South East Atlantic Fisheries Organisation

SOUTH EAST ATLANTIC FISHERIES ORGANISATION (SEAFO)

REPORT OF THE 13th SCIENTIFIC COMMITTEE MEETING

20 – 24 November 2017
Swakopmund
NAMIBIA

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1 Opening and welcome remarks by the Chairperson

1.1 The 13th Annual Meeting of the SEAFO Scientific Committee (SC) was convened between 20-24 November 2017 at the Strand Hotel, Swakopmund, Namibia. The Chairperson, Beau Tjizoo (standing in for Paul Kainge), opened the meeting and welcomed the delegates. He emphasized that it would be a discussion of scientific issues only and that all delegates were expected to freely express their scientific views so that issues can be resolved and the best possible advice forwarded to The Commission.

2 Adoption of agenda and meeting arrangements

2.1 SC adopted the agenda with minor revisions. Members were informed of the practical arrangements for the meeting by the Executive Secretary (Appendix I).

3 Appointment of Rapporteur

3.1 After nomination and secondment, Erich Maletzky was appointed as rapporteur for the 13th SEAFO Scientific Committee meeting.

4 Introduction of Observers

4.1 Observers from the GIZ – MARISMA Project and BirdLife International attended the 13th SEAFO Scientific Committee and are listed under the "Observers" section of Appendix II. An observer from CCAMLR was registered for the meeting but did not attend.

5 Introduction of Delegates

5.1 A total of 10 Scientific Committee members attended the 13th SEAFO Scientific Committee meeting (see Appendix II for list of participants). No members from Angola and the Republic of Korea attended.

6 Review of submitted SEAFO working documents and any related presentations, allocation to the agenda items

6.1 A total of 23 working documents were submitted to the Scientific Committee for review and considered during the 2017 SC meeting (Appendix III).

7 Review of the 2017 work program

7.1 Orange Roughy:

7.1.1 Namibia gave an overview of the orange roughy data. The SC agreed that the overview on the distribution of the catches gave a better understanding of the fishery and the distribution of the resource; but that there still needs to be further investigations into the South African data. SC noted

that for future information on CPUE should also be considered as this may shed some light on density trends of the species within national EEZs.

7.1.2 Namibia presented results of the 2016 orange roughy scientific survey conducted at well-known orange roughy fishing grounds within the Namibian EEZ (Appendix X). The most interesting result pertained to the decrease in average size from north to south (and the presence of juvenile fish at the two southern-most sites). These latter sites may indicate the nursery areas for this species within the Namibian EEZ. Another important result was the doubling of the total biomass estimate from the 2007 survey to the survey conducted in 2016 – which may be a direct indication of the efficacy of the moratorium on the Namibia fishery. SC noted that, although very interesting, the results do not shed any new light on the connection between the SEAFO and Namibian EEZ stocks – which was a concern raised by the Commission.

7.1.3 The potential for extending the Namibian orange roughy surveys into the SEAFO CA exists, however, given the current Namibian financial state a survey is not likely in the immediate future.

7.2 Patagonian toothfish:

7.2.1 For the further exploration of the toothfish stock dynamics and CPUE standardization SC established a team, headed by Tom Nishida, to conduct this task intersessionally. Results are expected for the 2018 SC meeting.

7.3 Further considerations of guidelines and principles underlying evaluations of appropriateness of closures and possible protocols for revision of closures

7.3.1 As agreed in 2016 by the SC, guidelines and principles underlying evaluations of appropriateness of closures and possible protocols for revision of closures should be drafted and O.A. Bergstad submitted a working document which was discussed during the meeting. An alternative 5-point proposal was presented at the SC meeting and also discussed. The SC concluded to propose a 7-point protocol incorporating elements from both contributions (Appendix XI).

7.4 FAO-ABNJ Deep Seas Project

7.4.1 The Executive Secretary gave feedback on the FAO/ABNJ proposal for an international workshop on the SEAFO deep-sea pot fishery which targets crabs from the *Chaceon* genus. It was concluded that, due to the limited scale of the SEAFO fishery and other fisheries globally, a desktop study is a more appropriate approach than hosting an international workshop. SC agreed that a workshop may be beneficial but SEAFO hosting such a workshop does not seem to be a viable option at this point (Appendix XVIII).
Considering that the workshop did not materialize in 2017, the SC would like to request that the Commission carry-over the funding to 2018.

7.4.2 The Executive Secretary provided information on the FAO/ABNJ proposal to dispatch an expert to Namibia for a desktop study on the stock assessment and socio-economic evaluation of the SEAFO and Namibian orange roughy fisheries – which may serve as the basis for management plan.

7.4.3 On the development of a checklist for the application and evaluation of exploratory fishing the Executive Secretary informed SC that the checklist was developed by the FAO/ABNJ Deep Seas Project and provided to the SC for consideration. The 5-page checklist covers both the submission and review processes of exploratory fisheries and the checklist was approved for use by the Secretariat and SC (Appendix XII).

7.4.4 The Executive Secretary informed the meeting that the Chair of the SC did contact the EAF-Nansen Program on the need for additional research surveys in the SEAFO CA – the details of which were discussed under Agenda Point 17.7.

7.4.5 On behalf of the Project Manager (Chris O'Brien) the Executive Secretary also informed the SC on the 2017 Project Update and 2018 Activities Plan of the FAO-ABNJ Deep Seas Project (Appendix XX) which covered a number of thematic initiatives (sub-projects) under the Project.

7.5 Participation in FAO/CECAF meeting – Dakar, Senegal 8-10 November 2016

7.5.1 Ivone Figueiredo reported from the FAO/CECAF technical workshop on deep-sea fisheries and vulnerable marine ecosystems in the eastern central Atlantic that she attended on behalf of the SEAFO SC. She noted that the workshop was organized as part of the FAO/ABNJ Deep Sea Project that supports the implementation of the International Guidelines for the Management of Deep-sea Fisheries in the High Seas (Appendix XIV).

7.6 Reporting on SIOFA SC meeting

7.6.1 Luis Lopez-Abellan reported on his attendance at the Southern Indian Ocean Fisheries Association (SIOFA) SC meeting and the South Pacific Regional Fisheries Management Organisation (SPRFMO) deep water workshop (Appendix XXI).

7.7 Bycatch species that could be incidentally taken in the SEAFO CA by ICCAT Fisheries

7.7.1 Beau Tjizoo reviewed the ICCAT bycatch tables and none of the SEAFO species were found in the list. Despite that the SC is aware of ICCAT fisheries in the SEAFO CA, these fisheries apparently do not catch SEAFO species.

8 Report by the Executive Secretary presenting landing tables updated to October 2017

8.1 The Executive Secretary presented data and related information submitted by CPs, including additional information made available by SC members. All retained and discarded catches are presented in the landings tables (Appendix IV).

8.2 Historical catch statistics for the SEAFO CA may still be regarded as incomplete. A table with the available data from 1995 to 1998 was listed in the report of the 1st annual meeting of the Commission (SEAFO, 2004). These data were based on a report by Japp (1999). Some data were derived from the "1975-2005 FAO Southeast Atlantic capture production database" and are included in the current tables of annual catch figures (Appendix IV).

9 Review spatial and temporal distribution of fishing activity and biological data

9.1 The spatial distribution maps for all fishing activities recorded during 2017, as well as the biological data tables, were provided and are included in the updated Stock Status Reports.

9.2 The SC noted that in 2017 a trawler conducted fishing (claiming to target hake) in several locations within the CA (specifically Sub-Areas B, C and D, and Division B1), and reported catches of Alfonsino and Pelagic Armourhead (as well as some other species) over a period of 23 days – totaling to 2.4 tons. The activities of this vessel encompassed four fishing days during which a total of 14 tows were completed.

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

10.1 The SC reviewed and updated all data on incidental catches of VME species and spatial distribution (see tables 23-35 of Appendix IV for data on VME catches).

11 Review Stock Status Reports

11.1 All Stock Status Reports were reviewed, updated and are presented as follows:

- Patagonian toothfish - (DOC/SC/05/2017) - Appendix V;
- Orange roughy - (DOC/SC/06/2017) - Appendix VI;
- Deep-sea red crab - (DOC/SC/07/2017) - Appendix VII;
- Pelagic armourhead/Southern boarfish - (DOC/SC/08/2017) - Appendix VIII;
- Alfonsino - (DOC/SC/09/2017) - Appendix IX;

12 Review research activities in the SEAFO CA since October 2016 to date

12.1 No new research activities were conducted within the SEAFO CA since 2016. However, an update was given to the SC on the progress of work related to the SEAFO VME and Seamount Survey conducted with the RV Dr. Fridtjof Nansen in 2015. It was noted that the work on the results from this survey is at an advanced stage and that two research papers are currently being finalized for submission to the African Journal of Marine Science.

13 Examine, where appropriate, assessments and research done by neighbouring States and other organisations

13.1 Apart from the orange roughy surveys in Namibian waters, the SC is not aware of any recent work pertinent to SEAFO in neighbouring states and organisations. However, SC is aware of research activity within the CA - such as the 2014 GEOMAR cruise (2014 GEOMAR Cruise Report) and the 2012 US Walvis Ridge "MV1203 Expedition" cruise (https://earthref.org/ERESE/projects/FMV1203/) and encourage sharing of the results from such undertakings under the SEAFO research guidelines.

13.2 The SC also noted that for any future research proposals, intended to take place within the SEAFO CA, that SC should be notified in advance according to the SEAFO research guidelines. CPs should be encouraged to facilitate such notification.

14 Further Research on SEAFO seamounts under the EAF-Nansen programme in 2019s

14. 1 Odd Aksel Bergstad informed the SC on the updated Science Plan of the EAF-Nansen Program (Appendix XV). He pointed out that the program is structured around three main research fields or pillars (namely "Sustainable Fisheries", "Oil/Gas/Pollution and Habitat Mapping" and "Climate Change") which are further subdivided into a number of thematic research foci. He highlighted that, for the 2019 work program, an area within the SEAFO CA has been identified under Theme 2 of the "Sustainable Fisheries" pillar and advised SC to put a small technical team together in preparation for this research opportunity – to which the SC agreed. This team would take into account the research priorities agreed by the SC in 2015, and signalled to the FAO.

SEAFO Technical Team for the preparation of the 2019 SEAFO EAF-Nansen Survey:

- Odd Aksel Bergstad (Norway – Team Leader)
- Luis Lopez-Abellan (EU)
- Granville Louw (South Africa)
- Elizabeth Voges (SEAFO)
- Tom Nishida (Japan)

14. 2 **ADDENDUM**: A letter was received from the programme Coordinator of the EAF-Nansen Programme (Appendix XIX). just after the SEAFO SC meeting 2017 to confirm that time was allocated for a survey in the SEAFO region in the survey programme of the new R/V Dr Fridtjof Nansen for 2019. SEAFO need to confirm their continued interest in such a collaborative activity

15 Proposal for Scientific and Technical Cooperation on the Walvis Ridge – MARISMA/BCC/Namibia/STRONG High Seas Project

15.1 Erich Maletzky, on behalf of Namibia, informed the SC of work currently underway on EBSAs within the BCLME Region (under the GIZ MARISMA Project facilitated via the Benguela Current Convention, BCC). He noted that the MARISMA Project, being a national Marine Spatial Planning (MSP) initiative, has activated the refinement process for all national and transboundary EBSAs identified in the 2014 CBD South Eastern Atlantic EBSA Report, and that this has resulted in the identification of new (i.e.

previously overlooked) EBSAs within the BCLME Region. In Namibia one promising new EBSA was identified along the north-western region of the EEZ that has a direct link to the already identified Walvis Ridge EBSA located within the SEAFO CA. As such, a request for co-operation on the further technical development (and data sharing) of the Walvis Ridge EBSA was submitted from Namibia to the SEAFO SC for consideration (Appendix XVII). However, although commending the preliminary work done by the MARISMA Project on the Walvis Ridge, SC concluded that the request is better directed at The Commission since SC does not have the mandate to take a decision on such a request. *It was advised that the Commission consider the request for co-operation in this regard as the CBD has already commenced the process on the further enhancement and augmentation of all EBSAs globally. This is a good opportunity for SEAFO to contribute to the refinement work on the Walvis Ridge EBSA, should the Commission request the SC to engage in this activity.*

15.2 The SC then requested more information on the STRONG High Seas Project to which Gunnar Finke (Observer from the GIZ MARISMA Project) responded in sharing some technical details of the project with the SC (Appendix XVII). He noted that this is a 5 year project funded by the German government and that fisheries management research project and regional capacity building opportunities exists for RFMOs like SEAFO. Although the project primarily concerns governance and as such may be of primary interest to the Commission, the SC expressed interest in the project and requested the MARISMA Observer to be kept informed once the program has formally been launched.

16 Review Total Allowable Catches and related management conditions for Patagonian toothfish, Alfonsino, Pelagic amourhead, Orange roughy and Deep-sea red crab

16.1 SC noted that under CM 32/16 the TACs for all SEAFO stocks are only reviewed every two years, and considering that the last reviews were conducted in 2016, no updates to the TAC were expected or provided during 2017.

16.2 Following the directive from the 2016 Commission Meeting to review the 50 ton TAC on orange roughy for the SEAFO CA outside Division B1, the SC reviewed the TAC and noted that orange roughy, being a slow growing and long-lived species as well as being a highly aggregating species, makes it extremely vulnerable to fishing. Furthermore, within the SEAFO CA the stock structure and status of the species are both unknown. Given these aspects, together with the limited knowledge on its biology and population structure and dynamics within the CA, the basis of the scientific advice for the management of orange roughy within SEAFO CA is weak due partly to the lack of scientific surveys. Under these circumstances both the assessment of the status of the stock and the scientific advice provided for the SEAFO CA can only be accomplished under a precautionary approach framework.

16.3 The SC developed advice based on the recorded historic catches of orange roughy within the SEAFO CA outside the main historical fishing area of Division B1, which have never exceeded 25t. The SC suggests two options for the management of orange roughy in areas outside Division B1 (where a moratorium on targeted fishing for orange roughy is in effect):

[a] to adopt a TAC on orange roughy not exceeding 25t allowing a limited target fishery and provision for incidental bycatches; or

[b] to only allow a bycatch on orange roughy in other fisheries not exceeding 25t. Targeted fisheries would be prohibited.

17 Review Recommendations from 2nd Performance Review

17.1 The Commission should identify criteria for maximum acceptable ecosystem impacts of fisheries in relation to inter alia habitat impacts and incidental bycatch. In order to initiate this process, the Commission should request the SC to consider candidates for maximum acceptable impact which are relevant, measurable and can be monitored.

SC considered this request and noted that given the limited data and knowledge linked to all (target and non-target) species within the SEAFO CA this is not an achievable task during the 2017 SC meeting, but possibly in the future. SC also noted that the concept of "maximum acceptable ecosystem impact" is a rather new concept and may take time to develop a set of criteria for implementation or evaluation. The SC recognised the need to identify different impacts, including pelagic fisheries associated with SEAFO CA seamounts and other anthropogenic activities. The SC noted with interest the FAO-ABNJ review and synthesis of the value of different sectors operating in the ABNJ.

17.2 The SC should continue its work on updating the Stock Status reports for stocks targeted by fisheries or where there may be future commercial interest, with an emphasis on the species-specific information as required for the Commission to fulfil its role as responsible for fisheries harvesting target species sustainably in the convention area.

The SC took note of this task and will continue to update all Stock Status Reports on an annual basis.

17.3 For those potential target species where there are no current fisheries this could be based on a risk assessment rather than attempting to move to a full-fledged stock assessment in a situation where no data are available from non-existing fisheries.

The SC discussed the issue and agreed to explore potential risk assessment approaches, applicable to new or re-emerging SEAFO CA fisheries. In particular members are tasked to explore experiences from SIOFA and IOTC where such approaches are being developed and evaluated. The Commission should be aware, however, of the data limitations in the SEAFO CA; hence the SC may have to resort to providing advice on the basis of precautionary principles without stock or risk assessments.

17.4 The SC should develop Ecosystem status reports regarding the interactions between fisheries and the marine ecosystem within the convention area. This could be one for the convention area or a set of reports for different subsystems within the area. The Ecosystem status report(s) should provide information and scientific advice as required by the Commission to fulfil its role in relation to ensuring that fisheries impacts on the marine ecosystem are acceptable. In order to use available resources efficiently on this task a risk based assessment, as discussed in the context of fish species, could be extended to fisheries and also include the wider ecosystem effects of fisheries.

SC noted that this request is dependent on outputs from previous assignments (in particular 17.1 and 17.3), and thus this task will be deferred until results are produced from these preceding tasks. The SC will have this on the agenda for the future meetings.

17.5 The SC should modify its rules of procedure to include guidance on how to proceed in order for the SC to provide conclusions which are helpful to the Commission in cases where there may be different opinions of a scientific nature between scientists.

The SC did not see a strong need to revise the Rules of Procedure #5, but the SC recognised a need to improve its reporting in order to provide guidance and reach conclusions. The SC also took note of the suggestion to report all views expressed during meeting discussions and will, henceforth, fully capture in the report all discussion and decisions reached during the SC meeting.

17.6 The basis for analysis and recommendations by SC, which has important economic, social or political implications for fisheries or member states, should be subject to independent peer review as is normal in science in order to provide trust in the integrity of the advice and recommendation in question. Peer review should apply regarding the scientific soundness of methods to be applied. In cases where a methodology is implemented repeatedly on updated data sets, such as a stock status which is using peer reviewed methodology on a data set which has just been updated with recent data, the SC should be in a position to internally review whether the prescribed methodology has been applied according to standards. Independence of peer reviewers can be judged on basis of the normal criteria used in science including that the reviewer or the organisation he or she is affiliated to should not have an interest in the matter under scrutiny and that there are no relations in terms of organisation, family or economy to any scientists involved in the analysis in the first place.

The SC proposed to revise the Rule of Procedure #6 to ensure that the work done by SC is peer reviewed whenever required – the revised text is emphasized in bold and italics below:

"In the exercise of its functions, the Committee ***shall seek peer review*** *of* ***its methodologies***, ***from FAO or*** other fisheries management, technical or scientific organizations with competence in the subject matter of such consultation, and may ***also*** seek ***independent*** expert advice as required on an ad hoc basis".

17.7 The Commission to consider a revision of protocols for opening of areas closed to all fisheries in order to enable decisions to be made on basis of data which can realistically be collected without jeopardising the health of ecosystems and fish stocks.

The SC drafted a document addressing this issue with the proposed protocols (Appendix XI) as discussed under Agenda Point 7.3.

18 Develop a protocol on Exceptional Circumstances on the application of Harvest Control Rules (HCR) to be considered by the Commission

18.1 The SC discussed a proposal under consideration pertaining to the application HCRs under exceptional conditions (Appendix XVI). The SC agreed that when the stock and fisheries evaluation indicates that exceptional circumstances are occurring, the SEAFO Commission shall consider a range of responses/possible courses of action taking into account the degree and types of circumstances noted. The responses/courses of action will be considered in the following sequence:

1. **Review the information, but maintain the HCR as the management tool; additional research/monitoring may be recommended to determine if the signal detected warrants moving to step 2;**

2. **Advance the review period, and potentially revise the HCR, but implement the HCR outputs;**

3. **Set a precautionary catch limit that departs from the HCR. The catch limits propose should be based on the best knowledge and assessment of sustainable harvesting level.**

19 Genetic analysis of orange roughy in Namibia

19.1 The SC, nor any CP, conducted genetic studies on orange roughy stock in the relevant EEZs and the SEAFO CA since 1998 (Flint *et. al.* 1998). A literature review revealed only two studies of relevance to orange roughy. The first was an international study done across 13 global sampling sites (Varela 2013); and the second was on a more localized scale with based on two sampling sites within the Namibian EEZ (Flint *et. al.* 1998). SC noted that, aside from the fact that neither of these studies answered the EEZ-SEAFO straddling stock issue. The two studies also used different genetic approaches (methodologies) that may not be fully comparable or appropriate for exploring population structure at the relevant spatial scale.

19.2 The SC will pursue all avenues and opportunities for obtaining orange roughy samples from the SEAFO CA for comparison with the Namibian and South African EEZ samples. SC agreed to contact geneticists at the relevant regional institutions as a preparatory step to the analysis of the samples. The SC still needs to ascertain the financial implications of having the genetic studies done locally or within the region. The SC will be exploring funding opportunities for the analysis (including via the FAO-ABNJ program).

20 Notice of Intent and Preliminary Impact Assessment for the 2018 Exploratory Fishing – Japan

20.1 The SC assessed the 2018 Notice of Intent for Exploratory Fishing submitted by Japan (Appendix XXII) and discussed the following issues which have relevance to the exploratory fishing endeavours of Japan. SC agreed, that although no objections were submitted against the proposal as the proposal satisfies conservation measures that need to be followed and areas proposed for exploratory fishing are areas that have historical fishing footprints, there are important concerns and issues that need to be highlighted for consideration by the Commission. These points raised by some SC members are as follows:

[1] Although stated as such in the proposal it is not clear how exactly the exploratory fishing plan, proposed by Japan, effectively limits fishing effort;

[2] Exploration will be conducted in an unmapped area where there is almost no information on the actual presence of VME indicators or VMEs. However, there is insufficient evidence to determine whether or not there are VMEs in the area, but in the shallower summits there are historic

records of VME indicator bycatches. The current proposal intends to proceed with exploration without the attempt of providing additional (more reliable) mapping data in this regard;

[3] There are conflicting indications about the use of trot-lines in that it is stated as having minimal impact on VMEs (and the retention during fishing operations), but alternatively also as being sufficient for a method for effectively mapping VMEs;

[4] If the past and proposed exploratory fishing in the Discovery area leads to the further expansion of the existing fishing area all summits shallower than 2000m will be open to fishing.

20.2 As a response to the concerns listed above, additional information and comments were provided by the experts from the proposing CP that:

1. Exploratory data stations will be set in such a way that it covers the exploratory area representatively above the 2,000m depth isobar (stipulated by the 2014 Commission meeting and CM30/15);

2. Based on past exploratory fishing, the weight of retained VME indicators on the proposed exploratory fishing area are negligible (89% of the sets showed no VME catch and the average weight/set is 61g, i.e., 0.61% of the threshold value), which is the sufficient evidence no SAI on VME indicators even without bottom maps;

3. The major reason of low bycatches of VME indicators is that the trot longline method is the least bottom touching gear, i.e., hooks in the deepest depth are 2 m above the bottom (thus hooks unlikely touch the bottom);

4. Uncertainties of retained VME bycatch weights due to drops-out are minimal, i.e., during hauling, hooks are entangled and become one bulk like a ball gripping VME indicators firmly, thus minimize drops-outs. In addition, hooks are mechanically hauled, but when hooks reach to the surface, crews haul manually to slow down to avoid drops-out. With these 2 facts, weights of VME indicators are likely close to real values in the Trot LL method.

5. Two precautionary approaches are applied to protect excess bycatch of VME indicators, i.e., (a) the exploratory fishing applies the longer move away distances (2 miles instead of 1 mile) to prevent excess bycatch of VME indicators and (b) exploratory fishing limit catch less than 15% of TAC to minimize fishing efforts and VME indicator bycatches.

20.3 The assessment by the SC did not result in a firm conclusion as to whether Significant Adverse Impacts on VMEs would be prevented.

21 Data Request from New Zealand's Ministry of Primary Industries for Seabird Risk Assessment

21.1 The Executive Secretary informed the SC of a data request on seabirds that was submitted to SEAFO from New Zealand (Appendix XXIII). SC looked at the existing data on seabirds and noted that most of the data are currently not captured into the SEAFO database.

21.2 SC also discussed the fields for the requested data and expressed uncertainty on the need of data such as vessel flag which impacts data confidentiality issues.

21.3 SC took note of the data request but agreed to forward the request to the Commission for decision.

22 Request for tissue samples of *Antimora* sp. for systematics study

22.1 The Executive Secretary informed the SC of a biological sample request from the ichthyologist Alexei Orlov targeting specifically *Antimora* sp. - also known as velvet cod (Appendix XXIV). The SC expressed willingness to provide the samples wherever possible and noted that the Japanese patagonian toothfish fleet is the only avenue for obtaining these samples at present. The Japanese delegation acknowledged receipt of the request and will consult the vessel and observer on the feasibility of accommodating the sample collection request.

23 Any Other Matters

23.1 A request was submitted to SEAFO on the co-operation of drafting a Memorandum of Understanding (MoU) between the Agreement on the Conservation of Albatrosses and Petrels (ACAP) and SEAFO on the mitigation of albatross and petrel bycatches in 2015. SC noted that very little progress has been made on this request since 2015 and encouraged further development (and commitment for participation in drafting) of the MoU.

23.2 On the resubmission of the EU proposal for a Gillnet Conservation Measure (Appendix XXV) SC maintains that there currently is no gillnet fisheries in SEAFO CA. The SC is not able to quantify the potential effect of gillnet fisheries on bottom resources and their habitats. The SC noted however that the knowledge available on the effect of gillnet fisheries over probably similar habitats as in the SEAFO CA show that their use may have significant negative effects on those ecosystems. Issues of concern are that abandoned or lost nets become entangled on three-dimensional features, and can maintain high ghost fishing catch rates for relatively long periods (several months to several years) (FAO; 2016). The SC noted that NEAFC has had a bottom gillnet ban beyond 200 metres since 2006 (REC. 03/2006). SC noted that the technical basis for Recommendation 2/2009 regarding gillnet fishing is still valid.

The SC noted that there is a need, as a precautionary measure, to prevent the development of gillnet fisheries in the SEAFO CA.

23.3 On the resubmission of EU proposal on Conservation Measure 04/06 (Appendix XXVI) for adoption by The Commission: The SC still maintains that the status of the deep-water sharks in the SEAFO CA is not known. Furthermore, the SC recognises that no assessment of the deep-water sharks in the SEAFO CA has ever been conducted, due to the lack or insufficient data available. Therefore, the SC is not in a position to conduct such an evaluation and subsequently is unable to provide scientific advice. The SC considered how the issue of deep-water sharks is dealt with in NEAFC and CCAMLR. NEAFC have adopted a recommendation on a ban of directed fishing for deep sea sharks since 2012 (NEAFC Recommendation 7: 2012). CCAMLR adopted a conservation measure that bans directed fishing on shark species in the Convention Area, for purposes other than scientific research. Any by-catch of sharks, especially juveniles and gravid females, taken accidentally in other fisheries, shall, as far as possible, be released alive (CM 32/18 (2006)).

The SC noted that a targeted fishery for deep water sharks should not be allowed within the SEAFO CA.

24 Collate advice and recommendations to the Commission on issues emanating from the 2017 meeting

Agenda Point 7.4:

Context: N$50 000 budget allocation for 2017 deep-sea red crab and orange roughy workshop.

Advice: Considering the workshop did not materialize in 2017 SC would like to notify The Commission to carry-over the funding to 2018.

Agenda Point 15:

Context: Request from Namibia for the co-operation on the Walvis Ridge EBSA refinement.

Advice: It was advised that the Commission consider the request for co-operation in this regard as the CBD has already commenced the process on the further enhancement and augmentation of all EBSAs globally. This is a good opportunity for SEAFO to contribute to the refinement work on the Walvis Ridge EBSA, should the Commission request the SC to engage in this activity.

Agenda Point 17.6:

Context: Review the Rules of Procedure #6 on the peer review of SC scientific work.

Advice: The SC proposed the following changes to the Rules of Procedure #6 for consideration by the Commission: "In the exercise of its functions, the Committee shall seek peer review of its methodologies, from FAO or other fisheries management, technical or scientific organizations with competence in the subject matter of such consultation, and may also seek independent expert advice as required on an ad hoc basis".

Agenda Point 18:

Context: The protocol on Exceptional Circumstances on the application of HCRs.

Advice: The SC agreed that when the stock and fisheries evaluation indicates that exceptional circumstances are occurring, the Commission shall follow the proposed 3 point protocol provided in section 18.1.

Agenda Point 20:

Context: The 2018 Notice of Intent for Exploratory Fishing by Japan.

Advice: SC agreed, that although no objections were submitted against the Notice of Intent, concerns were expressed and the assessment did not result in a firm conclusion as to whether Significant Adverse Impacts on VMEs would be prevented.

Agenda Point 21:

Context: New Zealand request for data on seabirds and fisheries.

Advice: SC took note of the data request but agreed to forward the request to the Commission for decision.

Agenda Point 23.2:

Context: Conservation Measure on the banning of gillnets in the SEAFO CA.

Advice: The SC noted that there is a need, as a precautionary measure, to prevent the development of gillnet fisheries in the SEAFO CA.

Agenda Point 23.3:

Context: Conservation Measure on the deep-water shark fisheries in the SEAFO CA.

Advice: The SC noted that a targeted fishery for deep water sharks should not be allowed within the SEAFO CA.

25 2018 Work Program

The SC discussed the work program for 2018 and outlined activities still pending for the remainder of 2017 as follows:

25.1 A number of work items (focussed around Orange roughy) emanated from the 2017 SC meeting and these are outlined below:
- South Africa to collate and provide orange roughy commercial (bycatches) and survey data from within its EEZ to the SEAFO Secretariat for consideration (Agenda Point 7.1).
- Collation of additional scientific information from Namibian-Spanish surveys (2008-2010) and the 2015 Dr. Fridtjof Nansen seamount survey (Agenda Point 7.1).
- Intersessional collation of information on Namibian and SEAFO orange roughy CPUE (Section 7.1.1).
- Namibia and South Africa to provide biological samples for genetic studies on orange roughy (Section 19.2)

25.2 Intersessional collaboration on the Patagonian toothfish stock dynamics and CPUE standardization (Agenda Point 7.2).

25.3 Development of proposal for an EAF-Nansen Program cruise in 2019 (Agenda Point 14).

25.4 Attempt to develop risk assessment approaches for new or re-emerging SEAFO fisheries (Agenda Point 17.3).

25.5 Intersessional consideration for the development of ecosystem status reporting (Agenda Point 17.4).

25.6 FAO-ABNJ Deep Seas Project in collaboration with NPFC. VME workshop participation: 12-15 March 2018 (Section 7.4.5).

25.7 FAO-ABNJ Deep Seas Project activities (e.g. follow up: orange roughy workshop and red crab desktop study – Agenda Point 7.4)

25.8 Data provision to SC and data validation (by stock co-ordinators) to be completed by mid-September 2018, given that the Secretariat receives data from CPs by end of August 2018. Stock Status Reports to be updated (post-data validation) intersessionally leading up to the 2018 SC meeting.

25.9 Review of the 2016 *SC "Procedures and Standards for SEAFO SC's Consideration of Proposals for Exploratory Fishing"* – in light of experiences gained during the 2017 SC meeting.

26 Budget for 2018

26.1 Given the 2018 work plan and other outcomes of the 2017 SC meeting the following budget is requested for consideration at the 2017 Commission meeting:
- N$50 000 (FAO-ABNJ Project: red crab desktop study) – funds to be carried-over to 2018.

27 Adoption of the report

27.1 The 2017 Scientific Committee Report was adopted at 17:47 on Thursday, 23 November 2017.

28 Duration, date and place of the next meeting

Duration: 5 days
Date: November 2018
Venue: TBD

SC agreed that the date and the venue for the 2018 SC meeting be at the discretion of the Commission.

29 Closure of meeting

29.1 On Thursday 23 November 2017 at 17h47, the Chairperson declared the 13th SEAFO Scientific Committee meeting closed. The Chairperson expressed his satisfaction for the work accomplished and thanked all participants for their valuable contributions.

30 References

Flint N.S., Van de Bank F.H., Theron J.P. *& A. Staby* 1998 – Genetic variation in two populations of Orange roughy (Hoplosthetus atlanticus) from Namibia. *Southern African Journal of Aquatic Sciences*, 24:1-2, 71-83.

Japp D. (1999) – An updated review of the catch statistics in the SEAFO Area was prepared by D.W. Japp, Fisheries and Oceanographic Support Services cc, Cape Town for consideration at the SEAFO Meeting in Cape Town on 27 September 1999. Unpublished.

Varela 2013 – A

APPENDIX I – Agenda for 13th SEAFO Scientific Committee Meeting

PROVISIONAL AGENDA FOR THE 13TH ANNUAL MEETING OF THE SCIENTIFIC COMMITTEE (SC) - 2017

CHAIR: **Beau Tjizoo (NAMIBIA)**
VICE-CHAIR: **Granville Louw (SOUTH AFRICA)**

Venue: Strand Hotel, Swakopmund
Date: 20-24 November 2017

	Agenda Item	Working Document
1	Opening and welcome remarks by the Chairperson	
2	Adoption of the agenda and meeting arrangements	DOC/SC/01/2017 DOC/SC/02/2017
3	Appointment of Rapporteur	
4	Introduction of Observers	
5	Introduction of Delegates	
6	Review of submitted SEAFO working documents and any related presentations, allocation to the agenda items	DOC/SC/00/2017
7	Review 2017 work program	DOC/SC/04/2017 DOC/SC/10/2017 DOC/SC/17/2017 DOC/SC/19/2017 DOC/SC/22/2017
8	Report by the Executive Secretary presenting landing table updated to October 2017	DOC/SC/03/2017
9	Review spatial and temporal distribution of fishing activity and biological data	DOC/SC/03/2017
10	Review the spatial distribution of reported catches of benthic organisms	DOC/SC/03/2017
11	Review Stock Status Reports 12.1 Patagonian toothfish 12.2 Orange roughy 12.3 Deep-sea Red Crab 12.4 Southern boarfish/pelagic amourhead 12.5 Alfonsino	 DOC/SC/05/2017 DOC/SC/06/2017 DOC/SC/07/2017 DOC/SC/08/2017 DOC/SC/09/2017
12	Review research activities in the SEAFO CA since October 2016 to date	
13	Examine, where appropriated, assessments and research done by neighboring States and other organizations	
14	Further Research on SEAFO seamounts under the EAF-Nansen programme in 2019	DOC/SC/11/2017
15	Proposal for Scientific and Technical Cooperation on the Walvis Ridge – MARISMA/BCC/Namibia/ Strong High Seas Project (Observer)	DOC/SC/12/2017
16	Review Total Allowable Catches and related management conditions for Patagonian tootfish, Alfonsino, Amourhead, Orange roughy and Deep-sea Red Crab	
17	Review Recommendations from 2nd Performance Review (2016)	
18	Develop a protocol on Exceptional Circumstances on the application of Harvest Control Rules (HCR) to be considered by Commission	DOC/SC/13/2017
19	Genetic analysis of orange roughy in Namibia	

20	Notice of Intent and Preliminary Impact Assessment for the 2018 Exploratory Fishing - Japan	DOC/SC/14/2017
21	Data Request from New Zealand's Ministry of Primary Industries for seabird risk assessment	DOC/SC/15/2017
22	Request for tissue samples of *Antimora* spp.for Genetic study	DOC/SC/16/2017
23	Any other matters	DOC/SC/18/2017 DOC/SC/20/2017 DOC/SC/21/2017 DOC/SC/23/2017
24	Collate Advice and recommendations to the Commission on issues emanating from the 2017 meeting	
25	2018 work programme	
26	Budget for 2018	
27	Adoption of the report	
28	Date and place of the next meeting	
29	Closure of the meeting	

Circulation Date: 20 October 2017
Updated: 15 Nov 2017

SEAFO Website http://www.seafo.org/Meetings

APPENDIX II – List of Participants

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No participation in the 13th SEAFO SC meeting.

