Sub-Committee agreed to commence work from 09:00hrs to 17:30hrs each day. The Chair presented terms of reference (listed below) after which the Meeting agreed on the working procedure. The first day was spent on reviewing the existing data, identifying gaps as well as addressing the terms of reference. Specific assignments on data review and analyses were allocated to participants and reported back to the Group.

In general, the quality and quantity of data has not significantly improved since 2006.

Terms of Reference for the Scientific Sub-committee

a Source, analyse and compile catch and CPUE data for the main fish stocks (e.g. orange roughy, alfonsino, armourhead, deep sea red crab, Patagonian toothfish) in terms of quantity and geographical positions for the SEAFO region using all existing information including observer data.
b Evaluate trends in the total catches and where possible CPUE for the stocks as outlined under point (a), and undertake stock assessments when appropriate.
c Evaluate and suggest reference points for deep sea fish resources.
d Recommending the areas that could be fished on each seamount (ref. Report of the 3rd Annual Meeting of the Commission, Annex 8, Conservation Measure 06/06, Para 3)
e Recommending a protocol for the collection of the data required to assess the stocks situation on these seamounts, with a view to developing future recommendations on management measures for these areas (ref. Report of the 3rd Annual Meeting of the Commission, Annex 8, Conservation Measure 06/06, Para 3)
f Examine and review the effects of lost, abandoned or discarded fishing gear and related marine debris and their adverse impacts on the habitats and on the fish stocks covered by the Convention and propose measures to address the problem.
g Examine, where appropriate, assessments and research done by neighbouring assessment and management organisations (such as BCLME/BCC, CCAMLR, GCLME, ICCAT, SWIOFC).

h Review the distribution of reported catches of benthic organisms (corals, sponges etc.).
i Undertake review of submitted SEAFO research documents

3. ADDRESSING THE TERMS OF REFERENCE

The terms of reference are addressed below in the same order as they appear above.

a. Compilation and Analysis of Catch and CPUE Data

The following countries are known to have been fishing in the SEAFO Area viz. Spain, Portugal, Russia, Cyprus, Mauritius, Japan, Korea, Poland, Norway, South Africa and Namibia. Catch analyses were made on the most recent catch statistics provided to the Secretariat. Most countries have provided incomplete statistics over years and therefore an estimate of total annual catches is currently not possible with the available data. The amount of Illegal, Unreported and Unregulated (IUU) fishing in the Area is unknown.

EU (Spain):
Data were provided for the years 2001-2006, with the exception of 2005. Apart from 2006, catch positions were not provided. The reported species composition changed from year to year. In 2004 some of the species listed do not appear to typically inhabit the SEAFO Area. No effort information was available. From 2001 to 2003, landings were small with the exception of around 100 tonnes of Patagonian toothfish. In 2006, eleven tonnes of toothfish were landed by a single Spanish vessel.

EU (Portugal):
Data was provided for 2004 to 2006. Data for 2004 and 2005 were similar to those provided to FAO by the STATLANT 47 questionnaire. A portion of these catches were reported as have been caught in coastal divisions. Data provided for 2006 showed catches of species that are not expected to occur in the SEAFO area. Catch positions were not provided. The reported species composition changed from year to year. No effort information was made available. Wreckfish catches of 0.5 tonnes were recorded for 2004, and six tonnes in 2005.

Japan:
Data were provided from July 2005 to June 2007. In 2005, 234 tonnes of deep-sea red crab and 73 tonnes of Patagonian toothfish were landed. In 2006, 390 tonnes of crab and 157 tonnes of toothfish were landed. In 2007, 509 tonnes of crab and 16 tonnes of toothfish were landed so far. Detailed catch positions for crab fishing are available, but only approximate catch positions were provided for toothfish in the past. Vessel monitoring system (VMS) data is available since October 2006. It is not clear if any fishing took place before June 2005.

Republic of Korea:
The only data that were provided were for 2003 when 245 tonnes of Patagonian toothfish was landed. According to the FAO database, 10 tonnes of toothfish were caught in 2005

in Fishing Area 47 but the division was not reported. Only approximate catch positions were provided for toothfish in the past. No effort information was made available. No bycatch information was provided. It is not clear if any fishing took place in any other year.

Namibia:
Detailed information for orange roughy and alfonsino fishing by the Namibian registered orange roughy vessels was provided from 1995-2005. This includes bycatch species such as oreo dory, cardinal fish and armourhead. No orange roughy fishing was done in 2006 and 2007. Data on crab fishing by one vessel in 2005 and 2007 has been provided, however it is not clear if any fishing took place in other years.

Foreign catches landed in Namibia:
Russian, Mauritian and Cyprian flagged vessels offloaded in Walvis Bay in 2004. Collectively they caught 969 tonnes of alfonsino, 217 tonnes of squid, 46 tonnes of boarfish and 23 tonnes of amourhead. A great number of species not normally expected to occur in the SEAFO Area were reported at 10 tonnes or more; horse mackerel (97 tonnes), hake (64 tonnes), ruby fish (72 tonnes), large eye dentex (39 tonnes), kingklip (25 tonnes) and rockcod (23 tonnes). No data for other years was made available. Whether this is the result of no fishing, is unknown.

b. Main SEAFO Species and By-catch and Evaluation of Trends in the Total catches

The commercially most important species are Patagonian toothfish, orange roughy, alfonsino and deep-sea red crabs. Horse mackerel and hake are not normally caught in the SEAFO Area and mackerel and pelagic sharks are the responsibility of ICCAT and should therefore be removed from the existing SEAFO species list (Appendix III, Table I). According to the available data, octopus and squid seem to be a minor bycatch species. Wreckfish can be found in the SEAFO Area, but have only been caught in very small quantities. Table 1 is the new proposed SEAFO species list.

Table I: Proposed SEAFO species List.

FAO 3 Alfa Code	Species	Latin Name	Transboundary
TOP	Patagonian toothfish	*Dissostichus eleginoides*	Yes
ORY	Orange Roughy	*Hoplosthethus spp*	Unknown
ALF	Alfonsino	*Family Berycidae*	Unknown
CGE	Deep-sea Red Crab	*Chaceon maritae*	Unknown
EDR	Armourhead	*Pseudopentaceros spp.*	Unknown
BOC	Boarfish	*Capros aper*	Unknown
ORD	Oreo dories	*Family Oreosomatidae*	Unknown
CDL	Cardinal Fish	*Epigonus spp.*	Unknown
OCZ	Octopus	*Family Octopodidae*	Unknown
SQC	Squid	*Family Loliginidae*	Unknown
WRF	Wreckfish	*Polyprion americanus*	Unknown
SKA	Skates	*Family Rajidae*	Unknown
SKH	Sharks (deep-sea)	*Order Selachomorpha*	Unknown

Catch statistics for the SEAFO Area are incomplete. A table with the available data from 1995 to 1998 was listed in the report of the 1st Annual Meeting of the Commission (2004), Appendix III (Table II). This data was based on the report by Japp (1999) and listed as pooled deep-sea species. This pooled species information should preferably be separated to be useful for further analysis. The data that was made available to the Provisional Working Group Meeting in 2006 did not provide split species information for Spain, Portugal, Iceland and Korea; also information for year 1998 was not available. Catches for the four main species are listed by country in Tables 2-5 as well as fishing method and management Area in which the catch was taken. Tables 6-7, list the by-catch species. A lot of information is still outstanding. In cases where it is known that fishing did not take place that year, it is indicated in the tables. The Sub-Committee recommends that effort should be made by the various countries to obtain the outstanding information to be able to complete the tables with the required information.

Some data were derived from the "1975-2005 FAO Southeast Atlantic capture production database" and added to the tables on catches. These are printed in bold. Only data from the oceanic divisions and for SEAFO species were taken into consideration.

Table 2: Catches in tonnes of Patagonian toothfish caught by Spain, Japan and Rep. of Korea.

