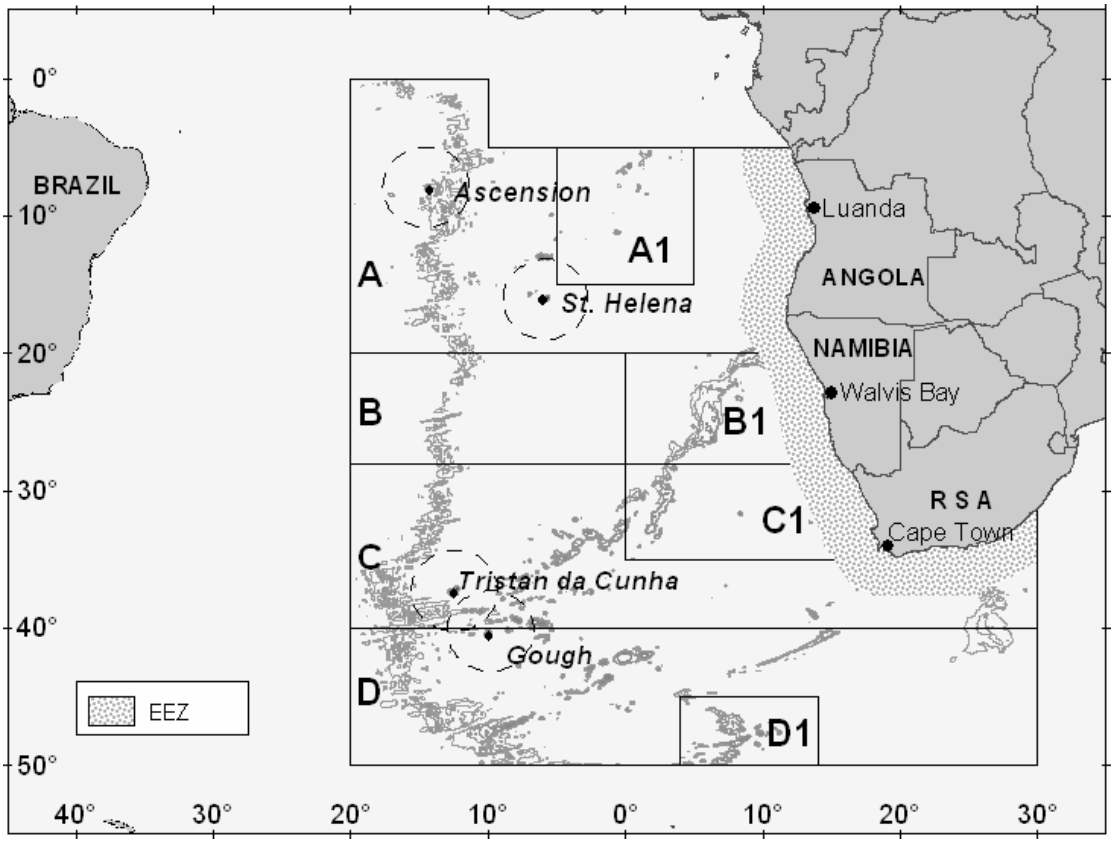
REPORT OF SEAFO SCIENTIFIC COMMITTEE, 2006



SOUTH EAST ATLANTIC FISHERIES ORGANISATION (SEAFO)

REPORT OF SEAFO SCIENTIFIC COMMITTEE 2006

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1. Opening of the Meeting

The 2nd Annual Meeting of SEAFO Scientific Committee (SC) was convened on 27-29 September 2006 at Windhoek Country Club and Resort, Windhoek, Namibia. The Meeting was opened by the Chairperson of the Scientific Committee, Dr. Reidar Toresen 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 & 3. 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.

4. 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.

5. Introduction of Participants

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

6. Meeting Procedures and Time Schedule

The SC agreed to the Meeting procedures and daily working program as proposed by the Chair.

7. Report of the PWG

Mr. Titus Iilende, who chaired the Provisional Working Group (PWG) presented its report. Considerable time was spent to examine the report, section by section. The report is attached as **Annex III**.

8. Consideration of the Report of PWG

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

In general, the quality and quantity of data available was of poor standard and needs to be improved in the future.

The terms of reference for the PWG are given in the report (ANNEX III), and the working group responded to all points. In this report, the points relevant for the management of the living resources in the SEAFO Convention Area are mentioned.

8.1 Demarcating Divisions and Sub-divisions

The SC recommends to subdivide the SEAFO Convention Area into four large Divisions (A-D) stretching from the western boundary of the SEAFO Area at 20°W, to the coastal EEZ Area and to 30°E south of the African continent (Figure 1). One Sub-division Area has been identified within each of these four divisions. The basic criteria used for creating the sub-divisions were:

- Areas with a catch history of more than 10 tonnes per species per year
- Ecological sensitive Areas such as seamounts (i.e. Mount Vema) where known by-catches have been reported in significant numbers.

SEAFO Division A.

This zone is demarcated as between 0-20ºS and 20ºW up to the Angolan EEZ. The basin of this SEAFO zone is 5000m deep with the shallowest seamount at 380m. The two islands, St. Helena and Ascension are situated in this zone each with a 200Nm EEZ and both belonging to the United Kingdom. These islands support their own fisheries based on large pelagics (tunas) and rock lobster. The Southern sub-tropical Current runs through this zone.

Sub-Division A1.

This Area is demarcated as between 5-15°S and from 5°W to 5°E. This Area seems to support an abundance of alfonsino and some orange roughy (as by-catch) as shown by a Norwegian vessel that fished there in 1997, 1998 & 2000. There are six seamounts such as Dampier, Malakiet etc. in the Area.

SEAFO Division B.

This zone is demarcated as between 20-28°S and 20°W to 0°E. This Area has a depth range of 3000-5000m. In this Area large pelagics (ICCAT species) are caught with pelagic longlines.

Sub-Division B1.

This Area is demarcated as between 20-28ºS, and 0-10ºE and borders the Namibian EEZ. In this zone orange roughy is trawled and red crab caught with pots. The Valdivia Bank is situated in this Area and also the seamounts Ewing and Maloy. The shallowest depth is 20m and the deepest 5000m.

SEAFO Division C.

This Area is demarcated as between 28-40ºS and 20°W to 30ºE. The Tristan da Cunha island group is situated in this zone and falls inside the Cape Basin. It is between 1000 and 5000m deep and has some seamounts such as Schmidt, Erica, Woest and Panzarini. ICCAT species (large pelagics) as well as Patagonian toothfish are caught here with demersal- and pelagic longlines.

Sub-Division C1.

This Area is demarcated as 28-35ºS, 5-10ºE and extends to the Southern African coastal EEZ's. This Area includes Mount Vema, which is the main fishing ground for the tuna pole-and-line fishery. It also supports recreational and commercial fisheries for yellowtail, rock lobster and other shallow water species. Its shallowest point is only seven metres deep and the deepest part 5000m.

SEAFO Division D.

This zone is demarcated as between 40-50ºS and 20°W to 30ºE with a depth range of between 300m to 5000m.This zone includes Gough Island and is situated in the Southern Ocean Current and within the Agulhas Basin and Agulhas Ridge. It contains some seamounts such as Discovery and Shannon. Patagonian toothfish and large pelagic ICCAT species are caught here with demersal- and pelagic longline.

Sub-Division D1.

This Area supports a demersal longline fishery for Patagonian toothfish and crab pots for deep-sea red crab. The Area is demarcated as between 45-50ºS and 4-14ºE with a depth range from 500-6000m.

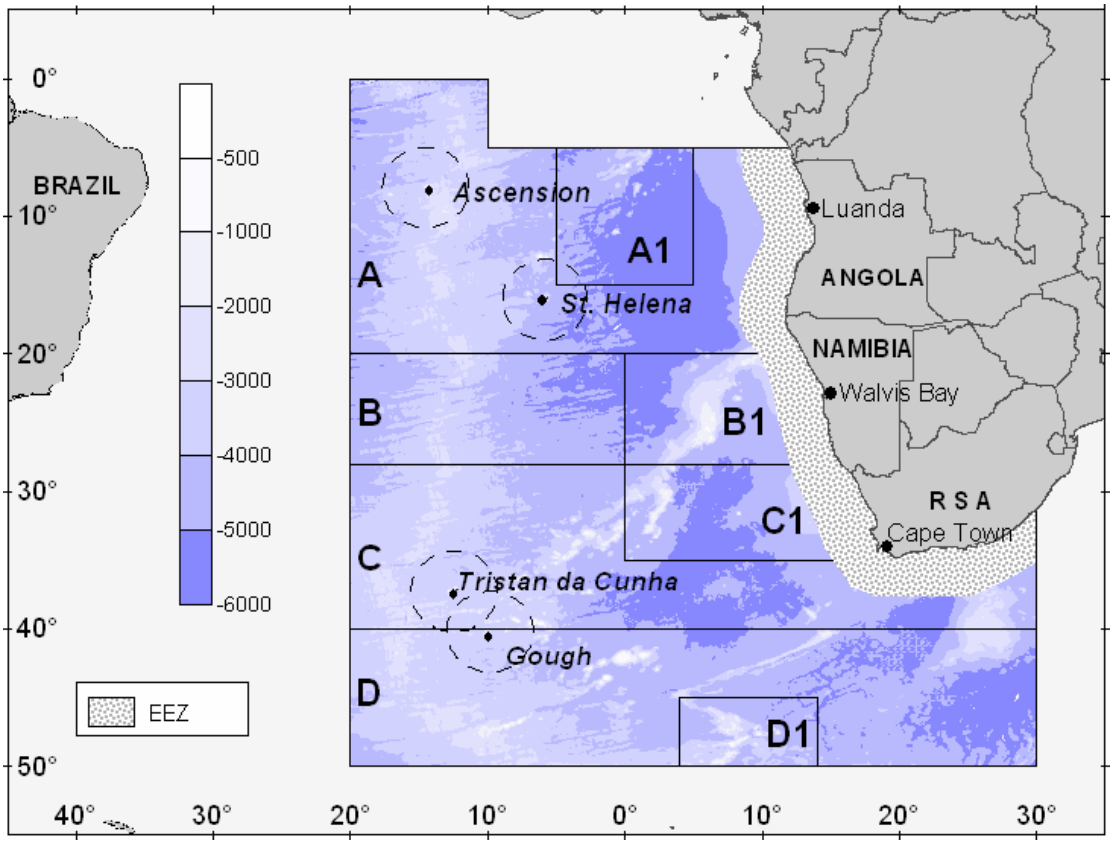


Figure 1. The SEAFO Convention Area with recommended divisions and sub-divisions.

8.2 Catch Trends (Sub-Division B1)

To date, only the Namibian orange roughy dataset 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 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 1. 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 2-5). 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 1. Number of trawls made per year and the total catch of deep-sea species taken by the Namibian orange roughy fleet.