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APPENDIX III – List of Working Documents submitted for the 13th SEAFO SC Meeting

LIST OF DOCUMENTS FOR THE 13TH SCIENTIFIC COMMITTEE (SC) MEETING (2017)

CHAIR: **Beau Tjizoo (NAMIBIA)**
VICE-CHAIR: **Granville Louw (SOUTH AFRICA)**

Venue: Strand Hotel, Swakopmund
Date: 20-24 November 2017

Document Ref. Number	Agenda Item	Document Title	Provider	Availability of Document
DOC/SC/00/2017	All	List of documents	Secretariat	Available before meeting
DOC/SC/01/2017	All	Provisional agenda of the 13th Annual Meeting of the Scientific Committee	Secretariat	Available before meeting
DOC/SC/02/2017	All	Provisional Annotated Agenda of the 13th Annual Meeting of the Scientific Committee	Secretariat	Available before meeting
DOC/SC/03/2017	8/9/10	2017 Landing tables	Secretariat	Available before meeting
DOC/SC/04/2017	7	Considerations of guidelines and principles underlying evaluations of appropriateness of closures and possible protocols for revision of closures.	Norway	Available before meeting
DOC/SC/05/2017	11	Stock Status Report Patagonian toothfish	Secretariat	Available before meeting
DOC/SC/06/2017	11	Stock Status Report Orange roughy	Secretariat	Available before meeting
DOC/SC/07/2017	11	Stock Status Deep-sea Red Crab	Secretariat	Available before meeting
DOC/SC/08/2017	11	Stock Status Report of Southern Boarfish/pelagic amourhead	Secretariat	Available before meeting
DOC/SC/09/2017	11	Stock Status Report of Alfonsino	Secretariat	Available before meeting
DOC/SC/10/2017	7	Checklist, application and evaluation template for exploratory fishing applications	Secretariat/FAO/ABNJ	Available before meeting
DOC/SC/11/2017	14	Further Research on SEAFO seamounts under the EAF-Nansen programme in 2019	Norway	Available before meeting
DOC/SC/12/2017	15	Proposal for Scientific and Technical Cooperation on the Walvis Ridge – MARISMA/BCC/Namibia/ Strong High Seas Project (Observer)	MARISMA/BCC/Namibia/ Strong High Seas Project (Observer)	Available before meeting

DOC/SC/13/2017	18	Develop a protocol on Exceptional Circumstances on the application of Harvest Control Rules (HCR) to be considered by Commission	EU	Available before meeting
DOC/SC/14/2017	20	Letter of Intent and Standards for the 2018 Exploratory Fishing - Japan	Japan	Available before meeting
DOC/SC/15/2017	21	Data Request from New Zealand's Ministry of Primary Industries for seabird risk assessment	New Zealand's Ministry of Primary Industries (Nathan Walker)	Available before meeting
DOC/SC/16/2017	22	Request for tissue samples of *Antimora* spp.for Genetic study	Scientist (Alexei Orlov)	Available before meeting
DOC/SC/17/2017	7	Report CECAF meeting on VME	EU	Available before meeting
DOC/SC/18/2017	23	Draft Arrangement ACAP/SEAFO	Secretariat	Available before meeting
DOC/SC/19/2017	7	Report SIOFA SC Meeting	EU	Available before meeting
DOC/SC/20/2017	23	Proposal CM Banning of gillnets	EU	Available before meeting
DOC/SC/21/2017	23	Proposal Revision CM 04-06	EU	Available before meeting
DOC/SC/22/2017	7	Potential of Deep-sea Crab workshop	FAO/ABNJ	Available before meeting
DOC/SC/23/2017	23	ABNJ progress report for 2017	ABNJ	Available at meeting

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SEAFO Website http://www.seafo.org/Meetings

APPENDIX IV – Landings, discards and bycatch tables

Retained & Discarded TAC species

NOTE: Catch figures were added for 2017 and the previous data was taken as is from the 2016 report.

Table 1: *Catches (tonnes) of Patagonian toothfish (Dissostichus eleginoide) (**TOP**) by South Africa, Spain, Japan and Korea.*

Nation	Spain		Japan				Korea				South Africa			
Fishing method	Longlines		Longlines				Longlines				Longlines			
Management Area	D0		D0		D1		D0		D1		D0		D1	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2002	18													
2003	101		47				245							
2004	6		124											
2005	-	-	158				10							
2006	11		155											
2007	-		166											
2008	-	-	122	0	-	-	76							
2009	-	-	86	0	74	0	16	0	46	0	-	-	-	-
2010	26	0	-	-	54	2	-	-	-	-	-	-	-	-
2011	-	-	159	6	-	-	-	-	-	-	15	0	28	0
2012	-	-	86	3	-	-	-	-	-	-	24	0	12	0
2013	-	-	41	2	19	1	-	-	-	-	-	-	-	-
2014	-	-	47	<1	6	<1	-	-	-	-	-	-	-	-
2015	-	-	52	<1	7	<1	-	-	-	-	-	-	-	-
2016	-	-	7	<1	53	<1	-	-	-	-	-	-	-	-
2017*	-	-	12	<1	-	-	-	-	-	-	-	-	-	-

- = No Fishing. Blank fields = No data available * Provisional (September 2017).

Table 2: *Catches (tons) of Orange roughy (Hoplostethus atlanticus) (**ORY**) made by Namibia, Norway and the Republic of South Africa.*

Nation	**Namibia**		**Norway**		**South Africa**	
Fishing method	**Bottom trawl**		**Bottom trawl**		**Bottom trawl**	
Management Area	**B1**		**A1**		**B1**	
Year	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**
1995	40		-			
1996	8		-			
1997	5		22		27#**	
1998	-	-	12			
1999	<1		-	-		
2000	75		0			
2001	94		-	-		
2002	9		-	-		
2003	27		-	-		
2004	15		-	-		
2005	18		-	-		
2006	-	-	-	-		
2007	-	-	-	-	-	-
2008	-	-	-	-	-	-
2009	-	-	-	-	-	-
2010	-	-	-	-	-	-
2011	-	-	-	-	-	-
2012	-	-	-	-	-	-
2013	-	-	-	-	-	-
2014	-	-	-	-	-	-
2015	-	-	-	-	-	-
2016	-	-	-	-	-	-
2017*	0	0	-	-	-	-

- = No Fishing. Blank fields = No data available. * Provisional (September 2017).

** Sum of Catches from 1993 to 1997. #Values taken from the Japp (1999).

Table 3A: *Catches (tonnes) of Alfonsino (Beryx splendens) (**ALF**) made by various countries.*

Flag State	Namibia		Namibia		Namibia		Norway		Russia		Portugal		Ukraine		Korea	
Fishing method	Bottom trawl		Bottom trawl		Bottom trawl		Bottom trawl		Bottom trawl		Bottom trawl		UNK		Mid-water trawl	
Management Area	B1		C0		C1		A1		UNK		UNK		UNK		B1	
Year	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded
1976									252#							
1977									2972#							
1978									125#							
1993													172§			
1994																
1995	1#						-	-								
1996	368#						-	-					747§			
1997	208#						836		2800#				392§			
1998	-	-					1066		69§							
1999	1						-	-			3§					
2000	<1						242				1§					
2001	1						-	-			7§					
2002	0						-	-			1§					
2003	0						-	-			5§					
2004	6						-	-	210							
2005	1						-	-	54							
2006	-	-					-	-	-	-	<1					
2007	-	-					-	-	-	-	-	-	-	-	-	-
2008	-	-					-	-	-	-	-	-	-	-	-	-
2009	-	-					-	-	-	-	-	-	-	-	-	-
2010	-	-					-	-	-	-	-	-	-	-	159	0
2011	-	-					-	-	-	-	-	-	-	-	165	0
2012	-	-					-	-	-	-	-	-	-	-	172	0
2013	-	-					-	-	-	-	-	-	-	-	13	0
2014	-	-					-	-	-	-	-	-	-	-	-	-
2015	-	-					-	-	-	-	-	-	-	-	-	-
2016*	-	-					-	-	-	-	-	-	-	-	-	-
2017*	0	0	<1	0	<1	0	-	-	-	-	-	-	-	-	-	-

* Provisional (September 2017). - = No Fishing. Blank fields = No data available. UNK = Unknown. # = Values taken from the Japp (1999). § = Values from FAO

Two species targeted, however, *Beryx splendens* constitutes majority of the catch total.

Table 3B: *Catches (tonnes) of Alfonsino (Beryx spp).(**ALF**) made by various countries.*

Nation	Spain		Poland		Cook Island		Mauritius		Cyprus		South Africa	
Fishing method	Mid-water trawl and Longlines		UNK		Bottom trawl		Bottom trawl		Bottom trawl		Bottom trawl	
Management Area	UNK		UNK		UNK		UNK		UNK		B1	
Year	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded
1976												
1977												
1978												
1993												
1994												
1995			1964§								60#	
1996											109#	
1997	186§										124#	
1998	402§											
1999												
2000												
2001	2											
2002												
2003	2											
2004	4				142		115		437			
2005	72											
2006	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-	-	-	-	-
2017*	-	-	-	-	-	-	-	-	-	-	-	-

* Provisional (September 2017). - = No Fishing. Blank fields = No data available. UNK = Unknown. # = Values taken from the Japp (1999). § = Values from FAO.
Two species targeted: Beryx splendens represents majority of catch.

Table 4: *Catches (tonnes) of Deep-sea red crab (Chaceon spp., considered to be mostly Chaceon erytheiae) (**GER)***

Nation	Japan		Korea		Namibia		Spain		Portugal	
Fishing method	Pots		Pots		Pots		Pots		Pots	
Management Area	B1		B1		B1		UNK		A	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2001			-	-			<1			
2002			-	-						
2003			-	-			5			
2004			-	-			24			
2005	253	0	-	-	54					
2006	389		-	-						
2007	770		-	-	3	0			35	
2008	39		-	-						
2009	196		-	-	-	-	-	-	-	-
2010	200	0	-	-			-			
2011	-	-	-	-	175	0	-	-	-	-
2012	-	-	-	-	198	0	-	-	-	-
2013	-	-	-	-	196	0	-	-	-	-
2014	-	-	-	-	135	0	-	-	-	-
2015	-	-	104	0	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-	-	-
2017*	140	0	-	-	7	0	-	-	-	-

* Provisional (September 2016). Ret. = Retained Disc. = Discarded - = No Fishing.
Blank fields = No data available. UNK = Unknown.
*[**Note:** C. erytheiae not in database species list? GER = Geryon spp]*

Table 5a: *Catches (tonnes) of Pelagic armourhead (Pseudopentaceros richardsoni)(* ***EDR****).*

Nation	Namibia		Russia		Ukraine		Namibia	
Fishing method	Bottom trawl		Bottom trawl		Bottom trawl		Bottom trawl	
Management Area	B1		B1		UNK		C0	
Year	Retained	Discarded	Retained	Discarded	Retained	Discarded	Retained	Discarded
1976			108					
1977			1273					
1978			53					
1993			1000		435§			
1994								
1995	8				49			
1996	284				281			
1997	559				18			
1998	-							
1999	-							
2000	20							
2001	-							
2002	-							
2003	4							
2004								
2005								
2006								
2007								
2008								
2009	-	-	-	-	-	-		
2010	-	-	-	-	-	-		
2011	-	-	-	-	-	-		
2012	-	-	-	-	-	-		
2013	-	-	-	-	-	-		
2014	-	-	-	-	-	-		
2015	-	-	-	-	-	-		
2016	-	-	-	-	-	-		
2017*	<1	0	-	-	-	-	<1	0

* Provisional (September 2017). - = No Fishing. Blank fields = No Data Available.
UNK = Unknown. § = Values from FAO

Table 5b: *Catches (tonnes) of Pelagic armourhead (Pseudopentaceros richardsoni) (**EDR**).*

Nation	Spain		Cyprus		Korea		South Africa	
Fishing method	Bottom trawl and Longline		Bottom trawl		Mid-water trawl		Bottom trawl	
Management Area	B1		UNK		B1		B1	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
1976								
1977								
1978								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								
2001	<1							
2002								
2003	3							
2004	3		22					
2005								
2006								
2007								
2008								
2009	-	-	-	-	-	-	-	-
2010	-	-	-	-	688	0	-	-
2011	-	-	-	-	135	0	-	-
2012	-	-	-	-	152	<1	-	-
2013	-	-	-	-	13	0	-	-
2014	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-
2017*	-	-	-	-	-	-	-	-

* Provisional (September 2017). - = No Fishing. Blank fields = No Data Available.
UNK = Unknown. § = Values from FAO

Retained & Discarded Bycatch species

Table 6: *Catches (tonnes) of oreo dories - Allocyttus verucossus (**ALL**), Neocyttus rhombiodalis (**ONV**), Allocyttus guineensis (**DMY***). Smooth oreo dories- Pseudocyttus maculatus (**SSO**).*

***NOTE:** DMY not in database

Nation	Russia		Cyprus		Mauritius		Namibia	
Fishing method	UNK		UNK		UNK		Bottom trawl	
Management Area	UNK		UNK		UNK		UNK	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
1995							<1	
1996							0	
1997							35	
1998							-	-
1999							3	
2000							33	
2001							14	
2002							1	
2003							1	
2004	<1		21		25		0	
2005							4	
2006								
2007								
2008								
2009								
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-
2017*	-	-	-	-	-	-	-	-

* Provisional (September 2017). - = No Fishing. Blank fields = No data available.
UNK = Unknown.

Table 7: *Catches (tonnes) of Wreckfish (Polyprion americanus). (**WRF**)*

Nation	Portugal	
Fishing method	Longlines	
Management Area	A	
Year	Retain	Discard
2004	1	
2005		
2006	6	
2007	9	
2008		
2009	0	0
2010	0	0
2011	0	0
2012	0	0
2013	-	-
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing. Blank fields = No data available.

Table 8: *Catches (tonnes) of Blackbelly rosefish (Helicolenus spp.). (**BRF**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	161	0
2011	47	0
2012	44	0
2013	4	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

Table 9: *Catches (tonnes) of Imperial Blackfish (Schedophilus ovalis). (**HDV**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retained	Discarded
2010	24	0
2011	35	0
2012	24	0
2013	<1	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

Table 10: *Catches (tonnes) of Silver Scabbardfish (Lepidotus caudatus). (**SVS**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	30	0
2011	15	0
2012	2	0
2013	0	<1
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

Table 11: *Catches (tonnes) of Mackerel (Scomber japonicus). (**MAZ**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	50	0
2011	0	0
2012	0	0
2013	0	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

***Table 12**: Catches (tonnes) of Cape Horse Mackerel (Trachurus capensis). (**HMC**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	1	0
2011	0	0
2012	0	0
2013	0	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

***Table 13:** Catches (tonnes) of Cape Bonnetmouth (Emmelichthys nitidus). (**EMM**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	11	0
2011	2	0
2012	<1	0
2013	0	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

***Table 14:** Catches (tonnes) of Oilfish (Ruvettus pretiosus). (**OIL**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	5	0
2011	13	0
2012	7	<1
2013	<1	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

***Table 15**: Catches (tonnes) Gemfish (Roudiescolar, Promethichthys prometheus). (**PRP**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	0	0
2011	0	0
2012	<1	0
2013	0	0
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

***Table 16:** Catches (tonnes) of Orange bellowfish (**NPR**)*

Nation	Korea	
Fishing method	Mid-water trawl	
Management Area	B1	
Year	Retain	Discard
2010	0	0
2011	0	0
2012	0	<1
2013	0	<1
2014	-	-
2015	-	-
2016	-	-
2017*	-	-

*Provisional (September 2017). - = No Fishing.

Table 17: *Catches (tonnes) of Grenadiers nei (Macrourus spp.) (**GRV**)*

Nation	Spain				Japan				Korea		South Africa				Namibia	
Fishing method	Longlines				Longlines				Longlines		Longlines				Bottom Trawl	
Management Area	D0		D1		D0		D1		D0		D0		D1		D0	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2009	-	-	-	-	0	0	0	6	0	<1	-	-	-	-		
2010	4	<1	2	0	0	0	0	3	-	-	-	-	-	-		
2011	-	-	-	-	0	22	0	0	-	-	0	0	0	0		
2012	-	-	-	-	0	21	0	0	-	-	0	3	0	<1		
2013	-	-	-	-	0	7	0	<1	-	-	-	-	-	-		
2014	-	-	-	-	0	6	0	<1	-	-	-	-	-	-		
2015	-	-	-	-	0	<1	0	2	-	-	-	-	-	-		
2016	-	-	-	-	1	1	0	2	-	-	-	-	-	-		
2017*	-	-	-	-	0	1	-	-	-	-	-	-	-	-	0	<1

*Provisional (September 2017). - = No Fishing.

Table 18: *Catches (tonnes) of Blue antimora (Antimora rostrata). (**ANT**)*

Nation	Spain				Japan				Korea				South Africa			
Fishing method	Longlines				Longlines				Longlines				Longlines			
Management Area	D0		D1		D0		D1		D0		D1		D0		D1	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2009	-	-	-	-	0	0	0	5	0	<1	0	<1	-	-	-	-
2010	0	<1	0	<1	0	0	0	1	-	-	-	-	-	-	-	-
2011	-	-	-	-	0	5	0	0	-	-	-	-	0	0	0	0
2012	-	-	-	-	0	4	0	0	-	-	-	-	0	<1	0	<1
2013	-	-	-	-	0	<1	0	<1	-	-	-	-	-	-	-	-
2014	-	-	-	-	0	2	0	<1	-	-	-	-	-	-	-	-
2015	-	-	-	-	0	<1	0	<1	-	-	-	-	-	-	-	-
2016	-	-	-	-	0	<1	0	<1	-	-	-	-	-	-	-	-
2017*	-	-	-	-	0	<1	-	-	-	-	-	-	-	-	-	-

*Provisional (September 2017). - = No Fishing.

Table 19: *Catches (tonnes) of Antarctic toothfish (Dissostichus mawsoni). (**TOA**)*

Nation	Japan			
Fishing method	Longlines			
Management Area	D0		D1	
Year	Retain	Discard	Retain	Discard
2014	< 1	0	0	0
2015	0	0	0	0
2016	0	0	0	0
2017*	0	0	-	-

*Provisional (September 2017).

Table 20: *Catches (tonnes) of King crab (Lithodidae spp., Lithodes ferox, Paralomis formosa). (**KCA, KCF, KCX**)*

Nation	Spain				Japan				Korea	
Fishing method	Longlines				Longlines				Pots	
Management Area	D0		D1		D0		D1		B1	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2009	-	-	-	-	0	0	0	<1	-	-
2010	0	<1	0	<1	0	0	0	<1	-	-
2011	-	-	-	-	0	0	-	-	-	-
2012	-	-	-	-	0	0	-	-	-	-
2013	-	-	-	-	0	<1	0	<1	-	-
2014	-	-	-	-	0	0	0	0	-	-
2015	-	-	-	-	0	0	0	0	1	0
2016	-	-	-	-	<1	0	0	<1	-	-
2017*	-	-	-	-	0	<1	-	-	-	-

- = No Fishing. *Provisional (September 2016).

Table 21: *Catches (tons) of Sharks (Selachimorpha spp., Etmopterus lucifer, Prionace glauca). (**SKH, ETF, BSH**)*

Nation	Japan			
Fishing method	Longlines			
Management Area	D0		D1	
Year	Retain	Discard	Retain	Discard
2009	0	<1	0	0
2010	0	0	0	0
2011	0	0	-	-
2012	0	0	-	-
2013	0	<1	0	0
2014	0	0	0	0
2015	0	<1	0	0
2016	0	0	0	0
2017*	0	0	-	-

- = No Fishing. *Provisional (September 2017).

Table 22: *Incidental mortality (seabirds: Black-browed Albatross (Thalassarche melanophris) (**DIM**); Wandering Albatross (Diomedea exulans) (**DIX**); Southern giant Petrel (Macronectes giganteus) (**MAI**); Great Shearwater (Puffinus gravis) (**PUG**).*

Nation	Japan			
Fishing method	Longlines			
Management Area	D			
Year	DIM	DIX	MAI	PUG
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	1	0	0	2
2015	0	0	0	0
2016	0	1	1	0
2017*	0	0	0	0

*Provisional (September 2017)

Data on catches of VME indicator species within the SEAFO CA

Tables 23-35 contain data on VME indicators. The listed benthic taxa are not confirmed as VME indicators.

Table 23: *Provisional list of benthic invertebrate VME indicator taxa for the SEAFO CA.*

Group / Species code	Phylum / Order / Family	Common name
PFR	Porifera (Phylum)	Sponges
GGW	Gorgonacea (Order)	Gorgonian corals
AZN=> AXT (Stylasteridae)	Anthoathecatae (Family)	Hydrocorals
CSS	Scleractinia (Order)	Stony corals
AQZ	Anthipatharia (Order)	Black corals
ZOT	Zoantharia (Order)	Zoanthids
AJZ	Alcyonacea (Order)	Soft corals
NTW	Pennatulacea (Order)	Sea pens
BZN	Bryozoa (Phylum)	Erect bryozoans
CWD	Crinoidea (Class)	Sea lilies
OWP	Ophiuroidea (Class)	Basket stars
SZS	Serpulidae (Family)	Annelida
SSX	Ascidiacea (Class)	Sea squirts
ATX[#]	Ceriantharia (Order)	Tube-dwelling Sea anemones

[#]FAO code changed to Ceriantharia

Table 24: *Catches (kg) of Gorgonians (VME indicators) (**GGW**).*

Nation	Japan		Spain	Korea
Management Area	D		D	B
Fishing method	LLS		LLS	Pots
	Bycatch (kg)		Bycatch (kg)	Bycatch (kg)
Year	D0	D1		B1
2010	0	0	47.5	-
2011	3.8	0	-	-
2012	30.3	0	-	-
2013	1.2	0	-	-
2014	2.34	2.6	-	-
2015	0	0.35	-	11.5
2016	0.01	9.54	-	-
2017*	1	0	-	-

- = No Fishing. *Provisional (September 2017).

Table 25: *Catches (kg) of Black corals and thorny corals (VME indicators) (**AQZ**)*

Nation	Japan	Spain	Korea
Management Area	D	D	B1
Fishing method	LLS	LLS	Pots
Year	Bycatch (kg)	Bycatch (kg)	Bycatch (kg)
2010	0	4.4	-
2011	0	-	-
2012	0.02	-	-
2013	0	-	0.4
2014	0	-	-
2015	0	-	0.25
2016	0	0	0
2017*	0.1	-	-

- = No Fishing. *Provisional (September 2017).

Table 26: *Catches (kg) of Scleractinia (VME indicators) (**CSS**)*

Nation	Japan		Spain	Korea
Management Area	D		D	B
Fishing method	LLS		LLS	Pots
	Bycatch (kg)		Bycatch (kg)	Bycatch (kg)
Year	D0	D1		B1
2010	0	0	2.2	-
2011	15.4	0	-	-
2012	17.6	0	-	-
2013	0	0	-	-
2014	2.8	0.3	-	-
2015	0	0	-	29.5
2016	0.68	3.88	-	-
2017*	7	-	-	-

- = No Fishing. *Provisional (September 2017).

Table 27*: Catches (kg) of sea pens (VME indicators) (**NTW**)*

Nation	Japan	Spain	Korea
Management Area	D	D	B1
Fishing method	LLS	LLS	Pots
Year	Bycatch (kg)	Bycatch (kg)	Bycatch (kg)
2010	0	1.3	-
2011	0	-	-
2012	0.02	-	-

2013	0	-	-
2014	0	-	-
2015	0	-	0.05
2016	0	-	-
2017*	0.02	-	-

- = No Fishing. *Provisional (September 2017).

Table 28: *Catches (kg) of sponges (VME indicators) (**PFR**)*

Nation	**Japan**		**Spain**	**Korea**
Management Area	**D**		**D**	**B**
Fishing method	**LLS**		**LLS**	**Pots**
	Bycatch (kg)		**Bycatch (kg)**	**Bycatch (kg)**
Year		**D0**		**B1**
2010	0		29.7	-
2011	0		-	-
2012	0		-	-
2013	0		-	-
2014	0		-	-
2015	0.4		-	0.3
2016	0.84		-	-
2017*	-	0.37	-	-

- = No Fishing. *Provisional (September 2017).

Table 29: *Catches (kg) of Zoanthids (VME indicators) (**ZOT**)*

Nation	**Japan**	**Spain**
Management Area	**D0**	**D**
Fishing method	**LLS**	**LLS**
Year	**Bycatch (kg)**	**Bycatch (kg)**
2010	0	0.3
2011	0	-
2012	0	-
2013	0	-
2014	0	-
2015	0	-
2016	0	-
2017*	1.12	-

- = No Fishing. *Provisional (September 2017).

Table 30: *Catches (kg) of soft corals (VME indicators) (**AJZ**)*

Nation	Japan	Spain
Management Area	D0	D
Fishing method	LLS	LLS
Year	Bycatch (kg)	Bycatch (kg)
2010	0	0.3
2011	0	-
2012	0	-
2013	0	-
2014	0	-
2015	0	-
2016	0	-
2017*	0.06	-

- = No Fishing. *Provisional (September 2017).

Table 31: *Catches (kg) of sea lilies (VME indicators) (**CWD**)*

Nation	Japan	Spain
Management Area	D	D
Fishing method	LLS	LLS
Year	Bycatch (kg)	Bycatch (kg)
2010	0	1.0
2011	0	-
2012	0.02	-
2013	0	-
2014	0	-
2015	0	-
2016	0	-
2017*	0	-

- = No Fishing. *Provisional (September 2017).

Table 32: *Catches (kg) of Hydrocorals (VME indicators) (**AXT, AZN**)*

Nation	Japan		Spain
Management Area	D		D
Fishing method	LLS		LLS
	Bycatch (kg)		Bycatch (kg)
Year		D0	
2010	0		0.1
2011	0		-
2012	0		-
2013	0		-

2014	0		-
2015	1		-
2016	1.2		-
2017*	0	0.59	-

- = No Fishing. *Provisional (September 2017).

Table 33: *Catches (kg) of Basket stars (VME indicators) (**OWP**)*

Nation	**Japan**		**Spain**	**Korea**
Management Area	**D**		**D**	**B**
Fishing method	**LLS**		**LLS**	**Pots**
	Bycatch (kg)		**Bycatch (kg)**	**Bycatch (kg)**
Year	**D0**	**D1**		**B1**
2010	0	0	0	-
2011	0	0	-	-
2012	0	0	-	-
2013	0	0	-	-
2014	0.1	0	-	-
2015	0	4.9	-	0.3
2016	0	0.6	-	-
2017*	0	-	-	-

- = No Fishing. *Provisional (September 2017).

Table 34: *Catches (kg) of Sea anemones (**ATX**).*

Nation	**Japan**		**Spain**	**Korea**
Management Area	**D**		**D**	**B**
Fishing method	**LLS**		**LLS**	**Pots**
Catch details	**Bycatch (kg)**		**Bycatch (kg)**	**Bycatch (kg)**
	D0	**D1**		**B1**
2010	0	0	0	-
2011	0	0	-	-
2012	0	0	-	-
2013	0	0	-	-
2014	0.2	0	-	-
2015	0	0	-	0.7
2016	0	0	-	-
2017*	0	-	-	-

- = No Fishing. *Provisional (September 2017).

Table 35: *Catches (kg) of Gastropoda (**GAS**)*

Nation	Japan		Spain	Korea
Management Area	D		D	B
Fishing method	LLS		LLS	Pots
Catch details	Bycatch (kg)		Bycatch (kg)	Bycatch (kg)
	D0	D1		B1
2010	0	0	0	-
2011	0	0	-	-
2012	0	0	-	-
2013	0	0	-	-
2014	0	0	-	-
2015	0	0	-	8.6
2016	0	0	-	-
2017*	0	-	-	-

- = No Fishing. *Provisional (September 2017).

There were no recorded encounters in 2017 of individual set bycatches exceeding the current VME threshold values:

Trawlers (existing fishing areas) 600kg live sponges
60kg live corral

Trawlers (new fishing areas) 400kg live sponges
60kg live corral

Longline sets (all areas) 10kg live sponges in 1200m line or 1000 hooks
10kg live corral in 1200m line or 1000 hooks

Pot sets (all areas) 10kg live sponges in 1200m line
10kg live corral in 1200m line

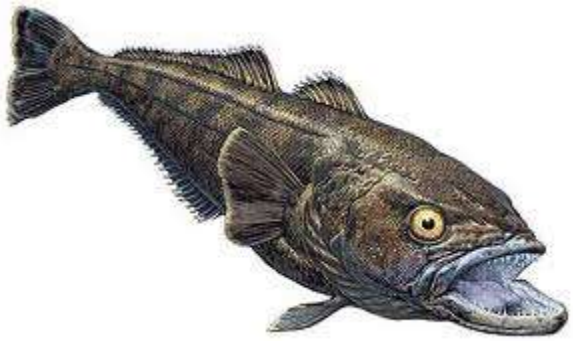
APPENDIX V – Stock Status Report: Patagonian toothfish

STATUS REPORT

Dissostichus eleginoides

Common Name: Patagonian toothfish

FAO-ASFIS Code: TOP



2017

Updated 21 November, 2017

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1. Description of the fishery

1.1 Description of fishing vessels and fishing gear

Fishing for Patagonian toothfish in the SEAFO CA started around 2002. The main fishing countries working in the area include vessels from Japan, the Republic of Korea, Spain and South Africa. Historically a maximum of three vessels per year fished in the SEAFO CA. The Spanish longline system and the Trotline (Fig. 1) are the fishing gears commonly used.

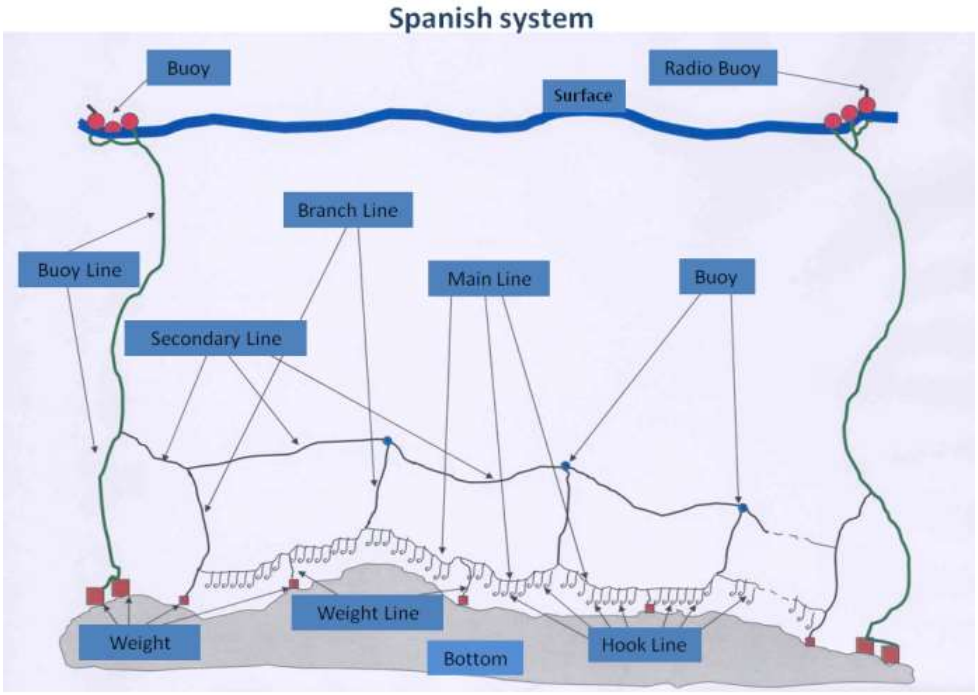
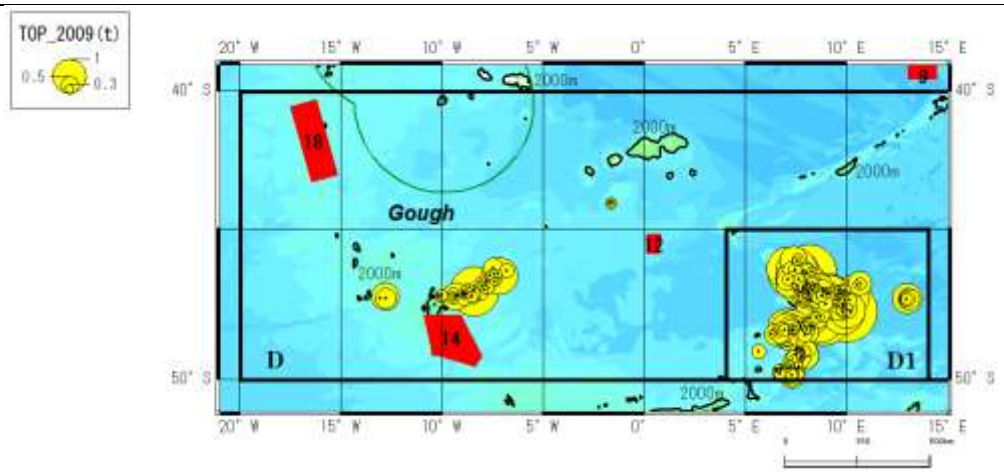


Figure 1: Fishing gears used to fish *D. eleginoides*: Spanish longline system (top) and the Trotline (bottom).