Main species	**Patagonian toothfish**		
Management Area	D1	D1	D1
Nations	Spain	Japan	Korea
Fishing method	Longline	Longline	Longline
Catches			
1976			
1977			
1978			
1993			
1994			
1995			
1996			
1997			
1998			
1999			
2000			
2001			
2002	18.28		
2003	100.54		245.19
2004	201.88		
2005		72.65	**10**
2006	11.51	157	
2007		15.76	

Table 3: Catches of orange roughy made by Namibia, Norway and RSA. Values in italics are taken from the Japp xls spread sheets.

Main species	**Orange roughy**		
Management Area	B1	A1	B1?
Nations	Namibia	Norway	RSA
Fishing method	Bottom trawl	Bottom trawl	Bottom trawl
Catches			
1976			
1977			
1978			
1993			
1994			
1995	39.3	No fishing	*1.18*
1996	7.9	No fishing	*0.04*
1997	5.2	22	*27.30*
1998	No fishing	12	
1999	0.3	No fishing	
2000	74.6	0	
2001	93.9	No fishing	
2002	9.0	No fishing	
2003	27.4	No fishing	
2004	14.7	No fishing	
2005	18.1	No fishing	
2006	No fishing	No fishing	
2007	No fishing	No fishing	

Table 4: Catches of alfonsino made by various countries. Values in italics are taken from the Japp xls spread sheets.

Main species	**Alfonsino**				
Management Area	B1	A1	unknown		
Nations	Namibia	Norway	Russia	Portugal	Ukraine
Fishing method	Bottom trawl	Bottom trawl	Bottom trawl		
Catches					
1976			*252*		
1977			*2972*		
1978			*125*		
1993			*?*		**172**
1994					
1995	*1.2*	No fishing			
1996	*368*	No fishing			**747**
1997	*208*	836	*2800*		**392**
1998	No fishing	1066	**69**		
1999	0.60	No fishing		**3**	
2000	0.05	242		**1**	
2001	0.63	No fishing		**7**	
2002	0.00	No fishing		**1**	
2003	0.00	No fishing		**5**	
2004	6.45	No fishing	210.44		
2005	0.71	No fishing	54		
2006		No fishing		0.3	
2007					

Main species						
Management Area			unknown	unknown	Unknown	B1?
Nations	Spain	Poland	Cook Island	Mauritius	Cyprus	RSA
Fishing method			Bottom trawl	Bottom trawl	Bottom trawl	Bottom trawl
Catches						
1976						
1977						
1978						
1993						
1994						
1995		**1964**				*59.705*
1996						*109.181*
1997	**186**					*124*
1998	**402**					
1999						
2000						
2001						
2002						
2003						
2004			141.55	114.88	436.97	
2005						
2006						
2007						

Table 5: Catches of deep-sea red crab made by Namibia and Japan.

Main species	**Deep-sea red crab**	
Management Area	B1	B1
Nations	Japan	Namibia
Fishing method	Pots	Pots
Catches		
1976		
1977		
1978		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		
2001		
2002		
2003		
2004		
2005	234.34	54.33
2006	390	
2007	509	4.1

Table 6: Catches of armourhead. Values in italics are taken from the Japp xls spread sheets.

Bycatch species	**Armourhead**				
Management Area	B1	B1	?	B1	Unknown
Nations	Namibia	Russia	Ukraine	RSA	Cyprus
Fishing method	BT	BT	BT	BT	BT
Catches					
1976		*108*			
1977		*1273*			
1978		*53*			
1993		*1000*	**435**		
1994					
1995	*3*		***49***	*529.581*	
1996	*212*		***281***	*201.184*	
1997	*546*		***18***	*12*	
1998					
1999					
2000					
2001					
2002					
2003					
2004					22
2005					
2006					
2007					

Table 7: Catches of boarfish and oreo dories.

By-catch species	**Boarfish**				**Oreo dories**
Management Area					
Nations	Russia	Cyprus	Mauritius	Namibia	Namibia
Fishing method				Bottom trawling	Bottom trawling
Catches					
1976					
1977					
1978					
1993					
1994					
1995				5.36	0.459
1996				71.67	0
1997				12.784	35.21
1998				No fishing	No fishing
1999				0	3.17
2000				79.19	32.853
2001				20.115	13.642
2002				0	0.5
2003				0	0.95
2004	0.081	21.312	25.164	4.4	0
2005				0	3.79
2006					
2007					

Orange roughy

To date, only the Namibian orange roughy dataset for Sub-Division B1 provided enough information to attempt to analyse trends. The fishery started in 1995, did not fish in 1998, but continued until 2005. During these 9 years, 7 Namibian vessels (Table 8) were fishing in the SEAFO Area for orange roughy and in total 1270 trawls were made and about 1000 tonnes of deep-sea species were caught. A total of 290 tonnes of orange roughy and 303 tonnes of alfonsino were landed over this time period. The total annual effort in number of trawls and the total number of deep-sea fish (orange roughy, alfonsino, boarfish, oreo dory, and cardinal fish) landed is illustrated in Table 9. The CPUE was the highest in 1995 and thereafter decreased rapidly to reach the lowest CPUE in 1999. Since then the CPUE seems to have stabilized at a low level (Figure 1 and 2). The working group recommended that since these CPUE trends are based on very limited data, caution should be taken in the interpretation of these results.

Table 8: Orange roughy/alfonsino: Fleet information, Sub-Division B1.

Flag	ID	Name	Length	GRT	Built	HP	IRCS
Nam	L737	Southern Aquarius	54		01/01/1974	3000	V5SH
Nam	L913	Emanguluko	31	483.00	01/01/1990	1850	V5SD
Nam	L892	Petersen	43	650.00	01/01/1979		V5RG
Nam	L861	Will Watch	69	1587.00	01/01/1972	2116	ZMWW
Nam	L918	Hurinis	37	784.00	01/01/1987	1680	V5SW
Maur	L1159	Bell Ocean II	57	1899.00	01/01/1990	3342	3BLG
Nam	L830	Seaflower	92	3179.75	01/01/1972	4800	V5HO

Table 9: Number of trawls made per year and the total catch of deep-sea species taken by the orange roughy fleet in Sub-Division B1.

	No of trawls	Catch (t)
1995	20	47
1996	223	340
1997	188	110
1999	16	4
2000	327	196
2001	295	130
2002	40	10
2003	63	32
2004	46	28
2005	61	40
2006	0	0
Total	1279	937

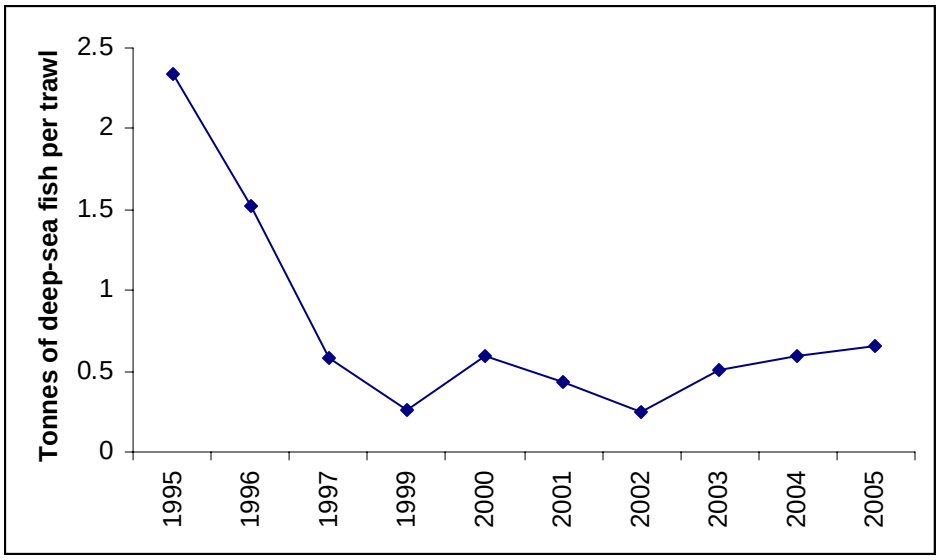

Figure 1: CPUE for the total deep-sea catch (all species) per trawl from 1995 to 2005 in Sub-Division B1.