	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
Total	1279	936

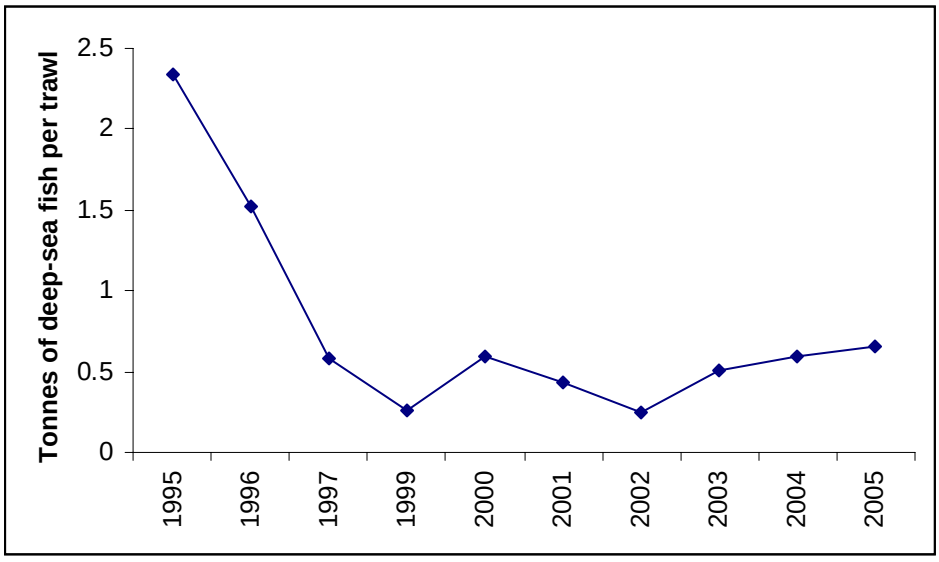


Figure 2. CPUE for the total deep-sea catch (all species) per trawl from 1995 to 2005.

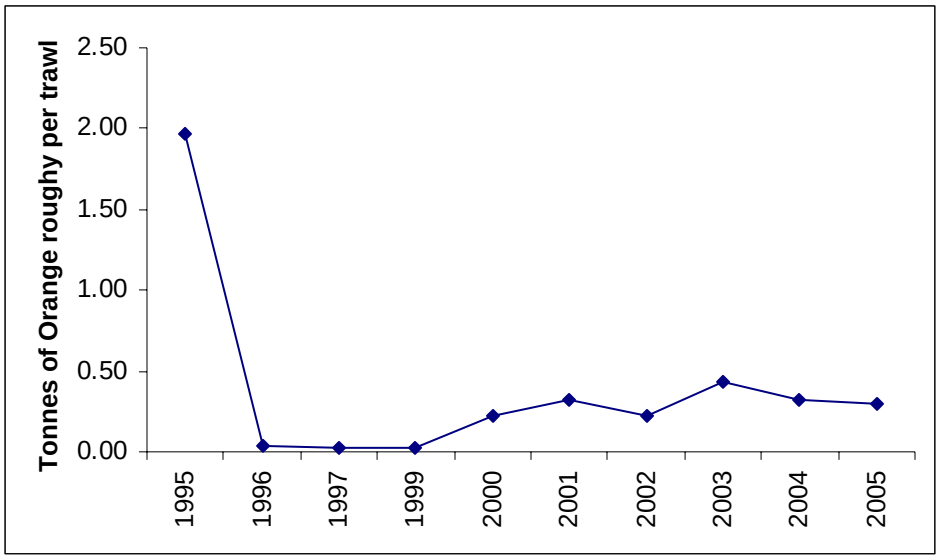


Figure 3: CPUE of orange roughy in tonnes per trawl.

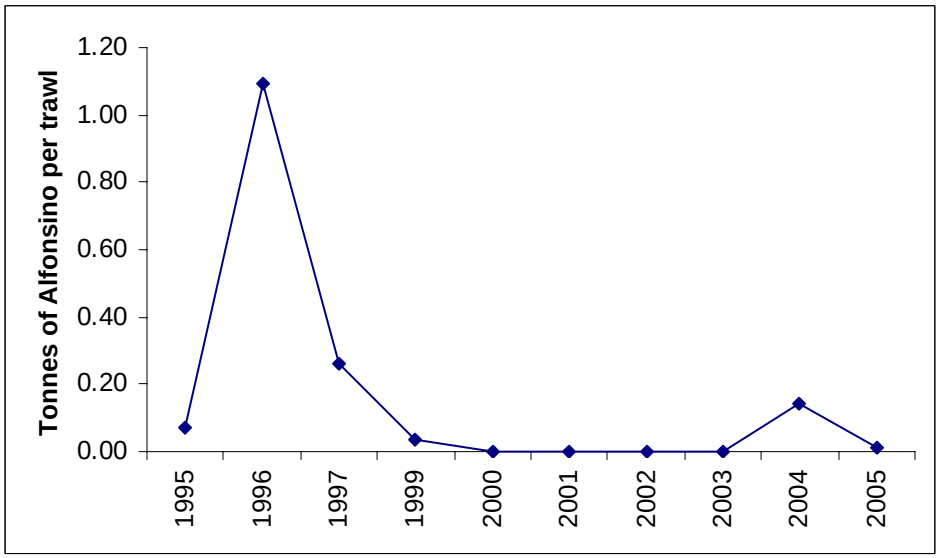


Figure 4: CPUE of alfonsino per trawl

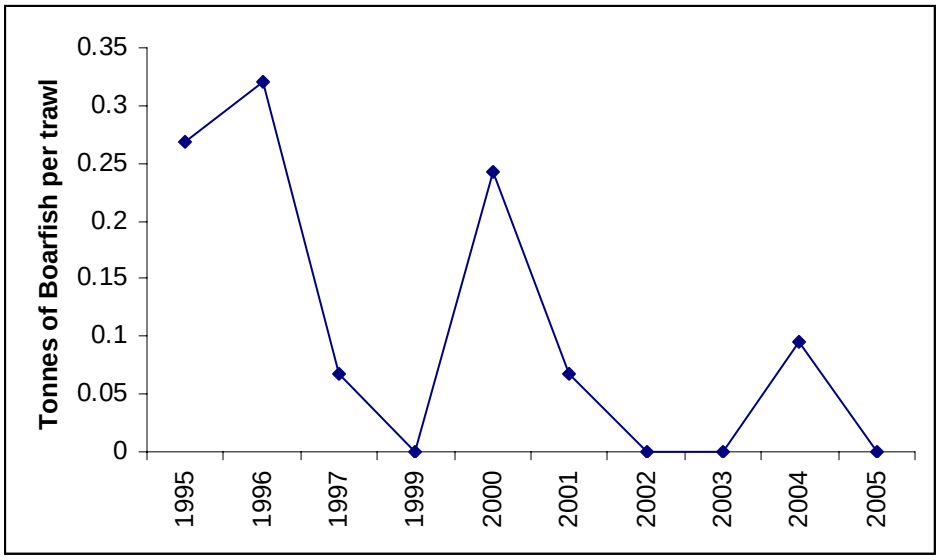


Figure 5: CPUE in tonnes per trawl of boarfish.

8.3 Main Features of the SEAFO Area

Topography

Some of the main topographic features inside the SEAFO Area are listed below (Figure 6):

- Walvis Ridge, which extends from around 18ºS, off the Namibian coast, into a south-westerly direction towards the mid-Atlantic ridge. This feature sub-divides the Area into the Cape Basin (south) and the Angola Basin to the north of this Area. Deep ocean circulation is guided and obstructed by this feature. Several important seamounts, banks and plateaus are associated with this feature e.g. Valdivia Bank etc.
- Agulhas Ridge extends from around 35ºS, south of Cape Town, into a south-westerly direction. This feature separates the Agulhas Basin from the Cape Basin to the north. Several important seamounts, banks and plateaus are also associated with this feature.
- Mid Atlantic Ridge at around 15ºW that runs through the entire SEAFO region from north to south.
- Many other important features such as seamounts (e.g. Mount Vema) and rises (Meteor Rise) exist in this Area and should be highlighted and discussed more comprehensively.

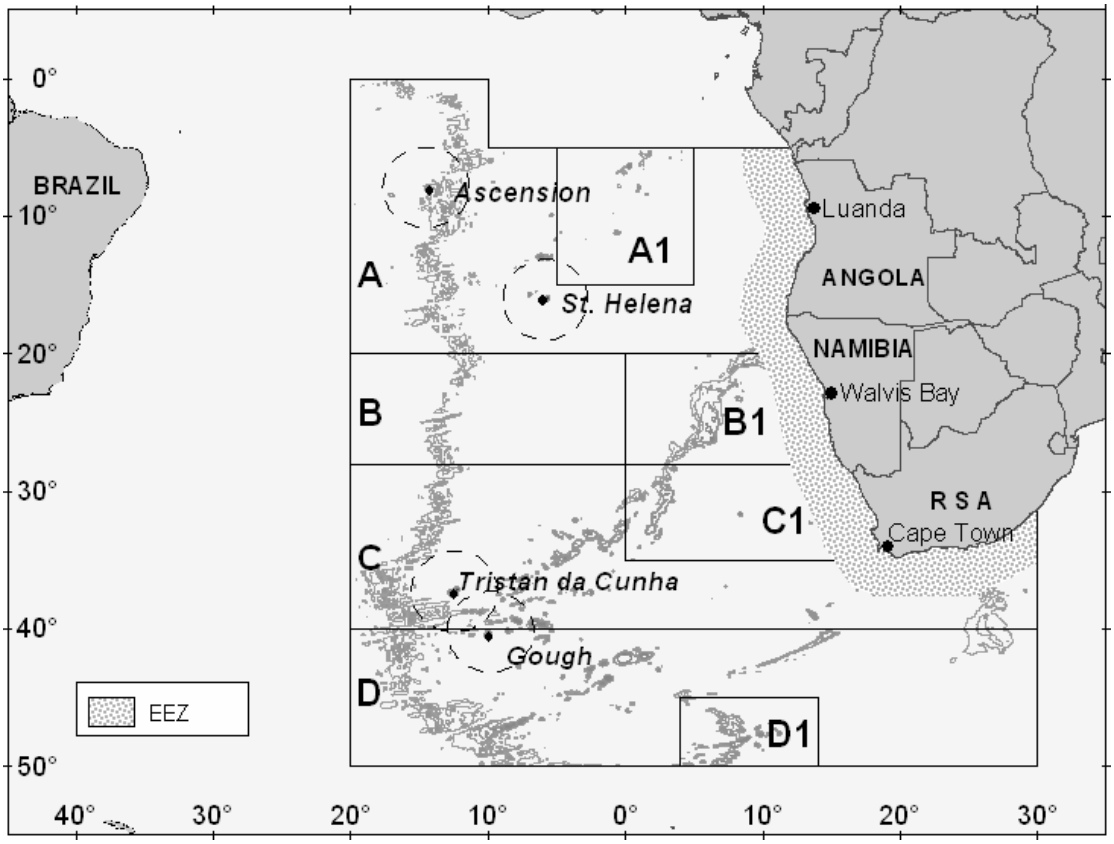


Figure 6. An illustration of the bottom bathymetry for the SEAFO Area. Important bottom features such as the Walvis Ridge, Mid Atlantic ridge, and other seabed elevations such as the Meteor Rise and seamount Vema to mention a few.

8.4 Biology of Key Species.

Information from Smith, M.M. and P.C. Heemstra (Eds) 1986 – Smith's Sea Fishes. Johannesburg, Macmillan. 1-1047 pp.

Bianchi, G.; Carpenter, K.E.;Roux, J.-P.;Molloy, F.J.;Boyer, D.; Boyer, H.J. FAO species identification guide for fishery purposes. Field guide to the living marine resources of Namibia. Rome, FAO. 1999. 265 p., 11 colour plates.