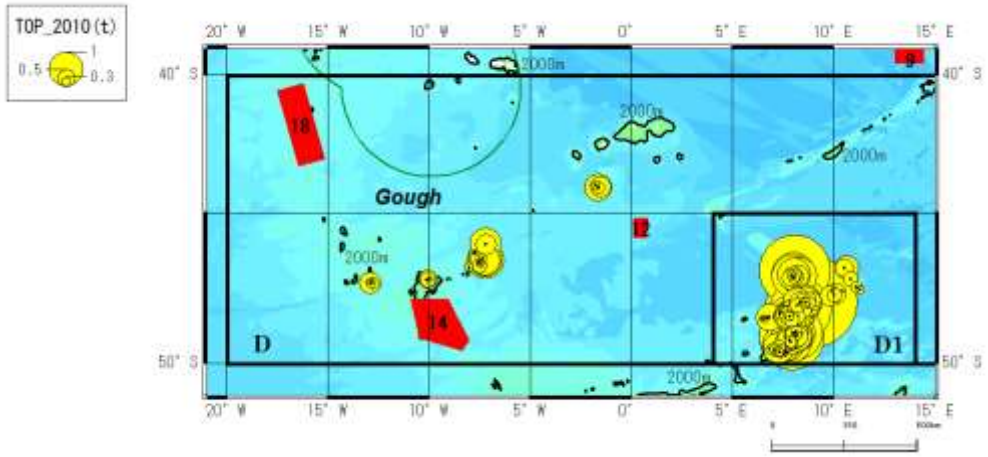
1.2 Spatial and temporal distribution of fishing

In SEAFO CA, the fishery from 2011 to 2014 took place in Sub-Area D, being concentrated over seamounts in Division D1, at Discovery seamount and also at seamounts located in the western part of Sub-Area D (Fig. 2).

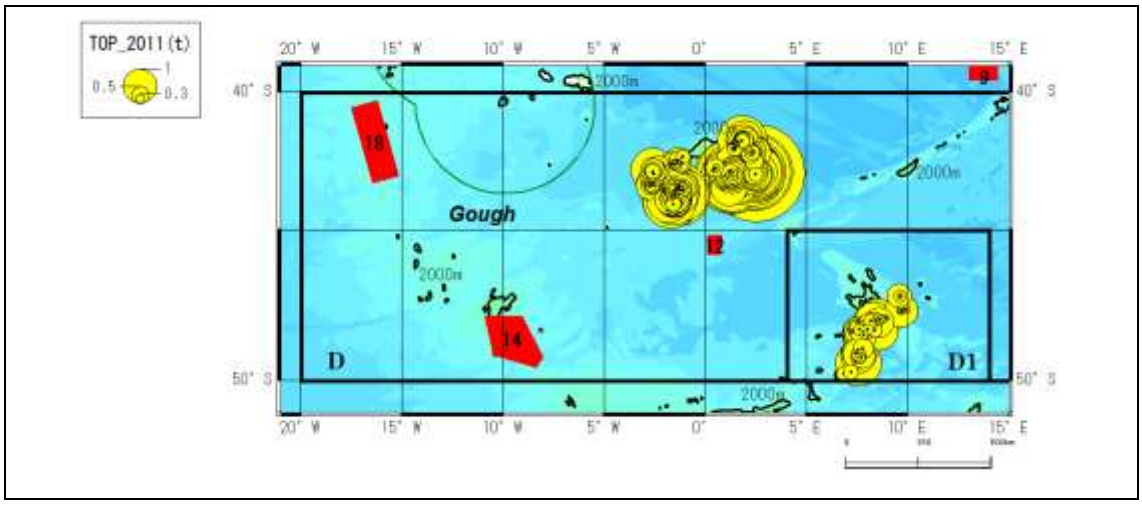
2009



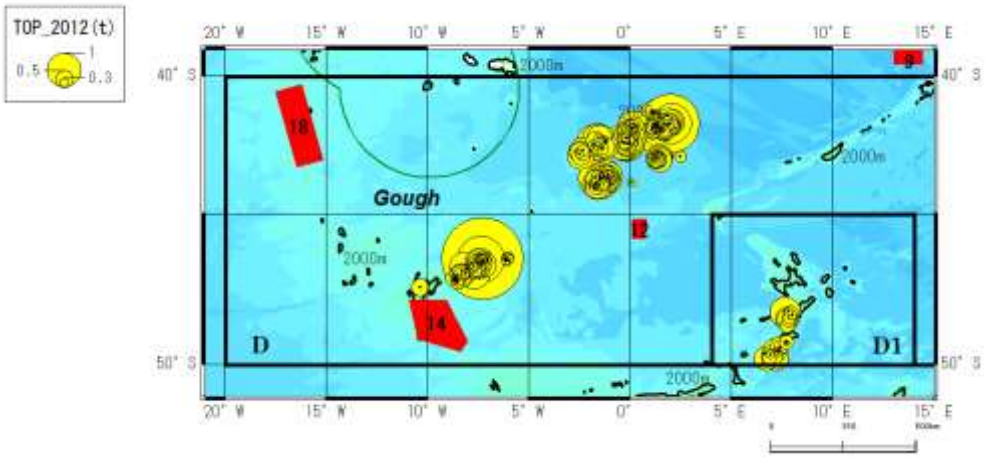
2010



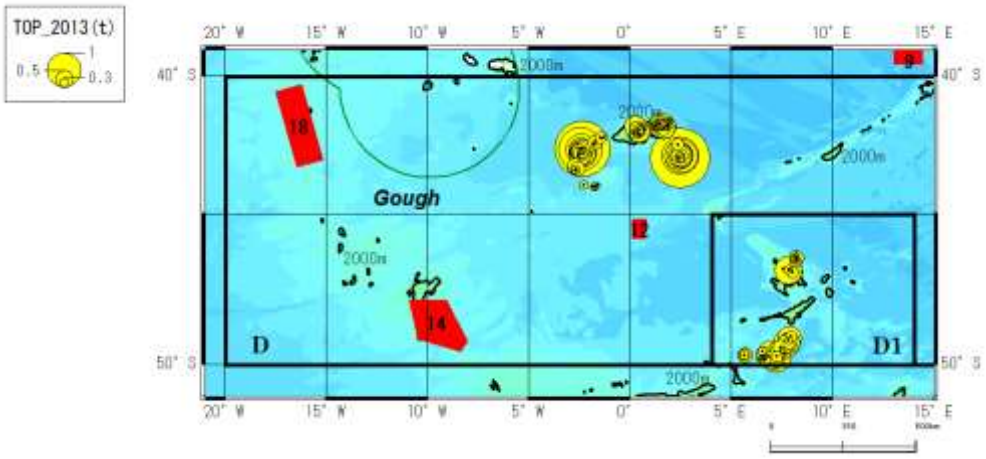
2011


TOP_2011 (t)
0.5
1
0.3
20° W
15° W
10° W
5° W
0°
5° E
10° E
15° E
40° S
50° S
2000m
Gough
18
14
12
9
D
D1

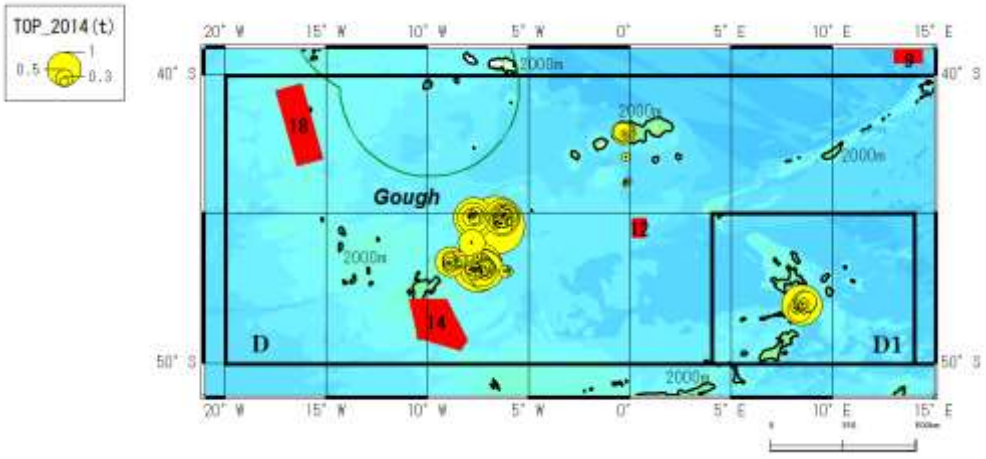
2012



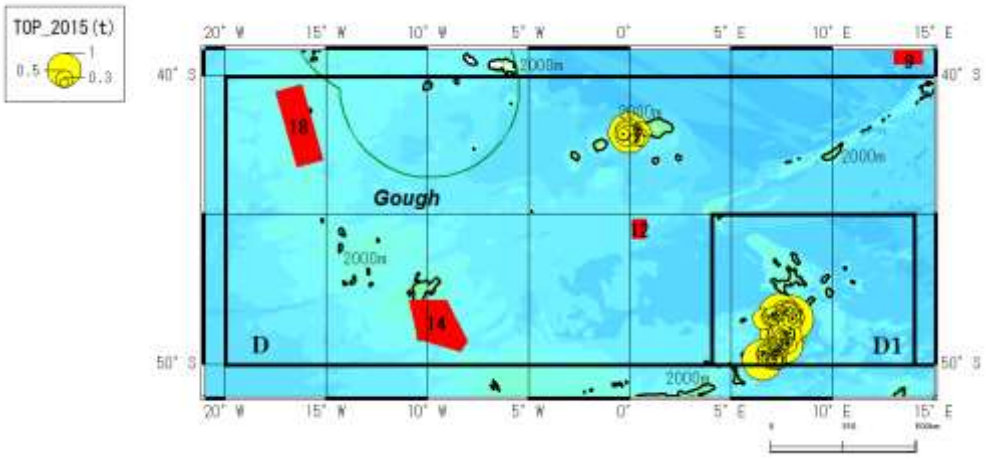
2013



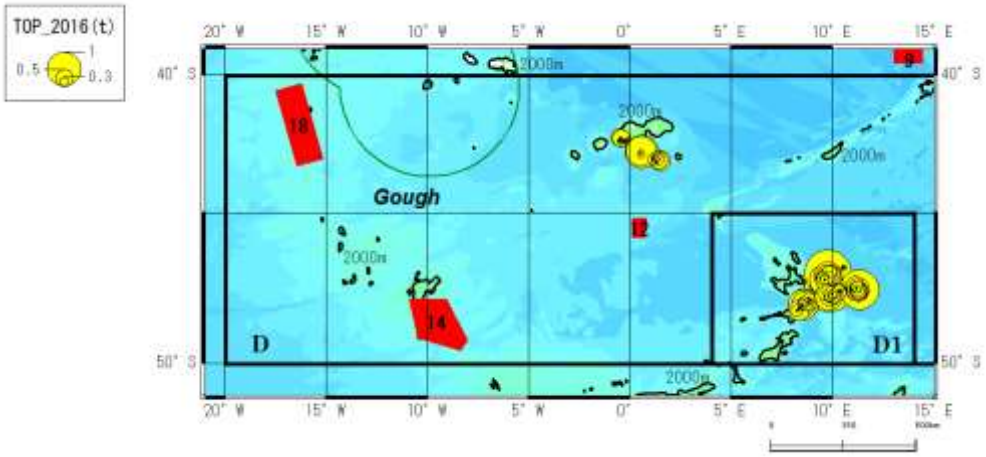
2014



2015



2016



2017

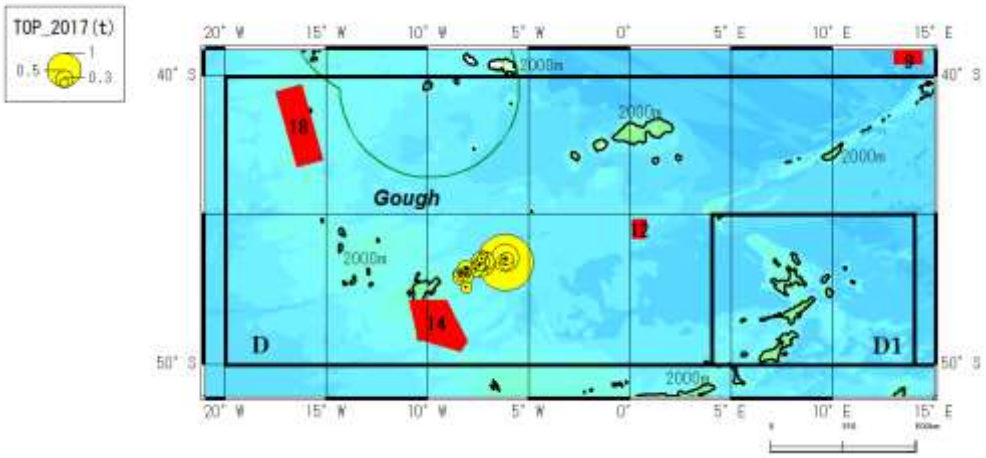


Figure 2: Reported catch of Patagonian toothfish (*Dissostichus* eleginoides) (2011-2017).

Table 1 shows that the main fishing ground is located on Discovery seamount and also in D1 but less hauls were deployed in the western seamounts of Sub-Area D.

Table 1: Number of sets by year and location

Year	Western	Discovery	D1- Meteor
2010	27	5	118
2011	1	207	54
2012	68	207	25
2013	0	108	57
2014	100	64*	13
2015	0	24	127
2016	0	22	67
2017	34	0	0

1.3 Reported retained catches and discards

Table 2A presents data on Patagonian toothfish catches and discards listed by country, as well as fishing gear used and the management area from which catches were taken. Annual catches varied between 18t (2002) and 413t (2007).

Discards were mainly due to parasite infection of fish. In the last three years with complete data (2013, 2014 and 2015) retained catches were 61, 79 and 59t respectively and the annual weight of discarded specimens was 3, 7 and 2 t in the three year period.

Table 2A: Catches (tons) of Patagonian toothfish (*Dissostichuseleginoides*) by South Africa, Spain, Japan and Korea (2002-2017)

Nation	Spain		Japan				Korea				South Africa			
Fishing method	Longlines		Longlines				Longlines				Longlines			
Management Area	D0		D0		D1		D0		D1		D0		D1	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2002	18													
2003	101		47				245							
2004	6		124											
2005	N/F	N/F	158				10							
2006	11		155											
2007	N/F		166											
2008	N/F	N/F	122	0	N/F	N/F	76							
2009	N/F	N/F	86	0	74	0	16	0	46	0	N/F	N/F	N/F	N/F
2010	26	0	N/F	N/F	54	2	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F
2011	N/F	N/F	159	6	N/F	N/F	N/F	N/F	N/F	N/F	15	0	28	0
2012	N/F	N/F	86	3	N/F	N/F	N/F	N/F	N/F	N/F	24	0	12	0
2013	N/F	N/F	41	2	19	1	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F
2014	N/F	N/F	47	<1	6	<1	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F
2015	N/F	N/F	52	<1	7	<1	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F
2016	N/F	N/F	7	<1	53	<1	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F
2017*	N/F	N/F	12	<1	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F	N/F

N/F = No Fishing. Blank fields = No data available. *Provisional (September 2017).

Ret. = Retained Disc. = Discarded

Table 2B: Atlantic toothfish (*Dissostichus mawsoni*). (TOA) catches and discards

Nation	Japan			
Fishing method	Longlines			
Management Area	D0		D1	
Year	Ret..	Disc.	Ret..	Disc.
2014	< 1	0	0	0
2015	0	0	0	0
2016	0	0	0	0
2017	0	0	N/F	N/F

Ret. = Retained Disc. = Discarded *Provisional (September 2017).

Retained and discarded bycatch from the Patagonian toothfish fishery are presented in Table 3. The two most important species (in terms of weight) are grenadiers (GRV) and Blue antimora (ANT).

1.4 IUU

IUU fishing activity in the SEAFO CA has been reported to the Secretariat latest in 2012, but the extent of IUU fishing is at present unknown.

2. Stock distribution and identity

Patagonian toothfish is a southern circumpolar, eurybathic species (70-1600m), associated with shelves of the sub-Antarctic islands usually north of 55ºS. Young stages are pelagic (North, 2002). The species occurs in the Kerguelen-Heard Ridge, islands of the Scotia Arc and the northern part of the Antarctic Peninsula (Hureau, 1985; DeWitt et al., 1990). This species is also known from the southern coast of Chile northward to Peru and the coast of Argentina, especially in the Patagonian area (DeWitt, 1990), and also present in Discovery and Meteor seamounts in the SE Atlantic (Figure 3) and El Cano Ridge in the South Indian Ocean (López-Abellán and Gonzalez, 1999, López-Abellán, 2005).

In SEAFO CA the stock structure of the species is unknown. The CCAMLR Scientific Committee in 2009 noted that in most years (since 2003) the main species caught in CCAMLR sub-area 48.6 (adjacent to and directly south of SEAFO Division D) is *D. eleginoides*. The distribution of the species appears to be driven by the sub-Antarctic front which extends into the SEAFO CA.

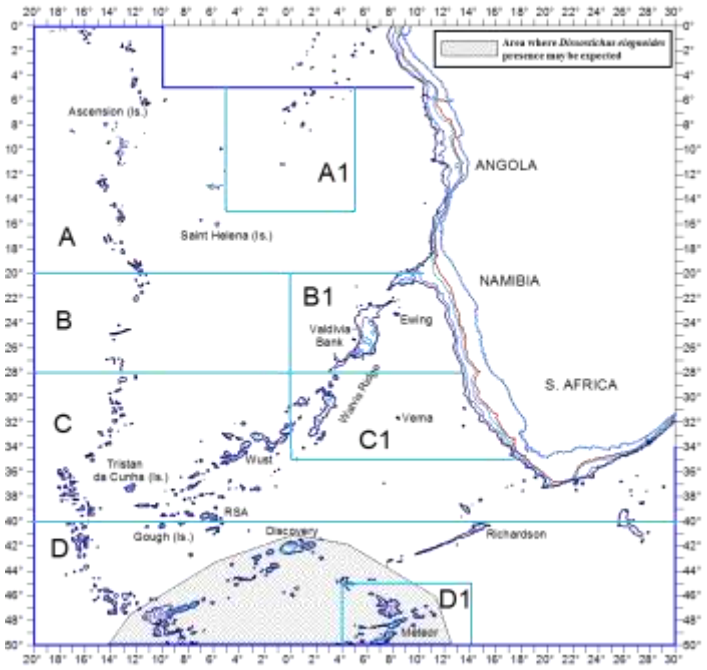


Figure 3: Species geographical distribution in the SEAFO CA (source: Species profile on the SEAFO website).

Table 3: Retained and discarded bycatch from the Patagonian toothfishfisheries (kg).

	2009				2010				2011		2012				2013				2014			
	Retained		Discarded		Retained		Discarded		Retained	Discarded	Retained		Discarded		Retained		Discarded		Retained		Discarded	
Species	D0	D1	D0	D1	D0	D1	D0	D1	D0	D0	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1
GRV			89	5 833	4 047	1 936	93	2 601		22 414			23 705	186			7 273	869				267
ANT			126	4 786			453	1 348		4 794			4 442	65			796	610			329	106
BYR	1 221		573																			
MCC			336	896																		
BYR																						
BEA	360																					
MZZ								168														
SRX										30			124				20					
MRL			108					1		2			37				1					
COX			2							21			75									
SKH			90																			
LEV			36				4															
KCX				1			3	35									83	10				
HYD													31				17					
BUK							17															
NOX										7												
MWS										6												
ETF																	3					
SEC													2									
SSK							2															
CKH							1	1														
KCF			1																			
TOA																			99			
RTX																					1122	

BSH: Blue shark (*Prionace glauca*); ETF: Blackbelly lanternshark (*Etmopterus Lucifer*); HIB: Deep-water arrowtooth eel (*Histiobranchus bathybius*); LEV: Lepidion codlings nei (*Lepidion spp*);ANT:Blue antimora (*Antimora rostrata*); BEA:Eaton's skate (*Bathyraja eatonii*); BYR:Kerguelen sandpaper skate (*Bathyraja irrasa*); COX:Conger eels, etc. nei (*Congridae*); CKH:Abyssal grenadier (*Coryphaenoides armatus*); BUK:Butterfly kingfish (*Gasterochisma melampus*); HYD:Ratfishes nei (*Hydrolagus spp*); LEV:Lepidion codlings nei (*Lepidion spp*); KCX:King crabs, stone crabs nei (*Lithodidae*); MCC:Ridge scaled rattail (*Macrourus carinatus*); GRV:Grenadiers nei (*Macrourus spp*); MWS:Smallhead moray cod (*Muraenolepis microcephalus*); MRL:Moray

cods nei (*Mur aenolepis spp*); NOX:Antarctic rockcods, noties nei (*Nototheniidae*); MZZ:Marine fishes nei (*Osteichthyes*); KCF:Globose king crab (*Paralomis formosa*); ETF:Blackbelly lantern shark (*Etmopterus lucifer*); SEC:Harbour seal (*Phoca vitulina*); SRX:Rays, stingrays, mantas nei (*Rajiformes*); SKH:Various sharks nei (*Selachimorpha(Pleurotremata*)); (Rajiformes); SSK:Kaup's arrowtooth eel (*Synaphobranchus kaupii*).

	2015				2016				2017			
	Retained		Discarded		Retained		Discarded		Retained		Discarded	
Species	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1	D0	D1
GRV			1221	1579	1197.7			2496.7			1338.3	
ANT			452	598			27.4	117.6				
BYR												
MCC												
BYR												
BEA												
MZZ												
SRX			16								19	
MRL			2				0.7				0.2	
COX												
SKH												
LEV												
KCX					9.1			1.4			2.1	
HYD			233									
BUK												
NOX												
MWS												
ETF			1									
SEC												
SSK												
CKH												
KCF												
TOA												
RTX			146									
BSH			89									
ETF												
HIB			18				0.9					
LEV			5									
CSS							0.68	3.88			6.91	
GGW							0.01	9.54			1.41	
AXT								0.12			303	
PFR								0.84			0.52	
OWP								0.6				
AGZ											0.06	
AJZ											0.06	
AQZ											0.1	
AZN											0.59	
GSK											12	
GWD											0.08	
NTW											0.02	
OEQ											1.14	
ZOT											1.12	

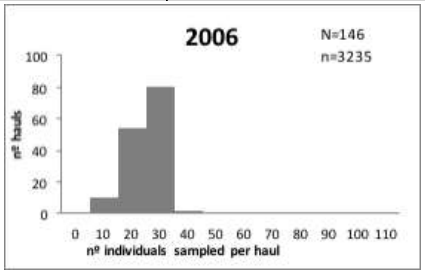
3. Data available for assessments, life history parameters and other population information

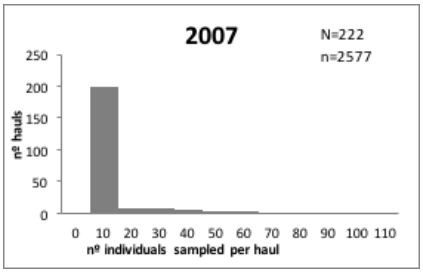
3.1 Fisheries and survey data

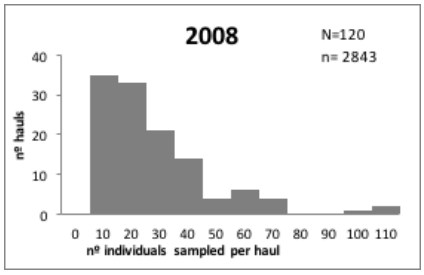
The number of fishing sets sampled from 2006 onwards indicates a good sampling level in line with the SEAFO preliminary guidelines for data collection (Table 4). On average 20 specimens were measured per sampled fishing set, which is considered acceptable given the length range of the exploited population. It will be necessary to apply in future this sampling effort of 20 individuals in all sampled fishing sets (Figure 4).

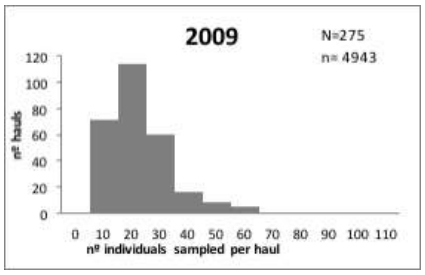
Table 4. Annual analysis of sampling effort conducted on board fishing vessel

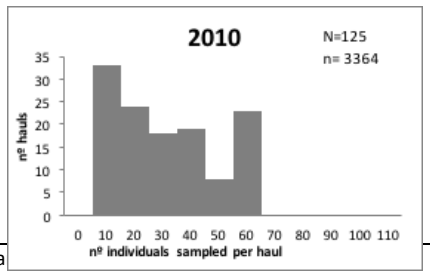
Year	No. of Sets Observed	Mean Individuals	Min. Individuals	Max. Individuals
2006	146	22.16	1	31
2007	222	11.61	1	57
2008	120	23.69	2	110
2009	275	17.97	1	58
2010	125	26.91	1	60
2011	263	32.95	1	60
2012	298	20.58	1	57
2013	164	19.87	1	70
2014	176	25.50	3	50
2015	149	17.23	1	23
2016	88	17.63	2	20
2017	32	15.03	1	25

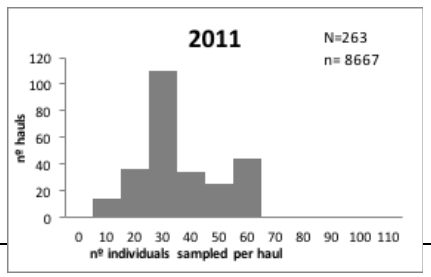












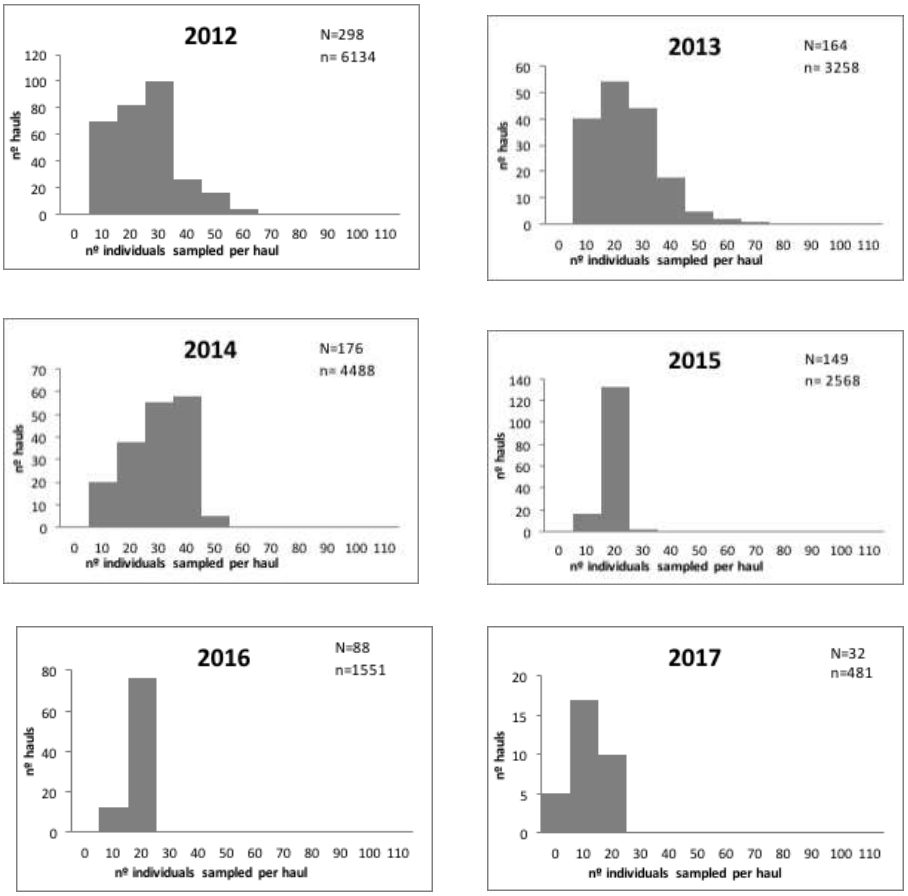
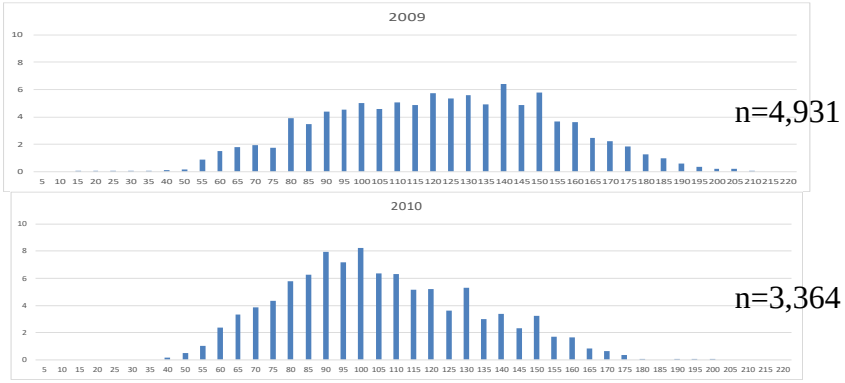


Figure 4: Frequency distribution of sample size per set. Data from Observer Reports submitted to SEAFO. N = number of sets sampled per year; n = total number of individuals sampled.

3.2 Length data and frequency distribution

Figure 5 shows the annual total length frequency distributions of Patagonian toothfish catches based on the observer data from all fleets submitted to SEAFO. Length frequency distributions for the period 2006-2013 suggest a shift towards smaller lengths in the catches in more recent years. The proportion of large fish appears to be declining.



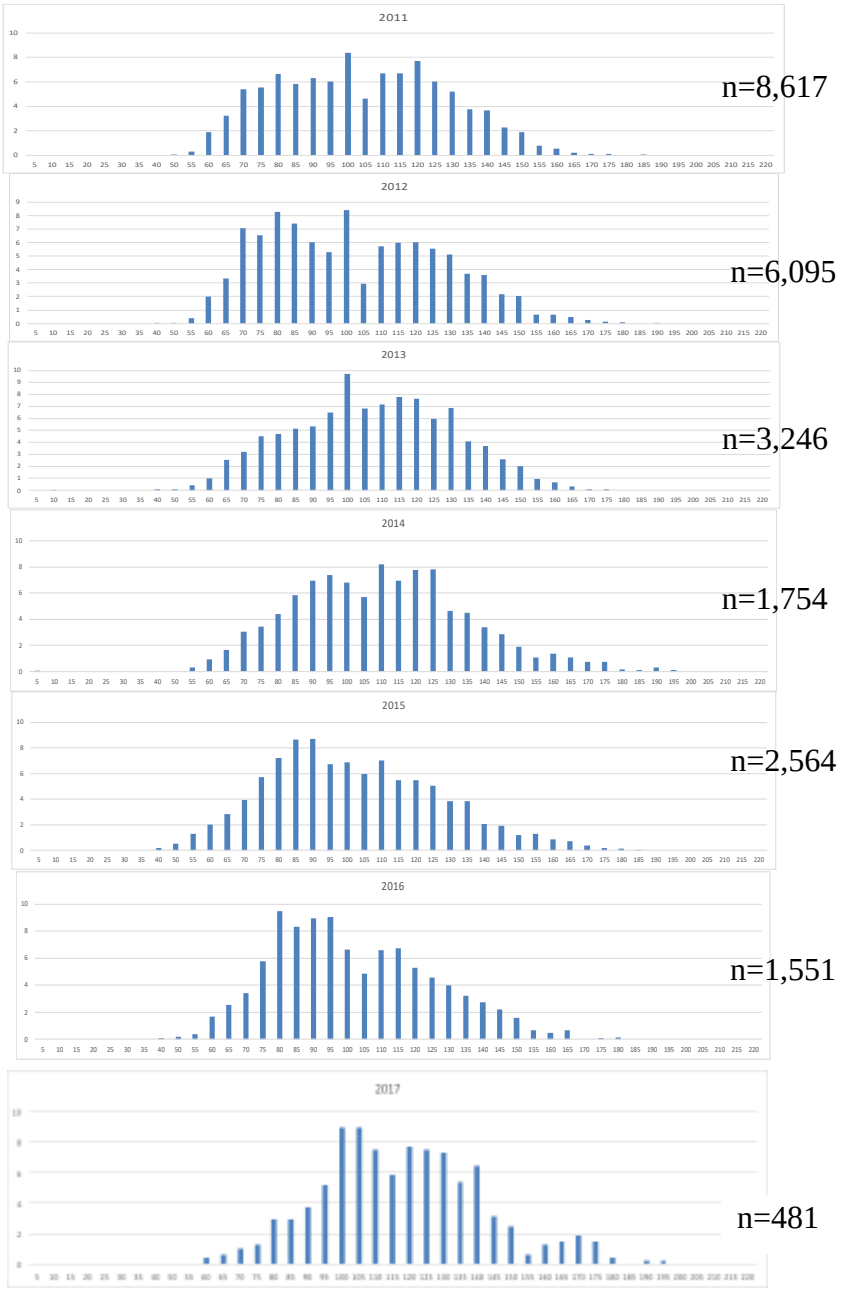


Figure 5: Annual size % freq. distributions *D. eleginoides* in Sub-Area D. (Y axis :0%-10%) (2009-2017)

3.3 Length-weight relationships

Table 5 shows the length-weight relationships by sex based on observer data from Japanese fleet in 2013.

Table 5: Length-weight relationships by sex (based on 2013 Japanese observer data)

Samples	a	b	r^2	n
Males	1E-06	3.4484	0.9768	405
Females	2E-06	3.4296	0.9579	860

3.4 Age data and growth parameters

There is no available information for this species in SEAFO CA.

3.5 Reproductive parameters

There is no available information for this species in SEAFO CA.

3.6 Natural mortality

There is no available information for this species in SEAFO CA.

3.7 Feeding and trophic relationships (including species interaction)

There is no available information for this species in SEAFO CA.

3.8 Tagging and migration

Eleven specimens were tagged in Subarea D in 2006 and fourteen in 2010 (Spanish flagged Viking Bay vessel). However, there is no available information on recoveries of tagged specimens or on tagged specimens tagged at adjacent areas of CCAMLR.

4. Stock assessment status

There are no agreed stock assessments.

5. Incidental mortality and bycatch of fish and invertebrates

5.1 Fish bycatch

Table 6 shows the bycatch species in the Patagonian toothfish (*Dissostichus eleginoides)* Fishery and its weights based on the observer reports. SC noted that the major bycatch is grenadiers (Macrouridae - GRV) and the bycatch is discarded. The impact of this bycatch on grenadiers spp. is unknown.