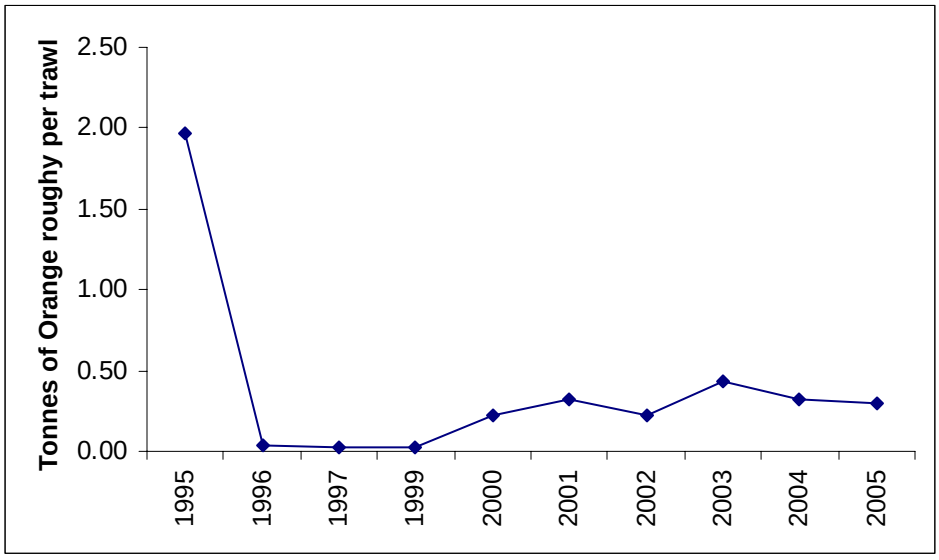

Figure 2: CPUE of orange roughy in tonnes per trawl in Sub-Division B1.

Deep sea red crab

Catch data for the last three years is available for Sub-Division B1. The landings increased from 234 tonnes in 2005 to 509 tonnes in 2007 (Table 4).

Patagonian toothfish

Catches were made from 2002 to 2007, ranging from 346 to 16 tonnes per year in Division D mainly Sub-Division D1. No trends were observed in catches (Table 5).

c. Reference Points for Deep Sea Fish Resources.

As a first step, the Sub-Committee agreed to categorise the commercially most important species in the SEAFO Convention Area into two categories (A and B) on the basis of available information of life history characteristics, perceived vulnerability to fishing and the fishing gear used. Table 10 shows life history characteristics and vulnerability to fishing of commercially important species.

Table 10. Major life history characteristics and vulnerability to fishing for commercially most important species in the SEAFO Area (Mostly using data presented in SEAFO 2006 Scientific Committee Report).

Species	**Longevity (circa)**	**Growth rate**	**Aggregations**	**Vulnerability to fishing**	**Fishing gear**
Orange roughy	150 years	Very slow	Yes	high	trawl
Oreo dories	150 years	Very slow	Yes	High	trawl
Alfonsino	17 years	moderate	Yes	High	trawl/gill nets
Armourhead	14 years	moderate	yes, in adult phase	high – but low fishing activity	trawl/gill nets
Patagonian toothfish	45 years	Slow	No	low – but high fishing pressure	long-line
Cardinal fish	100 years	Very slow	Yes	high – but low fishing activity	trawl
Wreckfish	unknown	unknown	No	low – solitary species, low fishing pressure	long-line
Deep-sea red crab spp.	30 years	Slow	Only sporadically	No	traps

Category A - considered to be long-lived, slow-growing and vulnerable to fishing

Orange roughy (*Hoplostethus atlanticus*)
Oreo dories (*Oreosomatidae* spp)
Alfonsino[1] (*Beryx splendens*)

Category B - considered to be moderate/short lived, faster-growing and less vulnerable to fishing.

Armourhead (*Pseudopentaceros richardsoni*)
Patagonian toothfish (*Dissostichus eleginoides*)
Cardinal fish (*Epigonus* spp)
Wreckfish (*Polyprion americanus*)

[1] Although not long-lived or slow growing, alfonsino was placed in category A because fisheries on this species are mainly on aggregations associated with seamounts and historical data suggests that large catches have been taken and that these aggregations may have been fished out.

Deep-sea red crab (*Chaceon* spp)

The Sub-Committee attempted to identify reference points for all species. The only data available for use were CPUE data and these were sparse for most species and were considered unreliable especially where species were taken as by-catch.

An alternative option available was to develop reference points based on catch thresholds. However, while there was agreement that these should be precautionary it was not possible to agree thresholds for all species.

For Patagonian toothfish, the Sub-Committee took account of current CCAMLR Conservation Measure 41-04 from 2006 relating to toothfish. For toothfish in SEAFO Division D, it was agreed to recommend a catch limit of 260 tonnes. The Sub-Committee, when addressing TOR d, agreed to again recommend closure of the area 13 in Sub-Division D1 and if this is accepted the catch limit of 260 tonnes should relate to the area in Division D outside the proposed closure area.

For deep-sea red crab spp, there is no evidence to suggest that this species is depleted. The Sub-Committee recommended a catch limit of 200 tonnes in Sub-Division B1 (average of recent catch levels) and 200 tonnes in the remainder of the SEAFO Area until such time as when additional information becomes available.

Given the vulnerability to fishing of some of remaining species, the paucity of data available for assessments, and the likely impact of trawls on vulnerable habitats on seamounts that remain open to fishing and elsewhere in the SEAFO Area, the Sub-Committee agreed to take a precautionary view and to recommend a ban on all forms of trawling in the SEAFO Area.

The Sub-Committee recommended that for trawling to resume there should be mapping of vulnerable habitats (corals, sponges) and that if trawling is resumed it should be at a low level until it can be demonstrated that higher levels of fishing are sustainable. Proposals for mapping of resources, exploratory fishing and resumed commercial fishing should be submitted to the SEAFO Scientific Committee for consideration before any activity takes place.

d. Recommending Areas that Could be Fished on Each Seamount

The Sub-Committee recognised that there is currently no information available on the spatial distribution of vulnerable habitats and fishing activity on individual seamounts within existing closed areas. Given this, the Sub-Committee considered that it would be inappropriate at the present time to recommend areas that could be opened to fishing. It should be noted that a recommendation to ban trawling in the SEAFO Area addresses the concern regarding the impact of trawling on vulnerable habitats on seamounts. Notwithstanding, the closure areas should remain in place to prevent damage to vulnerable habitats caused by other types of fishing gear e.g. gill nets and long-lines.

The Sub-Committee recommended that for fishing to resume in closed areas there should be mapping of vulnerable habitats (corals, sponges) and that research proposals should be submitted to the SEAFO Scientific Committee for consideration before any activity takes place.

e. Recommending Protocol for Data Collection

Although some organizations, such as CCAMLR, differentiate between exploratory and scientific surveys as a way to get information on unexplored areas, the SEAFO Scientific Sub-Committee agreed that exploratory fishing surveys in unexplored areas should not be permitted since they may cause irreversible damage to the seamounts. In alternative the Sub-Committee agreed that on these areas a preliminary evaluation of the habitat vulnerability to exploitation, as well as, mapping must be carried out using tools with minor impact effect over the bottom (e.g. multibeam sonars). At already exploited areas the Sub-Committee agreed that plans for exploratory fisheries should be reported to the SEAFO Secretariat and analysed by the Scientific Committee that would evaluate the adequacy of the proposal.

The Sub-Committee agreed that data log sheets (Annex VI) must include an additional item where information of lost gear can be included, namely, gear type, geographical co-ordinates and time and date of loss (also refer TOR f below).

f. Examining and Reviewing the Effects of Lost, Abandoned or Discarded Fishing Gear and Their Adverse Impacts

In the absence of relevant data, the Sub-Committee expressed its concern on the potential and actual ghost fishing of lost, abandoned and discarded bottom gillnets and traps / pots. The Sub-Committee recommended that flag States should report any lost fishing gear to the Secretariat. Consideration should be given to retrieval of lost gear by flag State.

g. Examining Assessments and Research Done By Neighbouring Assessments and Management Organisations

The research results, obtained by various commissions and other research & management organizations, were considered in the course of the Meeting. These results were used to reach solutions of various problems and tasks at hand. For example, CCAMLR data for toothfish were used to resolve recommendations for Division D.