Orange roughy *(Hoplostethus atlanticus*)

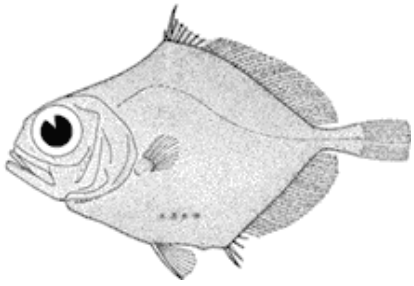
Orange roughy is a long-lived species, which matures at a late age (28 years) and has a low fecundity and natural mortality. It spawns during July and

August, peaking in the last weeks of July. This activity seems to be remarkably consistent between years and between different populations in the southern Hemisphere.

Alfonsino (*Beryx splendens*)

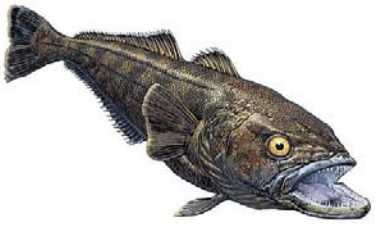
Alfonsino have a maximum recorded age of 17 years and females grow faster than males. Pre-spawning alfonsino have been recorded in New Zealand waters but spawning grounds are unknown. Summer-autumn spawning activity has been noted in the North and South Atlantic and North Pacific Oceans. Size at sexual maturity is probably about 30cm fork length (FL) at 4 to 5 years of age, observed in New Zealand.

Oreo Dory



Smooth oreo is a Southern Hemisphere species occurring from depths of 650 to 1500m. Black oreo have been reported from New Zealand, Australia and Namibia, occurring in depths from 600 to 1300m.
Both species appear to have a pelagic juvenile phase. The pelagic phase may last for 5-6 years with lengths of 16-19cm TL for smooth oreo and 4-5 years with lengths of 21-26cm TL for black oreo. Unvalidated age estimates indicate that oreos are slow-growing and long-lived. Smooth oreos maximum estimated age was 86 years (51.3cm TL fish) and black oreo maximum estimated age was 153 years (45.5cm TL fish).

Patagonian toothfish (*Dissostichus eleginoides*).

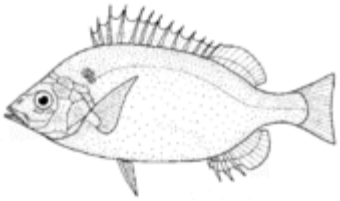


Patagonian toothfish is found in sub-Antarctic waters on shelves around islands and submarine banks. Toothfish is bottom-living, in depths up to 3800m, but move off the bottom on occasion to feed.

Toothfish reach sexual maturity when they are between 70cm and 95cm long. At this size the fish are between 8 and 10 years old.

The maximum size of toothfish is ~2.2m in length and about 120kg in weight. The maximum recorded age is about 45 years.

Armourhead (*Pseudopentaceros richardsoni*)

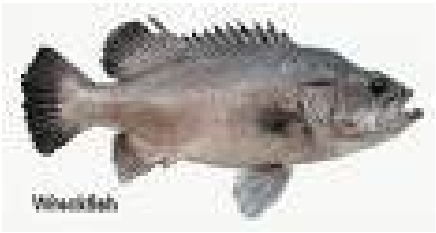


The pelagic armourhead, Richardson's boarfish, or southern boarfish (*Pseudopentaceros richardsoni*) belongs to the genus Pseudopentaceros, found in the north and south Pacific Ocean, Southeast Atlantic and the South Island of New Zealand, from the surface to depths of 300 metres on the continental shelf. Its length is between 30 and 50cm. Boarfish and amourhead might be the same fish, but identified incorrectly in the statistics and need to be confirmed in future.

Deep sea red crab *(Chaceon spp.)*

Chaceon maritae is a deep-sea crab of the family *brachyuran Geryonidae*. They are distributed along the entire west coast of Africa. Males mature at 80mm CW and females at 62mm CW. It is a slow growing species, with females having the faster growth rate than males, until maturity is reached. There are indications that two other species of this genus occur in the SEAFO Area.

Wreckfish (*Polyprionidae*)



The wreckfish is a large bottom-living fish similar to a grouper, which is classified in its own family, Polyprionidae. The wreckfish commonly exceeds 100cm total length and 30kg total weight, and lives in depths from 42-1000m as adults. Wreckfish have a broad but disjunct geographic distribution. Juveniles are very rare in the western Atlantic, but are common in the eastern Atlantic.

Cardinal Fishes (*Epigonus spp.*)

The cardinal fish (*Epigonus telescopus*) is found in the North Atlantic, Southeast Atlantic, Southwest Pacific, Walvis Ridge off southwestern Africa and New Zealand. It

belongs to the family Epigonidae the deepwater cardinal fishes. The maximum size is 75cm total length while the maximum reported age is 104 years. It occurs in depths ranging from 75 to 1200m.

8.5 Summary of the Biology of the Deep Sea Species

Many deep sea species exhibit slow growth and low productivity. They mature at a late stage (after many years) and some species are associated with specific bottom features (e.g. seamounts). Therefore they are more vulnerable to exploitation than fish stocks on the shelf.

Orange roughy are usually found in association with seamounts, canyons, and hydrographic fronts, and are typically long lived and late maturing. Because of these biological features and the fact that they show seasonal aggregations, they are vulnerable to sequential depletion and consequently the recovery time is long. Experience from around the world shows that management units need to be small as topographical features may be inhabited by separate populations.

9. Data Collection, Validation, Verification and Archiving

9.1 Process of Obtaining and Archiving of Data

A representative scientist/s should be nominated from each country fishing in the SEAFO Area. These scientists should receive all SEAFO related data from the observer/observer agencies, and be responsible for the data collection and initial verification and validation of the data. These scientists should keep the raw data, forward a copy of the electronic data to the SEAFO secretariat, and then present the data at the scientific committee meeting of SEAFO.

9.2 Training of Observers

The SEAFO secretariat should obtain contact numbers of the various observer agencies involved in the training of SEAFO observers. When appropriate, SEAFO should provide these observers/observer agencies with the standard forms (Excel spread sheets agreed upon during the SC meeting, 2006) to be completed for all catches in the SEAFO Area, and instructions describing how the forms are to be completed. This report should describe any additional information to be collected (e.g. info on corals, sponges and other benthic organisms). The updated version of the Excel spread sheets, the instructions for their use, and species descriptions will be posted on the SEAFO website.

9.3 Confidentiality of Data

The detailed data should remain only with the SEAFO secretariat and scientific committee members, but summaries of the aggregated data could be made

available to the wider public (e.g. web sites, etc.). All confidential data on vessels (eg names and fishing locations) will be protected. Access to scientific data should be conditional to approval by the SC representatives. Observer data should not be used for control/enforcement purposes.

9.4 Collection of Data at Sea

The following types of data will be collected:

(i) Catch and effort data need to be sent electronically by fishers to the SEAFO secretariat on a five day basis. (e-mail address of the SEAFO secretariat: info@seafo.org, faxnr: +26464220389).

(ii) Observer data are to be collected by appropriately trained scientific observers, and to be sent electronically to the designated national scientists responsible for the sampling scheme.

9.5 Archiving of Data

The data will be compiled and archived in the SEAFO scientific database.

10. Advice and Recommendations to the Commission

10.1. Advice on the Fisheries of Deep Sea Fish Resources

Due to the lack of sufficient data for stock assessments, it is not possible to give specific management advice for any of the species harvested in the SEAFO area.

As an interim measure, and taking into account the precautionary principle as stated in Article 7 of the Convention, the SC therefore recommends that:

- For existing fisheries, the fishing pressure should be reduced considerably and should only be allowed to expand again very slowly if and when reliable assessments indicate that increased harvests are sustainable.

- When new fisheries develop or existing fisheries expand into new areas, relevant indicators of the status of the stocks and fishing pressure should be established on the basis of small exploratory fisheries. These fisheries should only be allowed to expand very slowly if and when reliable assessments indicate that increased harvests are sustainable. Precautionary catch limits or effort limitations should be introduced.

The conventional indicators used in the advisory frameworks, such as biomass (state) and fishing mortality (impact) are difficult to measure for deepwater species. In addition, the long life span of most of these species require a long time to monitor a response and to detect positive effects of regulation measures. Consequently, the SC recommends that pressure indicators such as effort be used as an impact indicator in the management of these stocks.

Most deep-sea species can only sustain low rates of exploitation. Fisheries on such species should be permitted only when they are accompanied by programmes to collect data and should expand very slowly until reliable assessments indicate that increased harvests are sustainable.

10.2 Further Recommendations

1. The SC agreed on the necessity of the establishment of a permanent Sub Committee under the SC for continuing the work of collating data and assessing the fish stocks in the Area. The new Sub-committee should meet for three days immediately before the SC meeting in 2007 to continue the work carried out in 2006 by the SEAFO Provisional Working Group and also address new TOR (see section 11). The SC agreed to propose Titus Iilende, Namibia, to chair the Sub committee.

2. The SEAFO Convention Area should be divided into SEAFO Divisions and Sub-divisions according to the description given in Section 8.1 (Figure 1) of the SC Report.

3. Considering the 2005 SEAFO Commission recommendation on the establishment of a mandatory observer system for all vessels fishing in the Convention Area (SEAFO Conservation measure 01/05); Also considering that a standardised format for reporting data coming from such observers, for scientific assessment purposes, was agreed at the SEAFO Scientific Committee in 2005;

   The S.C. recommends that each Contracting Party appoint ‘designated scientist/s’ responsible for the following:-

   a. Establishment of sampling protocols and requirements, including fish identification keys.
   b. Monitoring the performance of the Observer System, including the quality of data produced.
   c. Provision of all historical fisheries data.
   d. Electronic transmission to the SEAFO Secretariat of all observer data required for stock assessments, consistent with the agreed SEAFO S.C. formats and deadlines.

4. Regarding the collection of fisheries and biological data the SC recommends the following:-

    a. Endeavour to improve and update existing and historical time series
    b. Strengthen data management at the SEAFO secretariat.
    c. Improve reporting :-
        i. Through flag states
        ii. Direct from vessels to SEAFO secretariat
        iii. By data capturing through port control/inspection
    d. Compile and maintain a metadatabase of all SEAFO living resources species (target and non-target species) including descriptions and photographic documentation
    e. Improve training of scientists and scientific observers in data collection, species ID, etc.