5.2 Incidental mortality (seabirds, mammals and turtles)

In the SEAFO database there are records of three seabirds having been caught during Japanese longline daytime fishing in 2014. The seabirds caught were recorded by the ID codes "PUG" – *Puffinus gravis* (Great shearwater) & "DIM" – *Thalassarche melanophris* (Southern black-browed albatross).

5.3 Invertebrate bycatch (VME taxa)

Table 6 shows the bycatch of VME species and its amount based on the observer data for the period 2010-2017. Figure 7 shows their geographic location.

Table 6: VME Bycatch from Patagonia toothfish fishery (kg)

	Species	Gorgonians (Gorgoniidae)	Hard corals, madrepores nei (Scleractinia)	Black corals and thorny corals (Antipatharia)	Basket and brittle stars (Ophiuroidea)	Sea pens (Pennatulacea)	Soft corals (Alcyonacea)	Feather stars and sea lilies (Crinoidea)	Hydrocorals (Stylasteridae)	Sponges
	FAO code	GGW	CSS	AQZ	OWP	NTW	AJZ	CWP	AXT(AZN)	PFR
2010	D0	33.9	2.1	3.9	1.3	1	0.2	0.9		
	D1	13.6	0.1	0.5	2	0.3	1	0.1		
2011	D0	3.8	15.4							
2012	D0	30.3	17.6	0.2		0	1.2			
2013	D0	2.3	0.3							

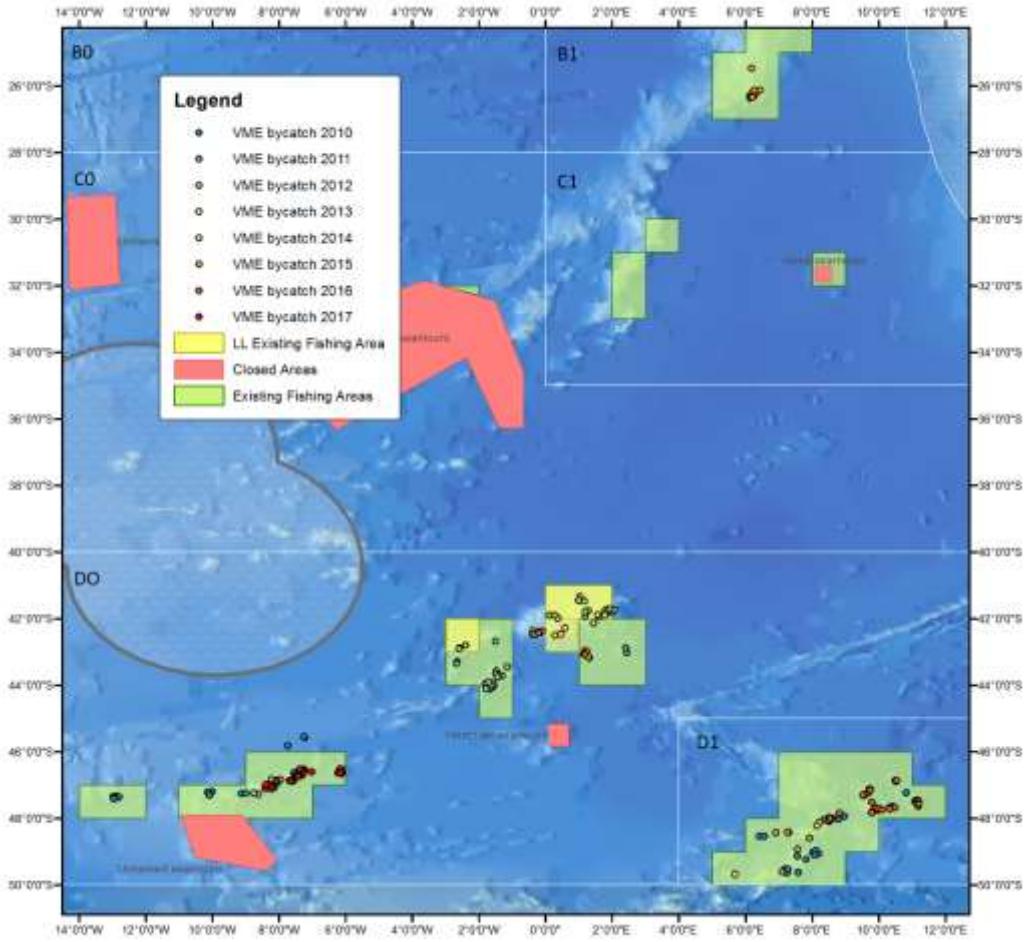


Figure 7: Locations for incidental bycatch of VME species (2010-2017).

5.4 Incidental mortality and bycatch mitigation methods

Offal dumping during hauling and bird scaring devices (Tori lines) are mandated to mitigate seabird bycatch.

5.5 Lost and abandoned gear

Figure 8 shows locations and amount of the lost gears based on the observer data from 2010 to 2013 (no lost gear in 2014-2015).

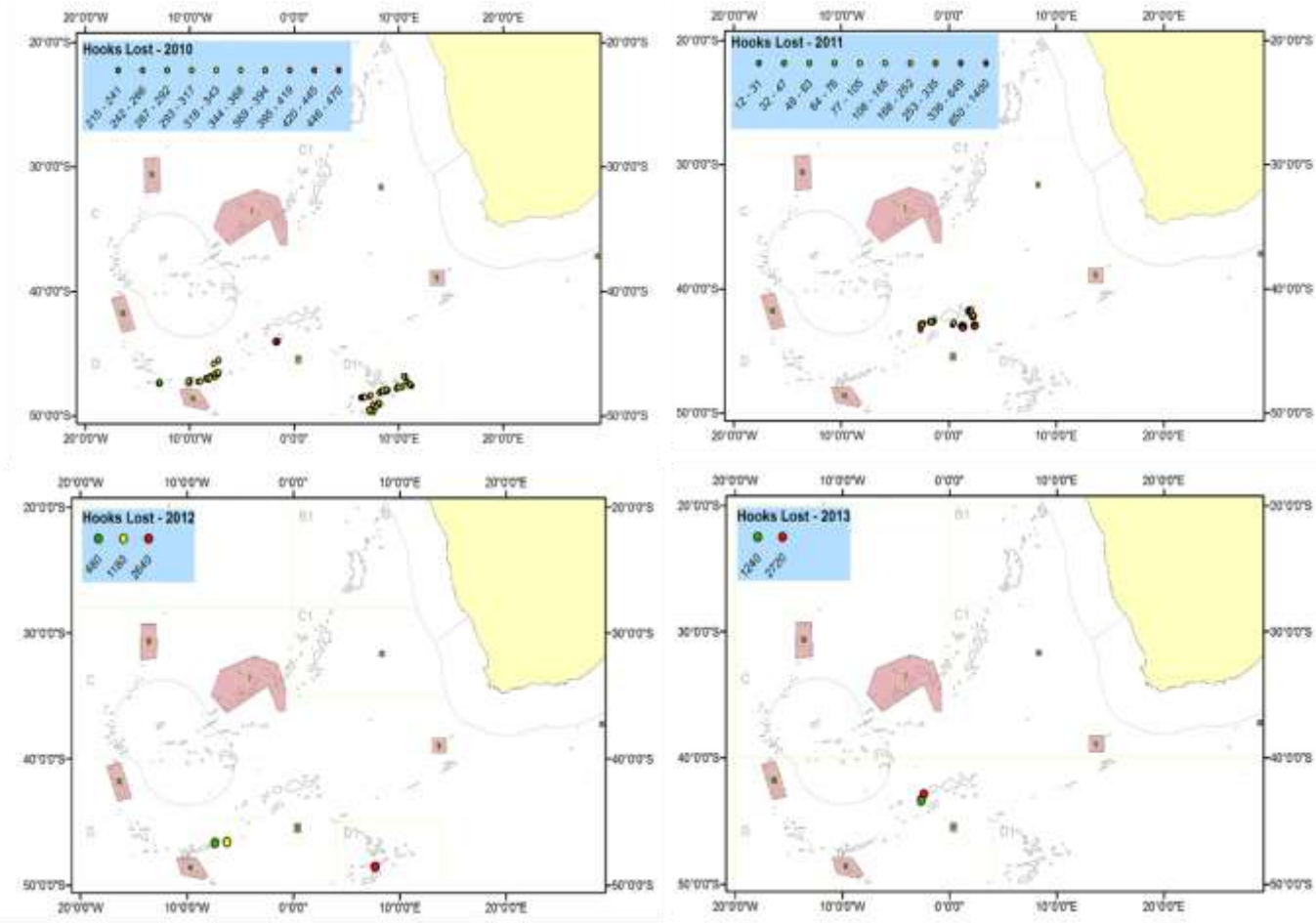


Figure 8: Locations and amount of the lost gears (hooks with attached short line) based on observer data (2010-2013) (no lost gear in 2014-2017).

6. Current conservation measures and management advice

In 2015 the Commission adopted a TAC of 264 t in Sub-Area D applying the harvest control rule, and zero tonnes for the remainder of the SEAFO CA for 2016.

The SC notes that in both 2015 and 2016 about 22% of the TAC was taken (incl. the experimental fishery), hence the fishery is not constrained by the TAC.

The application of the HCR requires as input a 5-year time-series of recent CPUE data. The CPUE series applied in 2015 was derived by pooling all available data in the SEAFO CA. No analysis was made to

determine if pooling was a valid approach. Also, the series first discussed in 2016 was not standardised as in 2015, and questions were asked about the consistency of the analysis between years.

The SC explored standardization using generalised linear models (GLM), but the explorations indicated that the variance explained was too low to extract meaningful results, hence further efforts would be required. There were, however, clear indications of significant area-effects, hence pooling of data from different fishing areas was probably not valid.

The SC then resorted to deriving CPUE series for separate fishing areas for which the more extensive continuous time-series of catch and effort data are available in the SEAFO database, i.e. the Meteor and Discovery seamounts. Data from the Western part were excluded from the assessment as the time series was not complete. Only Japanese data within the 2011 agreed footprint, i.e. from the party taking the bulk of the catch in all years, were used in order to retain consistency through the time series.

It is uncertain whether the two CPUE series shown in Fig. 9 reflects abundance, but in the absence of other alternatives, the series from Meteor and Discovery were considered valid for the derivation of TACs using the recommended and accepted HCR.

The CPUE series as derived both have best estimates of slope close to zero. For Discovery the best estimate is slightly negative, for Meteor the estimated slope was zero (Fig. 9).

Applying the HCR based on a weighted average of the CPUE slopes on Meteor and Discovery a TAC estimate of 266 t was derived. **The SC recommends a TAC for Subarea D of 266 t and a zero TAC for the remainder of the SEAFO CA for the years 2017 and 2018.**

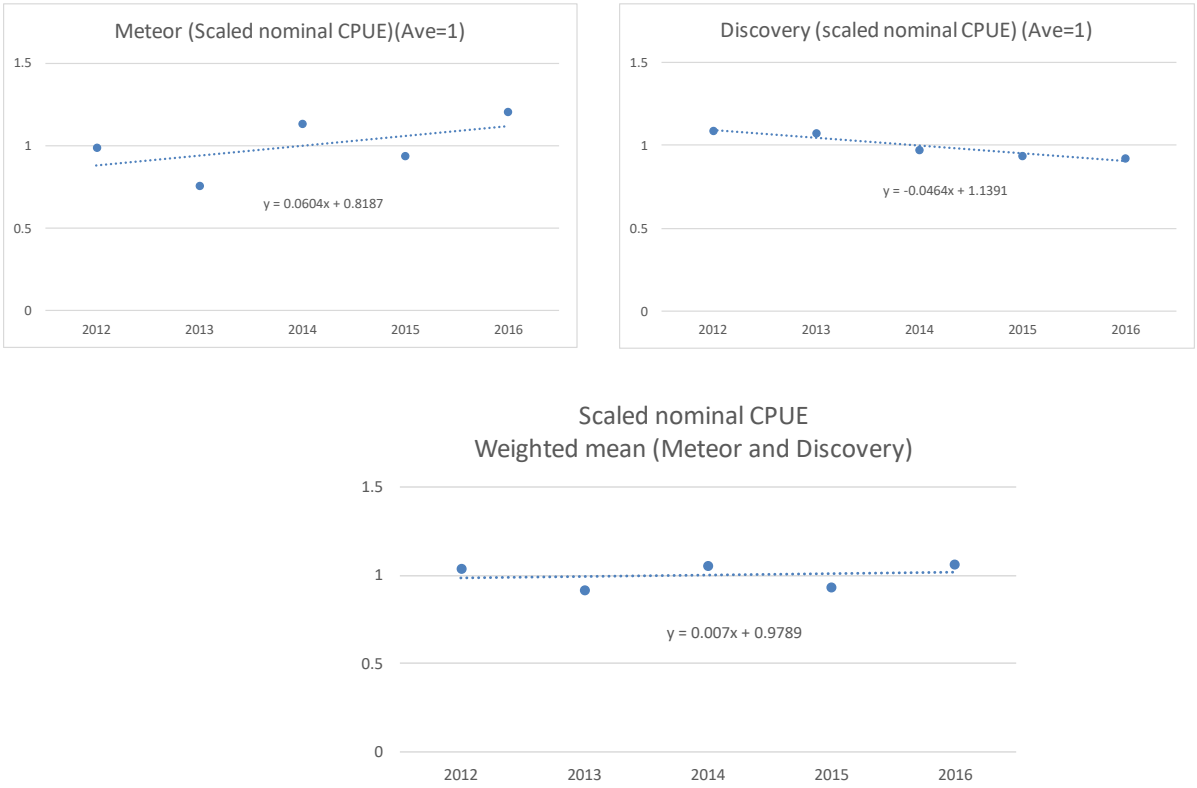


Figure 9: Upper: Average slope in Meteor (left) and Discovery(right) for 5 years CPUE (2012-2016)

Lower: Average slope based on the weighted average of two slopes.

Other Conservation Measures that are applicable to this fishery can be seen in Table 7.

Table 7: Other Conservation Measures that are applicable to this fishery.

Conservation Measure 04/06	On the Conservation of Sharks Caught in Association with Fisheries Managed by SEAFO
Conservation Measure 14/09	To Reduce Sea Turtle Mortality in SEAFO Fishing Operations.
Conservation Measure 25/12	On Reducing Incidental Bycatch of Seabirds in the SEAFO Convention Area
Conservation Measure 30/15	On the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area
Conservation Measure 31/15	On Total Allowable Catches and related conditions for Patagonian Toothfish, orange roughy, Alfonsino and Deep-Sea Red Crab in the SEAFO Convention Area in 2014

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Annex A: Biological data collected

Sex information collected (2009-2017)

species code	Year								
	2009	2010	2011	2012	2013	2014	2015	2016	2017
	Sex	Sex	Sex	Sex	Sex	Sex	Sex	Sex	Sex
	1	22				399			76
ANT	39	464				607	48	86	140
BOA								1	
BSH							1	1	
BYE									1
BYR	18								
CGE								11	
ETF								1	
GRV		655						197	
GSK									1
HIB								2	
KCU								1	
KCX		29						35	
MCC	84						165	234	
MCH							463	641	318
MRL								1	1
QMC							198		
RTX						958	60		
SRX							2		
TOA						11			
TOP	4931	3364	8652	6095	3247	1754	2564	1551	481

Number of otolith collected for TOP:

		Year								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
		Count	Count	Count	Count	Count	Count	Count	Count	Count
Scale/Otolith/ Both	O	0	0	0	0	0	**533**	**732**	**749**	**141**

Gonad information collected:

Year	species code															
	ANT		BSH	BYE	GRV	MCC		MCH	MRL		QMC	SRX	TOA		TOP	
	Gonad Weight (g)	Maturity Stage	Maturity Stage	Maturity Stage	Maturity Stage	Gonad Weight (g)	Maturity Stage	Maturity Stage	Gonad Weight (g)	Maturity Stage	Maturity Stage	Maturity Stage	Gonad Weight (g)	Maturity Stage	Gonad Weight (g)	Maturity Stage
2010					134											432
2014													11	11	1746	1746
2015			1				165	463			198	2			2563	2564
2016	15	15				183	183		1	1					1529	1530
2017				1											472	472

APPENDIX VI – Stock Status Report: Orange roughy

STATUS REPORT

Hoplostethus atlanticus

Common Name: Orange roughy - ORY

2017

Updated 20 November 2017

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1. Description of the fishery

1.1 Description of fishing vessels and fishing gear

Exploration for orange roughy first started in South Africa prior to 1994 but emphasis soon shifted to Namibia when an exploratory fishing license was given to a Namibian fishing company to search for commercial deep-water fish species. The fishery expanded, extending their fishing range into SEAFO CA. By 2008, a three year moratorium on orange roughy was enforced in Namibia and the fishery has not been re-opened yet.

Table 1 shows vessels that operated between 1995 and 2005 in the SEAFO CA. These vessels were also involved in the Alfonsino fishery during the same period.

Table 1: Orange roughy: Fleet information, SEAFO 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

Seven Namibian vessels (Table 1) were involved for the period that the fishery occurred in the SEAFO CA. The vessels employed the standard New Zealand “Arrow” rough bottom trawl with cut-away lower wings. Sweep and bridle lengths were 100 meters and 50 meters respectively. A “rock hopper” bobbin rig was used. The net had a 5-6 meter headline height when towed at 3- 3.5 knots and had an estimated wingspread of 15 meters. The cod end had a mesh of 110 mm. Each vessel spends on average 12 days at sea.

1.2 Spatial and temporal distribution of fishing

Fishing mainly occurred on Ewing seamount and Valdivia Bank within the SEAFO CA. These operations started in 1995 and continued until 2005. The fishing season usually extends from January to December and catches peak in winter months (May to July), which coincides with the spawning season of orange roughy.

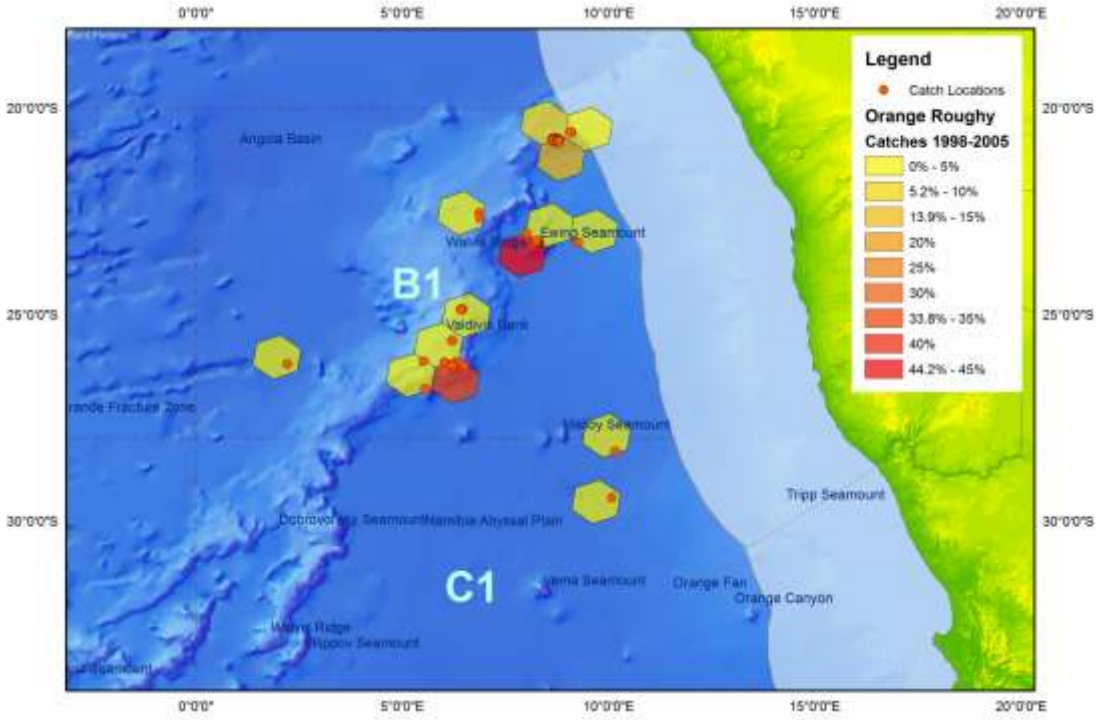

Figure 1: Geographical location of fishing activities in the SEAFO CA.

1.3 Reported retained catches and discards

For all the fishing grounds the home port is the same as the landing port, with Walvis Bay and Lüderitz the most important ports. All available landing information is presented in Table 2. However, the bulk of orange roughy catches were recorded within the Namibian EEZ (Table 3). A total of 1270 trawls were made landing about 290 tonnes of orange roughy.

Table 2: Catches of orange roughy in tonnes made by Namibia, Norway and RSA in the SEAFO CA

Nation	Namibia		Norway		South Africa	
Fishing method	Bottom trawl		Bottom trawl		Bottom trawl	
Management Area	B1		A1		B1	
Year	Retained	Discarded	Retained	Discarded	Retained	Discarded
1995	40		-			
1996	8		-			
1997	5		22		27#**	
1998	-	-	12			
1999	<1		-	-		
2000	75		0			
2001	94		-	-		
2002	9		-	-		
2003	27		-	-		
2004	15		-	-		
2005	18		-	-		
2006	-	-	-	-		

2007	-	-	-	-	-	-
2008	-	-	-	-	-	-
2009	-	-	-	-	-	-
2010	-	-	-	-	-	-
2011	-	-	-	-	-	-
2012	-	-	-	-	-	-
2013	-	-	-	-	-	-
2014	-	-	-	-	-	-
2015	-	-	-	-	-	-
2016	-	-	-	-	-	-
2017*	0	0	-	-	-	-

- = No fishing, Blank fields = No data available.
* Provisional (Aug 2014)
** Sum of Catches from 1993 to 1997.
# Values taken from the Japp (1999).

Table 3: Orange roughy landings (tonnes) in SEAFO CA and Namibian EEZ

Year	SEAFO CA	Namibian EEZ
1994	N/F	1 872
1995	40	6 288
1996	8	17 381
1997	5	14 729
1998	-	10 040
1999	<1	2 699
2000	75	1 344
2001	94	874
2002	9	1 985
2003	27	1 730
2004	15	1 106
2005	18	297
2006	-	429
2007	-	288
2008	-	6
2009	-	5
2010	-	1
2011	-	1
2012	-	2
2013	-	2
2014	-	1
2015	-	6
2016	-	236
2017	-	-

1.4 Illegal, unreported and unregulated (IUU) catch

IUU fishing activity in the SEAFO CA has been reported to the Secretariat in 2012.

2. Stock distribution and identity

Orange roughy (*Hoplostethus atlanticus*) is distributed globally (Fig. 3), but predominantly in the Southern Hemisphere. In the SE Atlantic orange roughy may most probably be regarded as a single stock (management unit). In the BCLME region the species occurs within the economic zones of each of the coastal states as well as in the SEAFO CA.

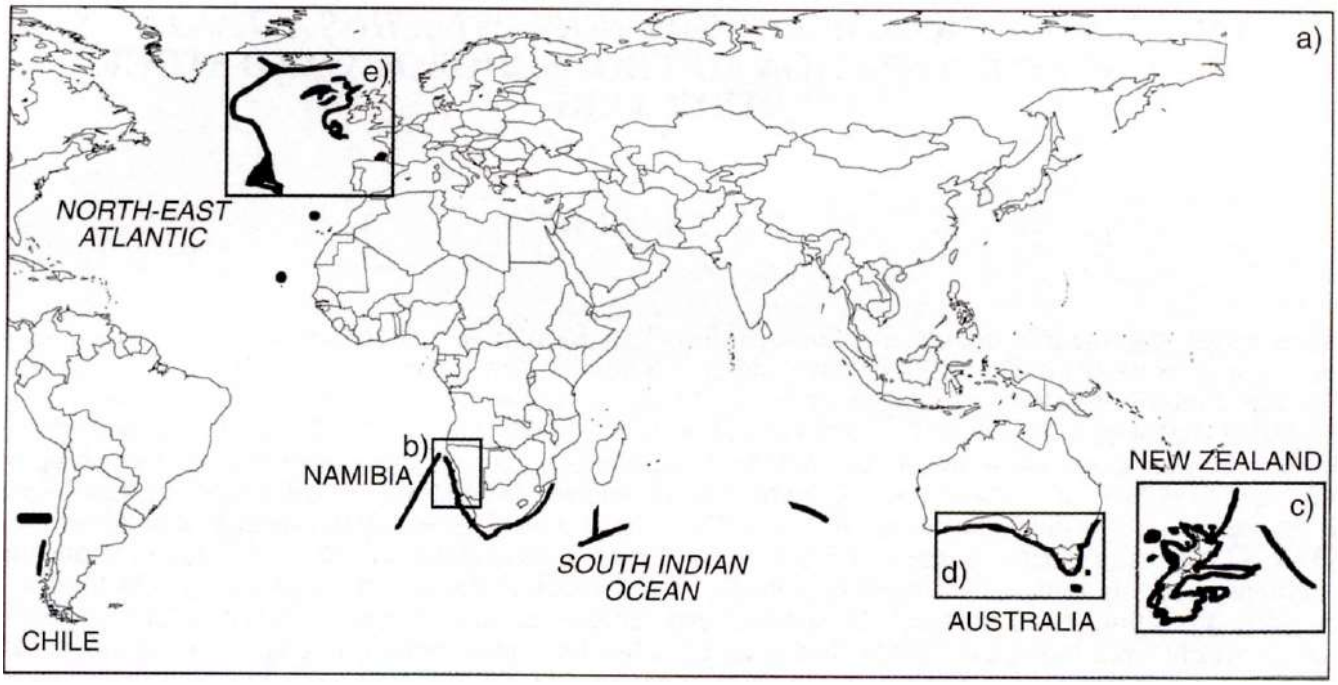

Figure 3: Global orange roughy distribution (Branch 2001).

The aggregating behaviour of orange roughy contributed to its vulnerability to overexploitation globally. Spawning aggregations of orange roughy have been targeted in Namibia during winter. Outside the spawning seasons catches were found to be lower due to a more dispersed resource. Orange roughy are also extremely slow-growing and estimates of maximum age are in excess of 100 years.

Recruitment to the fishery is poorly understood as juveniles are not found in significant quantities. Adults have been caught in small amounts in both Angolan and South African waters, but not in large spawning aggregations as in Namibia. Orange roughy distribution also extends beyond the economic zones of the BCLME countries with good catches reported for example on the Valdivia Bank on the South Atlantic Ridge as well as on the fringes of the Agulhas Bank and Walvis Ridge in the southern Benguela.

3. Data available for assessment, life history parameters and other population information

3.1 Fisheries and survey data

Catch records for the period 1995 to 2005 are available (see Table 2 above). The number of trawls made per year are depicted in table 4 and shows that more hauls were recorded in years when the catches were high.

Deep see fish surveys were conducted in the SEAFO CA by the Norweigan vessel, Dr Fridjof Nansen and by the Spanish vessel.

Table 4: Number of trawls observed per year

Year	Number of trawls
1995	20
1996	223
1997	188
1998	0
1999	16
2000	327
2001	295
2002	40
2003	63
2004	46
2005	61

3.2 Length data and frequencies distribution

No information available for SEAFO CA.

3.3 Length-weight relationships

No information available for SEAFO CA.

3.4 Age data and growth parameters

No information available for SEAFO CA.

3.5 Reproductive parameters

No information available for SEAFO CA.

3.6 Natural mortality

No information available for SEAFO CA.

3.7 Feeding and trophic relationships (including species interaction)

No information available for SEAFO CA.

3.8 Tagging and migration

No information available for SEAFO CA.

4. Stock assessment

4.1 Available abundance indices and estimates of biomass

The annual CPUE (total annual catch divided by number of trawls) are shown in figure 4. 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 until 2005 after which there are no data. It has not been confirmed that this CPUE index reflects stock abundance for a highly aggregating species like orange roughy.

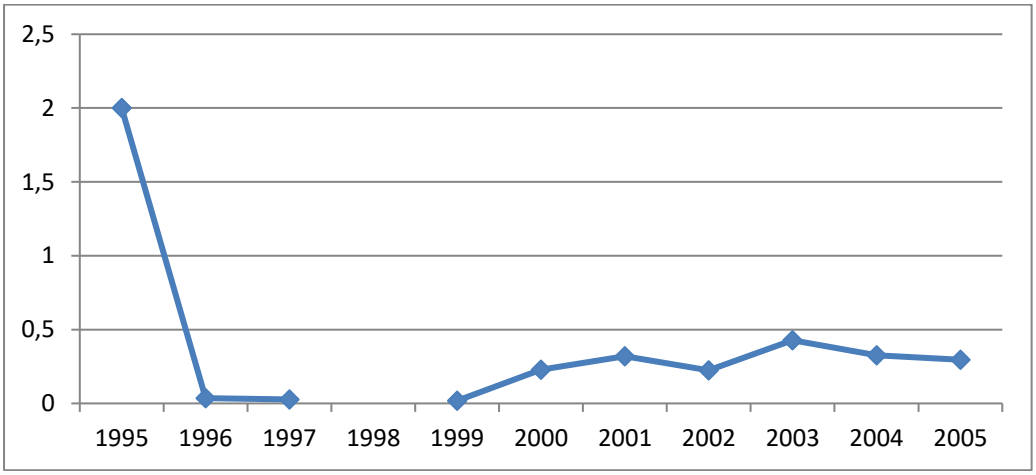

Figure 4: CPUE of orange roughy in tonnes per trawl in Division B1 (SEAFO SC Report 2006).

4.2 Data used

No data since 2005 available.

4.3 Methods used

No data since 2005 available.

4.4 Results

4.5 Discussion

4.6 Conclusion

Since there has been no fishery in recent years or no other fishery independent data available within the SEAFO CA, no assessment can be done at the moment.

4.7 Biological reference points and harvest control rules

No biological reference points and/or harvest control rules have been established for this stock as yet.

5. Incidental mortality and bycatch of fish and invertebrates

5.1 Incidental and bycatch statistics (seabirds, mammals and turtles)

No information available for the SEAFO CA.

5.2 Fish bycatch

Some of the bycatch species recorded are: Alfonsino (*Beryx splendens*), Black Oreo Dory (*Allocyttus niger*), Pelagic armourhead (*Pseudopentaceros richardsoni*), Black Cardinal fish (*Epigonus telescopus*), Smooth Oreo Dory (*Pseudocyttus maculatus*), Warty Oreo Dory (*Allocyttus verrucosus*) and various deep sea shark species.

5.3 Invertebrate bycatch including VME taxa

No information available for the SEAFO CA.

5.4 Incidental mortality and bycatch mitigation methods

No information available for the SEAFO CA.

5.5 Lost and abandoned gear

No lost and abandoned gear data was reported for orange roughy fishery in the SEAFO CA.

5.6 Ecosystem implications and effects

No Information available for the SEAFO CA

6. Current conservation measures and management advice

6.1 Current conservation measures

The 2016 management measure pertaining to orange roughy in the SEAFO CA (CM 31/15) has zero tonnes (moratorium on directed fishery) and a 4 tonnes bycatch allowance in Division B1, and 50 tonnes in the remainder of the SEAFO CA;

Table 5: Conservation measure relevant to orange roughy fishery

Conservation Measure 04/06	On the Conservation of Sharks Caught in Association with Fisheries Managed by SEAFO
Conservation Measure 14/09	To Reduce Sea Turtle Mortality in SEAFO Fishing Operations.

Conservation Measure 25/12	On Reducing Incidental Bycatch of Seabirds in the SEAFO Convention Area
Conservation Measure 30/15	On the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area
Conservation Measure 31/15	On Total Allowable Catches and related conditions for Patagonian Toothfish, orange roughy, Alfonsino and Deep-Sea Red Crab in the SEAFO Convention Area in 2014

6.2 Management advice

SC considered available data on orange roughy since the inception of the fisheries in SEAFO CA.

There is no fishery data available since 2005 for orange roughy within the SEAFO CA, as a result SC cannot conduct stock assessment of the orange roughy stock within the Convention Area.

SC recommends a moratorium for 2017 and 2018 on directed fishery in Division B1 and allowance for bycatch limit as proportion (10%) of the average of landings from the last five years with positive catches (i.e. 2001-2005), equivalent to 4 tonnes.

The SC did not consider the allowance of a 50 tonnes TAC in the remainder of the area and cannot review the current status quo, due to a lack of new information.

A harvest control rule shall be developed for orange roughy in the future as data becomes available.

In 2017 the SC reviewed the recommendation on orange roughy but could not advice on the most appropriate harvesting level on this stock due to lack of scientific information. Historically, there were no records of landings higher than 22 tonnes outside B1. SC recommended a precautionary tac or bycatch allowance outside B1.

The annual catch and set TAC outside the B1 are shown in figure 5. There were no landing recorded since 2005.

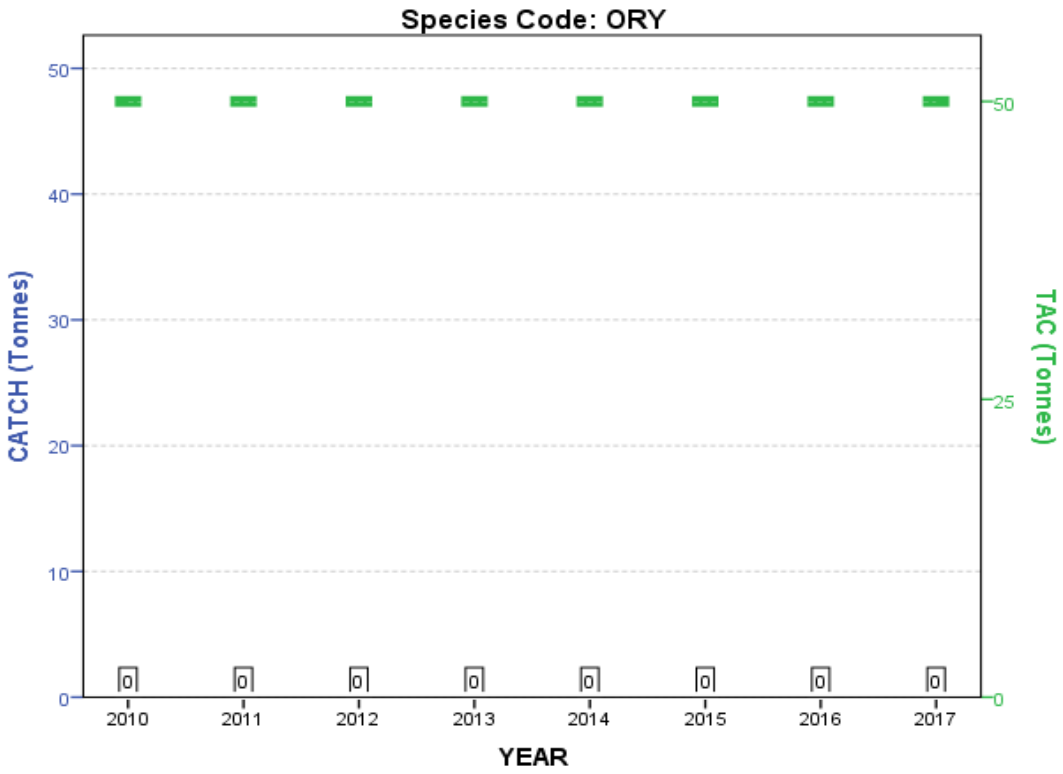

Figure 5: Orange roughy catches and set TAC outside the B1, since 2005.