The Benguela Current Commission (BCC) has recently been established by Angola, Namibia and South Africa. It will cover the region for northern Angola (Cabinda Province) to Port Elizabeth South Africa and extends from the high water mark to the outer extremities of the 200 mile EEZ's of each of the countries. It is a multi-sectoral Commission comprising seven Ministries from the three countries with the objectives of implementation of an ecosystem approach to ocean governance. It will cover fisheries,

productivity, ecosystem health and pollution as well as socio-economic and governance issues.

The Benguela Current Large Marine Ecosystem Programme (BCLME) which established the BCC is now nearing completion. Most of the fisheries management related projects and research undertaken in the BCLME as part of this Programme were focused on shallow and deep water hakes, horse mackerel, sardines and sardinellas. Assessments were also made of impacts of long-lining on pelagic sharks, sea birds and turtles. No formal assessments or studies were made in the BCLME area of deep sea fish species i.e. orange roughy or alfonsino or on tuna, swordfish, deep sea red crab or other species that might straddle the outer edge of the continental shelf into the SEAFO Area.

It is expected that the BCC will cooperate closely with SEAFO through their scientific and environmental working groups and that both Commissions will formally establish links. The Executive Secretaries of each Commission will be represented on the respective management boards.

h. Reviewing the Distribution of Reported Catches of Benthic Organisms

The Sub-Committee recommended that the protocol for the collection of information on benthos including corals and sponges be developed. Consideration should be given to the already existing NAFO proposal on this subject.

i. Reviewing of the Submitted SEAFO Research Documents

i(1). Proposal for a Revision of FAO Fishing Area 47 Statistical Divisions and Collaboration with SEAFO

The Coordinating Working Party on Fishery Statistics (CWP) at its 22nd Session (Rome, Italy, 27 February-2 March 2007) suggested FAO and SEAFO to conduct a joint study to analyze if it is feasible to rearrange the statistical divisions of the FAO Fishing Area "47 - Southeast Atlantic" regional database (which presently includes catch statistics for the 1975-2005 period) in a way that would both reduce to a minimum the disruption of historical data series and allow the reporting and compilation of data also according to the SEAFO divisions. The delegate from FAO presented the paper "*Proposal for a revision of FAO Fishing Area 47 statistical divisions with a view to a collaboration between FAO and SEAFO in the compilation of national capture data" (Appendix IV)* that was prepared in collaboration with the SEAFO Secretariat. The Sub-Committee asked clarifications and made general comments on the proposal. The Sub-Committee recommends that the Scientific Committee considers the proposal and, if appropriate, forward it to the Commission for its possible endorsement.

i(2). MAR-ECO Proposal

The Sub-Committee considered the "Research proposal on the patterns and processes of the Mid-Atlantic Ridge". The Sub-Committee found this proposal to be of great interest to SEAFO and coastal states in the region, especially concerning proposed research on and around Walvis Ridge. SEAFO has to work in difficult "data-poor" situation and more often than not the possible advice concerning sustainable exploitation of living resources in the area is inadequate. Therefore this Sub-Committee supported the proposal and expressed the interest in contributing towards the proposal's objectives.

At the same time, the Sub-Committee has noted with concern the lack of suitable resources in the region to conduct such difficult research, where various sampling gears will be used at depths well exceeding 1000 m. In the Sub-Committee's opinion, the best option to extend this research from the north Atlantic (the previous phase of the project), will be to conduct fieldwork on the same vessel as used previously, i.e. the Norwegian R/V G.O. Sars. This approach is vital for the success of the project for the following reasons:

- To ensure continuity, compatibility and same reference points for all the data: biological and oceanographic;
- This vessel has a known track record in deep water research and is one of the few research vessels in the world which are potentially available.
- Logistics of the cruise (or cruises) may draw directly from the previous experience;
- However it is recognized that there are other vessels available and capable of carrying out this work and should G.O Sars not be available, their participation should be encouraged

i(3). FIRMS Stock Inventories

The Sub-Committee also considered FIRMS stock inventories and referred the issue to the SC for further consideration.

4. ANY OTHER MATTERS

There were no other matters raised

5. ADOPTION OF THE REPORT

The report was presented and adopted by the Meeting.

6. DATE AND PLACE FOR THE NEXT MEETING OF THE SUB-COMMITTEE

The next Meeting of the Sub-Committee will be on 29 September to 1 October, followed by the Meeting of the Scientific Committee from 2-3 October 2008, in Windhoek.

7. CLOSURE OF THE MEETING

On Wednesday at 17:30hrs October 3, the Chairperson declared the closure of the Meeting after all items have been completed. In his closing remarks, the Chair expressed his satisfaction for the work accomplished and thanked all participants for their valuable contributions.

APPENDIX I

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APPENDIX II

AGENDA FOR THE SUB-COMMITTEE OF THE SC

Date: 1-3 October 2007

Venue: National Marine Information and Research Centre, Swakopmund

1. Opening Welcome by Mr. Titus Iilende, Chairperson of the Sub-Committee
2. Adoption of the Agenda and Arrangements
3. Appointment of Rapporteur
4. Introduction of Participants
5. Review of the Terms of Reference for the Sub-Committee by the Chairperson
6. Working Sessions to Address the Terms of Reference
7. Any other Business
8. Consideration and Adoption of the Report
9. Date and Place of the Next Meeting of the Sub-Committee
10. Closure of the Meeting

Terms of Reference for the Scientific Sub-committee

a. Source, analyse and compile catch and CPUE data for the main fish stocks (e.g. orange roughy, alfonsino, armourhead, deep sea red crab, Patagonian toothfish) in terms of quantity and geographical positions for the SEAFO region using all existing information including observer data.
b. Evaluate trends in the total catches and where possible CPUE for the stocks as outlined under point (a), and undertake stock assessments when appropriate.
c. Evaluate and suggest reference points for deep sea fish resources.
d. Recommending the areas that could be fished on each seamount (ref. Report of the 3rd Annual Meeting of the Commission, Annex 8, Conservation Measure 06/06, Para 3)
e. Recommending a protocol for the collection of the data required to assess the stocks situation on these seamounts, with a view to developing future recommendations on management measures for these areas (ref. Report of the 3rd Annual Meeting of the Commission, Annex 8, Conservation Measure 06/06, Para 3)
f. Examine and review the effects of lost, abandoned or discarded fishing gear and related marine debris and their adverse impacts on the habitats and on the fish stocks covered by the Convention and propose measures to address the problem.
g. Examine, where appropriate, assessments and research done by neighbouring assessment and management organisations (such as BCLME/BCC, CCAMLR, GCLME, ICCAT, SWIOFC).

h. Review the distribution of reported catches of benthic organisms (corals, sponges etc.).
i. Undertake review of submitted SEAFO research documents

APPENDIX III

SEAFO SPECIES LISTS

Table I: SEAFO species list from the Convention text.

FAO 3 ALFA CODE	SPECIES	LATIN NAME
ALF	Alfonsinos	Family Berycidae
HOM	Horse Mackerel	Trachurus spp.
MAC	Mackerel	Scomber spp.
ORY	Orange roughy	Hoplostethus spp.
SKA	Skates	Family Rajidae
SKH	Sharks	Order Selachomorpha
EDR	Armourhead	Pseudopentaceros spp.
CDL	Cardinal Fish	Epigonus spp.
CGE	Deepsea Crab	*Chaceon maritae*
OCZ	Octopus and Squids	Families Octopodidae and Loliginidae
TOP	Patagonia toothfish	*Dissostichus eleginoides*
	Hake	Merluccius spp.
WRF	Wreckfish	*Polyprion americanus*
ORD	Oreodories	Family Oreosomatidae

Table II: Review of catch data from SEAFO Area (from Japp, 1999).