5. Regarding the Ecosystem Approach to Fisheries:-

    a. Instruct scientific observers to collect data on benthic organisms such as corals and sponges observed in catches (from all gears)
    b. Improve understanding of seamount ecology through research surveys.
    c. Following the Precautionary Approach, immediately introduce closed Areas preventing all types of fishing within the context of the SEAFO Convention on the following seamounts. The position of the seamounts are indicated in Figure 7:-

    DIVISION A

    - None

    SUB-DIVISION A1

    - Dampier Seamount (10-12S & 2W-0E) - already slightly exploited (one Norwegian vessel)
    - Malahit Guyot Seamount (11-13S & 2-4W) - already slightly exploited (one Norwegian vessel)

    DIVISION B

    - None

SUB-DIVISION B1

- Valdivia Bank (25-27 E & 5-8E) - already exploited
- Ewing Seamount (22-24S & 7-9E) - already exploited
- Molloy Seamount (27-29S & 8-10E) - already exploited

DIVISION C

- Schmidt-Ott Seamount & Erica Seamount (37-40S & 13-17E) - considered to be unexploited
- Africana Seamount (37-38S & 28-30E) - considered to be unexploited
- Panzarini Seamount (39-41 S& 11-13E) - considered to be unexploited

SUB-DIVISION C1

- Vema Seamount (31-32S & 8-9E) - already exploited
- Wust Seamount (33-34S & 6-8E) - considered to be unexploited

DIVISION D

- Discovery, Junoy, Shannon Seamounts (41-44S & 6W-3E) - considered to be unexploited
- Schwabenland & Herdman Seamounts (44-47S & 1W-2E) - considered to be unexploited

SUB-DIVISION D1

- Meteor, Zulu, Xhosa, Swazi, Merz Seamounts (46-49S & 7-12E) – some or most already exploited

6. 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.

7. 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.

8. Any new and exploratory fishing should be consistent with the SC advice.

9. Continuous strengthening of co-operation with CCAMLR, ICCAT, BCC/BCLME, GGLME and SWIOFC.

10. VMS data to be made available, according to agreed procedures, for the SC for stock assessment purpose.

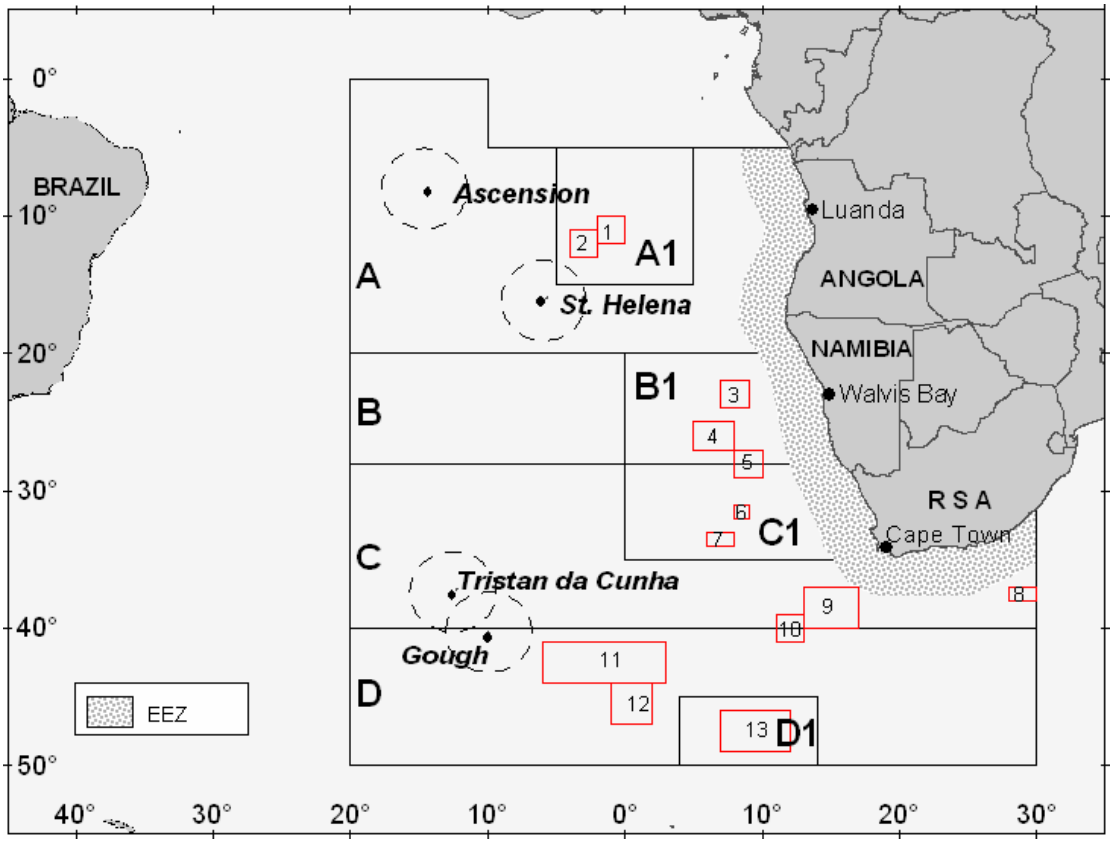


Figure 7. The SEAFO Convention Area with proposed divisions and subdivisions and indications of Areas with seamounts.

11. Future Work Program

The SC agreed on the necessity of the establishment of a permanent Sub Committee under the SC for continuing the work of collating data and assessing the fish stocks in the Area. The new Sub-committee should meet for three days immediately before the SC meeting in 2007 to continue the work carried out in 2006 by the SEAFO Provisional Working Group and also address new TOR. The SC agreed to propose Titus Iilende, Namibia, to chair the Sub committee. Member countries should nominate members to the sub-committee and notify the

SEAFO secretariat of membership by 1 January 2007. Observers can participate and should comply with the rules of procedure of the SC.

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. 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

12. Cooperation with other Organisations

Recognising the importance of cooperation with other organisations in respect of information exchange on fisheries and environment, the SC recommended at its 2nd Annual Meeting in 2005 that the Executive Secretary in consultation its Chair, contact specific organisations (ref. Report of the SEAFO Scientific Committee, 2005, section 9.2) to this effect.

The Executive Secretary informed the Meeting that formal contacts were made and positive responses received. Of the many organisations conducted, CCAMLR and ICCAT are identified as the most relevant in this matter.

The LME Programs that will eventually evolved into permanent Commissions (BCLME/Benguela Current Commission and the GCLME/Gulf of Guinea Current Commission) are identified as candidates for cooperation in information exchange, particularly for the straddling fish stocks between the exclusive economic zones of the coastal States and the high seas in the SEAFO Convention Area.

The SC agreed that the cooperation should be promoted.

13. Budget for 2007

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 2007.

14. Any Other Matters

No any other matter was raised.

15. Adoption of the Report

The report was presented and adopted by the meeting.

16. Date and Place of Next Meeting

The next meeting of Scientific Committee will be held on 4-5 October 2007 at the National Marine Information and Research Centre (NatMIRC), Swakopmund. It will be preceded by a meeting of the Sub-Committee that will be convened from 1-3 October 2007 at the same place.

17. Close of Meeting

On Friday 29 September at 15:30hrs, 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 2ND MEETING OF THE SEAFO SCIENTIFIC COMMITTEE

1. Opening and welcome remarks by the Chair
2. Adoption of the agenda
3. Announcement on practical arrangements
4. Appointment of rapporteurs
5. Introduction of participants
6. Meeting procedures and time schedule
7. Report by the Chair of the PWG
8. Consideration of the report of PWG
9. Data collection, validation, verification and archiving
10. Rules and procedures for the management of dissemination of the data
11. Advice and recommendations to the Commission
12. Future work program
13. Budget for 2007
14. Cooperation with other organisations
15. Adoption of the report
16. Date and place of the next meeting
17. Close of the meeting

Annex II

LIST OF PARTICIPANTS

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Annex III

SEAFO PROVISIONAL WORKING GROUP MEETING

Safari Hotel

Windhoek

28 August to 1 September 2006

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INTRODUCTION

During the 2nd Annual Meeting of the Commission held in October 2005, a decision was made to establish the Provisional Working Group (PWG) as proposed by the Scientific Committee. The primary aim of the PWG was to carry out the analyses of existing fisheries and oceanographic data within the SEAFO Convention Area. Titus Iilende (Namibia) was nominated to chair the PWG. The meeting took place at Safari Hotel in Windhoek, Namibia from 28 August to 1 September 2006. The meeting was attended by 13 participants representing scientists from Angola, Namibia, Norway and South Africa (Appendix I). Scientists from the EU could not attend the meeting due to other commitments.

1 WORKING PROCEDURE

The chairperson opened the meeting by welcoming all the participants. The agenda (Appendix II) was adopted after the PWG decided to work as a single group. Hannes Holtzhausen and Rudolph Cloete were appointed as rapporteurs. The PWG agreed to commence work from 08:30hrs to 17:30hrs each day. The Chair presented terms of reference (listed below) after which the existing data at the Secretariat was presented by the Executive Secretary. The first day was spent on formulating and agreeing on the procedure and appropriate methods to achieving the desired output considering the data at hand. Specific assignments on data compilation and analyses were allocated to participants with progress reviewed / presented to the Group at various internals during the week.

In general, the quality and quantity of data available was of poor standard and needs to be improved on in future.

Terms of reference for the Provisional Working Group

a. Source and analyse catch data for the main fish stocks (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. Establish and evaluate trends in the total catches and where possible catch per unit effort for the stocks as outlined under point (a).
c. Propose sub-divisions within the SEAFO region based on geographic distributions of the catches of the main fish stocks, as well as ecosystems and sub-ecosystems characteristics.
d. Prepare a background document for the SEAFO region giving a description of oceanographic features and where the main biological production takes place. The document should also have a description of the main fisheries resources as outlined under point (a) including present knowledge about their biology.
e. Analyse length distribution data of the main species.

f. Source and analyse fleet information for the main species in the region.
g. Determine species and quantify of the by-catch caught by the fisheries.
h. Examine links between commercially exploited fish stocks in the SEAFO region and similar stocks within the EEZ of the BCLME countries.
i. Evaluate information on fisheries, oceanography, productivity and biodiversity around seamounts in SEAFO region.
j. If information exists, evaluate impacts of fishing gears on seabed and benthic ecosystems.

2 CATCH DATA ANALYSIS OF ALL SPECIES RECORDED IN SEAFO AREA

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

EU (Spain):
Data was provided for the years 2001-2004. Catch positions were not provided and some of the species listed do not appear to typically inhabit the SEAFO Area. The reported species composition changed from year to year. No effort information was available. From 2001 to 2003, hardly any landings were made with the exception of about 120 tonnes of Patagonian toothfish. In 2004, 90 tonnes of argentines, 70 tonnes of boarfish and 200 tonnes of Patagonian toothfish was made. Large catches of West African geryon (23 tonnes), African striped grunt (941 tonnes) and bigeye grunt (200 tonnes) were made. These species have not been recorded in the SEAFO Area before. No recent data was made available. Whether this is the result of no fishing, is unknown.

EU (Portugal):
Data was provided for 2004 and 2005. Catch positions were not provided. The reported species composition changed from year to year. No effort information was made available. This fleet appears to target large pelagic sharks. No other species of more than 10 tonnes were taken. Wreckfish catches of 500kg was recorded for 2004. No recent data was made available. Whether this is the result of no fishing, is unknown.

Japan:
Data was provided for 2005 and 2006. During 2005, 234 tonnes of deep-sea red crab and 73 tonnes of patagonian toothfish were taken. During 2006, 124 tonnes of crab and 1.5 tonnes of toothfish were landed. Detailed catch positions for crab fishing are available, but only very rough catch positions were provided for toothfish. Besides one crab vessel, detailed effort information is not available. No

other species of more than 10 tonnes were taken. No data before June 2005 was made available. Whether this is the result of no fishing, is unknown.

Korea:
Data was provided for 2003 only and 245 tonnes of Patagonian toothfish was landed. Only very rough catch positions were provided. No effort information was made available. No bycatch information was provided. No data for other years was made available. Whether this is the result of no fishing, is unknown.