7. References

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APPENDIX VII – Stock Status Report: Deep-sea Red Crab

STATUS REPORT

Chaceon erytheiae

Common Name: Deep-sea red crab

FAO-ASFIS Code: GER

2017

Updated: 20 November 2017

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1. Description of the fishery

1.1 Description of fishing vessels and fishing gear

Data within the SEAFO database indicate that the deep-sea red crab (DSRC) resource has been utilized by two nations primarily, Namibia and Japan. The Namibian-flagged vessel, *FV Crab Queen 1*, known to fish crab in the SEAFO CA is a 49.61m, 1989-built steel vessel with an onboard holding capacity of 610m^3. The vessel can process on average 1200 traps (i.e. three sets with 400 traps each) per day.

During 2005 an older Japanese-flagged vessel, *FV Kinpo Maru no. 58*, conducted crab fishing activities in the SEAFO CA. This vessel was built in 1986, is 62.60m in length and has an onboard holding capacity of 648m^3. The *Kinpo Maru*, however, was replaced by the *FV Seiryo Maru* which is 37.06m in length, was built in 1987 and has an on-board holding capacity of 289 m^3.

The Namibian and Japanese vessels' gear setup (set deployment & design) are very similar. Both vessels use the same type of fishing gear – known as Japanese beehive pots (Fig. 1). The beehive pots are conical metal frames covered in fishing net with an inlet shoot (trap entrance – Fig. 1) on the upper side of the structure and a catch retention bag on its underside. When settled on the seabed the upper side of the trap are roughly 50cm above the ground ensuring easy access to the entrance of the trap. The trap entrance leads to the kitchen area of the trap – which is sealed off by a plastic shoot that ensures all crabs end up in the bottom of the trap.

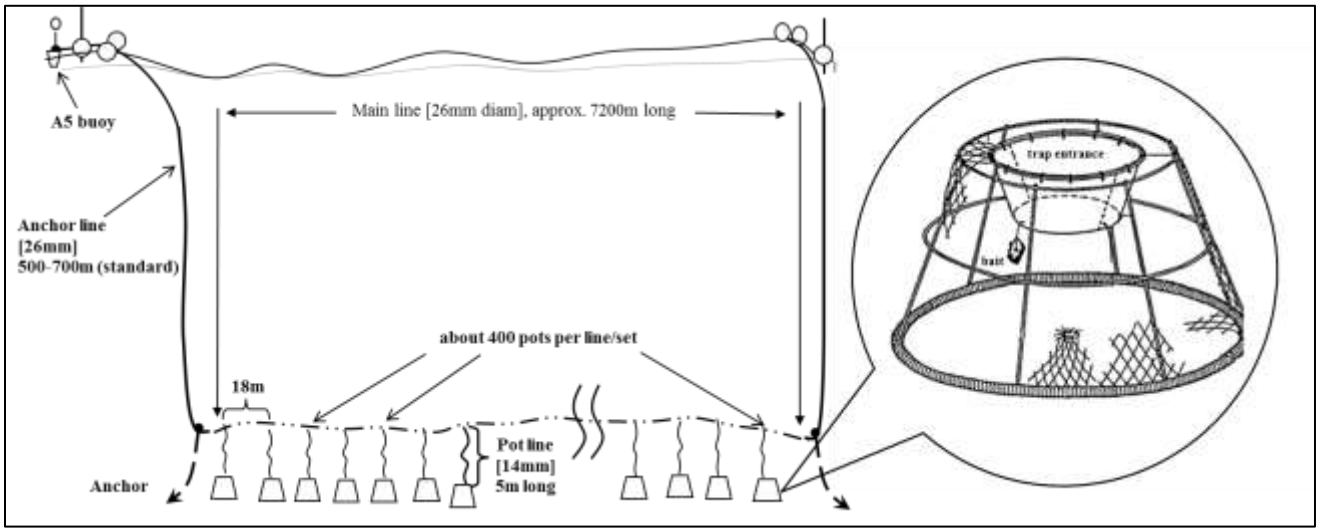

Figure 1: Deep-sea red crab fishing gear setup (set deployment and design) and illustration of a Japanese beehive pot (shown in enlarged form on the right).

One set or pot line consists of about 200-400 beehive pots, spaced roughly 18m apart, on a float line attached to two (start & end) anchors for keeping the gear in place on the seabed (Fig. 1). The start & end points of a set are clearly marked on the surface of the water with floats and one A5 buoy that denotes the start of a line. Under this setup (i.e. 400 pots at 18m intervals) one crab fishing line covers a distance of roughly 7.2km (3.9nm) on the sea floor and sea surface.

In 2017 a new Namibia-flagged deep-sea red crab vessel (*MFV Noordburg Kalapuse* – Call Sign: V5WO) conducted crab fishing operations in Division B1 of the SEAFO CA. This vessel, with a holding capacity of 633m^3 and fishing gear capacity of 1397 pots deployed on 4 sets/lines, was resident in the CA for a period of 14 days but only recorded a total of 4 fishing days in which it landed 7 tonnes of crab. Being new to the

area the data seem to indicate that the vessel experienced severe weather (or other operational) problems in that it lost fishing gear on two separate occasions (days) during the fishing trip and, according to the Observer Report, spent a considerable amount of time trying to recover this gear with no success. This may be the reason why the vessel only managed to record such a low catch for the period of time it was in the SEAFO CA.

1.2 Spatial and temporal distribution of fishing

In the SEAFO Convention Area fishing for deep-sea red crab is focussed mainly on *Chaceon erytheiae* on Valdivia Bank – a fairly extensive seamount that forms part of the Walvis Ridge (Fig. 2-6). This seamount is located in Division B1 of the SEAFO CA and has been the main fishing area of the crab fishery since 2005 when the resource was accessed by Japan. Records from the SEAFO database indicate that fishing for crab in this area occurred over a depth range of 280-1150m.

Table 1: The total number of sets from which deep-sea red crab catches were derived for the period 2010-2017.

2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2017**
181	133	129	103	107	73	**142**

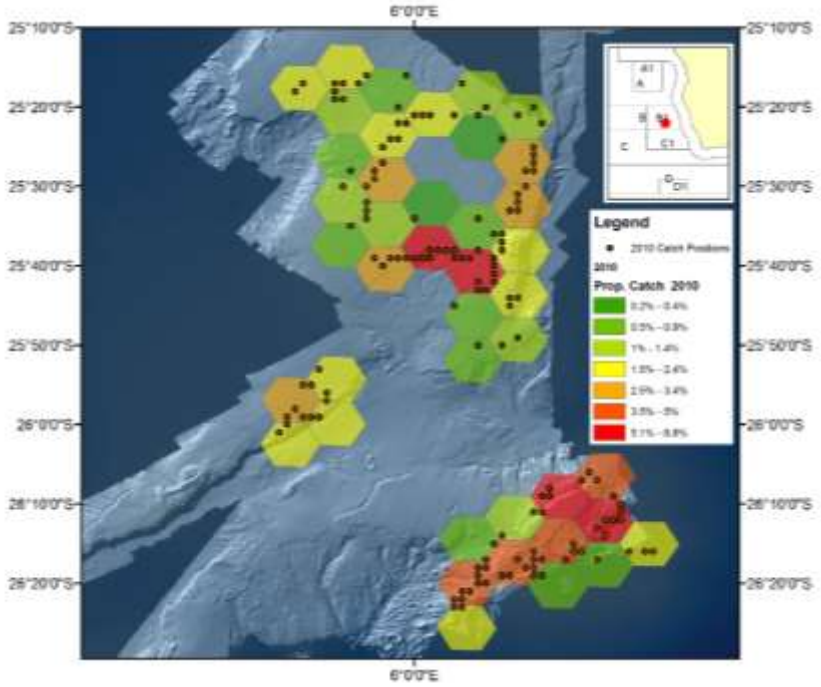

Figure 2: The 2010 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

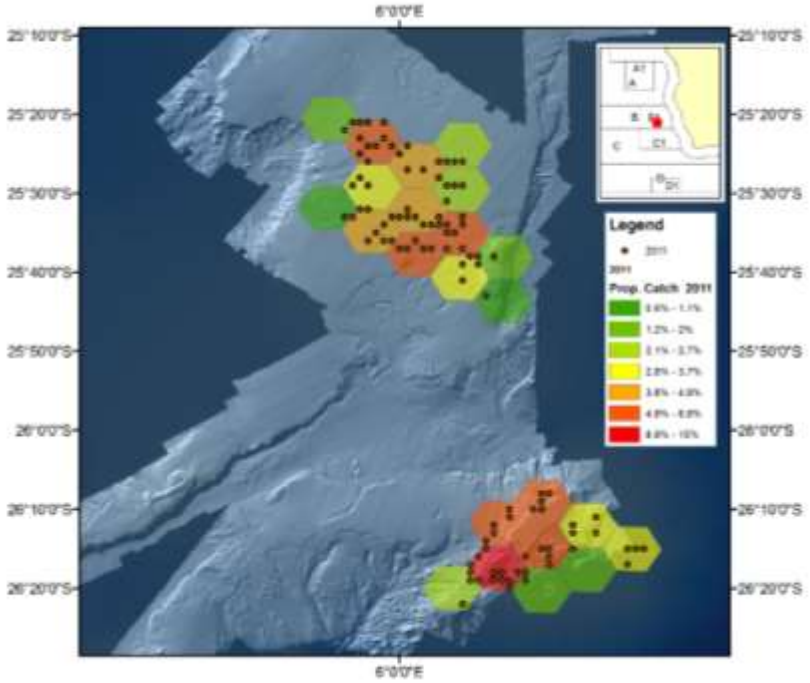

Figure 3: The 2011 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

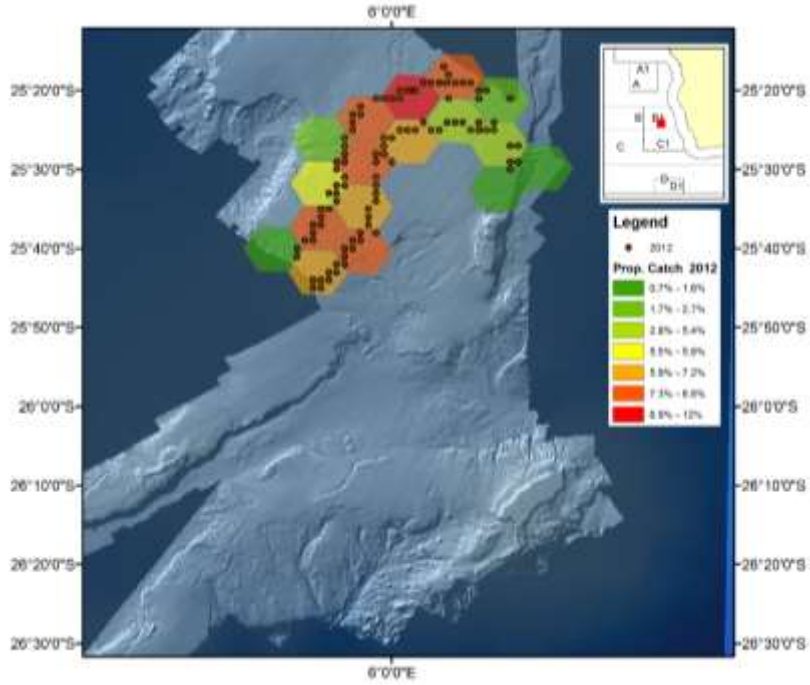

Figure 4: The 2012 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

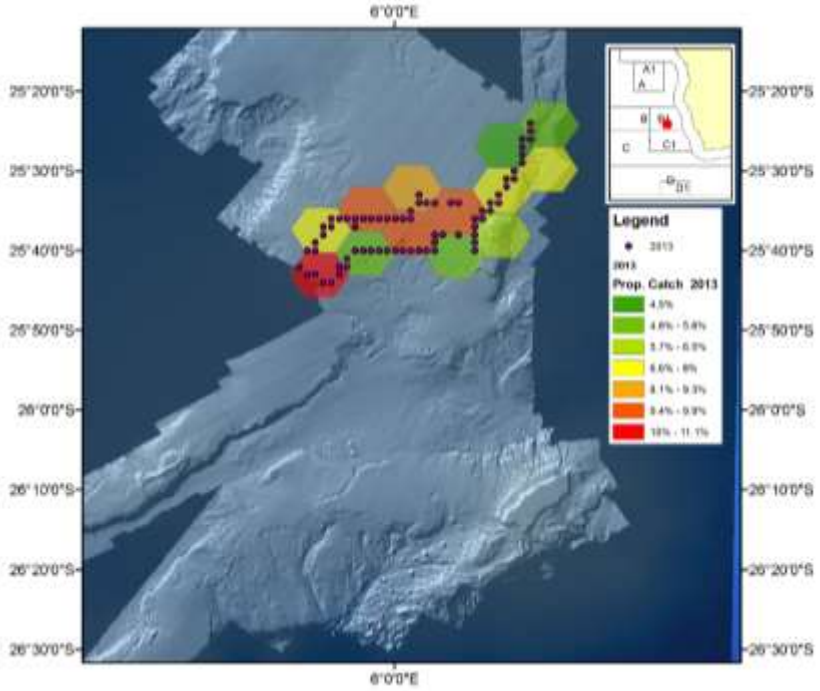

Figure 5: The 2013 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

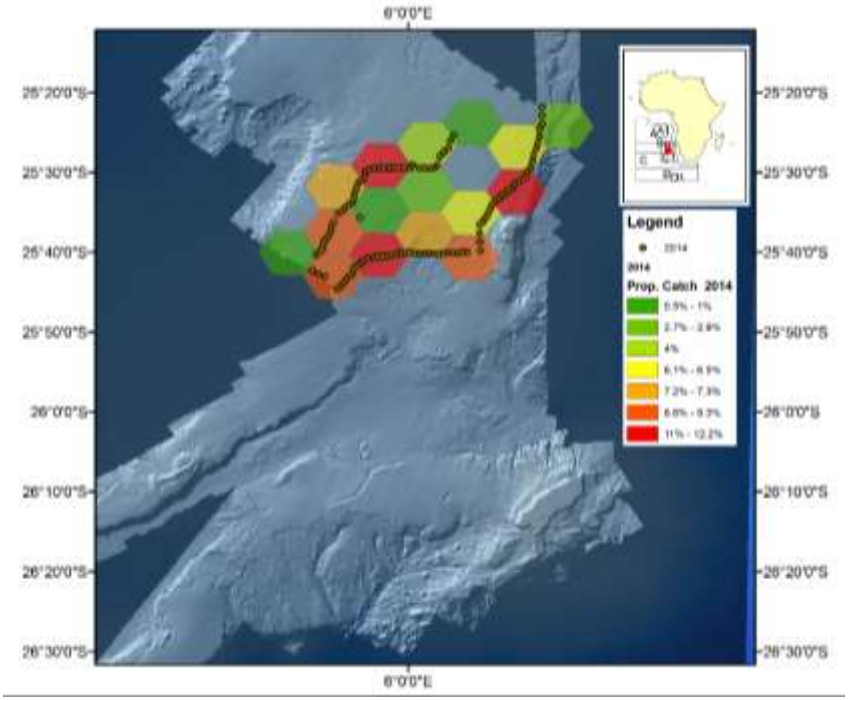

Figure 6: The 2014 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

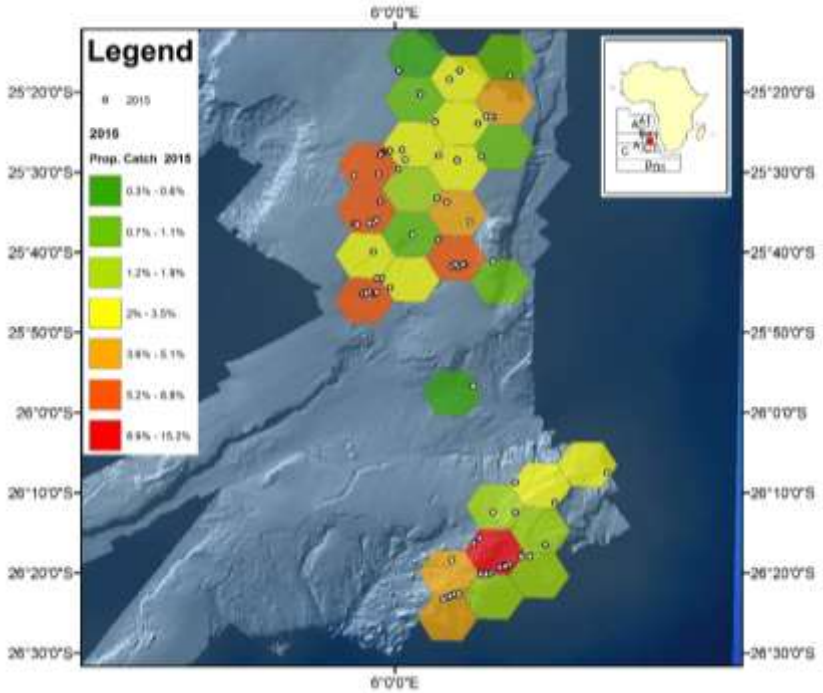

Figure 7: The 2015 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

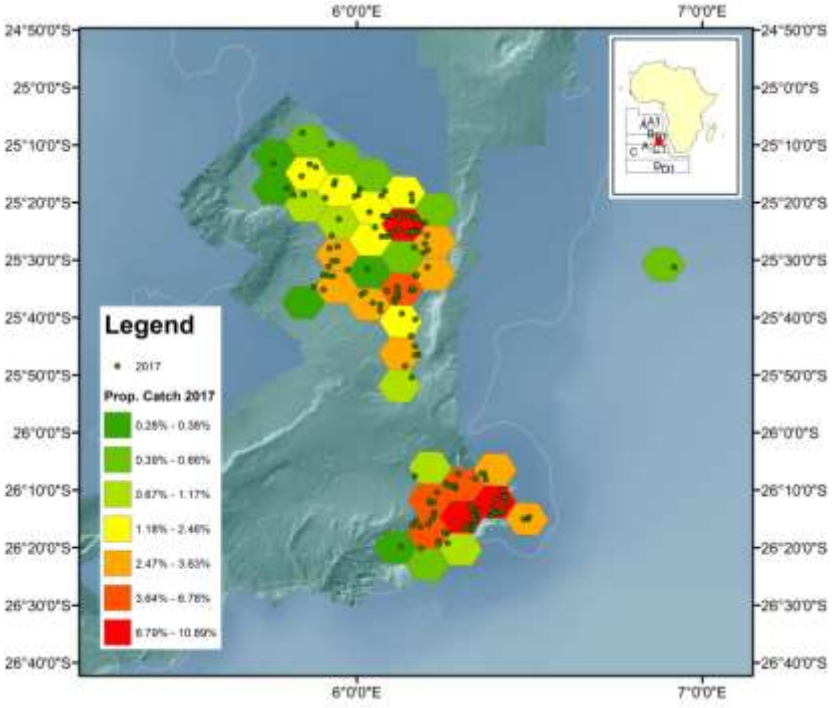

Figure 8: The 2017 catch distributions for deep-sea red crab in Division B1 aggregated to a 10 km^2 hexagonal area.

1.3 Reported landings and discards

Reported landings (Table 2) comprise catches made by Japanese, Namibian, Spanish, Portuguese and Korean-flagged vessels over the period 2001-2017. As is evident from Table 2 the two main players in the SEAFO crab fishery are Japan and Namibia, respectively, with Spanish and Portuguese vessels having only sporadically fished for crab in the SEAFO CA over the period 2003 to 2007. Spanish-flagged vessels actively

fished for crab in the SEAFO CA during 2003 and 2004, whereas Portuguese-flagged vessels only fished for crab once during 2007 (Table 2).

Table 2: Catches (tonnes) of deep-sea red crab (*Chaceon spp*. – considered to be mostly *Chaceon erytheiae*).

Nation	Japan		Korea		Namibia		Spain		Portugal	
Fishing method	Pots		Pots		Pots		Pots		Pots	
Management Area	B1		B1		B1		UNK		A	
Year	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard	Retain	Discard
2001			-	-			<1			
2002			-	-						
2003			-	-			5			
2004			-	-			24			
2005	253	0	-	-	54					
2006	389		-	-						
2007	770		-	-	3	0			35	
2008	39		-	-						
2009	196		-	-	-	-	-	-	-	-
2010	200	0	-	-			-			
2011	-	-	-	-	175	0	-	-	-	-
2012	-	-	-	-	198	0	-	-	-	-
2013	-	-	-	-	196	0	-	-	-	-
2014	-	-	-	-	135	0	-	-	-	-
2015	-	-	104	0	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-	-	-
2017*	140	0	-	-	7	0	-	-	-	-

* Provisional (September 2017). Ret. = Retained Disc. = Discarded - = No Fishing.
Blank fields = No data available. UNK = Unknown.

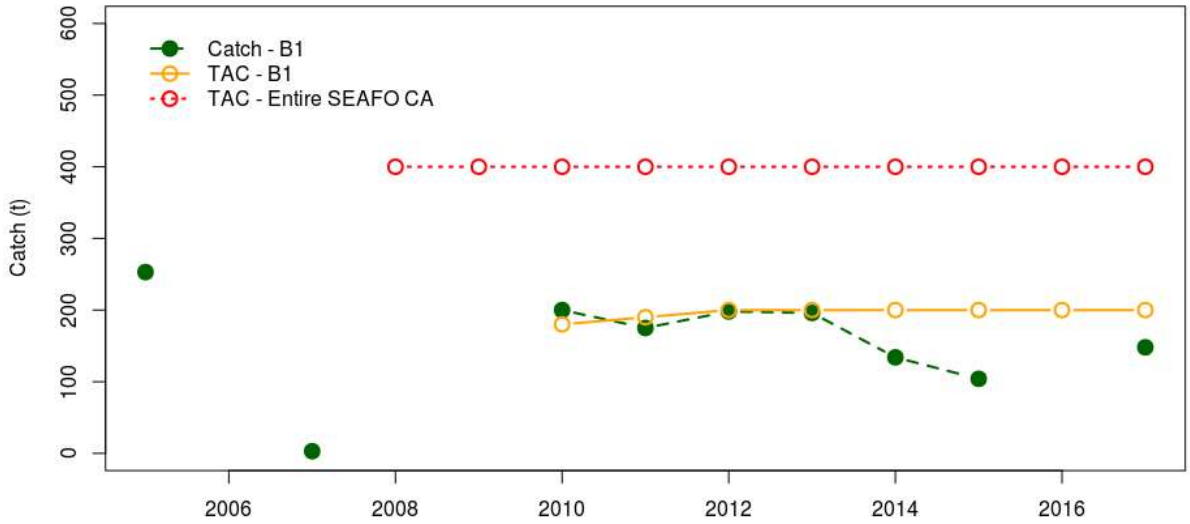

Figure 9: Annual catches in relation to TAC for Deep-Sea Red Crab in Division B1 and the remaining SEAFO CA. The only reported catch outside B1 is that made by Portugal in Division A1 during 2007 (see Table 2 for clarity).

Being a pot fishery, the deep-sea red crab fishery has an almost negligible bycatch impact. To date only 5kg of teleost (Marine nei and European sprat) fish discards have been recorded, during 2010, from this fishery. As of 2010, however, minimal to moderate bycatches of king crabs have also been in terms of the records from this fishery (see Section 5.3 for additional information).

1.4 IUU catch

IUU fishing activity in the SEAFO CA has been reported to the Secretariat latest in 2012, but the extent of IUU fishing is at present unknown.

2. Stock distribution and identity

One species of deep-sea red crab has been recorded in Division B1, namely *Chaceon erytheiae* (López-Abellán *et al*. 2008), and is thus considered the target species of this fishery. Aside from the areas recorded in catch records the overall distribution of *Chaceon erytheiae* within the SEAFO CA is still unknown. Further encounter records documented through video footage during the 2015 FAO-Nansen VME survey in the SEAFO CA indicate that deep-sea red crab are distributed across a major part of the Valdivia seamount range, as well as the Ewing and Vema seamounts (DOC/SC/26/2015).

Preliminary results from genetics studies, based on Mitochondrial DNA, indicate that the deep-sea red crab targeted by the pot fishery on the Valdivia Bank is confirmed as *C. erytheiae* (López-Abellán *pers. comm.*).

3. Data available for assessments, life history parameters and other population information

3.1 Fisheries and surveys data

Fishery-dependent data exist only for more recent years (2010-2017) of the SEAFO deep-sea red crab fishery (Fig. 10). Biological data from the fishery comprise gender-specific length-frequency, weight-at-length, female maturity and berry state data (Table 3).

Table 3: Illustration of sampling frequencies (2010-2017) from the deep-sea red crab commercial fleet within the SEAFO CA.

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2017**
Total Number of Sets	181	133	120	103	107	74	135
Crabs Sampled per Set	30	30	30	30	100	136	100
Total Crabs Sampled	5430	3990	3600	3077	10654	32500	13500

Very limited fisheries-independent data on deep-sea red crabs exists for the SEAFO CA. A total of 479 deep-sea red crabs were sampled during the 2008 Spanish-Namibia survey on Valdivia Bank. The data was collected over a depth range of 867-1660m. Additionally 127 deep-sea red crab samples were collected onboard the *RV Fridtjof Nansen* during the SEAFO VME mapping survey conducted at the start of 2015 (DOC/SC/26/2015).

3.2 Length data and frequency distribution

Available length-frequency data for crabs caught in the SEAFO CA over the period 2010-2017 are presented in Figure 10. Length-frequency data from all areas sampled in Division B1 were pooled as no significant differences were detected between areas.

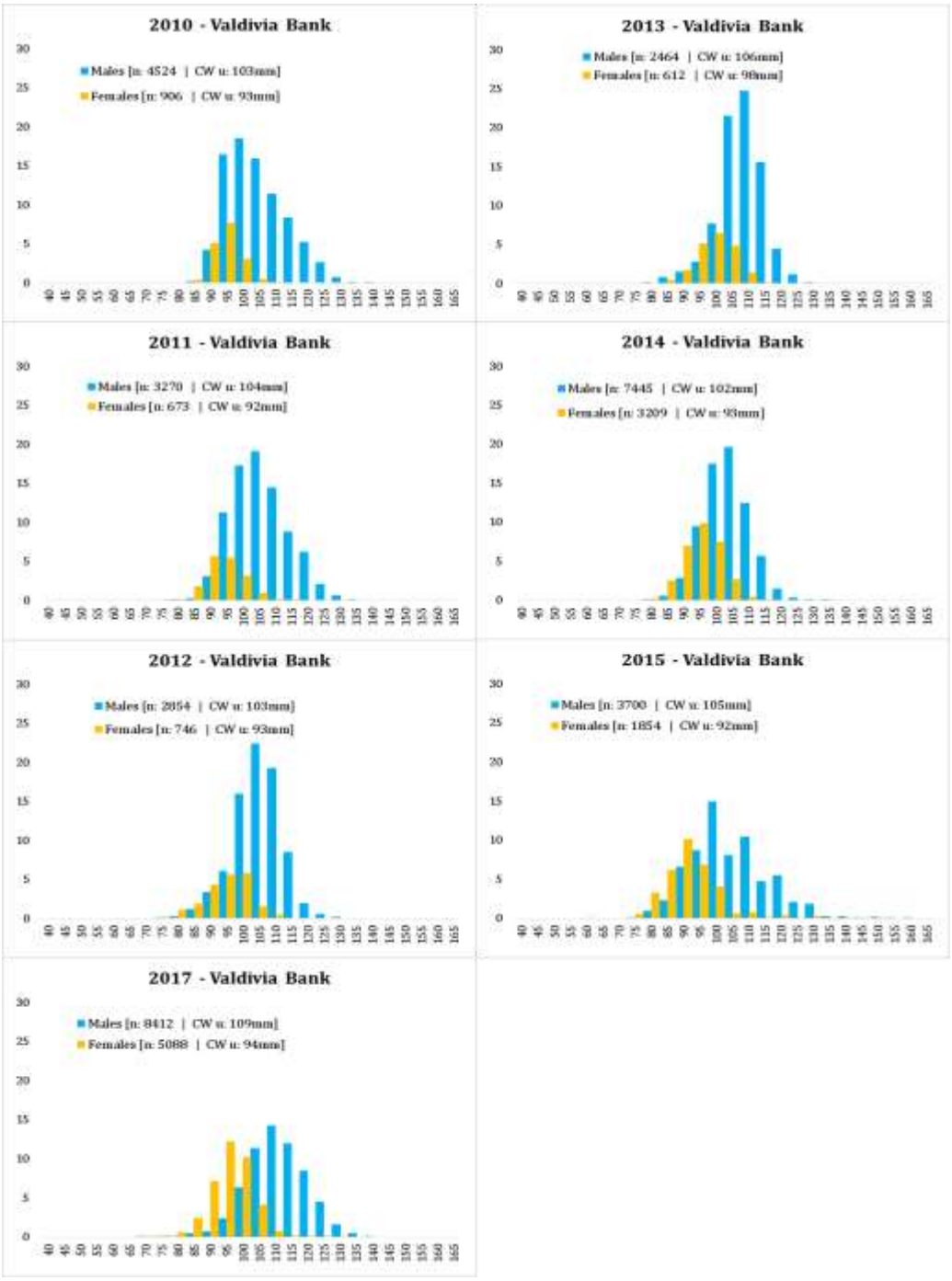

Figure 10: Carapace width (mm) frequencies (in percentages) of crabs sampled from commercial catches [2010-2015 & 2017]. Notes: "n" refers to sample size; "u" refers to the carapace width arithmetic mean for each sample as indicated.

For the period 2010-2017 there have been no significant changes in the female crab size distribution (Fig. 10). The male crab size distribution changed from a wider size distribution in 2010 and 2011, where larger male crabs were recorded, to a slightly narrowed size distribution in 2012-2014 of smaller crabs. During

2015 a lot more female crabs larger than 110mm were recorded than any preceding years since 2010 (Fig. 10). Sex ratio from crab commercial samples fluctuated around 4:1 in favour of male crabs – a well-known bias of the commercial traps used in this fishery.

3.3 Length-weight relationships

Length-weight relationship derived from catches on Valdivia Bank reveal the gender-specific growth disparity (Fig. 11). Male crabs grow at a faster rate than females and thus attain much larger sizes than female crabs. This species attribute, however, is not unique to *Chaceon erytheiae* and has been recorded for other crab species in the *Chaceon* genus (Le Roux 1997). Data from the 2008 survey show a much more coherent length-weight relation for both male and female crabs (Fig. 12).

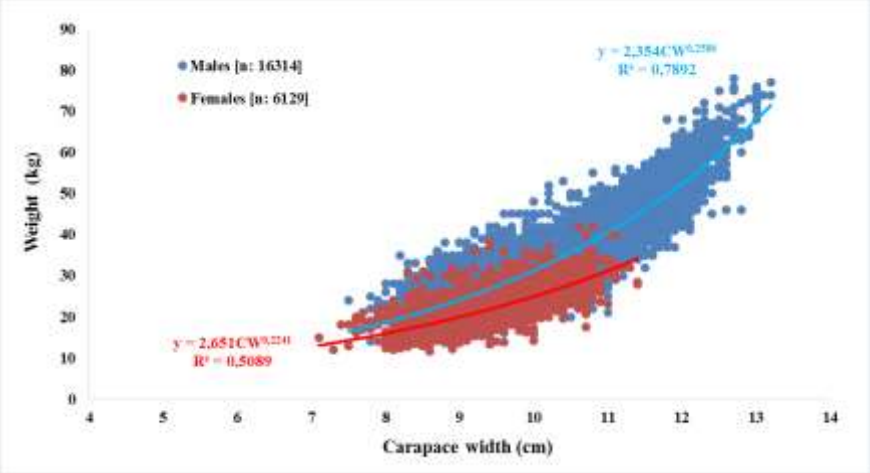

Figure 11: Length-at-weight data for *Chaceon erytheiae* as recorded from catches on Valdivia Bank (2008-2015). Red text show female length-weight relationship, blue text show male length-weight relationship.

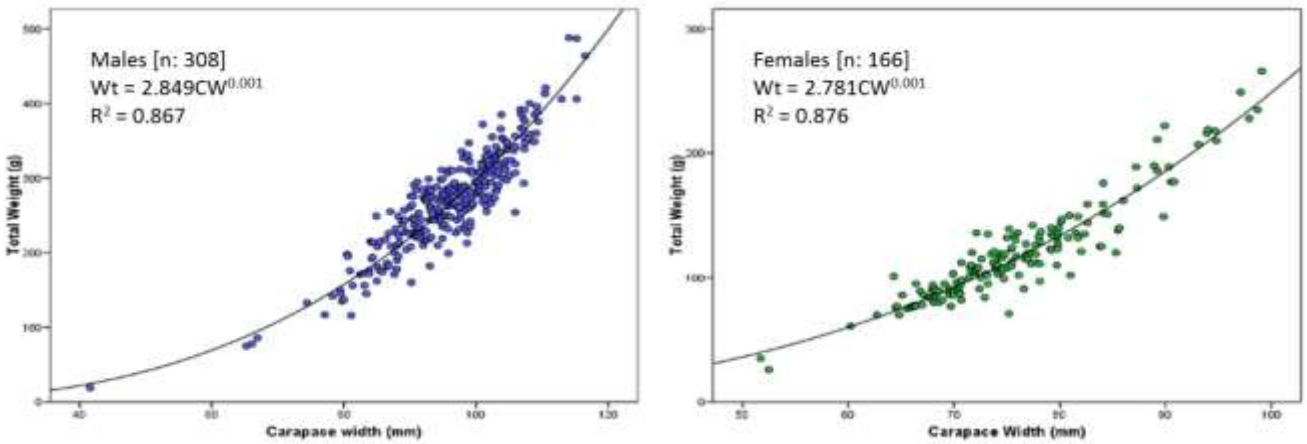

Figure 12: Length-at-weight data for *Chaceon erytheiae* as recorded from the 2008 Spain-Namibia survey (López-Abellán *et al*. 2008).