	1995	**1996**	**1997**	**1998**	
Country	**Outside EEZ**	**Outside EEZ**	**Outside EEZ**	**Outside EEZ**	**Comments**
RSA	600	312		400	Alfonsino/Oroughy/Amourhead
Namibia	100	624	970	200	Alfonsino/Oroughy/Amourhead
Russ. Fed.			2800		Alfonsino/Oroughy/Amourhead
Spain	1069	372.8	280.1	682.3	Alfonsino/Oroughy/Amourhead
Japan		1008	=2171	700	Crab mostly/some groundfish
Portugal	62.7	38.1	137.5	154	Var. Sp., Octopus, wreckfish
Korea	268	6110	636		Large pelagics
Norway			863.9	1085.3	Alfonsino/Oroughy/Amourhead
Iceland			466	126	Alfonsino/Oroughy/Amourhead
Total	**2100**	**8519**	**8502**	**3348**	
Average annual catch 1995 – 1998 = 5617t					

APPENDIX IV

Proposal for a revision of FAO Fishing Area 47 statistical divisions with a view to a collaboration between FAO and SEAFO in the compilation of national capture data

Luca Garibaldi[1] and Hashali Hamukuaya[2]

The FAO Fisheries and Aquaculture Information and Statistics Service (FIES) regularly updates the regional database for the FAO Fishing Area "47 - Southeast Atlantic", which includes data by statistical divisions since 1975 and is a continuation of the database created by the International Commission for the Southeast Atlantic Fisheries (ICSEAF). However, the present utility of this database has been questioned several times as it provides only limited information of interest to SEAFO, the fishery regional body presently operating in this area, given that its Convention Area (outside the EEZs) and the statistical divisions do not coincide.

This issue was discussed at the 22nd Session of the Coordinating Working Party on Fishery Statistics (CWP), 27 February-2 March 2007, Rome, Italy, and included in the report of the Session as follows: *"FAO and SEAFO suggested to conduct in the near future a joint study to analyze if it is feasible to rearrange the statistical divisions of Area 47 in a way that would both reduce to a minimum the disruption of historical data series and allow the reporting and compilation of data for the SEAFO Convention Area in the future. Results of this study should be presented to the appropriate SEAFO body and reported to CWP at the 23rd session."*

Present situation

Major FAO Fishing Area "47 - Southeast Atlantic" is presently subdivided into the following divisions (Figure 1 and Table 1).

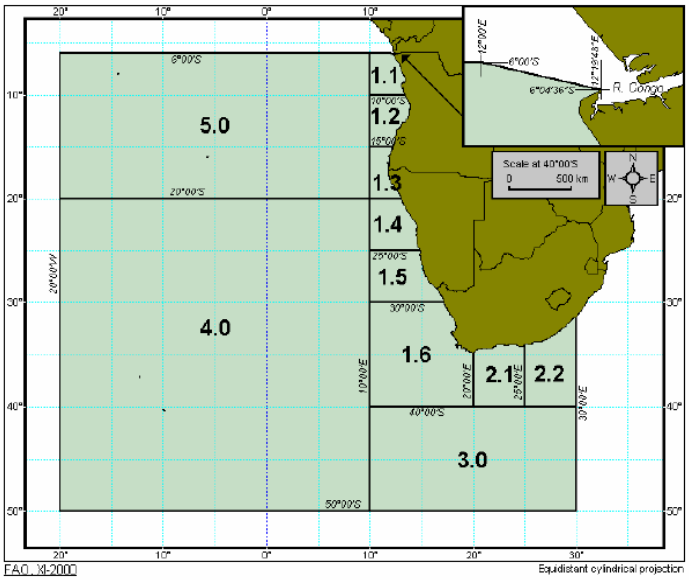

Figure 1. The "Area 47 - Southeast Atlantic" and its statistical divisions

[1]Fisheries and Aquaculture Information and Statistics Service (FIES), FAO Fisheries and Aquaculture Department.
[2] SEAFO Secretariat, Walvis Bay, Namibia.

Table 1. Codes and names of the "Area 47 - Southeast Atlantic" statistical divisions

Division code	Division name
47.1.1	Cape Palmeirinhas
47.1.2	Cape Salinas
47.1.3	Cunene
47.1.4	Cape Cross
47.1.5	Orange River
47.1.6	Cape of Good Hope
47.2.1	Middle Agulhas
47.2.2	Eastern Agulhas
47.3.0	Southern oceanic
47.4.0	Tristan da Cunha
47.5.0	St Helena and Ascension
47.1.9	Western coastal, not known
47.2.9	Agulhas coastal, not known
47.9.0	Not known (Atl. SE area)
47.0.0	Tunas (Atl. SE area)

The SEAFO Scientific Committee recommended to subdivide the SEAFO Convention Area into four large divisions (A-D) (see map[3] in Figure 2). One sub-division area has been identified within each of these four divisions.

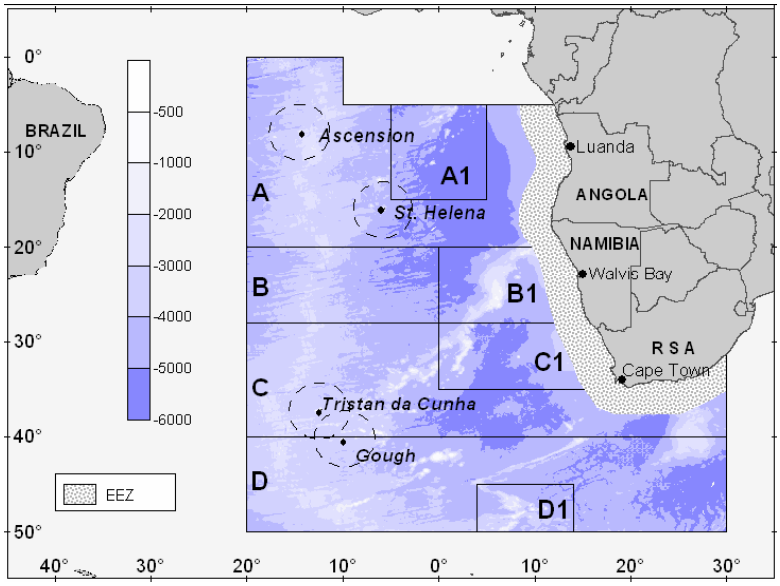

Figure 2. The SEAFO Convention Area with recommended divisions and sub-divisions

Proposal for a revision of Area 47 statistical divisions

A possible revision of Area 47 statistical divisions should take into account both continuity and consistency of the data series presently held in the FAO Southeast Atlantic capture

[3]Information and map derived from the 2006 Report of the SEAFO Scientific Committee (27-29 September 2006, Windhoek, Namibia) downloaded at http://www.seafo.org/ . Note: in the above map, the northern boundary of the SEAFO Convention Area along 6° latitude South is instead represented at 5° latitude South.

production database as well as the characteristics of the SEAFO Convention Area, which covers all waters in Area 47 with the exclusion of the EEZs of the continental states. Therefore, in this proposed revision we separately considered the two major groups of statistical divisions ("coastal" and "oceanic") in which Area 47 is presently subdivided. Table 2 summarizes the proposed changes by group of divisions, which can be visualized in the map in Figure 3.