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. Data on crab fishing by one vessel in 2005 has been provided. Only very rough catch positions were provided. No effort information was made available. No bycatch information was provided. No data for other years was made available. Whether this is the result of no fishing, is unknown.

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 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 (21.6 tonnes). See Table 1. No data for other years was made available. Whether this is the result of no fishing, is unknown.

3 CATCH TRENDS (MANAGEMENT AREA B1)

To date, only the Namibian orange roughy dataset 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 2&3) 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 1. 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 (Figure 1-4). 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 1: Number of trawls made per year and the total catch of deep-sea species taken by the Namibian orange roughy fleet.

	No of trawls	Catch (t)
1995	20	46.87
1996	223	339.97
1997	188	110.18
1999	16	4.09
2000	327	195.58
2001	295	129.54
2002	40	9.83
2003	63	31.91
2004	46	27.61
2005	61	40.31
Total	1279	935.88

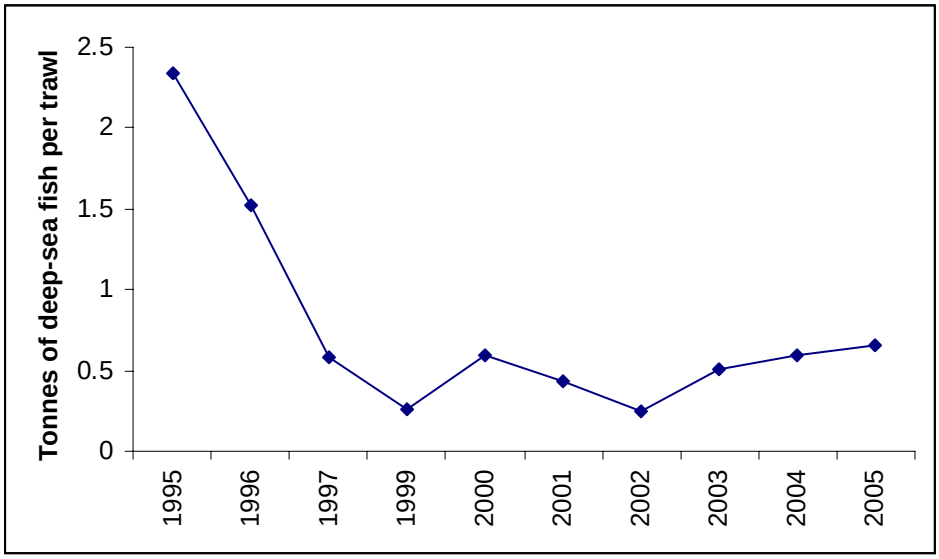


Figure 1: CPUE for the total deep-sea catch (all species) per trawl from 1995 to 2005.

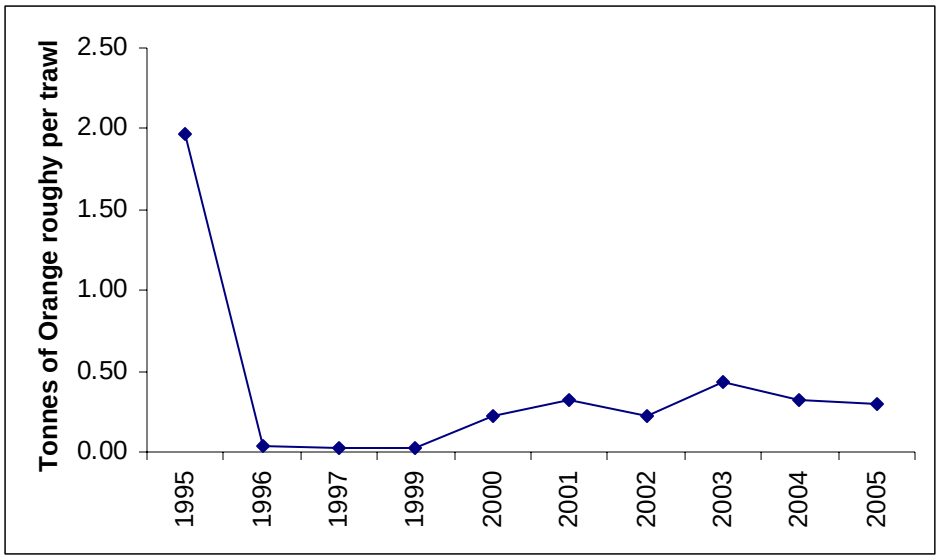


Figure 2: CPUE of orange roughy in tonnes per trawl

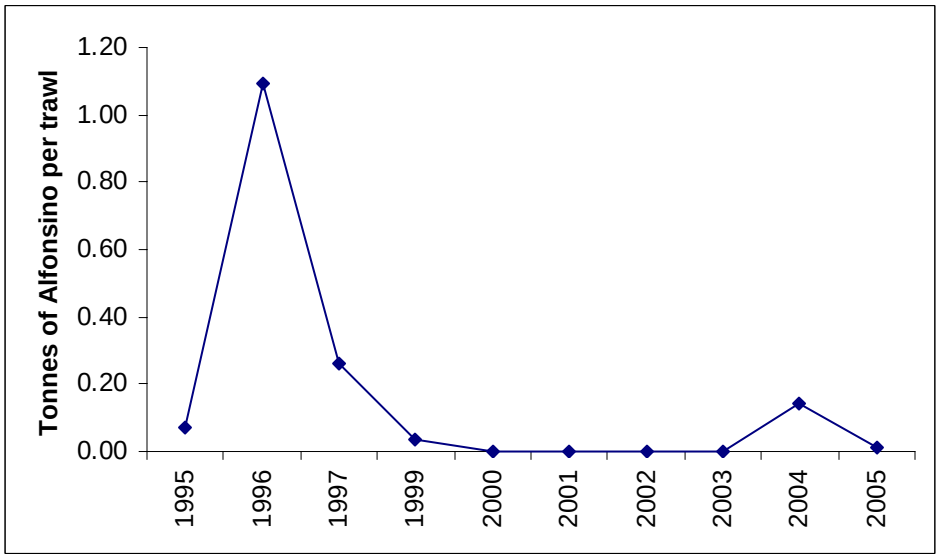


Figure 3: CPUE of alfonsino per trawl

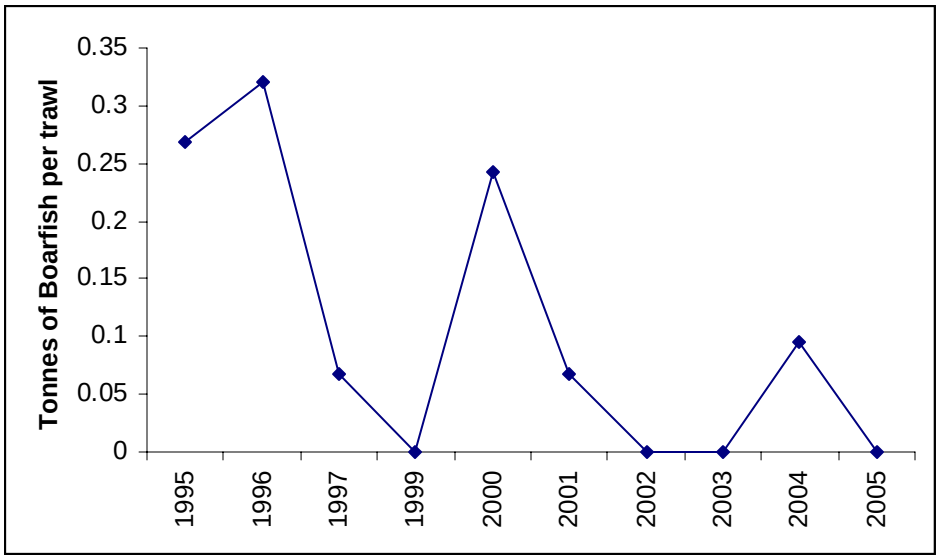


Figure 4: CPUE in tonnes per trawl of boarfish.

DEMARCATING ZONES AND MANAGEMENT AREAS

The SEAFO Area has been subdivided into four large zones (A-D) stretching from the western boundary of the SEAFO Area at 20°W, to the coastal EEZ Area and to 30°E south of the African continent (Figure 5). One management Area has been identified within each of these four zones. The basic criteria used for creating the management Areas were:

- Areas with a catch history of more than 10 tonnes per species per year
- Ecological sensitive Areas such as seamounts (i.e. Mount Vema) where known bycatches have been reported in significant numbers.

SEAFO Zone A.

This zone is demarcated as between 0-20ºS and 20ºW up to the Angolan EEZ. The basin of this SEAFO zone is 5000m deep with the shallowest seamount at 380m. The two islands, St. Helena and Ascension are situated in this zone each with a 200Nm EEZ and both belonging to the United Kingdom. These islands support their own fisheries based on large pelagics (tunas) and rock lobster. The Southern sub-tropical Current runs through this zone.

Management Area A1.

This Area is demarcated as between 5-15°S and from 5°W to 5°E. This Area seems to support an abundance of alfonsino and some orange roughy (as bycatch) as shown by a Norwegian vessel that fished there in 1997, 1998 & 2000. There are six seamounts such as Dampier, Malakiet etc. in the Area.

SEAFO Zone B.

This zone is demarcated as between 20-30°S and 20°W to 0°E. This Area has a depth range of 3000-5000m. In this Area large pelagics (ICCAT species) are caught with pelagic longlines.

Management Area B1.

This Area is demarcated as between 20-30ºS, and 0-10ºE and borders the Namibian EEZ. In this zone orange roughy is trawled and red crab caught with pots. The Valdivia Bank is situated in this Area and also the seamounts Ewing and Maloy. The shallowest depth is 20m and the deepest 5000m.

SEAFO Zone C.

This Area is demarcated as between 30-40ºS and 20°W to 30ºE. The Tristan da Cunha island group is situated in this zone and falls inside the Cape Basin. It is between 1000 and 5000m deep and has some seamounts such as Schmidt, Erica, Woest and Panzarini. ICCAT species (large pelagics) as well as Patagonian toothfish are caught here with demersal- and pelagic longlines.

Management Area C1.

This Area is demarcated as 30-35ºS, 5-10ºE and extends to the Southern African coastal EEZ's. This Area includes Mount Vema, which is the main fishing ground for the tuna pole-and-line fishery. It also supports recreational and commercial fisheries for yellowtail, rock lobster and other shallow water species. Its shallowest point is only seven metres deep and the deepest part 5000m.

SEAFO Zone D.

This zone is demarcated as between 40-50ºS and 20°W to 30ºE with a depth range of between 300m to 5000m.This zone includes Gough Island and is situated in the Southern Ocean Current and within the Agulhas Basin and Agulhas Ridge. It contains some seamounts such as Discovery and Shannon. Patagonian toothfish and large pelagic ICCAT species are caught here with demersal- and pelagic longline.

Management Area D1.

This Area supports a demersal longline fishery for Patagonian toothfish and crab pots for deep-sea red crab. The Area is demarcated as between 45-50ºS and 4-14ºE with a depth range from 500-6000m.