3.4 Age data and growth parameters

No information exists on the age and growth attributes of *Chaceon erytheiae*.

3.5 Reproductive parameters

Very limited reproductive data exist for *Chaceon erytheiae* from commercial samples. This dataset constitute female maturity and berry data collected during 2010-2015. However, the mating and spawning seasons for *C. erytheiae* within the SEAFO CA are still unknown.

3.6 Natural mortality

No natural mortality data exist for *Chaceon erytheiae*.

3.7 Feeding and trophic relationships (including species interaction)

No data exist for *Chaceon erytheiae*.

3.8 Tagging and migration

No data on migration exist for *Chaceon erytheiae* in the SEAFO CA.

4. Stock assessment status

4.1 Available abundance indices and estimates of biomass

Currently the only data available for the assessment for *C. erytheiae* abundance within the SEAFO CA are the catch and effort data from which a limited catch-per-unit effort (CPUE) series can be constructed.

4.2 Data used

The available SEAFO data (2005-2017) for purposes of considering possible assessment strategies are presented in Table 4.

Table 4: Description of the entire deep-sea red crab database highlighting important datasets.

Year	Flag State	Data Type - Source	Brief Description [NB Data Groups only]
2005	JPN	Catch Data – Observer Report	Set-by-Set data (vessel ID, set-haul positions & dates), Depth, Catch, Effort - (157 records).
2007	NAM	Catch Data – Observer Report	Set-by-Set data (vessel ID, set-haul positions & dates), Depth, Catch, Effort - (10 records - sets).
2010	JPN	Catch & Biological Data – Observer Report	Set data (vessel ID, set-haul positions & dates), Depth, Length, Weight, Catch, Effort - (Catch: 181 records, Biological: 5430 records).
2011	NAM	Catch & Biol. Data – Observer Report	Set-by-Set data (vessel ID, set-haul positions & dates), Depth, Length, Weight, Catch, Effort - (Catch: 133 records, Biological: 3990 records).
2012	NAM	Catch & Biol. Data – Obs. Report & Captain's Logbook [log sheet data]	Set-by-Set data (vessel ID, set-haul positions & dates), Depth, Length, Weight, Catch, Effort - (Catch: 129 records, Biological: 3600 records).

2013	NAM	Catch Data – Captain's Logbook [log sheet data]	Set-by-Set data (vessel ID, set-haul positions & dates), Depth, Catch, Effort - (Catch: 103 records, Biological: 3090 records).
2014	NAM	Catch Data – Captain's Logbook [log sheet data]	Set-by-Set data (vessel ID, set-haul positions and dates), Depth, Length, Weight, Catch, Effort – (Catch: 107 records, Biological: 10660 records)
2015	KOR	Catch Data – Fishing Logbook data	Set-by-Set data (vessel ID, set-haul positions and dates), Depth, Length, Weight, Catch, Effort – (Catch: 73 records, Biological: 5554 records)
2017	JPN & NAM	Catch Data – Fishing Logbook data	Set-by-Set data (vessel ID, set-haul positions and dates), Depth, Length, Weight, Catch, Effort – (Catch: 142 records, Biological: 5554 records)

4.3 Methods used

CPUE Standardization:

As part of the annual updating of the deep-sea red crab abundance index another attempt was made during 2017 at standardizing the CPUE index. Following the outcomes of the 2015 assessment that revealed "SoakTime" as an unreliable factor for consideration in the CPUE standardization, "SoakTime" was again omitted from the 2017 standardization of the annual CPUE from the SEAFO deep-sea red crab fishery.

Table 6: Description of the sets for which catch and effort data are available for the CPUE standardization.

2005	**2007**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2017**
157	10	181	133	129	103	107	73	142

The records from 2007 were excluded from the analysis as they were derived from an area not exploited in the remaining years and, constituting only 10 sets, were not comparable to datasets from the rest of the data series. In addition to this the 7 sets from a Namibian vessel that conducted some very uncharacteristic crab fishing operations during 2017 were also removed from the analysis as the data from this vessel was severely disparate (both in terms of total set number and catch) from all of the remaining data in the SEAFO database.

The following variables from each record were considered in the model:

- Year - A 12-month period – explanatory variable (covariate).
- Semester - A calendar semester in a fishing year – explanatory variable (covariate).
- VesselID - Identification code for a participating vessel – explanatory variable (covariate).
- Zone - Identification code for a fishing area – explanatory variable (covariate). Co-ordinates where categorized into three smaller fishing zones reflecting the fishing records within Division B1.
- Depth - Fishing depth – explanatory variable (covariate). Depth was categorized into 50 metre intervals covering the entire range of depths recorded by the fishery.
- Pots - The number of baited pots used per set during fishing operations – explanatory variable (co-variate).
- CPUE - Catch/number of pots – response variable.

4.4 Results

Results from the CPUE standardization are presented below to illustrate some of the more important outputs and methods applied.

The maximum set of model parameters offered to the stepwise selection procedure was:

$$CPUE = \beta_0 + \beta_1 \text{ Year} + \beta_2 \text{ VesselID} + \beta_3 \text{ Depth} + \beta_4 \text{ Zone} + \beta_5 \text{ Semester} + \beta_6 \text{ Pots} + \varepsilon$$

A stepwise backward model selection procedure was deployed in selecting the covariates, to the model. The model with lowest Akaike value (AIC - Akaike Information Criterion) was selected as the best model, since it has a better predictive power. The best model (outlined below) was then used for further analysis.

$$CPUE = \beta_0 + \beta_1 \text{ Year} + \beta_3 \text{ Depth} + \beta_5 \text{ Semester} + \beta_6 \text{ Pots} + \varepsilon$$

Table 7 presents the estimates of the coefficients, standard error and *t* values for different levels of the factors entered into the selected model. Model, covariate year, depth, semester and pots are very significant with p-values of $2.2*10^{-16}$, $7.179*10^{-13}$, $2.457*10^{-3}$ and $1.328*10^{-10}$ indicating strong covariance with deep-sea red crab catch rates. Zone, as a covariate, was not found to be significant during the 2017 analysis.

Table 7: ANOVA results for the CPUE model.

Covariates	Df	Deviance	Residual Df	Residual Deviance	Pr(>Chi)
NULL			994	1098.72	
Year	7	381.75	987	716.97	< 2.2e-16 ***
Depth	16	58.83	971	658.14	7.179e-13 ***
as.factor(SEMESTER)	1	3.20	970	654.94	0.02457 *
Pots	16	50.99	954	603.95	1.328e-10 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

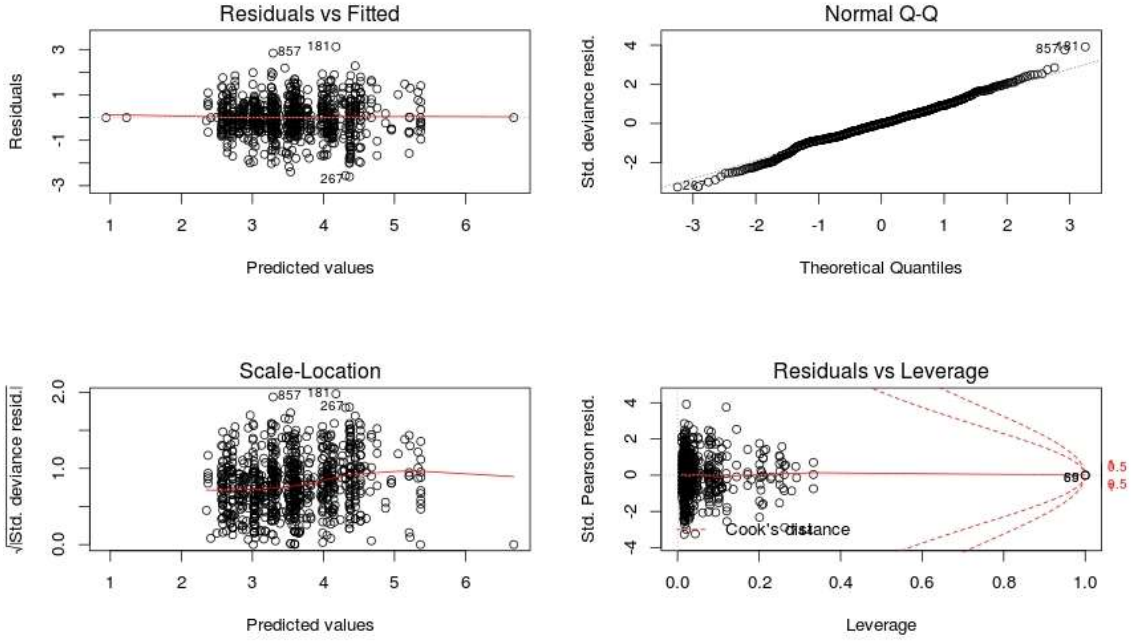

Figure 13: QQ and studentized residual plots of the best lognormal fit model for retained catch CPUE (kg/pot).

Model diagnostics of the best model were assessed. This involved checking for normality of the residuals and the spread of the residuals across the fitted values. A total of 23 outliers were removed (out of a total of 883 data points – i.e. outliers removed equates to 2.7% of entire dataset) on the basis of residual

skewness and Cook's Distance disparity. After the removal of the outliers diagnostic plots revealed improve distributions thus indicating that model assumptions were not violated. QQplots of the residuals indicated that the model residuals were well within the excepted limits for data skewness (Fig. 13). Plots of the residuals versus fitted values indicated evenly distributed data points, no overridingly skewed patterns in the plot (Fig. 13). Therefore there is no evidence of non-constant error variance in the residual plot and independence assumption also appeared reasonable.

Results from the standardized CPUE exercise suggest that CPUE has fluctuated over a moderate range (of 0.248 and 5.108) during the period 2005 to 2015. However, the confidence margins are fairly wide for the main part of the CPUE series – which indicates that the CPUE hasn't change significantly over the period 2011-2015, with the exception of 2010, 2014 and 2017 where the CPUE was very close to zero (Fig. 14).

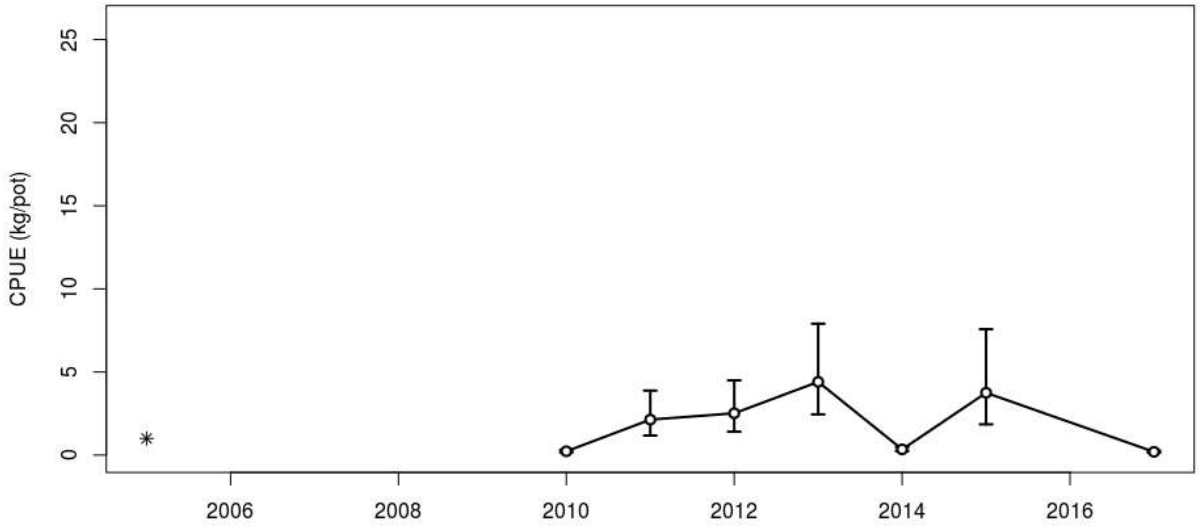

Figure 14: Trends in catch CPUE indexes for catches per pot-hour of crabs – with soak time as a categorical variable (factor). Standardized Index: black line with standard deviation (error bars).

4.5 Discussion

In light of new catch and effort data received from the deep-sea red crab fishery in 2015 another run on the standardization of crab CPUE series was conducted in 2015. In contrast to the CPUE standardization of 2014, soak time was not considered as a predictive variable or covariate in the GLM implemented during 2015. The reason for this were twofold:- firstly, the soak times recorded for the 2015 crab fishing operations were far in excess of those calculated for years prior to 2015; and secondly, there doesn't seem to be any correlation between the viability of bait and catch rates in the crab fishery that would necessitate the inclusion of soak time as a predictive variable in the CPUE standardization. For these reasons the CPUE calculated in 2015 for the crab fishery is referenced as "Kg/Pot" and not "Kg/Pot.Hour" as was the case in 2014. The CPUE standardization revealed that, although the data series is very short, there was no severe changes in the CPUE trend since 2010 and that it is well within range of the 2005 CPUE.

In 2014 an exploratory Length Cohort Analysis (LCA) was conducted, and was found to be inconclusive but nevertheless indicated that the SEAFO deep-sea red crab resource is not in any risk of over-exploitation. This exploratory exercise was not repeated in 2015.

SC also noted that sampling on deep-sea red crab is quite good, but not all valuable data are available hence it is affecting our choice of an assessment method.

SC discussed in 2014 the possibility of applying the harvest rule and it was decided that the Greenland Halibut harvest control rule used in NAFO may be the most appropriate option for deep-sea red crab. This was adopted by the Commission in 2014.

In 2014 only near 50% of the TAC was caught. The reason for this is unknown to the SC. At this point in time there are no indications for why the TACs was not landed fully during 2015 and 2017 (see Figure

4.6 Conclusion

The biological data series obtained from the SEAFO deep-sea red crab fishery, although short, is of relatively good quality. Nevertheless, important data such as growth parameter for the *C. erytheiae* stock, which will enhance the cohort analyses of the resource, was not available for the SEAFO CA and emphasis needs to be given in collecting this data for future assessments.

4.7 Biological reference points and harvest control rules

At this point in time it should be noted that no biological reference points exist for this stock in the SEAFO CA.

However, it is worthwhile to note that the *C. erytheiae* stock, based on the grounds of it being a long-lived and relatively stable stock, is a good candidate for an empirical Harvest Control Rule (HCR) similar to that applied to the Greenland halibut stock by the North Atlantic Fisheries Organization (NAFO). This is a simple HCR that merely considers that slope of an abundance index such as the CPUE and applies a catch limit to future years based in the current year's TAC. The concept is as follows:

$$TAC_{y+1} = \begin{cases} TAC_y \times (1 + \lambda_u \times slope) & if \quad slope \geq 0 \quad \text{...rule 1} \\ TAC_y \times (1 + \lambda_d \times slope) & if \quad slope < 0 \quad \text{...rule 2} \end{cases}$$

Slope: average slope of the Biomass Indicator (CPUE, Survey) in recent 5 years.

- λ_u :TAC control coefficient if slope > 0 (Stock seems to be growing) : λ_u=1
- λ_d :TAC control coefficient if slope < 0 (Stock seems to be decreasing) : λ_d=2
- TAC generated by the HCR is constrained to ± 5% of the TAC in the preceding year.

For the interim this is considered to be a fairly good starting point, given the current status of the *C. erytheiae* resource, until such time that additional data are available for more advance stock assessment approaches.

5. Incidental mortality and bycatch of fish and invertebrates

5.1 Incidental mortality (seabirds, mammals and turtles)

No incidental catches of seabirds, mammals and turtles have been recorded from the deep-sea red crab fishery to date.

5.2 Fish bycatch

Incidental and bycatch records from the deep-sea red crab fishery indicate that only one species is currently impacted by this fishery.

Table 6: Incidental (bycatch) catch from the deep-sea red crab fishery (kg).

	2009	2010	2011	2012
Species	-	**B1**	-	-
***MZZ**		5.23		

*** Marine Nei fishes (*Osteichthyes*)**

5.3 Invertebrate bycatch including VME taxa

Very limited bycatches of invertebrate and VME taxa have been reported from the SEAFO deep-sea red crab fishery. To date roughly 1343kg of King crab (*Lithodesferox* – KCA) bycatches been recorded from the deep-sea red crab fishery in Division B1 (Fig. 15 & 16). All these bycatches were made during 2015 only.

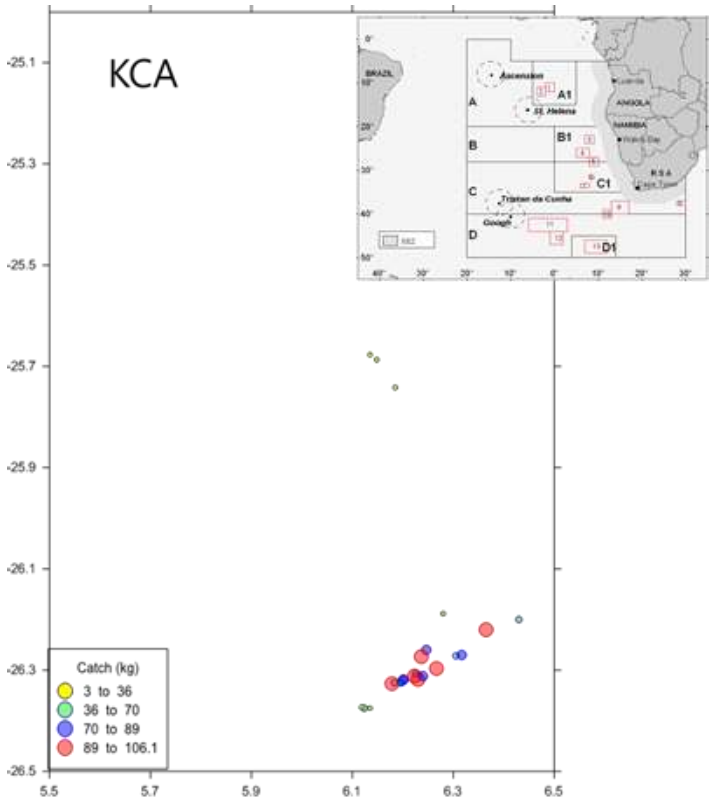

Figure 15: Spatial reference of King crab (*Lithodes ferox*) bycatches recorded from the deep-sea red crab fishery in Division B1 during 2015.

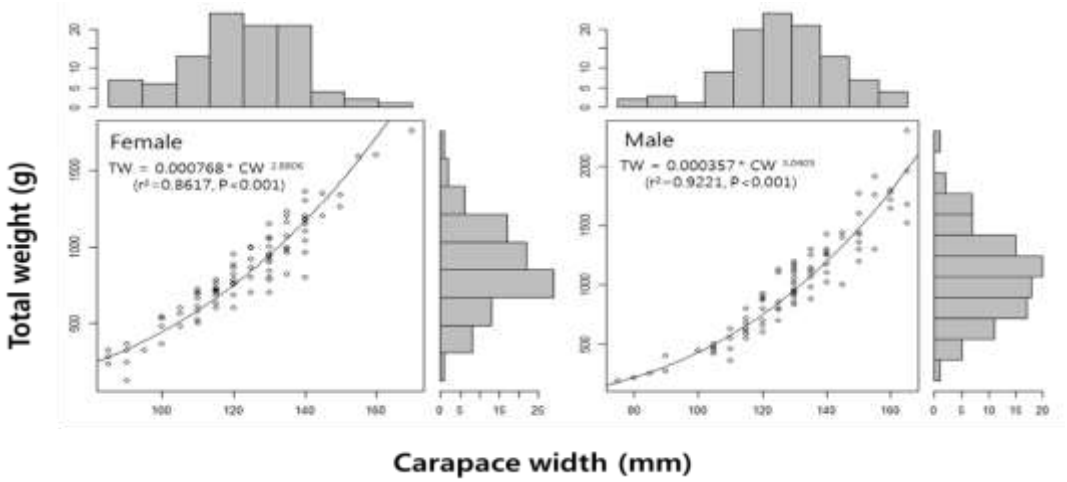

Figure 16: Sample statistics of King crab bycatches recorded by the deep-sea red crab fishery in Division B1 during 2015.

Incidental bycatches of VME indicator species have been minimal, and to date no bycatches exceeding the encounter thresholds have been recorded from the SEAFO deep-sea red crab fishery.

5.4 Incidental mortality and bycatch mitigation methods

There currently exist no incidental and bycatch mitigation measures for the deep-sea red crab fishery in the SEAFO CA.

5.5 Lost and abandoned gear

Two incidences of lost gear was report during 2017 for a new fishing vessel (*MFV Noordburg Kalapuse* – Call Sign: V5WO). The two incidents were report on 20 & 22 February 2017, the locations where the gear was lost are indicated in Figure 15 and a description of the lost gear lost is outlined below:

Gear Type: Crab pots, search grabber, 4 line anchors, 12 weight bars and 20 floats.
Quantity: 6 pots lost offline and 608 pots lost attached to the line. Search grabber, 4 anchor lines and 12 weight bars. Twenty floats attached to the lost line.

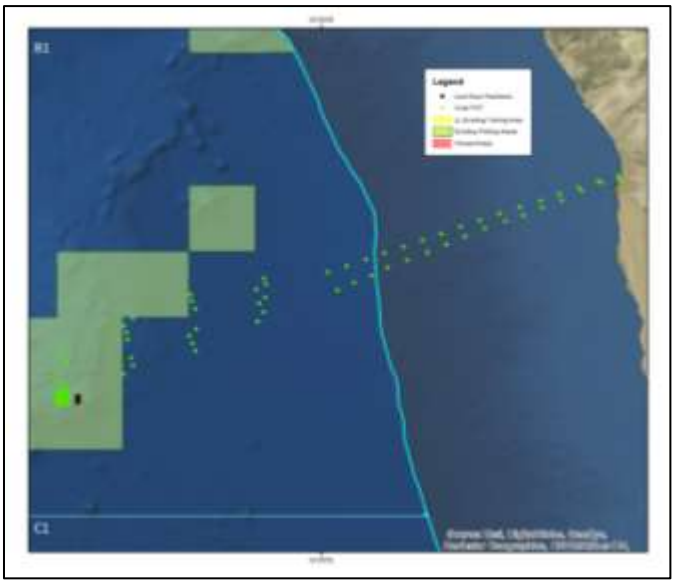

Figure 15: Positions of crab fishing gear lost by the MFV Noordburg Kalapuse 20 and 22 February 2017.

5.6 Ecosystem implications and effects

The SEAFO deep-sea red crab fishery has very limited to no negative ecosystem impacts in terms of it temporal and spatial context.

6. Current conservation measures and management advice

Considering that the TACs set for Deep-Sea Red Crab under CM 27/13 are reviewed every two years, and that the last review was done in 2016, no update or review of the TAC was conducted for 2017.

Table 7: Other Conservation Measures that are applicable to this fishery.

Conservation Measure 04/06	Conservation of sharks caught in association with fisheries managed by SEAFO.
Conservation Measure 14/09	Reduce sea turtle mortality in SEAFO fishing operations.
Conservation Measure 18/10	Management of vulnerable deep water habitats and ecosystems in the SEAFO Convention Area.
Conservation Measure 25/12	Reducing incidental bycatch of seabirds in the SEAFO Convention Area.
Conservation Measure 26/13	Bottom fishing activities in the SEAFO Convention Area.

7. References

Le Roux L. 1997 – Stock assessment and population dynamics of the deep-sea red crab *Chaceon maritae* (Brachyura, Geryonidae) off the Namibian Coast. M.Sc. thesis, University of Iceland, Department of Biology. 88 pp.

López-Abellán, L.J., J.A. Holtzhausen, L.M. Agudo, P. Jiménez, J. L. Sanz, M. González-Porto, S. Jiménez, P. Pascual, J. F. González, C. Presas, E. Fraile and M. Ferrer. 2008. Preliminary report of the multidisciplinary research cruise on the Walvis Ridge seamounts (Atlantic Southeast-SEAFO). http://hdl.handle.net/10508/370, Part I-II: 191 pp.

APPENDIX VIII – Stock Status Report: Pelagic armourhead

STATUS REPORT

Pseudopentaceros richardsoni
Common names: Pelagic armourhead, Southern boarfish

2017
Updated 21November 2017

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8. Description of the fishery

8.1 Fishing fleets and fishing gear

In recent years the Korean trawl fishery was the only fishery targeting the pelagic armourhead in the SEAFO CA. It started in 2010 but due to the depletion of the pelagic armourhead stock, the fishery finished in 2014. During the period 2010-2013 two fishing vessels participated in the fishery, F/V Adventure and F/V Dongsan Ho.

Although primarily considered as a midwater trawl fishery, 94% of the tows recorded by onboard observers were classified as "Demersal". Whether or not these trawls were bottom trawls remains uncertain, and this is an issue that still requires clarification.

At the SEAFO CA the F/V Adventure stern trawler operated with the following fishing gears (Table 1 and Figs. 1- 4 provide the specifications of the fishing gears):

- HAMPIDJAN NET is a bottom otter trawl with two-piece nets of 66 m in length. The head rope is 48 m long; ground rope is 50 m; the height, width and girth of the net are 5.5 m, 30 m and 100 m, respectively. The cod-end mesh size is 120 mm. The ground gear is 50 m in length and 903 kg in weight, and the float is 1,018 kg.
- MANUFACTURED NET is a four-piece net with a overall length of 66.9 m. The lengths of the head rope and ground rope are 59.0 m and 77.9 m, respectively. The height, width and girth of the net are 5.5 m, 200 m and 83 m, respectively. The cod-end mesh size is 120 mm. The ground is 77.9 m in length and the weight of the ground is 2,068 kg. The float is 913.200 kg with the floating rate of 44%.
- MIDWATER NET is 210 m long. The lengths of head rope and ground ropes are 93.6 m. The height and width of the net are 70.0 m and 240-260 m, respectively. The girth of the net is 816 m and the cod-end mesh size is 120 mm.

Table 1: Specifications of the fishing gears available at F/V Adventure.

Gear Specifications		HAMPIDJAN NET bottom trawl	MANUFACTURED NET bottom trawl	MIDWATER NET
Otter board	type	VRS-TYPE	VRS-TYPE	VRS-TYPE
	material	Steel	Steel	Steel
	size (mm)	2,300 x 4,030	2,750 x 4,900	1,854 x 3,818
	weight (kg)	3,930	4,320	2,000
	under water weight (kg)	2,619	2,473	1,145
Trawl Net	purpose	bottom fishing (figure1)	bottom fishing (figure2)	mid-water fishing (figure3)
	net length overall(m)	66	66.9	210.0
	head rope (m)	48	59.0	93.6
	ground rope (m)	50	77.9	93.6
	net height (m)	5.5	5.5	70
	net width (m)	30	200	240~260
	net girth (m)	100	83	816
	mesh size (mm)	120	120	120

At the SEAFO CA F/V Dongsan Ho, a stern trawler, operated with mid-water KITE trawl and the bottom trawl net PE Net. The mid-water KITE trawl (Fig. 4) includes ropes and has kites at the upper part and chains at the lower part . The height of the net's gate is approximately 50 m, and the total length is around 280 m. When net is settled, it sinks underwater and the sinking depth of the net is controlled by the wire ropes. The upper and lower parts of the bottom trawl net PE Net have attached plastic buoys and rubber balls respectively. As in the case of KITE gear the wire ropes control the sinking depth of the settled gear.

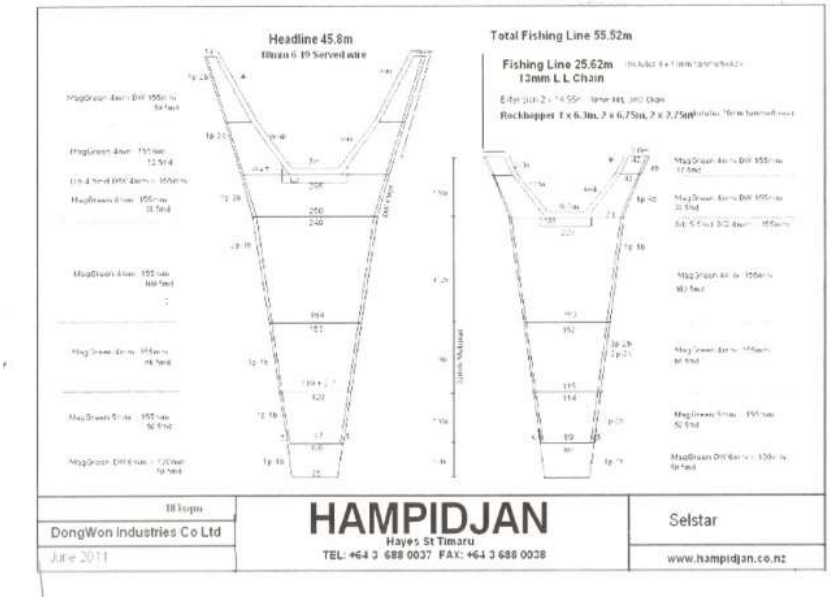


Figure 1: Diagram of HAMPIDJAN NET of F/V Adventure.

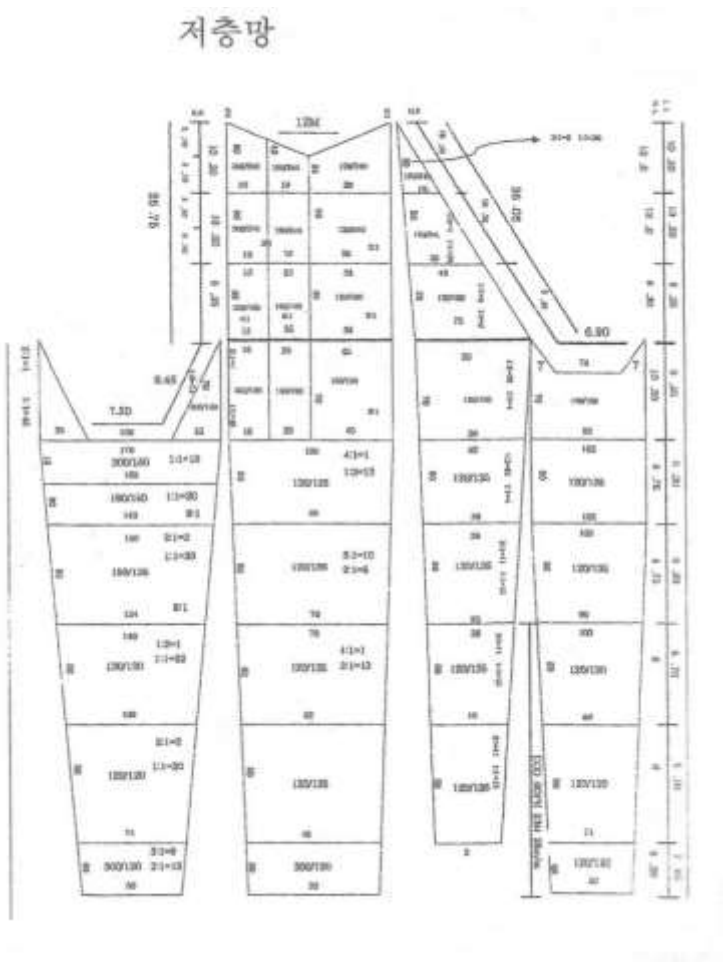


Figure 2: Drawing of the Custom Manufactured Bottom Trawl Net of F/V Adventure.

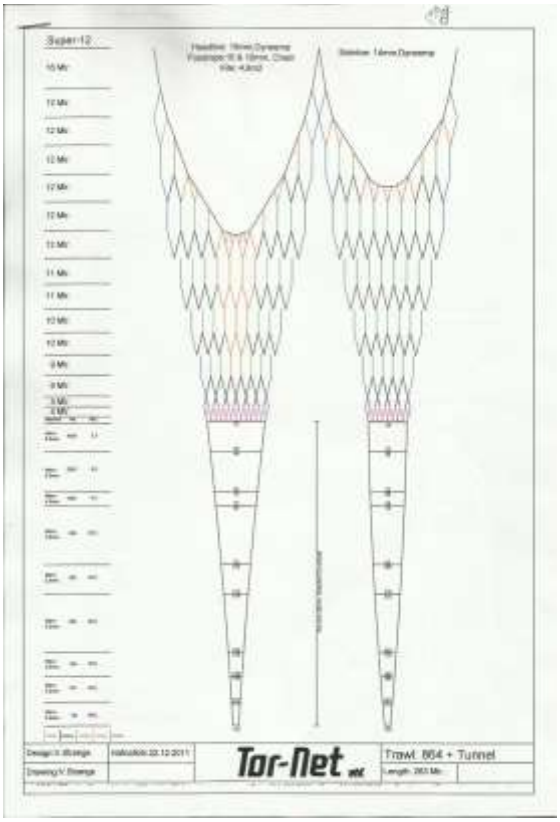


Figure 3: Drawing of mid-water trawl net of F/V Adventure.

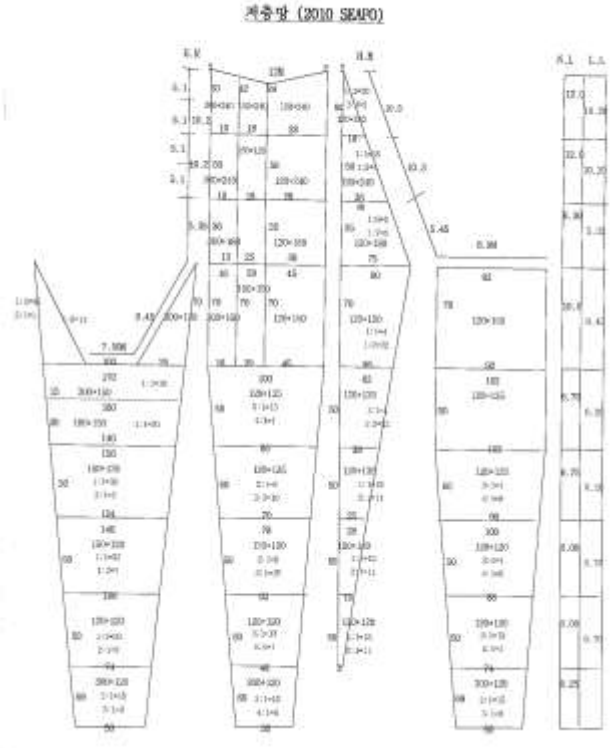
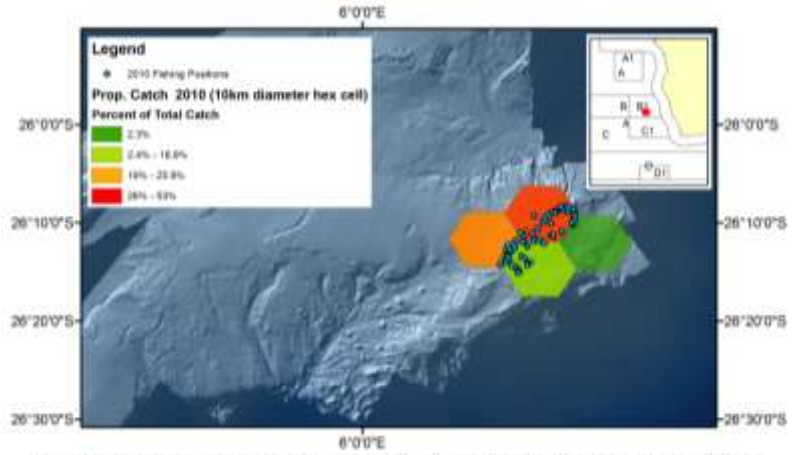


Figure 4: Drawing of mid-water KITE trawl of F/V Dongsan Ho.