Table 2. Proposed revisions by group of divisions

Group of divisions	Present FAO divisions	Revision of divisions' boundaries	Possible revisions in the data series of the Area 47 database
coastal divisions	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 2.1, 2.2	offshore boundaries as the EEZs boundaries, boundaries between divisions would remain unchanged	all data moved to the corresponding new divisions
oceanic divisions	3.0, 4.0, 5.0	boundaries between divisions as those of SEAFO divisions (A, B, C, D) and sub-divisions (A1, B1, C1, D1)	the possibility of assigning historical data from divisions 3.0, 4.0, and 5.0 to new oceanic divisions and sub-divisions should be examined
unspecified divisions (catches for which the statistical division is not exactly known)	1.9, 2.9, 9.0	no changes	data for 1.9 and 2.9 moved to new 1.9 and 2.9 unchanged; historical data for division 9.0 should be verified for the possibility of assigning catches of oceanic species to the new oceanic divisions, all other data moved to new 9.0 unchanged
Tunas	0.0	no changes	data for 0.0 moved to new 0.0 unchanged

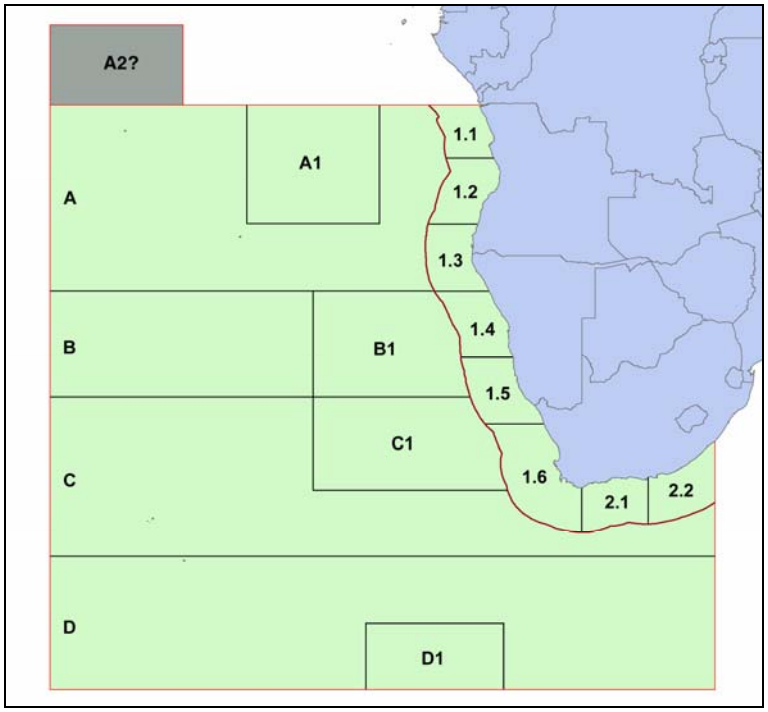

Figure 3. Proposed boundaries of new statistical divisions and sub-divisions for Area 47

It should be noted that there is a major inconsistency between the SEAFO Convention Area and the FAO Fishing Area 47, i.e. the rectangle bounded by a line joining the following points 0°-20°W; 0°-10°W; 6°S-10ºW; 6°S-20ºW (darker area in Figure 3) that in the FAO global grid of Major Fishing Areas belongs to Area 34 and not to Area 47. If organizations are interested in proceeding towards a common questionnaire (see below), then FAO and SEAFO should seek to amend this inconsistency. A possible solution would be to create a new sub-division (temporarily called "A2") within the present SEAFO's "A" division, matching the above mentioned area. In this way, SEAFO would consider the catches reported for the "A2" division as taken within its Convention Area, whereas FAO would allocate the same data to FAO Fishing Area "34 – Eastern Central Atlantic" according to the definition of the FAO Major Fishing Areas.

Envisaged possible developments and advantages for both FAO and SEAFO by an agreed subdivision of Area 47 and a common questionnaire for catch statistics

This proposed revision would allow FAO and SEAFO to establish a common questionnaire for the collection of catch statistics by divisions and subdivisions in Area 47. This questionnaire would be easily made available incorporating the revised divisions into the STATLANT 47A questionnaire, the format currently used by FAO to collect catch data by divisions in Area 47.

A common FAO-SEAFO questionnaire would provide advantages for both organizations and also for nations fishing in the area by reducing the burden in the preparation of catch reports to the two organizations. This opportunity may also provide a stimulus to revitalize efforts to improve national data collection schemes in the overall region. SEAFO would gain access to data on oceanic catches not only for members but also for those countries which are not members of SEAFO but that report catch statistics to FAO by the STATLANT 47A. The collaboration of FAO with SEAFO, an organization based in the region and with continuous contacts with coastal states, could facilitate reporting also of non-oceanic catches in Area 47, which is useful to FAO for its Global capture database.

How would the common questionnaire work?

Besides its work on fishery statistics standards, the CWP also provides a mechanism to coordinate fishery statistical programmes of its members. SEAFO is encouraged to apply for membership of the CWP as this would help in developing and strengthening the collaboration between FAO and SEAFO in the field of fishery statistics, and would also allow SEAFO to participate in future discussions with relevant intergovernmental organizations about the improvement of statistical activities.

In the CWP framework, FAO dispatches the paper and electronic questionnaires for regional catch statistics (mostly called STATLANT XX questionnaire) to the national correspondents on behalf of several Regional Fishery Bodies (RFBs) and also takes follow-up actions to non-responding countries. National correspondents are requested to return the questionnaire duly completed to both FAO and the relevant RFB. For its Global capture database, FAO utilizes only the catch data for the entire fishing area, whereas the RFB compiles also the data by subareas/divisions which are later disseminated by the RFB itself either through the RFB's dedicated software and/or the FAO's FISHSTAT+ platform.

This arrangement has been in place for many years with NAFO (FAO Fishing Area "21 – Northwest Atlantic"), ICES (FAO Fishing Area "27 – Northeast Atlantic"), and CCAMLR (FAO

Fishing Areas "48, 58, 88 – Southern Ocean"). FAO, together with these RFBs, routinely compare the data held in the respective databases to avoid any major discrepancies that may arise in the processing and storing of the data as well as from the utilization by FAO of data derived from other sources, including other FAO questionnaires (e.g. the FAO's NS1 "National Summary – Capture Production") and those by non-FAO organizations (e.g. tuna catches compiled by the tuna regional bodies).

The collaboration between FAO and SEAFO could take place along the same lines as that between FAO and the RFBs mentioned above. It should be noted that, unlike to the three RFBs, the SEAFO Convention Area does not correspond to a whole FAO Fishing Area but only to a portion of it (i.e. area outside the EEZs). However, this should not impede the agreement of a similar arrangement between FAO and SEAFO, although each organization should concentrate on the data which fall under its mandate. In principle, FAO would continue to compile and disseminate the regional database for the whole Fishing Area 47 while SEAFO would concentrate on the divisions covered by its Convention Area.

If this should be successfully implemented, Area 47 would become the first among the regional catch databases managed by FAO in which divisions' boundaries match the EEZs offshore boundaries. FAO receives increasing requests to incorporate more detailed catch location, especially separation between catches taken inside and outside national EEZs. Coastal countries, particularly in Northwest Africa where a significant share of catches within EEZs is taken by Distant Water Fleets (DWFs), often point out that catch statistics in international databases, such as that of FAO, should not be only recorded by the flag of the vessel but also by the EEZ. The proposed revision of divisions in Area 47 would move in this direction as, besides the spatial information by divisions, it would also allow an easy separation between catches within the EEZs and those from the high seas.

How would the FAO database for Fishing Area 47 be modified if the revised divisions are implemented?

Presently, the FAO Fishing Area "47 - Southeast Atlantic" regional database[4] includes catch statistics for a 31-year period (1975-2005). Older data were collected under the *aegis* of ICSEAF, the commission that was in charge of the whole Area 47 until it ceased its activities in 1990. In the early 2000s, FAO resumed the compilation and updating of this database as the majority of the countries fishing in the area had continued to submit catch data by the STATLANT 47 questionnaire. This data could provide interesting information on historical catch trend in the area, particularly as the database includes also catch data by DWFs.

The possible implementation of revised statistical divisions would obviously have a significant impact on the database. From a given year, data for one of its three variables (country, species item, statistical division) would be recorded according to a modified spatial classification. As already seen in Table 2 and Figure 3, changes in coastal divisions would be limited, but changes in oceanic divisions would be more substantial. There are three possible options on how to deal with the divisions' modification:

1. Countries fishing in the area (particularly coastal countries) would be requested to provide backward revisions of their data according to the new divisions;

[4]Database and FISHSTAT+ software to consult it are downloadable at http://www.fao.org/fi/statist/fisoft/fishplus.asp

2. FAO and SEAFO would collaborate, possibly with the help of local experts, in trying to reassign some of the historical catches according to the new oceanic divisions, on the basis of the biological characteristics of the species and other information;
3. No changes would be made to the data compiled according to the old divisions; after the implementation of the divisions' modification, catch statistics would be entered in the database according to the new spatial classification and old data would stay as they were.