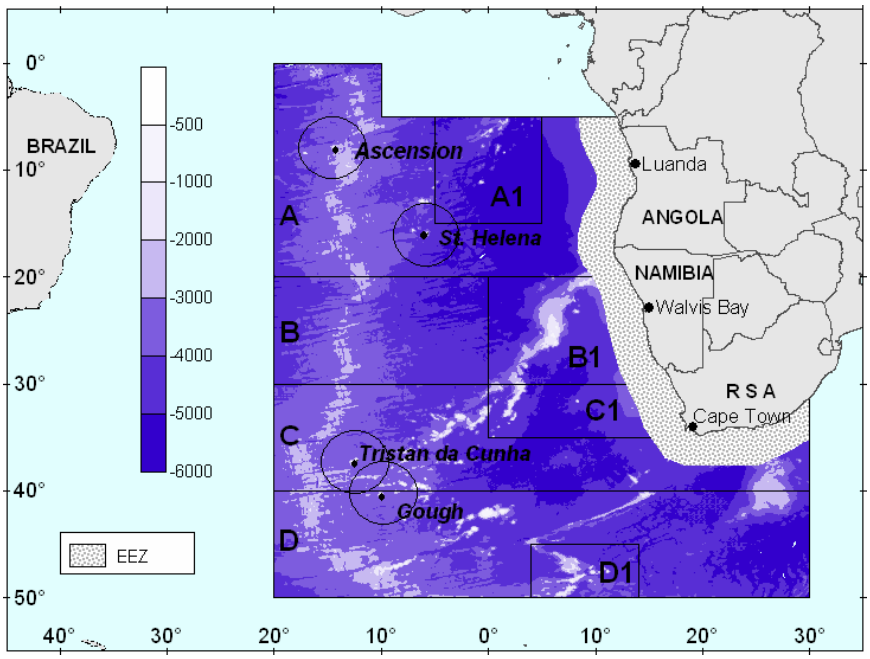


Figure 5. This map indicates the demarcated SEAFO zones as well as the management Areas identified in each. The topography of the SEAFO Area is used as background to indicate the relevance of bottom features such as ridges and rises in relation to the various management Areas.

MAIN OCEANOGRAPHIC FEATURES OF THE SEAFO AREA

Topography

Some of the main topographic features inside the SEAFO Area are listed below (Figure 6):

- Walvis Ridge, which extends from around 18ºS, off the Namibian coast, into a south-westerly direction towards the mid-Atlantic ridge. This feature sub-divides the Area into the Cape Basin (south) and the Angola Basin to the north of this Area. Deep ocean circulation is guided and obstructed by this feature. Several important seamounts, banks and plateaus are associated with this feature e.g. Valdivia Bank etc.
- Agulhas Ridge extends from around 35ºS, south of Cape Town, into a south-westerly direction. This feature separates the Agulhas Basin from the Cape Basin to the north. Several important seamounts, banks and plateaus are also associated with this feature.
- Mid Atlantic Ridge at around 15ºW that runs through the entire SEAFO region from north to south.
- Many other important features such as seamounts (e.g. Mount Vema) and rises (Meteor Rise) exist in this Area and should be highlighted and discussed more comprehensively.

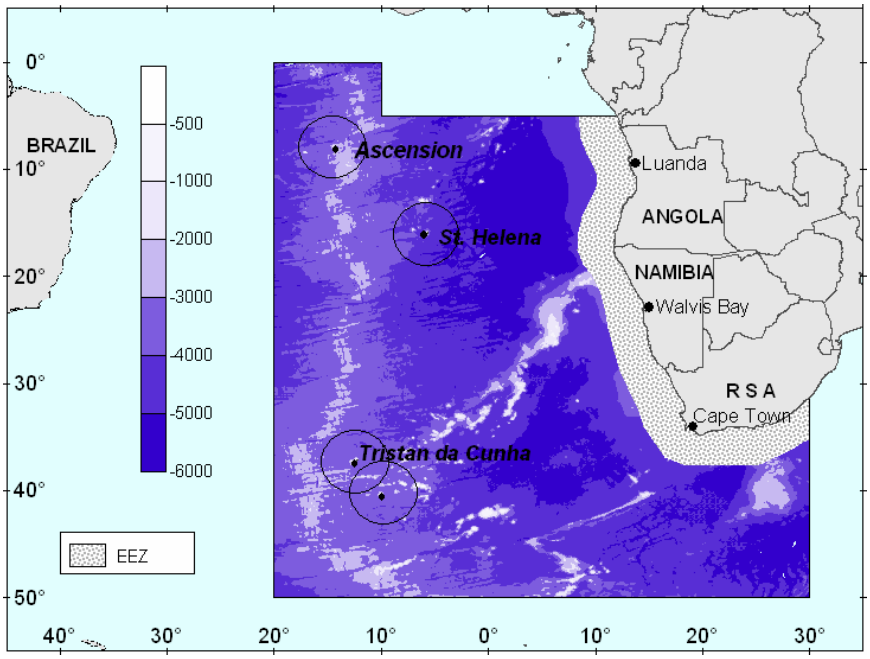


Figure 6. An illustration of the bottom bathymetry for the SEAFO Area. Important bottom features such as the Walvis Ridge, Mid Atlantic ridge, and other seabed elevations such as the Meteor Rise and seamount Vema to mention a few.

4 OCEANOGRAPHIC BOUNDARIES

Northern boundary: The South Atlantic Equatorial current flows westward along the equatorial Area (Figure 7).

Western boundary: Open end of the South Atlantic gyre. The poleward flowing Brazil current is situated further west of SEAFO's western boundary.

Eastern boundary: It mainly consists of the Benguela and Angolan Currents along the African continent.

- The Benguela flows in a north to north-westerly direction (~15-35ºS). The Benguela is a major upwelling Area, very productive and characterized by cool surface temperatures.
- The warm Angolan current flows in a southerly direction along the Angolan coast and meets the Benguela roughly around 17-15ºS commonly referred to as the Angola/Benguela front. In this frontal Area offshore flow into the SEAFO Area occurs. This is clearly demonstrated by the offshore extension of primary production in this Area and has also been observed from the flow tracks of surface floats that have been deployed in this Area.
- The warm Agulhas Current flows south of the African continent in a westerly direction where it meets up with the Benguela Current. Warm eddies are spawned in this Area and transported north-westerly into the SEAFO Area.

Southern boundary: The Southern Ocean current forms the southern boundary of the SEAFO Area. The Antarctic convergence zone is close to the southern boundary of this Area.

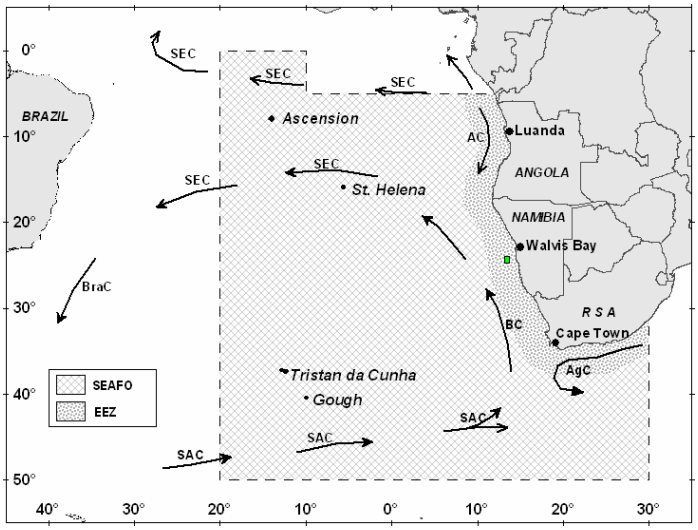


Figure 7. An illustration of the surface circulation relevant to the SEAFO Area. SST variability.

Solar insolation is responsible for the warmer sea surface temperatures that occur in summer and the reduction thereof in winter for the lower winter sea surface temperatures (Figure 8). This is especially true for the open ocean region. Wind driven upwelling along the south-western African coast (Namibia & RSA) is responsible for cooler SST in the coastal Areas; cool filaments often extend offshore into the SEAFO Area from the Lüderitz upwelling region. Inter-annual variability is quite clearly illustrated by the SST anomaly maps in Figure 9. Temperatures in the southern region are usually much cooler as depicted in the temperature figures.

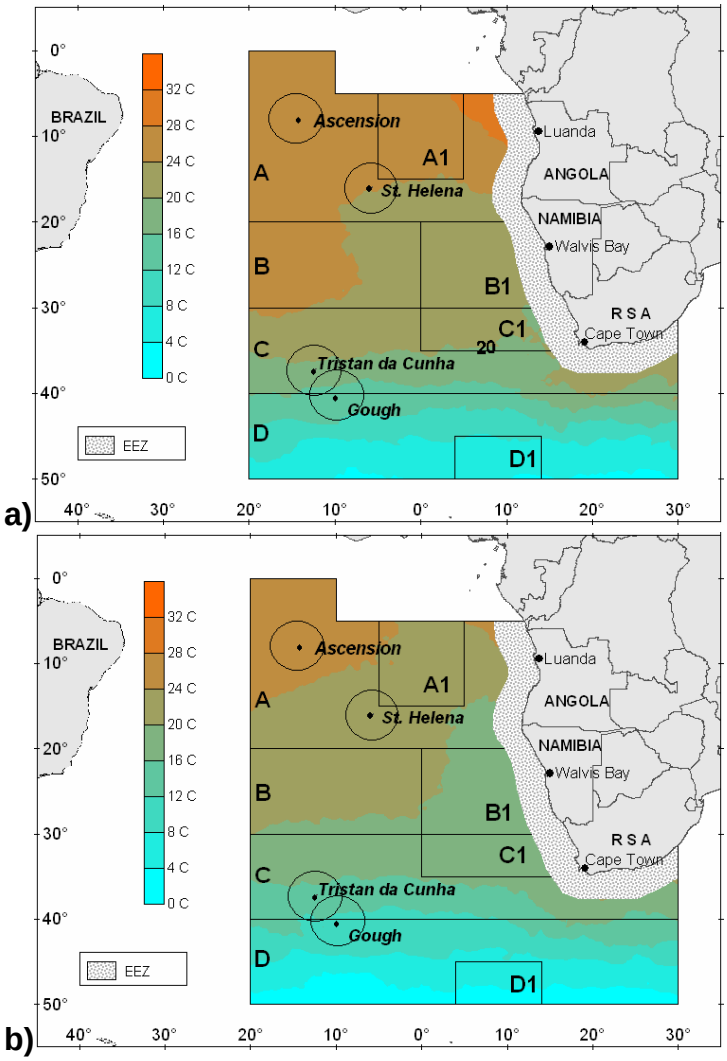


Figure 8. Typical (a) summer and (b) winter sea surface temperature patterns of the SEAFO region. Data obtained from MODIS.