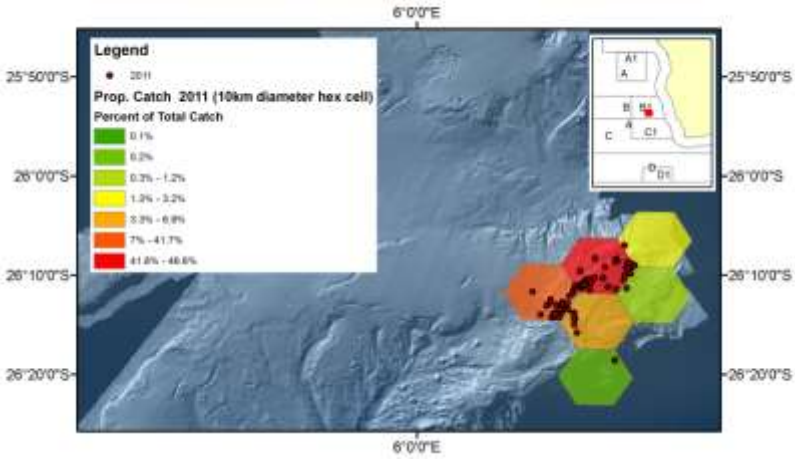
8.2 Spatial and temporal distribution of fishing

During the period 2010-2013 the Korean trawl fishery targeting pelagic armourhead took mainly place at the southern and northern parts of the Valdivia Bank, in Division B1 of the SEAFO CA (Figure 5). In addition, in 2013, a single haul was also conducted at North Walvis Ridge in Subdivision B1 (Table 1, Fig. 5, lower).

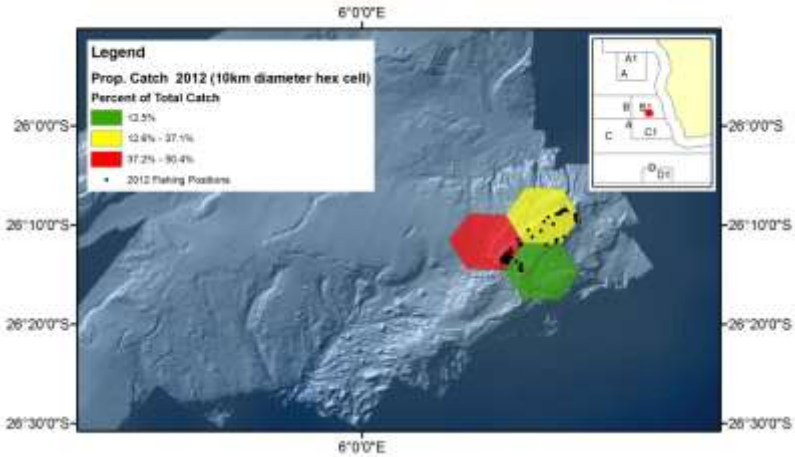
At the Valdivia Bank, the fishing grounds of the Korean fishery were primarily located in a small area of about 200 km^2.



Proportion Catch of pelagic armourhead (Peudopentaceros richardsoni) in 2011 (10km diameter hexagonal cells)



Proportion Catch of pelagic armourhead (Peudopentaceros richardsoni) in 2012 (10km diameter hexagonal cells)



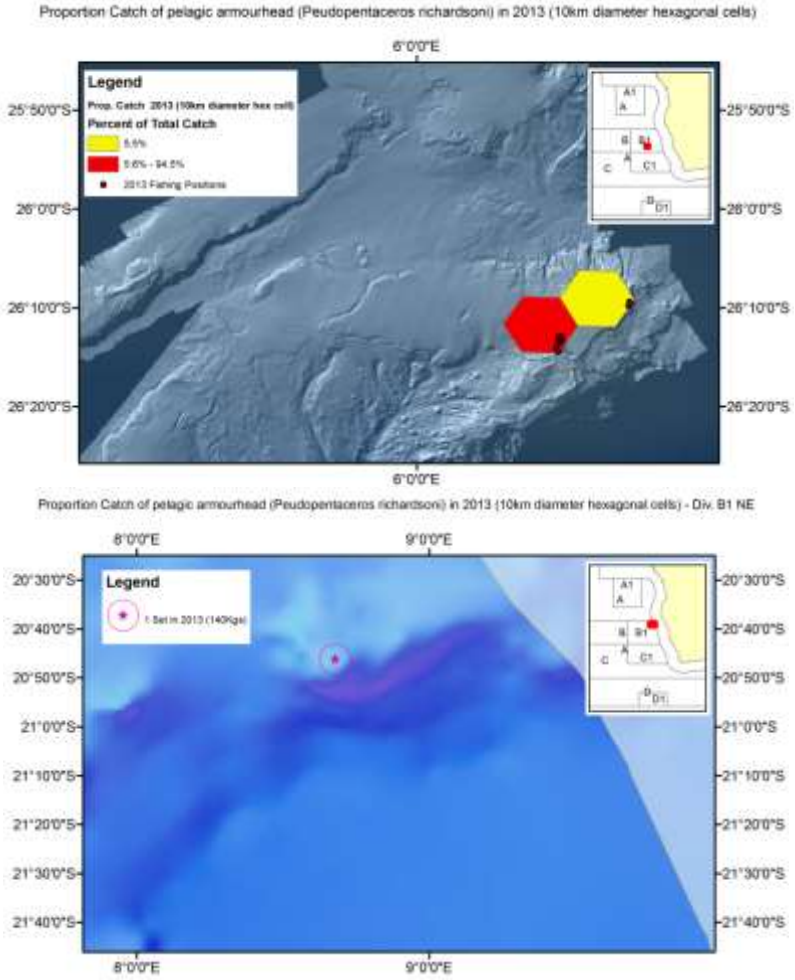


Figure 5: Spatial distribution of fishing positions and reported catches of pelagic armourhead (*P. richardsoni*) aggregated by 10km diameter hexagonal cells, 2010-2013. Lower map shows the single fishing position in the Northeastern seamount of B1 (Northeastern Walvis Ridge) reported in 2013. Data from observer reports submitted to SEAFO until Sept. 2014.

Table 1: Number of trawl hauls by year and SEAFO region (ref. Fig. 5).

Year	Valdivia Bank	North Walvis Ridge
2010	63	
2011	88	
2012	117	
2013	9	1

In 2017, only one vessel (trawler) from Namibia has conducted fishing activity in the SEAFO CA, targeting seamount species. Catches of pelagic armourhead took place in B1 and C0 (Fig. 6).

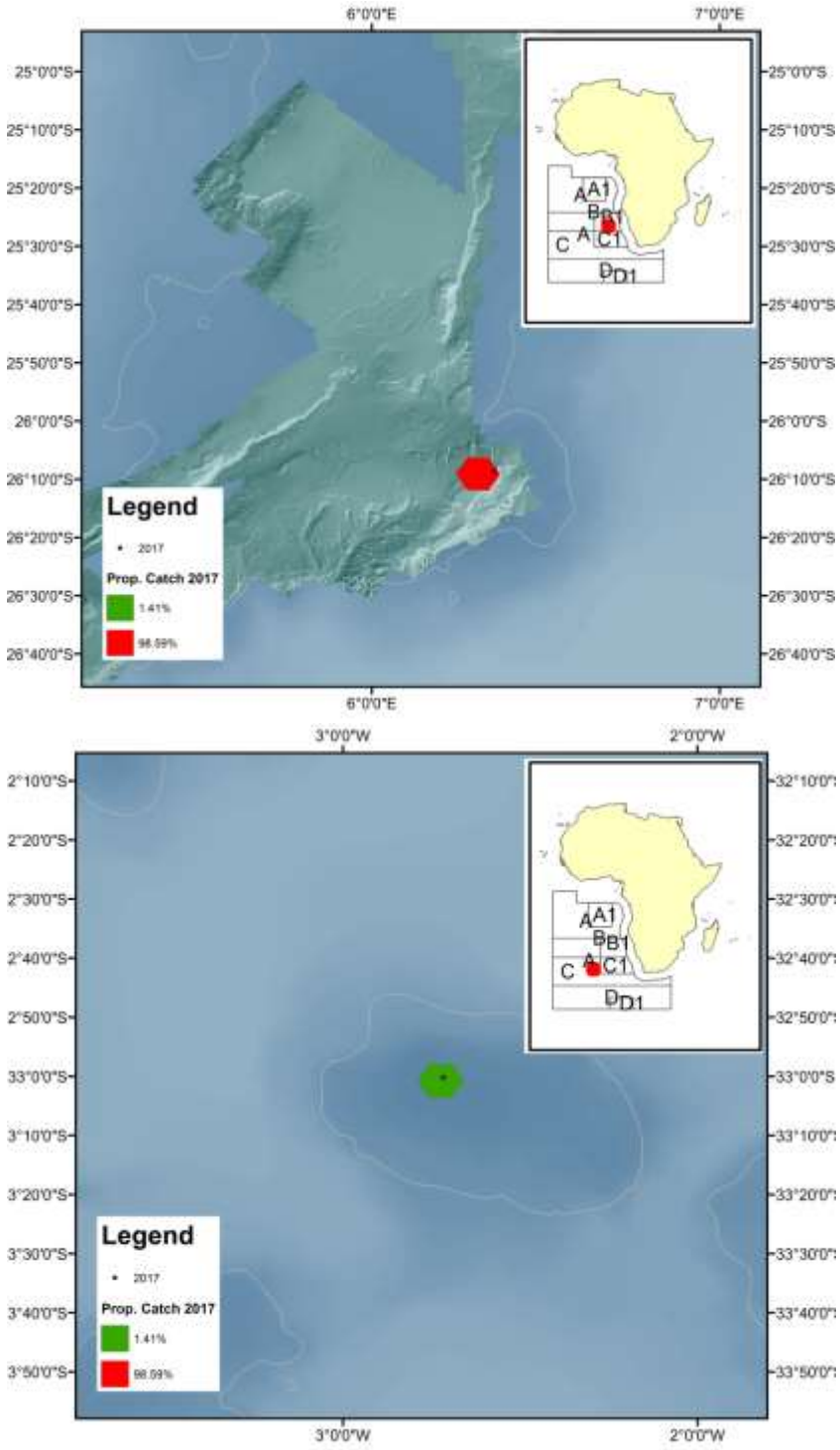


Figure 6: 2017 georeferenced fishing hauls and relative catches of pelagic Armourhead (*P. richardsoni*) aggregated by 10km diameter hexagonal cells. Upper map shows the single fishing position in B1 and the lower map the fishing position in C.

8.3 Reported retained catches and discards

Table 2 presents the annual catches and by-catches of pelagic Armourhead by country, fishing gear and SEAFO CA sub-divisions since 1976, At the early years the main fishing countries were:

- Russia operating with bottom trawls (late 1970s and 1993);
- Ukraine operating with bottom trawls (mid-1990s);
- Namibia and South Africa both operating with bottom trawls (mid-1990s);
- South Korea primarily operating with mid-water trawl (2010-2013).

The highest annual catches were recorded by Russia with 1,273 and 1,000 t in 1977 and 1993, respectively, and by Korea with 688 t in 2010. In 2017 the catches reported are derived from the Namibian trawler fishing hauls.

Table 2: Reported catches (tonnes) of pelagic armourhead *(Pseudopentaceros richardsoni*) from the SEAFO CA. Data reported by SEAFO CPs and other flag states reporting to SEAFO, and from FAO.

Nation	**Namibia**		**Russia**		**Ukraine**		**Namibia**	
Fishing method	**Bottom trawl**		**Bottom trawl**		**Bottom trawl**		**Bottom trawl**	
Management Area	**B1**		**B1**		**UNK**		**C1**	
Year	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**
1976			108					
1977			1273					
1978			53					
1993			1000		435§			
1994								
1995	8				49			
1996	284				281			
1997	559				18			
1998	--							
1999	--							
2000	20							
2001	--							
2002	--							
2003	4							
2004								
2005								
2006								
2007								
2008								
2009	--	--	--	--	--	--		
2010	--	--	--	--	--	--		
2011	--	--	--	--	--	--		
2012	--	--	--	--	--	--		
2013	--	--	--	--	--	--		
2014	--	--	--	--	--	--		
2015	--	--	--	--	--	--		

2016	--	--	--	--	--	--		
2017*	<1	0	--	--	--	--	<1	0

* Provisional (September 2017). -- = No Fishing. Blank fields = No Data Available.
UNK = Unknown. § = Values from FAO

8.4 IUU catch

IUU catches are unknown. Historically, fishing vessels have reported IUU fishing activity in the SEAFO CA to SEAFO secretariat. The reports may have been incomplete, and the extent of such activity and impacts on pelagic armourhead are unknown. In recent years no reports or other information indicating IUU fishing were received, so it is believed that IUU activity have stopped or become much reduced.

9. Stock distribution and identity

The pentacerotid *Pseudopentaceros richardsoni* (Smith 1844) is a southern circumglobal, benthopelagic species. The species inhabits the outer shelf and upper continental shelves, as well as, seamounts and underwater ridges (100-1000 m) between 0 and 1 000 m depth (Heemstra, 1986), e.g. Tristan de Cunha, on the Walvis Ridge and seamounts off South Africa (Southeast Atlantic); south of Madagascar (Western Indian Ocean) as well as in southern Australia, New Zealand and the Southeast Pacific.

In the SEAFO CA, the potential distribution area of the species and adjacent waters is shown in Figure 6. It is unlikely that the species is abundant south of about 40^{O}S, i.e. in Division D.

P. richardsoni populations particularly the adult exploited fraction, have patchy distributions Adult fraction tend to occur in a restricted depth *stratum* on the summit of seamounts and oceanic banks. The species recruit to the summit of the seamounts after approximately 4 years of pelagic life and thereafter aggregates.

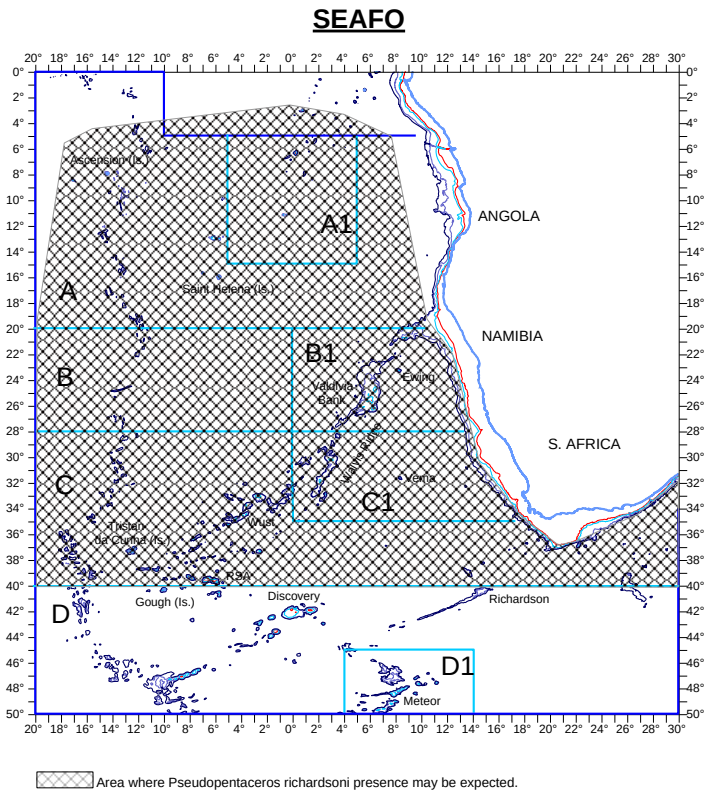


Figure 7: Potential geographical distribution of *P.richardsoni* in the SEAFO CA and adjacent waters (source: Species profile on the SEAFO website referring to several sources).

10. Data available for assessments, life history parameters and other population information

10.1 Fisheries and survey data

Geo-referenced data on catch and effort were available from haul-by-haul observer reports for the entire time-series of the Korean fishery (2010-2013), but logbook data were not available.

During the investigation of selected SEAFO seamounts in Jan-Feb 2015 by the RV Dr Fridtjof Nansen, pelagic armourhead were recorded in trawl catches and videos, and attempts were made to record aggregations of these species by acoustics. Small aggregations were observed in videos on a summit knolls in Wüst, and a single aggregation in Valdivia Middle. Scattered individuals occurred on the upper slope of Vema. The main former fishing area Valdivia Bank appeared impoverished with only scattered individuals and no acoustic recordings.

10.2 Length data and length frequency distributions

In 2014 the SC reviewed length data collected by observers on Korean fishing vessels. The number of individuals measured was considered insufficient to derive reliable length compositions of the catches. As a consequence, the length frequency distributions and length statistics (e.g. ranges and mean lengths) presented in 2013 or earlier SC reports were considered invalid. However, if sufficient length data were available, cohort analyses to perceived stock status based on length could be adopted.

The number hauls versus the number of fishes measured at each fishing haul are presented in Figure 7 and Table 3. Although most trawl tows have been sampled the number of individual measured per haul was clearly insufficient. This number has even decreased in the latter years

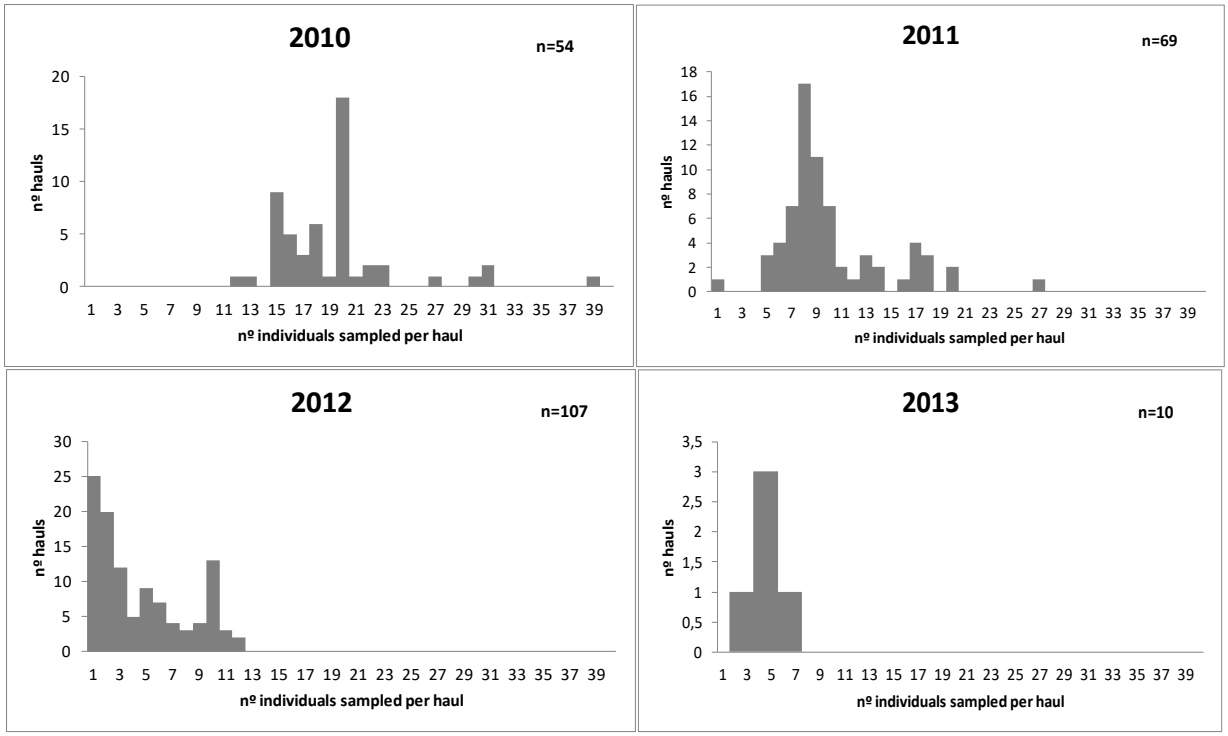


Figure 8: Frequency distributions of sample sizes for individual trawl tows, 2010-2013 in the Valdivia Bank trawl fishery for pelagic armourhead. The source is observer reports submitted to SEAFO until September 2014. n- number of tows sampled by observers.

Table 3: Total number of trawl tows sampled per year, annual mean, minimum, maximum number of fishes measured per trawl tow. The mean number of individuals measured per tonne is presented in the last column. (Data presented are official data submitted to SEAFO till Sept. 2014).

Year	No. of trawl tows sampled	Mean ind. sampled/tow	Min. ind. sampled/tow	Max. ind. sampled/tow	Mean ind. sampled/tonne
2010	54	19.3	12	39	0.03
2011	69	10.1	1	27	0.09
2012	107	4.5	1	12	0.03
2013	10	4.5	2	7	0.35

10.3 Length-weight relationships

The weight-length relationship of pelagic armourhead (for the two sexes combined) derived from observed data collected between 2010–2012 was: W=.016 L3.048 (r2 =.96).~~αβ~~

10.4 Age data and growth parameters

There is no available information for SEAFO CA.

10.5 Reproductive parameters

For the period 2010 – 2012, the number of fishes by maturity stage and month are shown in Table 4. High proportions of pre-spawning and spawning stages were observed (Fig. 8). Although for the period 2010-2012 fishing activity in SEAFO CA has been restricted to May and June, data suggest that spawning is likely to occur after May, probably before September. If this is the case at the SEAFO CA the spawning period is different from that in the Southwest Indian Ocean, admitted to occur between October and December (López-Abellán et al. 2007).

Table 4: Annual number of fish by maturity stage of Pelagic Armourhead (*Pseudopentaceros richardsoni*) in the SEAFO CA for 2010-2012. Source: observer samples from Korean fishery.

Year	Month \ Maturity stage	Immature	Developing	Pre-spawning	Spawning	Spent
2010	Sep	0	504	159	0	0
	Oct	0	437	107	0	0
	Nov	0	84	26	0	0
2011	Jan	14	78	27	0	0
	Sep	59	75	4	0	0
	Oct	30	26	13	0	0
	Nov	0	16	27	2	0
2012	May	0	0	38	96	0
	Jun	0	0	69	352	0

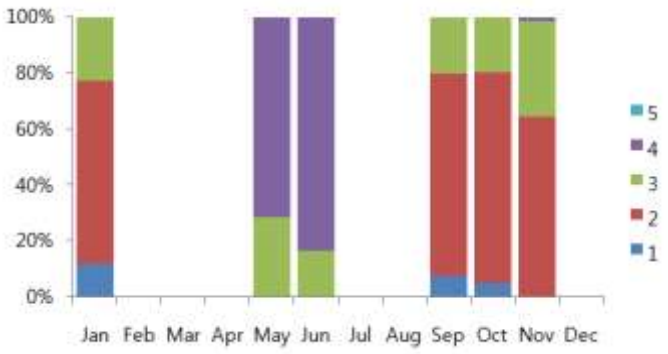


Figure 8: Pelagic Armourhead (*Pseudopentaceros richardsoni*) in the SEAFO CA for 2010-2012 - Proportion of specimens by maturity stage by month (1: immature, 2: developing, 3: pre-spawning, 4: spawning and 5: spent).

The adjustment of the maturity ogive to the reproductive data indicates 44.1 cm FL as size of first maturity (Fig. 9).

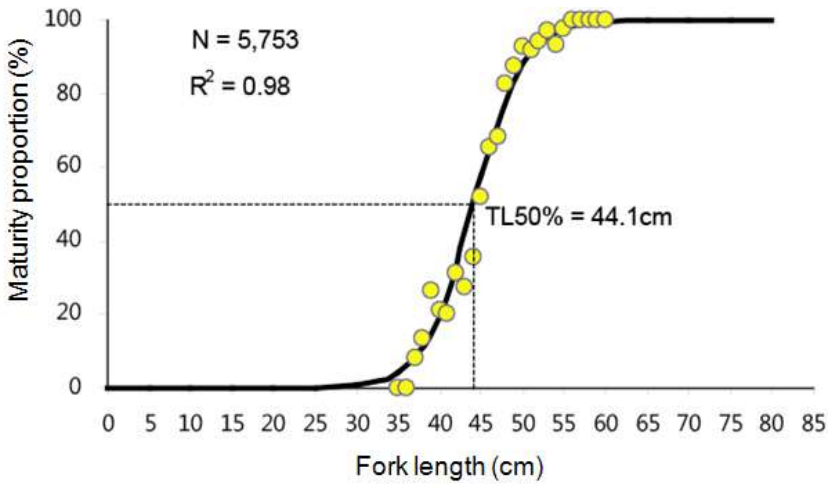


Figure 9: Pelagic armourhead (*Pseudopentaceros richardsoni*) - Valdivia Bank (SEAFO CA Subdivision B1). Proportion mature specimens *versus* fork length in cm

10.6 Natural mortality

Empirical natural mortality for pelagic armourhead were estimated using different methods (Tab. 6). For some methods the species growth parameter estimates (K=0.27 year^{-1}; L_{inf}=65.1 cm; and t_0=-0.34 year-1) derived for the Southwest Indian Ocean (López-Abellán et al. 2008a) and for Valdivia Bank during the Spanish-Namibian research survey (López-Abellán et al. 2008b) were used. In the Southwest Indian Ocean the maximum observed age of the species was 14 years.

Table 6: Empirical natural mortality estimates determined using the Fishmethods R package.

Method	M
Pauly (1980) - Length Equation	0.457
Hoenig (1983) - Joint Equation	0.316
Hoenig (1983) - Fish Equation	**0.300**
Alverson and Carney (1975)	0.253
Roff (1984)	0.417
Gunderson and Dygert (1988)	0.089

The estimate M=0.3 calculated using the Hoenig´s method was considered the most adequate for the species and it was therefore adopted for the subsequent analyses.

10.7 Feeding and trophic relationships (including species interaction)

There is no available information for SEAFO CA

10.8 Tagging and migration

There is no available information SEAFO CA

11. Stock assessment status

The specific spatial distribution of the adult fraction of *P. richardsoni* population favours the use of catch per unit of effort (CPUE) data as indicator of biomass and support the analysis of CPUE temporal trends. Furthermore, given the fact that data time series available begins at the start of fishery local depletion model was used as a tool to evaluate the status of the population.

Depletion estimators are widely used to estimate population abundance (Seber, 2002; Hilborn and Walters, 1992). These estimators assume a simple linear relationship between CPUE and cumulative effort (DeLury, 1947) or cumulative catch (Leslie and Davis, 1939). Procedures and discussions to evaluate stock status using depletion models are available in the Scientific Committee reports (SEAFO SC Report 2012 (Pages 21-23); SEAFO SC Report 2013 (Pages 17-18)).

As data available suggest that prior to 2010 the stock was unexploited, the Gulland (1971) method was adopted to estimate maximum sustainable yield (MSY)

11.1 Data used

Catch and effort data per fishing haul were available for the whole fishery time series. The fishing hauls considered in the analysis were restricted to those in which the total catch of *P. richardsoni* represented more than 80% of the total catch of *P. richardsoni* plus *Beryx splendens*. This criterion was adopted because catches of these two species are highly negatively correlated, i.e., when one of these two species occurs in the haul the other does not occur, as it can be seen for 2010 data (Fig. 11).

For each haul the estimate of CPUE of *P. richardsoni* corresponded to the ratio of total catch of the species by the haul duration.

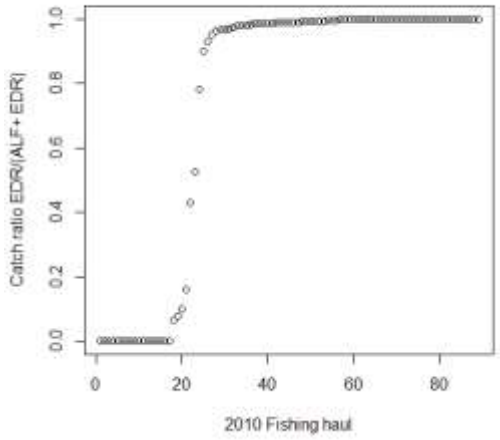


Figure 10: Korean trawl fishery - 2010 estimates of ratio of total catch *Pseudopentaceros richardsoni* by the total catch of *Pseudopentaceros richardsoni* and *Beryx splendens* by haul.

11.2 Methods used

The depletion model was adjusted to the whole data set available for the Korean trawl fishery (2014 was the last year with fishery data available). This model assumes that no recruitment and

emigration/immigration to the fishing area occur during a particular season of fishing. So, under these assumptions, catch rates will decline with continued fishing until all the fish have been removed.

The model is adjusted by fitting a linear regression model to CPUE and the corresponding temporal cumulative catches. The total biomass available at the beginning of the season is estimated as the total catch that corresponds to local extinction, i.e. point that intersects the x-axis.

The uncertainties on parameter estimates were determined by bootstrapping; a total of 2000 bootstrap samples were derived from the input data and confidence interval of each parameter using the bootstrap estimates were derived accordingly. MSY estimate was determined based on the estimate of the initial biomass value derived from the depletion model and following the Gulland approach as MSY = 0.5*B*M, where B is unexploited (virgin) biomass and M the estimate of instantaneous natural mortality rate.

11.3 Results

The CPUE time-series showed a big decline from 2010 to 2011 follow by a stability at low levels in 2011, 2012, and 2013 (Fig. 11). In 2014 there was no fishery, hence no data on CPUE.

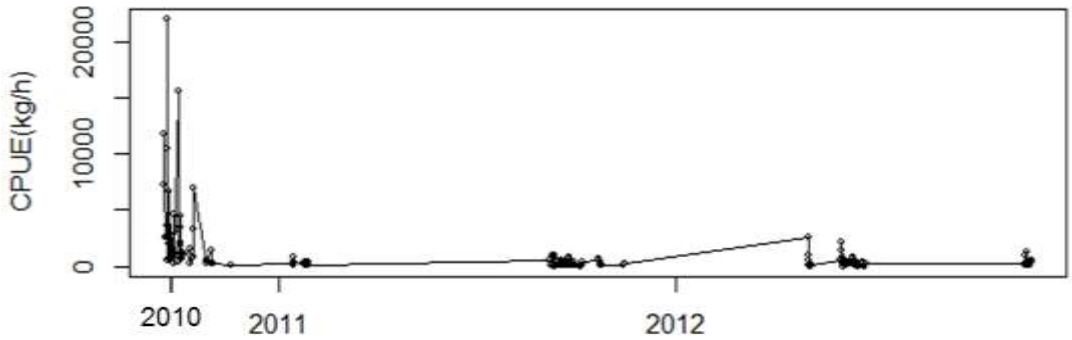


Figure 11: Time-series of catch per unit of effort (CPUE, kg/trawl hour), i.e. set-by-set data, for pelagic armourhead from 2010 to 2013. Source: observer reports submitted to SEAFO.

Figure 12 presents the CPUE against cumulative catch and the adjusted regression lines for 2010 and 2011. The 2010 biomass estimate at the beginning of the fishing season (851 t) was considered a proxy of the unexploited biomass. Table 6 shows estimates of the biomass at the beginning of the fishing seasons in 2010 and 2011, as well as the 25% and 75% percentiles.

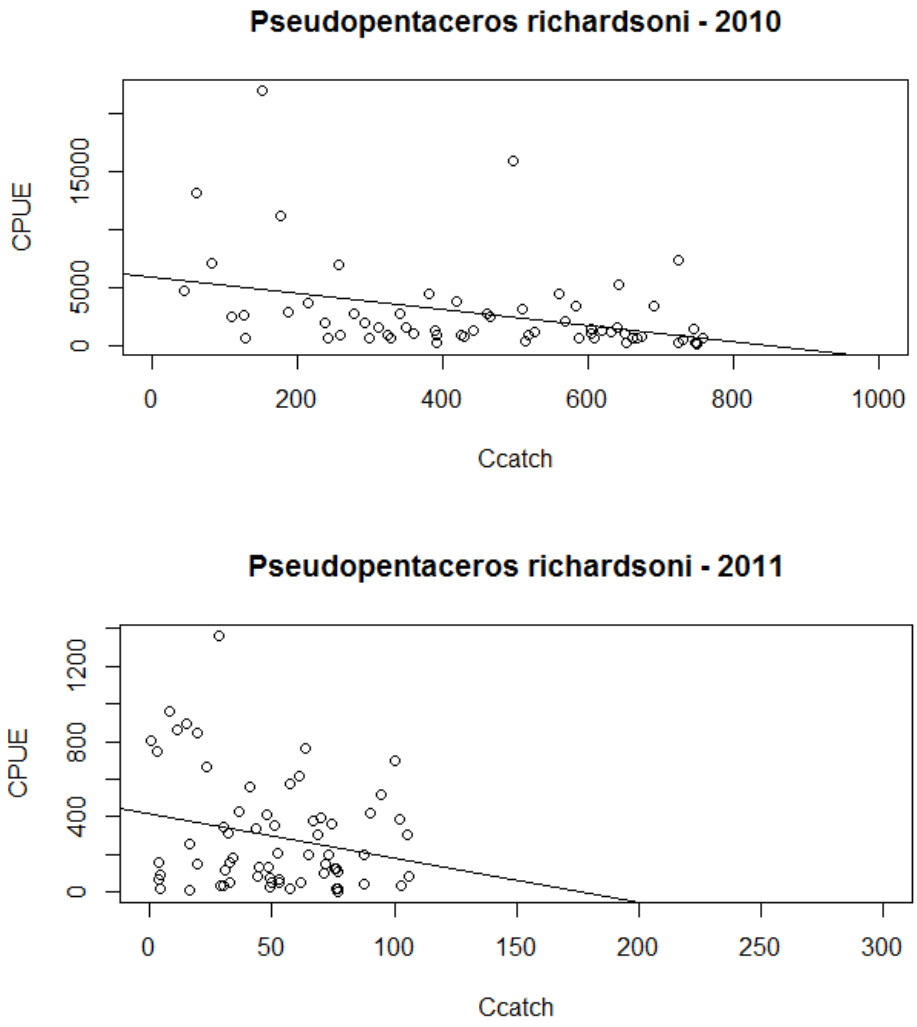


Figure 12: The CPUE against cumulative catch (Ccatch, tonne) of *Pseudopentaceros richardsoni* and the adjusted regression lines for 2010 and 2011. Note the different scales on the CPUE axes.