Option "1" would be the best solution, although is very unlikely that some countries which already have difficulties in collecting and reporting current catch statistics would be able to provide such revisions. The intermediate option "2" seems the most reasonable and feasible (see in Table 2 some preliminary indications about major re-assignments for all present FAO divisions), hoping that national authorities and local experts would help in clarifying uncertain cases that may arise. If option "3" is chosen, information by new divisions would be available only after the implementation of the change. This would provoke the disruption of several data series and trends by division but the integrity of the data as reported by the fishing nations would be maintained.

A feedback and suggestions on this issue by the national experts attending the SEAFO Sub-Committee are anticipated.

APPENDIX V

MAR-ECO PROPOSAL

PATTERNS AND PROCESSES OF THE ECOSYSTEMS OF THE SOUTHERN MID-ATLANTIC

A proposed Census of Marine Life initiative

Interim South Atlantic MAR-ECO Steering Group

Introduction

The abyssal plains, mid-oceanic ridges and seamount chains constitute vast and little known deep-sea ecosystems whose understanding has been a priority within the scope of The Census of Marine Life program. In that sense, several projects under the umbrella of CoML have directed research efforts to these ecosystems unveiling their biodiversity and ecology (Yarincick & O'Dor, 2005; O'Dor & Gallardo,2005).

Among them the **MAR-ECO: Patterns and Processes of the ecosystems of the northern mid-Atlantic** was proposed in 2001 aiming at describing and understanding the patterns of distribution abundance and trophic relationships of the organisms inhabiting the mid-oceanic North Atlantic, and identifying and modelling the ecological processes that cause variability in these patterns (Bergstad & Godo, 2003) **.** Between 2003 to 2005, the northern Mid-Atlantic ridge and adjacent areas were sampled with the best technology available by ten research vessels in a collaborative effort of over 100 scientists and students from sixteen countries. Their results have produced important advances on pelagic, benthopelagic and epibenthic macrofauna of the Mid-Atlantic ridge, from Iceland to the Azores, with particular emphasis in fishes, cephalopods, gelatinous plankton and crustaceans (O'Dor & Gallardo, 2005). In view of the successful approach and stimulating results obtained in mid-oceanic North Atlantic, the idea of expansion of MAR-ECO south of the Azores and into the southern mid-Atlantic ridge emerged among the group of MAR-ECO scientists as a natural step for an extension of the project until 2010.

In that sense the MAR-ECO Steering Committee proposed a Workshop with the aims of (a) informing the South Atlantic marine science community about strategies and methodologies used by MAR-ECO to study biodiversity along the mid-Atlantic ridge in the North Atlantic and (b) stimulating the development of collaborative research efforts on the southern Mid-Atlantic ridge.

This Workshop was held in Balneário Camboriu, Brazil, in September 2006, and gathered members of the MAR-ECO Steering Committee and scientists from Brazil, Argentina, Uruguay, South Africa and Namibia. Considerably less known than the north-Atlantic, the mid-oceanic South Atlantic was not only shown to be a vast field for descriptive and comparative studies but also to provide unique questions considering its complex patterns of geological morphology and deepwater circulation, its connections with the North Atlantic, Pacific, Indian and Antarctic ocean systems and its recent origin, possibly the newest of all oceans.

As a strategy to proceed on this initiative, an Interim South Atlantic MAR-ECO Steering Group was formed, coordinated from South America, whose first task was to prepare the following outline of the South Atlantic MAR-ECO Science Plan to be submitted to the CoML and provide elements for the renewal proposal of MAR-ECO in 2007.

The CoML field program on seamounts (CenSeam) has also identified the South Atlantic as a poorly known and sampled area in terms of global seamount biodiversity. A representative from the New Zealand secretariat of CenSeam attended the first planning meeting, and further cooperation with MAR-ECO and the development of South Atlantic research was identified in the CenSeam renewal proposal in January 2007.

Aims and scope

The aims of the study proposed for the mid-oceanic South Atlantic would essentially follow those established for the North Atlantic project (Bergstad & Godø, 2003), and also link with those of CenSeam (Stocks et al. 2004). However, considering the current lack of knowledge on the diversity of the deep South Atlantic and the complexity of its geological morphology and circulation patterns, the study is intended to be more descriptive, with a stronger focus on biodiversity and biogeography than processes.

Besides the intrinsic need for geological and biodiversity information in the mid-oceanic South Atlantic, the main questions raised at the Workshop in Brazil, considering regional features ad processes, were:

- Are there longitudinal and/or latitudinal gradients in the fauna along the ridge?

- Are there differences between faunas of the northern and southern sectors of the mid-Atlantic ridge? Does the Equatorial Fracture Zone act as barrier for fauna between these sectors?
- How does the mid-oceanic ridge take part in the connections of fauna between African and American coasts? Are the Walvis Ridge and Rio Grande Rise stepping stones for dispersal from the older coastal areas on both sides of the Atlantic to newly formed habitats at the ridge?
- Do the Walvis Ridge and Rio Grande Rise act as barriers for northward dispersal of the Antarctic Ocean fauna?
- The Southern MAR traverses an area where four oceans meet. How does this affect the biodiversity and dispersal of organisms?
- How do current systems affect productivity at the ridge? Are frontal areas highly productive?
- What is the ecological role of the MAR ridge, Walvis Ridge, Rio Grande Rise and other seamount systems on South Atlantic deep-water fisheries?

With these questions as background, it was determined that the proposed South Atlantic MAR-ECO programme will aim at:

- describing and understanding the patterns of distribution, abundance and relationships of the organisms inhabiting the mid-oceanic South Atlantic ridge and adjacent areas, and
- exploring the role of the mid-oceanic South Atlantic ridge and its adjacent morphological features in dispersal processes of deep-water fauna between the coasts of Africa and South America and among the north Atlantic, Pacific, Indian and Antarctic oceans.

The study will primarily focus on the mid-oceanic ridge itself but also cover adjacent morphological features in three target areas along the ridge:

1. Northern area. Characterized by the transverse Equatorial Fracture Zone that has a major effect on the patterns of deepwater circulation between North and South Atlantic.
2. Middle area. Where the Vitoria-Trindade Seamounts on the west side and the Cameroon Volcanic Line on the east side are comparatively more oligotrophic environments than the more southern areas.
3. Southern area. Where the Rio Grande Rise on the west side and the Walvis Ridge on the east side are closest to the polar front and may influence northward circulation of deep Antarctic waters.

As in the North Atlantic MAR-ECO, sampling will concentrate on macrofauna both mesopelagic and bathypelagic, although an emphasis will be given to benthic organisms. The study will also be system-oriented, involving cooperation between biologists, physical and geological oceanographers, and technologists. Finally field sampling and observations shall use, if/where possible, the advanced technologies responsible for the successful progress of North Atlantic MAR-ECO (Bergstad & Godø, 2003; O'Dor & Gallardo, 2005).

Justification

The deep ocean comprises the most remote and least understood ecosystems on the planet. North Atlantic MAR-ECO has shown that the gap of knowledge in mid-oceanic ridges can be effectively addressed by well planned intensive sampling and the use of modern technology (O'Dor & Gallardo, 2005). This approach has provided society with well-documented new information on previously described and undescribed species and models on how mid-oceanic ridge communities are structured. Such information is paramount for building common awareness on these "last frontiers" of the planet and providing a scientific basis for their future use and conservation. Mining and fishing in mid-oceanic ridges and associated seamounts are two important human activities that require prompt basic information for their rational development. In the South Atlantic, although such activities have been developed, information on diversity and biological processes of deepwater environments such as the mid-oceanic ridge has been scarce and less available than in the North Atlantic. In order to improve understanding of the role of the MAR, as well as to provide information necessary to manage human exploitation, the southward expansion of the MAR-ECO project approach is urgently required.