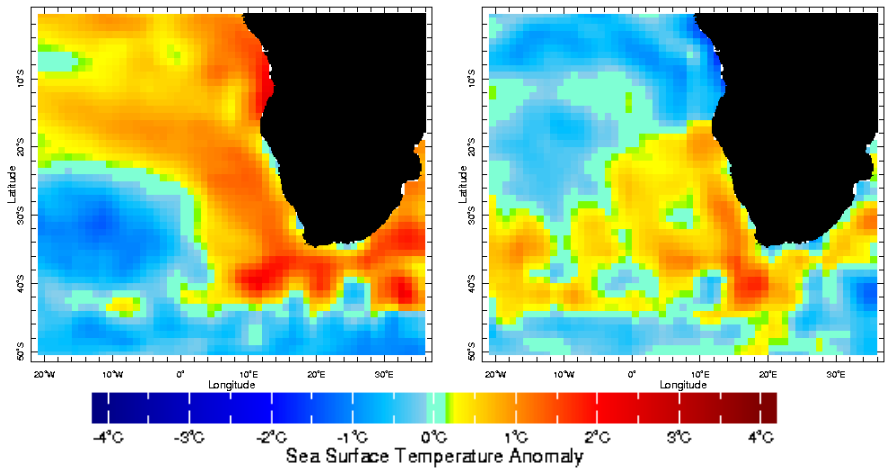


Figure 9. Examples of SST variability in the SEAFO Area. These represent anomalies for January and July 2005. NCEP database.

Productivity

Figure 10 illustrates the average chlorophyll-a concentration over the SEAFO Area and clearly identifies the main EEZ Areas as Areas of highest production (EEZ Areas indicated with blue dotted line).
Largest offshore extension of chlorophyll-a production into the SEAFO Area exists at the Angola/Benguela frontal Area and farther north at the equatorial region. Relatively high chlorophyll-a concentrations are also found in the southern ocean. The western part of the SEAFO region is clearly part of the unproductive oceanic type.

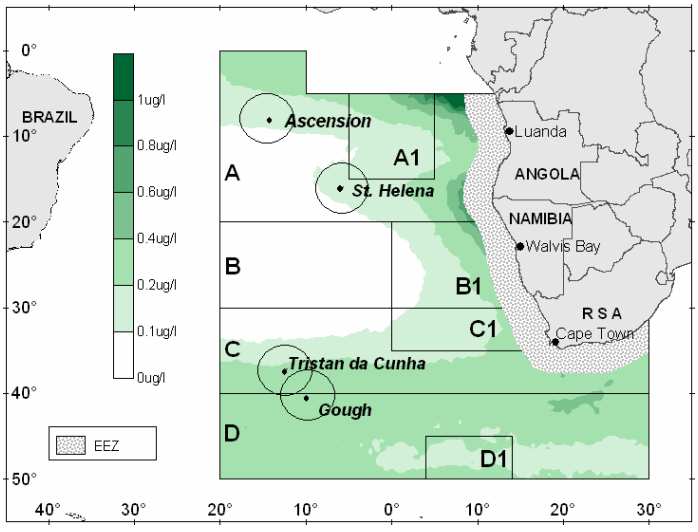


Figure 10. Average chlorophyll-a concentration calculated for the SEAFO Area representing primary production (2002-2006). Plot derived from SeaWIFS data.
Meteorology.

The south Atlantic high-pressure system and the associated low over the sub-continent drives the upwelling along the eastern boundary of the SEAFO Area (Benguela Current). The position of this high varies seasonally and is located farther south in summer and farther north in winter, which is responsible for the seasonality in the upwelling activity.

Major anomalous environmental events in the region

The **Benguela Nino** affects the coastal Areas off Angola and Namibia on a decadal scale. It is associated with the advection of warm water across the equator (very similar to the Pacific Nino) towards the African coast and farther down the coast into northern Namibian waters, resulting in strong positive temperature anomalies. It usually occurs in summer/autumn and persists for several months (January to April). The offshore impact of it into SEAFO Area is unknown.

Oxygen poor bottom waters along the central/northern Namibian coast as well as along the Angolan coast are another well-documented phenomenon of the region. However, it is mainly limited to the continental shelf (inside the EEZ) and it is unlikely that this extends as far offshore as the SEAFO Area.

BIOLOGY OF KEY SPECIES

Orange roughy *(Hoplostethus atlanticus*)

Orange roughy is a long-lived species, which matures at a late age (28 years) and has a low fecundity and natural mortality. It spawns during July and August, peaking in the last weeks of July. This activity seems to be remarkably consistent between years and between different populations in the southern Hemisphere.

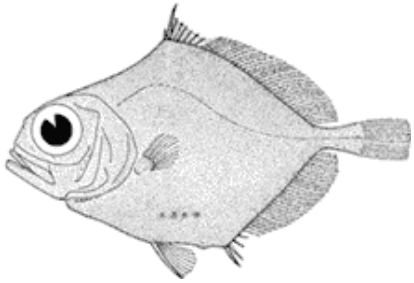
Alfonsino (*Beryx splendens*)

Alfonsino have a maximum recorded age of 17 years and females grow faster than males. Pre-spawning alfonsino have been recorded in New Zealand waters but spawning grounds are unknown. Summer-autumn spawning activity has been noted in the North and South Atlantic and North Pacific Oceans. Size at sexual maturity is probably about 30cm fork length (FL) at 4 to 5 years of age, observed in New Zealand.

Boarfish (*Caproidae*)

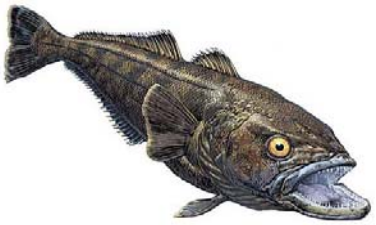
Boarfish and amourhead might be the same fish, but identified incorrectly in the statistics and need to be confirmed in future.

Oreo Dory



Smooth oreo is a Southern Hemisphere species occurring from depths of 650 to 1500m. Black oreo have been reported from New Zealand, Australia and Namibia, occurring in depths from 600 to 1300m.
Both species appear to have a pelagic juvenile phase. The pelagic phase may last for 5-6 years with lengths of 16-19cm TL for smooth oreo and 4-5 years with lengths of 21-26cm TL for black oreo. Unvalidated age estimates indicate that oreos are slow-growing and long-lived. Smooth oreos maximum estimated age was 86 years (51.3cm TL fish) and black oreo maximum estimated age was 153 years (45.5cm TL fish).

Patagonian toothfish (*Dissostichus eleginoides*).

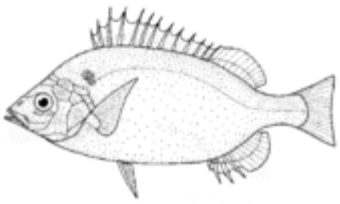


Patagonian toothfish is found in sub-Antarctic waters on shelves around islands and submarine banks. Toothfish is bottom-living, in depths up to 3800m, but move off the bottom on occasion to feed.

Toothfish reach sexual maturity when they are between 70cm and 95cm long. At this size the fish are between 8 and 10 years old.

The maximum size of toothfish is ~2.2m in length and about 120kg in weight. The maximum recorded age is about 45 years.

Armourhead (*Pseudopentaceros richardsoni*)



The pelagic armourhead, Richardson's boarfish, or southern boarfish (*Pseudopentaceros richardsoni*) belongs to the genus Pseudopentaceros, found in the north and south Pacific Ocean, Southeast Atlantic and the South Island of New Zealand, from the surface to depths of 300 metres on the continental shelf. Its length is between 30 and 50cm. Boarfish and amourhead might be the same fish, but identified incorrectly in the statistics and need to be confirmed in future.

Deep sea red crab *(Chaceon maritae)*

Chaceon maritae is a true deep-sea crab of the family *brachyuran Geryonidae*. They are distributed from Namibia to Portugal. Males mature at 80mm CW and females at 62mm CW. It is a slow growing species, with females having the faster growth rate than males, until maturity is reached.

Wreckfish (*Polyprionidae*)

The wreckfish is a large bottom-living fish similar to a grouper, which is classified in its own family, Polyprionidae. The wreckfish commonly exceeds 100cm total length and 30kg total weight, and lives in depths from 42-1000m as adults. Wreckfish have a broad but disjunct geographic distribution. Juveniles are very rare in the western Atlantic, but are common in the eastern Atlantic.

Cardinal Fish (*Epigonus telescopus*)

The cardinal fish is found in the North Atlantic, Southeast Atlantic, Southwest Pacific, Walvis Ridge off southwestern Africa and New Zealand. It belongs to the family Epigonidae the deepwater cardinal fishes. The maximum size is 75cm total length while the maximum reported age is 104 years. It is a bathydemersal species occurring in depths ranging from 75 to 1200m.

LENGTH-FREQUENCY ANALYSIS

Length frequency data of deep-sea red crab

A total of 1676 crab were measured between 21 September and 19 October 2005 in the Area between 24-25°S and 5-6°E, depth range between 800 and 1100m. Male crab contributed 41% to all samples combined, and average size was 94mm carapace width (CW) for males and 88mm CW for females.

The size distribution data indicate both males and females to occur between 70 to 112mm CW (Figure 11). In Figure 12 commercial samples from the SEAFO catches are compared to that of commercial crab catches inside Namibia's EEZ, during 2005. The size distribution data indicate that male crab from the SEAFO Area occur over a different size range than that caught inside the EEZ, whilst for female crab it was similar. Male crab caught inside the EEZ included a larger proportion of large size crab above 100mm CW than was observed in SEAFO samples, whilst samples from SEAFO catches included a larger proportion of larger size female crab (>85mm CW). Maturity data is available but the quality needs to be verified.

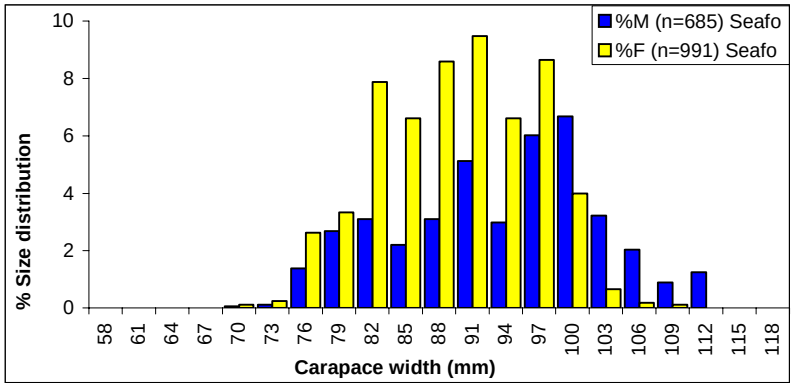


Figure 11: Percentage size distribution of male (M) and female (F) crab sampled in the SEAFO Area during 2005.

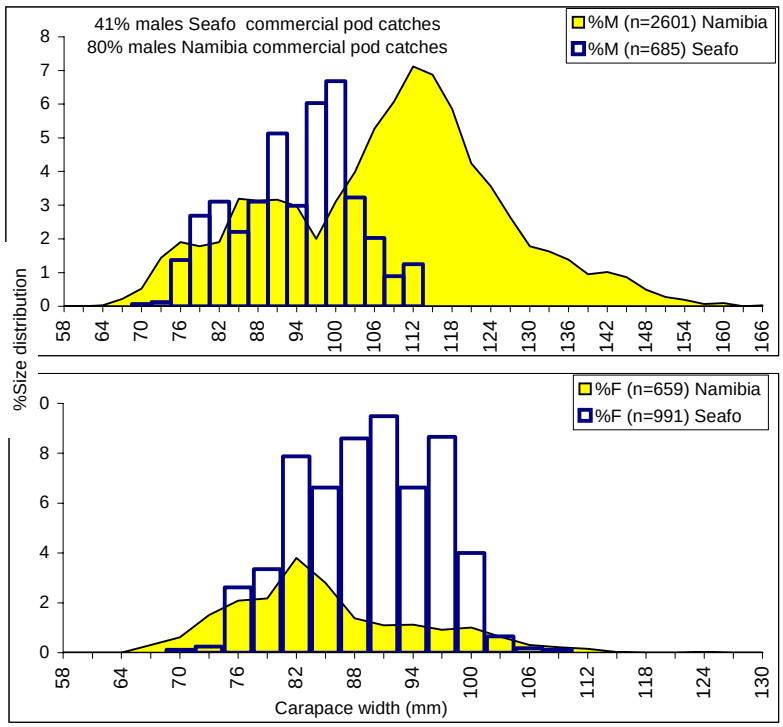


Figure 12: Comparison of size distribution data between samples collected in the SEAFO Area and within Namibia's EEZ.

FLEET INFORMATION

Available fleet information is listed in Table 2 and 3. The horsepower ranges from 1000 to 4800. The length of the vessels ranges between 31 and 92m.

Table 2: Deep-sea red crab: Fleet information.

Flag	ID	Name	Length	GRT	Built	HP	IRCS
Nam	L1179	Crab Queen	49	619.00	01/01/1989	1000	V5XD
Jap		Kimpo Maru					
Nam	L434	Oshimanda	49	443.27	21/09/1976	1200	V5OS

Table 3: Orange roughy/alfonsino: Fleet information.

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

MAIN SEAFO SPECIES AND BYCATCH

The most important species are Patagonian toothfish, orange roughy, alfonsino and deep-sea red crab. 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). The boarfish should be included in the SEAFO species list. 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 3 is the new proposed SEAFO species list.

Table 3: 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 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 this working group meeting 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 given in Tables 4-7. The catches are listed by country. The fishing method and management Area in which the catch was taken is also indicated in the list. Tables 8-9, lists the bycatch 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 working group 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.

Table 4: Catches in tonnes of Patagonian toothfish caught by Spain, Japan and Korea.

Main species	**Patagonian toothfish**		
Management Area	D1	B1	D1
Nations	Spain	Japan	Korea
Fishing method	Longline	Pots	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	
2006		1.50	

Table 5: 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	

Table 6: 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	unknown	unknown	unknown	B1?
Nations	Namibia	Norway	Russia	Cook Island	Mauritius	Cyprus	RSA
Fishing method	Bottom trawl	Bottom trawl	Bottom trawl	Bottom trawl	Bottom trawl	Bottom trawl	Bottom trawl
Catches							
1976			*252*				
1977			*2972*				
1978			*125*				
1993			*?*				
1994							
1995	*1.2*	No fishing					*59.705*
1996	*368*	No fishing					*109.181*
1997	*208*	836	*2800*				*124*
1998	No fishing	1066					
1999	0.60	No fishing					
2000	0.05	242					
2001	0.63	No fishing					
2002	0.00	No fishing					
2003	0.00	No fishing					
2004	6.45	No fishing	210.44	141.55	114.88	436.97	
2005	0.71	No fishing	54				
2006		No fishing					

Table 7: Catches of deep-sea red crab made by 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	124.24	

Table 8: 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	RSA	Cyprus
Fishing method	Bottom trawling	Bottom trawling	Bottom trawling	Bottom trawling
Catches				
1976		*108*		
1977		*1273*		
1978		*53*		
1993		*1000*		
1994				
1995	*3*		*529.581*	
1996	*212*		*201.184*	
1997	*546*		*12*	
1998				
1999				
2000				
2001				
2002				
2003				
2004				22
2005				
2006				

Table 9: Catches of boarfish and oreo dories.

Bycatch 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					

RESOURCE LINKAGES BETWEEN SEAFO AREA AND OTHER CONVENTION AREAS and EEZS

The main fish stocks found in the SEAFO region are deep-sea red crab, orange rough, alfonsino, boarfish, deep waters shrimps, Patagonian toothfish and wreckfish. Some of these fish species (e.g. orange roughy, alfonsino) are also found in the EEZ of coastal states (Table 3). The Patagonian toothfish is a transboundary species between SEAFO and the CCAMLR Convention Areas. Due to limited availability of scientific data on the species found in both the SEAFO region and in EEZ of coastal states, it is difficult to establish whether they are the same or different stocks (Table 3).

SEAMOUNT ECOLOGY IN SEAFO AREA

Seamounts are being enriched in respect of nutrients through vertical transport. In general, seamounts tend to have their own localized currents and upwelling resulting in rich plant and animal life with a high degree of endemism of slow-growing, long-lived animals. Little scientific information is available on the seamounts within the SEAFO Convention Area. However, the R/V Dr. Fridtjof Nansen conducted a scientific survey (Gammelsrod et al., 1997) on Valdivia Bank and Ewing Mount in 1997. The location of these seamounts lies within the influence of the Benguela Current ecosystem. Valdivia Bank consists of a

complex series of peaks and troughs, with pinnacles of rock rising from more than 2000m depth to within 23m of the surface. These characteristics favour offshore fisheries such as orange roughy and alfonsino. Plankton samples collected at these seamounts contained high concentrations of phytoplankton, zooplankton and fish larvae; this could suggest that the Areas are important nursery grounds for specific fish species. The observed cyclonic gyre around the seamount probably acts to retain fish larvae for the early stage survival of species.

The available catch statistics in management Area B1, suggests that deep-sea species such as orange roughy, alfonsino, deep-sea red crab, boarfish, cardinal fish and oreo dories are fished mainly on Ewing seamount and Valdivia Bank, which are located on the eastern side of the Walvis Ridge.

Due to lack of detailed information on the ecological sensitivity and characteristics of seamounts one should follow a precautionary management approach.

IMPACTS OF FISHING GEAR ON THE ECOSYSTEM

Reviews of studies worldwide have shown similar impact caused by trawling, including the removal or damage of the benthic animals, the smoothing of the seabed, or the reduction of the habitat complexity (Auster and Langton, 1999). The current debate over bottom trawling is focused not only on where and to what degree it is appropriated but whether it deserves to be discontinued.

Koslow *et.al.* (2001) studied directly the impacts of trawling on seamounts in south of Tasmania. Their study compared fauna found in fished and unfished seamounts. Their study found that unfished seamounts had 7.2 times higher total biomass and 106% more species than the fished seamounts. They also found that fished seamounts had higher amount of coral debris and coral sands, which may indicate the remains of past coral disturbances. In addition to the above case study, several studies off coasts of North America, Europe, Scandinavia have recorded huge damages on coral communities.

The investigation by the National Academy of Sciences (2002) found that bottom trawling damages the habitat where juvenile fish hide from their predators, and can alter marine ecosystems enough to offer at least a partial explanation for the declines in fish populations seen in recent decades.

Static fishing gear such as pots or traps are considered to be highly selective for target species. In addition, these gears might be considered to be environmentally friendly because they cause relatively little disturbance of seabed communities when compared with towed bottom- fishing gears (Jennings and Kaiser, 1998). However, these can be lost as a result of bad weather, pots being snagged on seabed obstructions, or pots being inadvertently towed away by mobile fishing gears. The lost gear may then continue to fish indiscriminately,

which is a phenomenon known as “ghost-fishing.” Little is known about the frequency of static gear loss or for how long such gears continue to fish. Considerable numbers of pots are also lost each year from some fisheries, although estimates vary greatly between different studies.

It should be noted that seabirds such as albatrosses occur in the whole SEAFO Convention Area and that unintentional catches of seabirds in the longline fisheries is a global problem and that mitigating measures such as the deployment of Tory lines should be made mandatory in the SEAFO Area. It should also be mandatory for all vessels operating in the Convention Area to report all accidental catches of seabirds. It is further important to adhere to any other international conventions that might be applicable in the SEAFO Convention Area. Turtles are also considered to be potentially at risk.

Taking into account the results of the impact of fishing highlighted above, it is important for SEAFO to consider precautionary measures to minimise their impacts on vulnerable habitats and also to put in place measures to minimise catch by lost or abandoned gear. It is further important that fishing is not allowed to expand before the sustainability is assessed. Known fishing grounds for species such as orange roughy are concentrated on very small Areas such as pinnacles and therefore the effect of trawling could be much more severe.

RECOMMENDATIONS

1. Regular reporting of accurate catch information as per mandatory SEAFO logsheets
2. Endeavour to improve & update existing and historical time series
3. Strengthen data management at the SEAFO secretariat
4. Multiple reporting
    a. Through flag state
    b. Direct from vessel to SEAFO secretariat
    c. Data capturing through port control/inspection
5. Compile database of all SEAFO fish species (target and non-target species) through photographic documentation – take pictures
6. Consider the development of a robust scheme of collecting information appropriate for EAF management.
7. Training of scientists and inspectors in data collection, species ID's, etc.
8. Speedy implementation of VMS
9. Develop a SEAFO MCS to ensure compliance
10. Enforce mandatory observer deployment (biological data collection)
11. Encourage new and exploratory fishing
12. Continuous strengthening of cooperation with CCAMLR and ICCAT
13. The precautionary management approach should be followed, especially in view of inadequate information
14. Improve understanding of seamount ecology and threats possibly through active research
15. Investigate the use of biodegradable crab pots (prevent ghost fishing)

APPENDIX I

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APPENDIX II

DRAFT AGENDA FOR THE PROVISIONAL WORKING GROUP (PWG) MEETING OF THE SEAFO SCIENTIFIC COMMITTEE AUGUST 28 – 01 SEPTEMBER 2006

WINDHOEK, NAMIBIA

1. Opening Welcome by Mr. Titus Iilende, Chairperson of the PWG.
2. Appointment of Rapporteur.
3. Adoption of Agenda.
4. Introductory remarks and arrangements by Dr. Hashali Hamukuaya, Executive Secretary of SEAFO.
5. Background and review of the TORs of the PWG by Mr. Titus Iilende (the proposal is to split the Meeting into two Groups: Group 1 to deal with Stock Assessment issues and Group 2 focuses on the Ecosystem issues).

Assignments for the (Data Analysis and) Stock Assessment Group are:

a. Review and analyses of existing data
b. Evaluate resources status, trends, and CPUE
c. Evaluate stocks structures through length distributions if available
d. Assessment of fleet information
e. Quantification of non-target species
f. Evaluate the scope and extent of transboundary of the resources
g. Group report including all the above

Assignments for the Ecosystem Group are:

a. Sub-divide the Area (results of Group 1 will be needed to complete this task)
b. Evaluation of fisheries and oceanography of the seamounts
c. Evaluation of impacts of gears on the environment
d. Group Report including all the above

6. Preparation and Adoption of Final Report (Final report shall merge the two groups' reports).
7. Any other business
8. Closure of Meeting

Note: The morning of Day 1 shall be used for introduction and arrangement of the two Groups. At the beginning of each day, plenary shall convene and the chairs of the two Groups shall present briefings from their Groups. On Thursday, a final report shall be prepared for adoption on Friday.

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
	Armourhead	Pseudopentaceros spp.
	Cardinal Fish	Epigonus spp.
	Deepsea Crab	*Chaceon maritae*
	Octopus and Squids	Families Octopodidae and Loliginidae
	Patagonia toothfish	*Dissostichus eleginoides*
	Hake	Merluccius spp.
WRF	Wreckfish	*Polyprion americanus*
	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

REFERENCE LIST

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