The mid-Atlantic ridge is the central morphological feature and the spreading centre of the Atlantic Ocean. The ridge extends 14.000 km continuously from 87^{o} N to 54^{o} S. Its form is the outcome of two independent spreading processes; one that originated the North Atlantic in the early Mesozoic nearly 200 MY ago, and another that originated in the South Atlantic in the early Cretaceous, 100 MY later, connecting it southwards to the other three oceans, the Antarctic, Pacific and Indian (Fairhead & Wilson, 2004). The joining of these two spreading centres in the early mid-Cretaceous resulted in a shear zone developing between West Africa and the northern margin of Brazil which produced the Equatorial Fracture Zone. This is a large geological feature about 60 MY old and 4 km high, that affects both the linearity of the ridge system and large-scale

ocean circulation (Huang & Jin, 2002, Fairhead & Wilson, 2004). At the southern extreme, two seamount chains, the Walvis Ridge and Rio Grande Rise, spread transversely as the result of "hot spots" or deformation processes of the seafloor, and bridged the central ridge to African and American continents, respectively. These geological features, and other seamount chains and oceanic islands associated with the central ridge, have been shown to affect deep-water circulation and may have particular roles (i.e. barriers, stepping stones) on deep-water faunal dispersal not only from the adjacent continental margins but also at the interface with the connected oceans (Huang & Jin, 2002; Bickert & Mackensen, 2003). On the whole, these features add considerable scientific interest to the central questions of MAR-ECO and associate it to other programs under the umbrella of CoML, in particular CenSeam, but also CeDAMar, ANDEEP, ChEss and CAML (O'Dor & Gallardo, 2005).

The mid-Atlantic ridge and adjacent morphological structures are part of the "Area" which comprises the seafloor space outside EEZ boundaries. Interest in mineral exploration has been shown by several South Atlantic coastal countries under the coordination of The International Seabed Authority. As an example, the Rio Grande Rise and Walvis Ridge have been identified as having cobalt crusts mining potential. It is evident that biodiversity and ecological studies must parallel mineral exploration and will meet the interests of governments and energy companies that operate in South Atlantic deep-sea floor.

South Atlantic deep-water fishing has been developed in association with slope areas and seamount systems particularly in the highly productive areas of the South Eastern coast including international waters off Angola, Namibia, South Africa and UK overseas territories. Crustaceans and benthopelagic fishes exploited on these areas have been the subject of conservation efforts of the South East Atlantic Fisheries Organization (SEAFO) whose associated scientists will benefit from new information on target and non-target species generated by the studies proposed here in the South Atlantic. This can also apply to Argentinean and Brazilian fisheries agencies who have implemented deep-water fishing programs in their EEZs. The Rio Grande Rise area has sustained significant pelagic fishing (sharks, swordfish), but its potential for demersal fishing is less known and interest to countries such as Brazil.

In summary, the study of mid-oceanic South Atlantic combines (a) important scientific questions regarding deep-water marine life diversification and dispersal in the "world's newest ocean" and (b) economical interests of the international community, particularly developing coastal countries

of the southern hemisphere, towards deep-sea floor exploration. Such study calls for a modern and well-tested approach such as the one developed by MAR-ECO and an international initiative such as the Census of Marine Life.

Organisation

A South Atlantic MAR-ECO Steering Group, coordinated from South America, with a wide geographic representation in both South America and Africa (currently Brazil, Argentina, Uruguay, South Africa and Namibia). It will have common membership with the northern Steering Group:

a) The South Atlantic Steering Group will have one member from the North Atlantic MAR-ECO Steering Group
b) The chair of the South Atlantic Steering Group will also meet in the North Atlantic Steering Group
c) The South Atlantic Steering Group will also have one member from the CenSeam Steering

Progress Plan

The Southern Mid-Atlantic programme will be incorporated into the MAR-ECO renewal proposal due in mid-2007. Time-frames will be defined when partnerships have been organized and a permanent Steering Committee has been established. However, the programme will include several phases that can be outlined as follows:

1. Workshop to further define objectives, scope and schedule. Brazil offers to host an international workshop as part of XII COLAMAR (Latin American Congress of Marine Sciences) to be held in Florianópolis, in April 2007. The objective is to plan the project proposal and discuss partnerships, specific goals, sampling strategies, mobilization of shiptime and equipment, and funding possibilities. This latter aspect will benefit from the fact that Brazilian naval and fishing authorities will attend the XII COLACMAR as well as observers from oil companies (i.e. PETROBRAS), all of them potential shiptime providers and funding sources for the South Atlantic MAR-ECO initiative.

2. Allocation of responsibilities and project building. In this phase, partners will have to commit themselves to specific tasks and responsibilities. The writing of project proposals and acquisition of financial resources is an essential task of this phase.

3. Literature studies and data mining. Assembly of current and archived information on biodiversity, oceanography and geology of the Mid-oceanic South Atlantic as a part of the planning process and also as a source of comparative information.

4. Modelling. Based on the main patterns revealed by the MAR-ECO data analysis on the northern Mid-Atlantic and ideas developed during the workshop (1) as well as the exploration of available sources (3), central models and testable hypotheses relevant to the study of patterns and processes of the mid-oceanic environment should be developed. The aim of this modelling is to provide greater focus for the programme and its individual projects.

5. MAR-ECO Technological adaptation and fitting of research vessels. One main objective of the programme is to adapt the new technology developed and tested by North Atlantic MAR-ECO in order to produce comparative results in the mid-oceanic South Atlantic. This phase will parallel discussions about sampling strategies and availability of research vessels. Also, mobilization of shiptime and gears will be a major issue in the phase. Options to be examined as partnerships are established include:

a) to use institutional vessels with gear, including those used in the North Atlantic MAR-ECO and those owned by oil companies, e.g. PETROBRAS;
b) to charter fishing or research vessels, e.g. from the Brazilian Navy;
c) to borrow gears and/or combine shiptime with other CoML field projects, e.g. CeDAMar, ANDEEP, CenSeam, Chess and CAML (taking advantage of the International Polar Year). CenSeam has oferred use of New Zealand seamount sampling equipment, and access to its Minigrant scheme may also help support some participation/travel for voyages.
d) to rent gears from other institutions
e) investigating institutions construct their own gear with help from collaborating institutions (e.g. landers from Oceanlab)

6. Field study. A major field effort, focussing on the southern Mid-Atlantic Ridge will be conducted, possibly involving several well-equipped research vessels. A multi-disciplinary and

international crew of scientists and technicians, both from countries engaged in the North Atlantic and new partners from the South Atlantic, will run the cruises and provide the material and data for subsequent analyses. If plans to carry out a dedicated field programme cannot be realised, efforts will focus on attempting to survey and obtain samples from voyages in the region being carried out for other research programmes.

7. Analyses. The field effort will provide substantial data and biological material for a range of analyses related to the testing of the central models (4). The material will be worked up in individual laboratories under the coordination of the South Atlantic Steering Group. In this phase it is important to anticipate that taxonomy and management of biological collections will be a particular issue that will require the development of strategies for attracting capable taxonomists and regional museums able to handle large collections from both South America and Africa.

8. Regional synthesis. The central questions and hypotheses formulated for the MAR-ECO approach in the South Atlantic will be addressed in the light of results obtained by activities conducted during phases 6 and 7. This will require a coordinated effort, possibly through group meetings, and a final symposium should be organised where results are presented and discussed.

9. Incorporation of regional results in MAR-ECO and global census models. A fundamental step in this initiative will be to compare and unify patterns emerged from MAR-ECO approach both in North and South Atlantic. Are processes uniform throughout the Mid-Atlantic Ridge? Are there important differences related to the separate ocean spread processes north and south of the Equator? A comprehensive analysis involving biodiversity, deep-water fauna dispersal and biological processes of the Mid-Atlantic Ridge should be the pinnacle of this study. It will also provide important data on South Atlantic seamounts to feed into CenSeam. Overall the programme will be a significant source of information for the global CoML.

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