Table 6: Summary statistics of the biomass (t) at the beginning of the fishing season derived from 2000 bootstrap re-sampling estimates.

Year	25 Percentile	Estimate	75 Percentile
2010	751	851	1096
2011	137	176	229

Applying the Gulland method, and assuming a virgin biomass of 851t and 0.3 for M, the estimate of MSY is 128 t.

11.4 Discussion

The catches of P. richardsoni were derived from a directed fishery on Valdivia Bank held in a very small area, where the adults concentrated. Such species spatial distribution pattern make it highly vulnerable to overfishing.

The biomass index derived from onboard observer data Korean fishery targeting pelagic armourhead show a strong decrease (in 2011 the CPUE was approximately 16% of that in 2010). After 2011 the values of CPUE remained stable but very low levels.
The depletion model run adjusted for the year 2010 showed a significant negative regression slope and the regression explained near 40% of the variance.
Similar perception of the stock development could be depicted from the analysis of CPUE time series and from depletion model. No valid size or age distributions allowing evaluation of trends in size-age structure of the stock through time, as well as, no recruitment indexes were available. However, under the assumption of a 4-year recruitment age, it was expected that until 2015 the entries in the population mainly come from year classes born prior to 2010, i.e. before the fishery started.

The current perception of the stock fished primarily on the Valdivia Bank is that it is reduced to a low level.

The 2010-2013 fishery for armourhead was mainly conducted on the Valdivia Bank. A single catch was, however, also reported from a seamount in the northeastern corner of B1. The true distribution of the species in the SEAFO CA is probably wider, but the areas of suitable character and depth, i.e. shallower than 600m and north of 40°N, are few and widely dispersed (Figure 13). Fisheries expanding into other areas also have to be closely monitored and regulated (Ch 4.7).

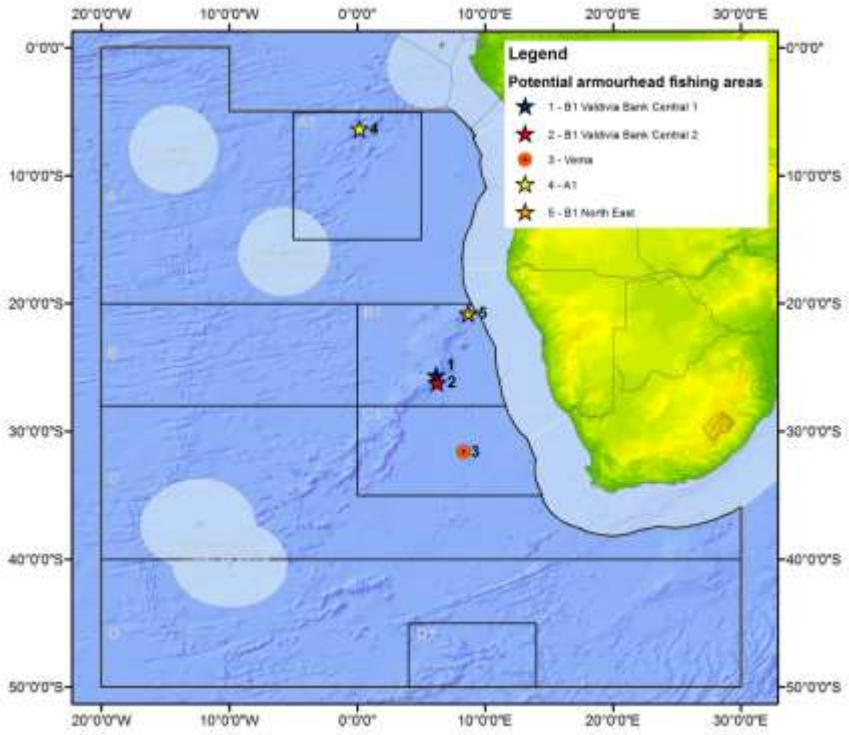


Figure 13: Bathymetry of the SEAFO CA and locations with bottom depths of 600m or less.

There is no information on recruitment, and it is not known whether the concentrations of the species constitute a self-sustaining population or are sustained by immigration/influx of larvae and juveniles from other areas. Furthermore, it is unknown if the 2013 biomass estimate on Valdivia Bank was above or below a level at which recruitment is impaired.

In recent years, i.e. 2014 onwards, there is no further information that allows to perceive the status of the adult population in Valvidia Bank.

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12. Incidental mortality and by-catch of fish and invertebrates

12.1 Incidental mortality (seabirds, mammals and turtles)

There are no reports of incidental bycatches of birds, mammals and turtles in the armourhead fishery.

12.2 Fish by-catch

Observer reports document that by-catch species in the pelagic armourhead fishery on Valdivia Bank were blackbelly rosefish, imperial blackfish, oilfish, Cape bonnetmouth, and silver scabbardfish. Among these alfonsino, blackbelly rosefish, imperial blackfish, and oilfish were the most abundant species (Table 7).

Minor catches of Japanese mackerel (*Scomber japonicas*) (50 t in 2010)**,** Cape horse mackerel (*Trachurus capensis*), and the longspine bellowfish (*Notopogon xenosoma*) were also recorded in the Korean observer reports, but it is uncertain whether these species occurred in the armourhead fishery. The identification of the latter species is also uncertain.

Table 7: By-catch from Pelagic Armourhead / southern boarfish (*Pseudopentaceros richardsoni*) fishery.

	2010	**2011**	**2012**	**2013**
Species (FAO code)	**B1**	**B1**	**B1**	**B1**
BRF	161	42	35	4
HDV	24	35	24	<1
OIL	5	13	7	<1
EMM	11	2	<1	0
GEM	0	0	<1	0
SVS	30	15	2	0

BRF: Blackbelly rosefish (*Helicolenus mouchezi*); HDV: Imperial blackfish (*Schedophilus ovalis*); OIL: Oilfish (*Ruvettus pretiosus*) ; EMM: Cape bonnetmooth (*Emmelichthys nitidus*) and PRP: Roudi escolar (*Promethichthys prometheus*)??, SVS: silver scabbardfish (*Lepidotus caudatus*).

12.3 VME indicator incidental catch

For the Korean armourhead fishery on Valdivia Bank observers recorded 0.4 kg of VME indicator species in 2013 and less than 1 kg in previous years of the 2010-2013. Catches never exceeded the agreed SEAFO threshold levels.

12.4 Incidental and bycatch mitigation methods

There are no technical mitigation measures implemented for the armourhead fishery.

12.5 Lost and abandoned gear

There were no reported lost and abandoned gear resulting from the armourhead fishery

12.6 Ecosystem implications and effects

There is no formal evaluation available for this fishery.

13. Biological reference points and harvest control rules

Apart from the provisional estimate of MSY=128 t (Ch. 4.4), no reference points have been estimated and found to be valid. The main reason is the shortage of basic data to carry out assessments.

In 2014 SC recommended that a harvest control rule be implemented and suggested as a candidate HCR the following:

$$TAC_{y+1} = \begin{cases} TAC_y \times (1 + \lambda_u \times slope) & if \quad slope \geq 0 \\ TAC_y \times (1 + \lambda_d \times slope) & if \quad slope < 0 \end{cases}$$

Where 'Slope' = average slope of the Biomass Indicator (CPUE) in the recent 5 years
and ;
λu :TAC control coefficient if slope > 0 (Stock seems to be growing) : λu=1
λd :TAC control coefficient if slope < 0 (Stock seems to be decreasing) : λd=2

The TAC generated by this HCR is constrained to ± 5% of the TAC in the preceding year.

14. Current conservation measures and management advice.

Considering that the TACs set for pelagic armourhead under CM 32/16 is reviewed every two years, and that the last review was done in 2016, no update or review of the TAC was conducted for 2017.

The TAC advised in 2014 was derived using the average of the catches in 2011 and 2012. This is a simplistic approach not based on stock assessments or stock trend indices, hence the resulting TAC advice will be uncertain. Currently, due to the interruption of the fishery, the recommended and accepted HCR cannot be applied, nor the average of recent catches as in 2014. Due to the lack of recent fishery data there is even greater uncertainty than in 2014.

Prior to the interruption of the fishery, the catch per unit of effort had declined to a low level. The survey in 2015 did not detect concentrations of armourhead in the previous fishing area at that time. It was expressed that the absence of a fishery has provided a potential for recovery.

Due to the uncertainties explained above, SC members expressed different views on the TAC advice for 2017-2018 for the SEAFO CA. The agreed advice is a TAC of 135 tonnes. This level is slightly lower than that derived in 2014, hence possibly more precautionary. It must be emphasized that the state of the stock is unknown.

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APPENDIX IX – Stock Status Report: Alfonsino

STATUS REPORT

Beryx splendens
Alfonsino

2017

Updated 21 November 2017

TABLE OF CONTENTS

1. Description of the fishery

1.1 Description of fishing vessels and fishing gear

In recent years the Korean trawl fishery was the only fishery targeting the alfonsino in the SEAFO CA. This fishery finished it activity in 2014. During the period 2010-2013 two fishing vessels participated in the fishery.

Although primarily considered as a midwater trawl fishery, 94% of the tows recorded by onboard observers were classified as "Demersal". Whether or not these trawls were bottom trawls remains uncertain, and this is an issue that still requires clarification.

At the SEAFO CA the vessel1 stern trawler operated with the following fishing gears (Table 1 and Figs. 1- 4 provide the specifications of the fishing gears):

- HAMPIDJAN NET is a bottom otter trawl with two-piece nets of 66 m in length. The head rope is 48 m long; ground rope is 50 m; the height, width and girth of the net are 5.5 m, 30 m and 100 m, respectively. The cod-end mesh size is 120 mm. The ground gear is 50 m in length and 903 kg in weight, and the float is 1,018 kg.
- MANUFACTURED NET is a four-piece net with an overall length of 66.9 m. The lengths of the head rope and ground rope are 59.0 m and 77.9 m, respectively. The height, width and girth of the net are 5.5 m, 200 m and 83 m, respectively. The cod-end mesh size is 120 mm. The ground is 77.9 m in length and the weight of the ground is 2,068 kg. The float is 913.200 kg with the floating rate of 44%.
- MIDWATER NET is 210 m long. The lengths of head rope and ground ropes are 93.6 m. The height and width of the net are 70.0 m and 240-260 m, respectively. The girth of the net is 816 m and the cod-end mesh size is 120 mm.

Table 1: Fishing gear specifications at vessel 1

Gear Specifications		HAMPIDJAN NET bottom trawl	MANUFACTURED NET bottom trawl	MIDWATER NET
Otter board	type	VRS-TYPE	VRS-TYPE	VRS-TYPE
	material	Steel	Steel	Steel
	size (mm)	2,300 x 4,030	2,750 x 4,900	1,854 x 3,818
	weight (kg)	3,930	4,320	2,000
	under water weight (kg)	2,619	2,473	1,145
Trawl Net	purpose	bottom fishing (figure1)	bottom fishing (figure2)	mid-water fishing (figure3)
	net length overall(m)	66	66.9	210.0
	head rope (m)	48	59.0	93.6
	ground rope (m)	50	77.9	93.6
	net height (m)	5.5	5.5	70
	net width (m)	30	200	240~260
	net girth (m)	100	83	816
	mesh size (mm)	120	120	120

The vessel2 was a stern trawler which operated with two types of fishing gears: a mid-water trawl net; and the bottom trawl net. The gear used for the operation in the SEAFO Convention Area was the mid-water KITE gear (Figure 4).

The height of the net's gate is approximately 50 m, and the total length is around 280 m. When net is settled, it sinks underwater and the sinking depth of the net is controlled by the wire ropes. The upper and lower parts of the bottom trawl net PE Net have attached plastic buoys and rubber balls respectively. As in the case of KITE gear the wire ropes control the sinking depth of the settled gear.

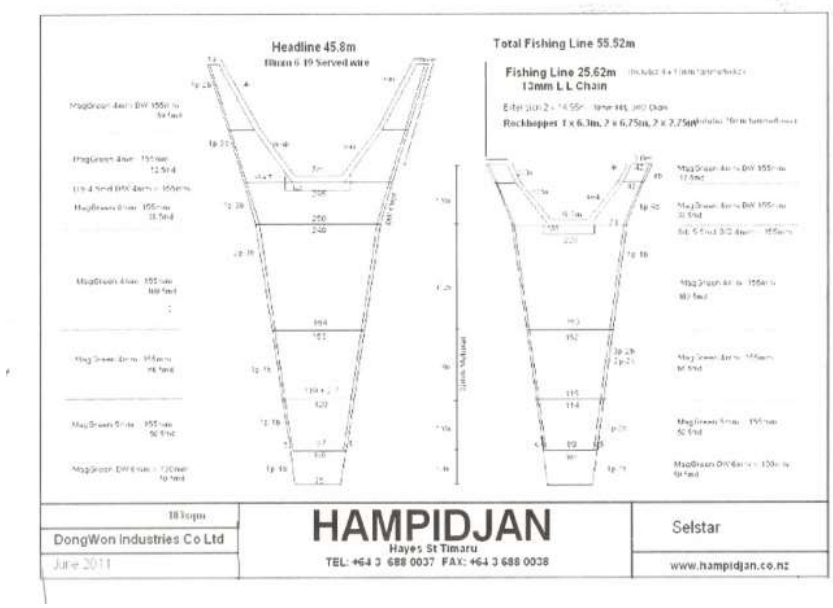

Figure 1: Diagram of HAMPIDJAN NET of the vesse1.

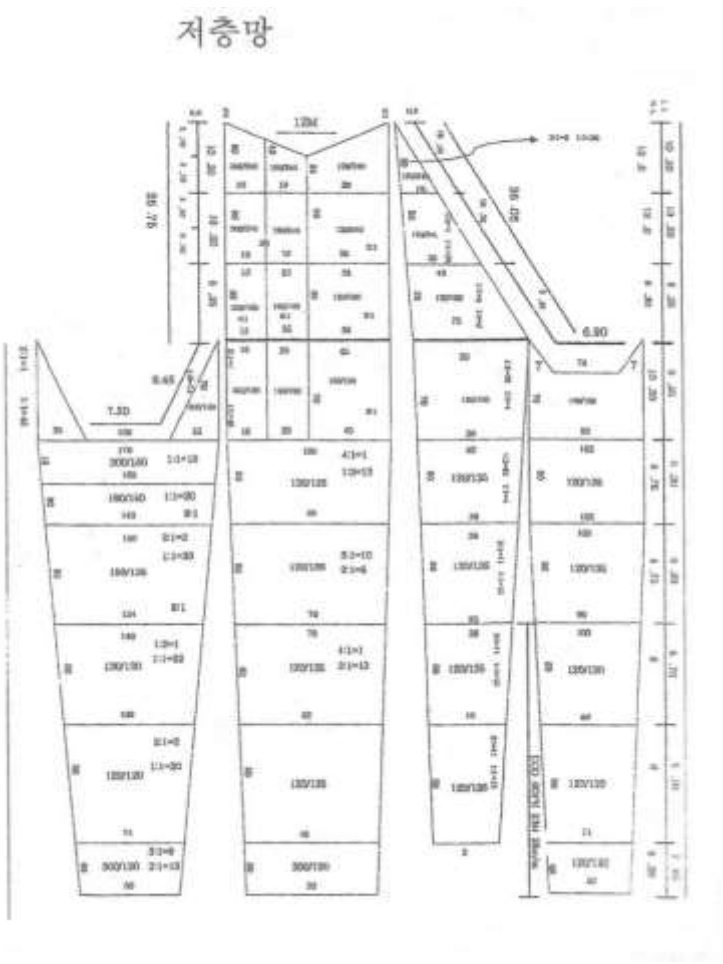

Figure 2: Drawing of the Custom Manufactured Bottom Trawl Net of the vesse1.

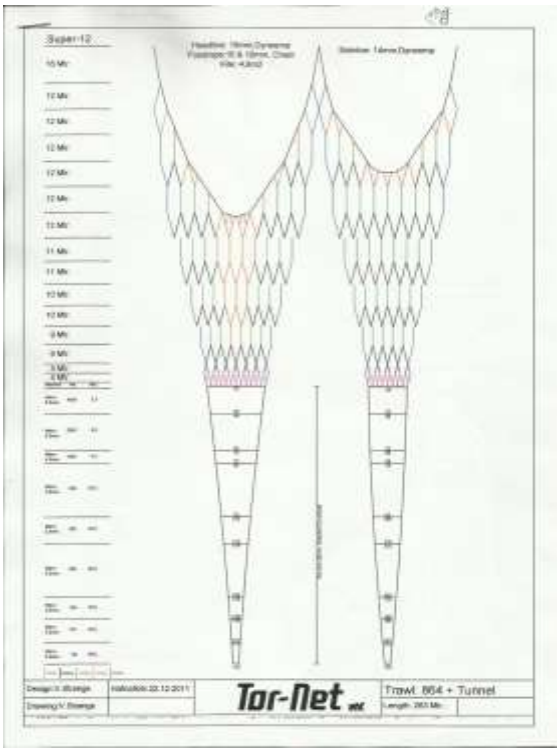

Figure 3: Drawing of mid-water trawl net of the vesse1.

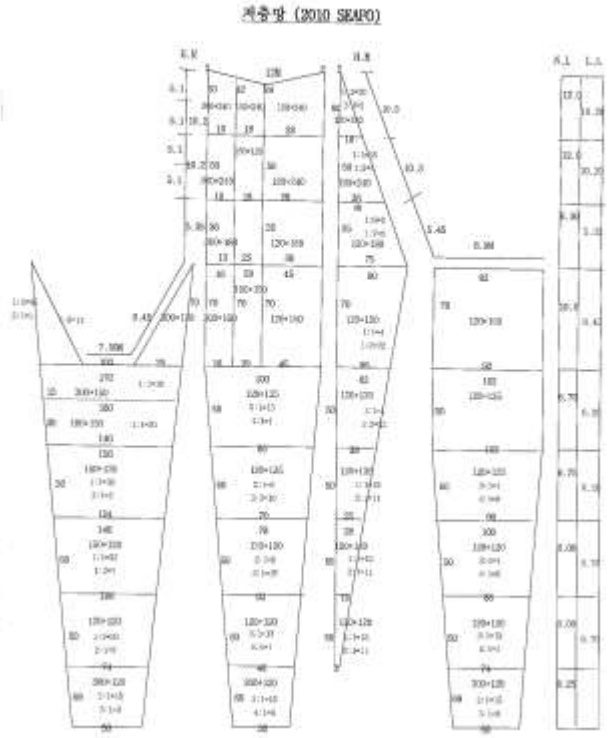

Figure 4: Drawing of mid-water trawl net of the vessel 2.

1.2 Spatial and temporal distribution of fishing

During the period from 2010 to 2011the Korean trawl vessels caught Alfonsino mainly in the northern part of Division B1and in the southern part in 2012 and 2013 (Figs. 5-8). The three main fishing grounds in Division B1 are shown in these figures.

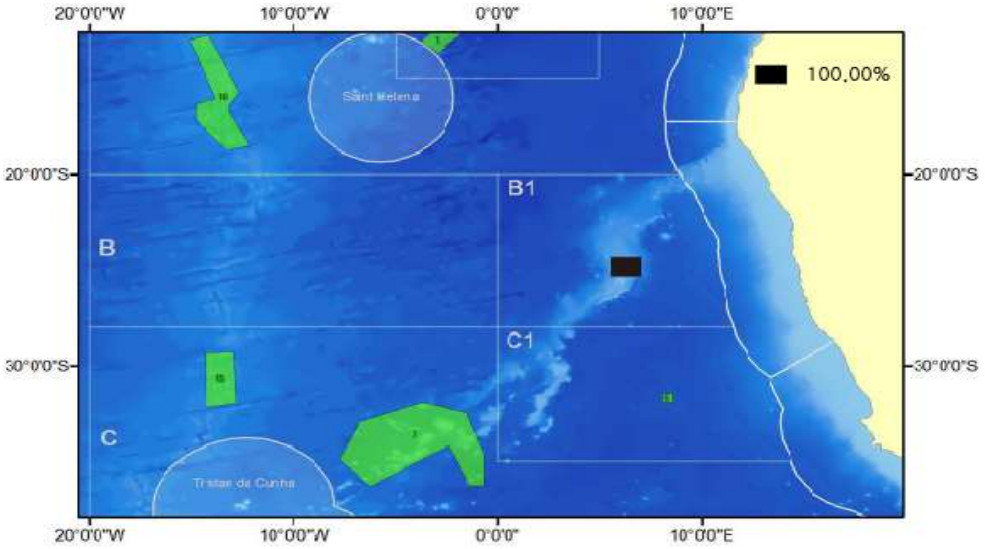

Figure 5: Proportion of catch of Alfonsino (*B. splendens*) by zone (2013).

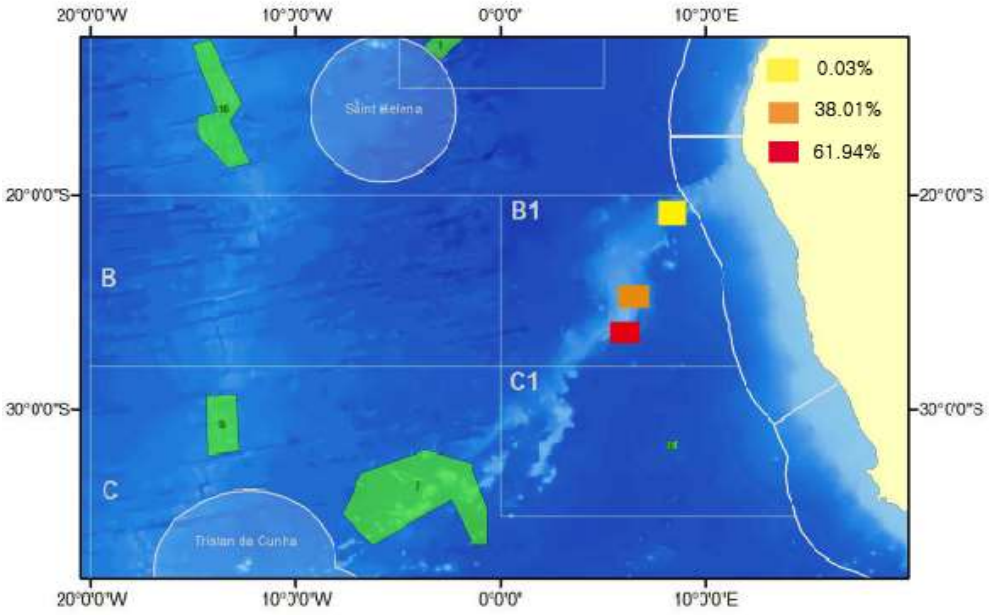

Figure 6: Proportion of catch of Alfonsino (*B. splendens*) by zone c (Jan-Nov 2012).

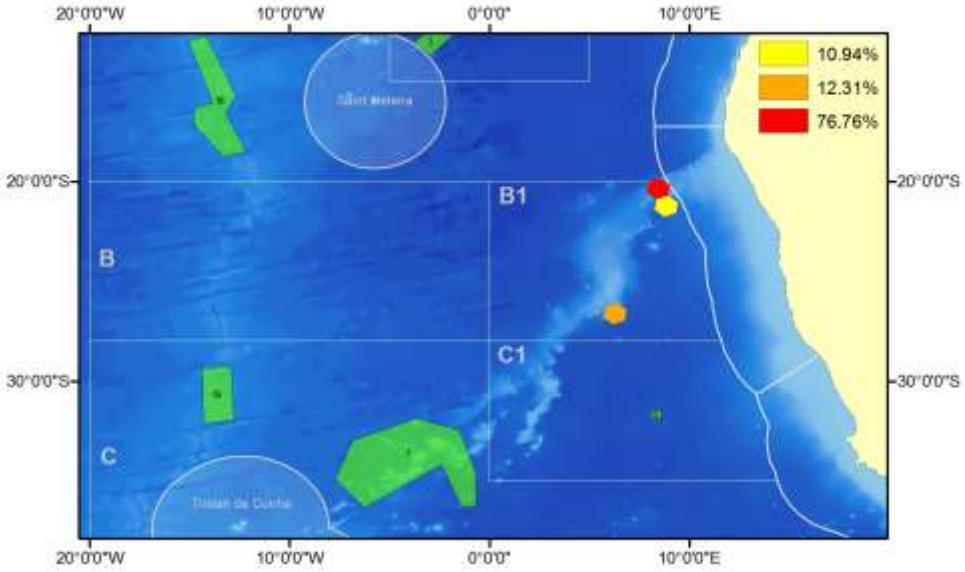

Figure 7: Proportion of catch of Alfonsino (*B. splendens*) aggregated to 100km diameter hexagonal cells (2011).

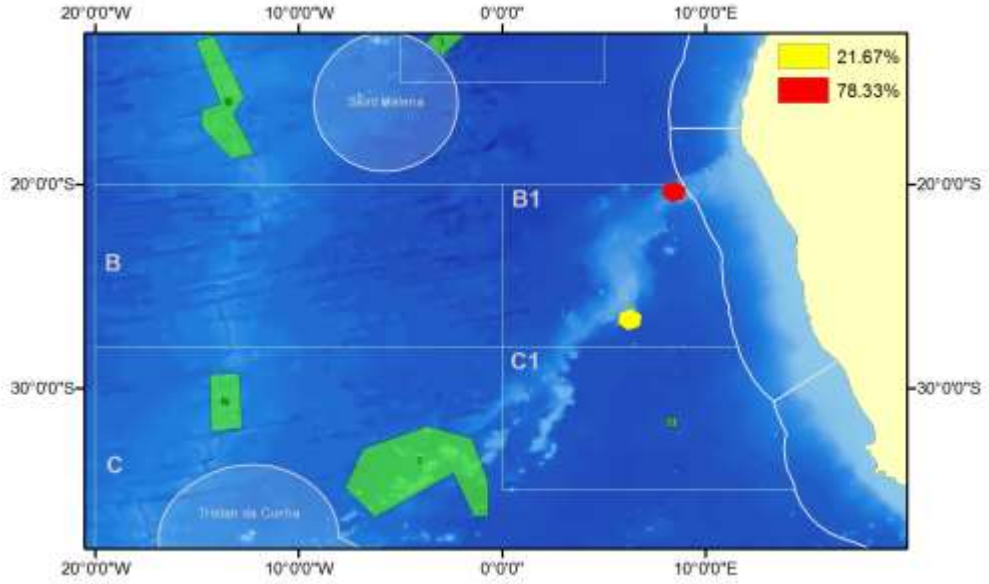

Figure 8: Proportion of catch of Alfonsino (*B. splendens*) aggregated to 100km diameter hexagonal cells (2010).

In 2017, only one vessel (trawler) from Namibia has conducted fishing activity in the SEAFO CA, targeting seamount species. Catches of Alfonsino took place in C0 (Fig. 9).

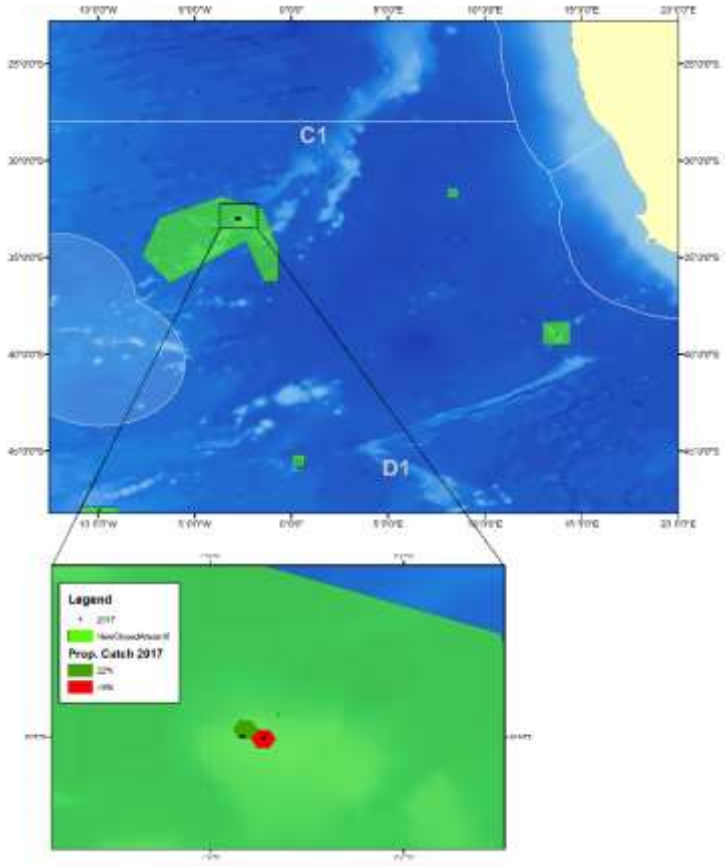

Figure 9: Proportion of catch (Namibian vessel) of Alfonsino (*B. splendens*) aggregated to 100km diameter hexagonal cells (2017).

1.3 Reported retained catches and discards

Table 2 presents Alfonsino catches by country, as well as fishing gear and the sub-divisions in which the catch was taken. The main fishing countries worked in the area included Russia (bottom trawl) in the late 1970s, Ukraine in the mid-1990s, Russia (bottom trawl), Norway (bottom trawl), Spain (MWT /BLL), Poland and Namibia (bottom trawl) in the late 1990s, and South Korea (mid-water trawl) for 4 years from 2010 to 2013, respectively, 198 tonnes, 196 tonnes, 172 tonnes and 1.6tonnes. Historically the highest catches of the fish were recorded by Russia with 2,972 and 2,800 tons in 1977 and 1997 respectively, Poland 1,964 tonnes in 1995, and Norway 1,066 tons in 1998 in the SEAFO CA.

Table 2: Catches (tonnes) of Alfonsino (*B. splendens*) made by various countries. Values in *italics* are taken from Japp (1999). Values in **bold** are from the FAO.

Flag State	**Namibia**		**Namibia**		**Namibia**		**Norway**		**Russia**		**Portugal**		**Ukraine**		**Korea**	
Fishing method	**Bottom trawl**		**Bottom trawl**		**Bottom trawl**		**Bottom trawl**		**Bottom trawl**		**Bottom trawl**		**UNK**		**Mid-water trawl**	
Management Area	**B1**		**C0**		**C1**		**A1**		**UNK**		**UNK**		**UNK**		**B1**	
Year	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**
1976									252 #							
1977									2972 #							
1978									125 #							
1993													172 §			
1994																
1995	1 #						--	--								
1996	368 #						--	--					747 §			
1997	208 #						836		2800 #				392 §			
1998	--	--					1066		69 §							
1999	1						--	--			3 §					
2000	<1						242				1 §					
2001	1						--	--			7 §					
2002	0						--	--			1 §					
2003	0						--	--			5 §					
2004	6						--	--	210							
2005	1						--	--	54							
2006	--	--					--	--	--	--	<1					
2007	--	--					--	--	--	--	--	--	--	--	--	--

2008	--	--					--	--	--	--	--	--	--	--	--	--
2009	--	--					--	--	--	--	--	--	--	--	--	--
2010	--	--					--	--	--	--	--	--	--	--	159	0
2011	--	--					--	--	--	--	--	--	--	--	165	0
2012	--	--					--	--	--	--	--	--	--	--	172	0
2013	--	--					--	--	--	--	--	--	--	--	13	0
2014	--	--					--	--	--	--	--	--	--	--	--	--
2015	--	--					--	--	--	--	--	--	--	--	--	--
2016	--	--					--	--	--	--	--	--	--	--	--	--
2017*	0	0	<1	0	<1	0	--	--	--	--	--	--	--	--	--	--

* Provisional (September 2017)

-- means no fishing. Blank fields mean no data available.

Table 2(cont).

Nation	**Spain**		**Poland**		**Cook Island**		**Mauritius**		**Cyprus**		**South Africa**	
Fishing method	**Mid-water trawl and Longlines**		**UNK**		**Bottom trawl**		**Bottom trawl**		**Bottom trawl**		**Bottom trawl**	
Management Area	**UNK**		**UNK**		**UNK**		**UNK**		**UNK**		**B1**	
Year	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**	**Retained**	**Discarded**
1976												
1977												
1978												
1993												
1994												
1995			1964§								60#	
1996											109#	
1997	186§										124#	
1998	402§											
1999												
2000												
2001	2											
2002												
2003	2											
2004	4				142		115		437			
2005	72											
2006	--	--	--	--	--	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	--	--	--	--	--	--
2011	--	--	--	--	--	--	--	--	--	--	--	--
2012	--	--	--	--	--	--	--	--	--	--	--	--
2013	--	--	--	--	--	--	--	--	--	--	--	--
2014	--	--	--	--	--	--	--	--	--	--	--	--
2015	--	--	--	--	--	--	--	--	--	--	--	--
2016	--	--	--	--	--	--	--	--	--	--	--	--
2017*	--	--	--	--	--	--	--	--	--	--	--	--

* Provisional (September 2017). -- = No Fishing. Blank fields = No data available. UNK = Unknown. # = Values taken from the Japp (1999). § = Values from FAO.
Two species targeted: *Beryx splendens* represents majority of catch

1.4 IUU catch

Some IUU fishing activity in the SEAFO CA has been reported for a vessel to the Secretariat, but the extent of this is at present unknown.

2. Stock distribution and identity

Alfonsino has a global distribution and has been reported from all tropical and temperate oceans (excluding from the northeast Pacific and Mediterranean Sea) between latitudes of about 65° N and 43° S. It occurs from depths of about 25 m to at least 1300 m (Busakhin 1982). In the Atlantic Ocean the species occurs at both at western (Gulf of Maine to the Gulf of Mexico) and eastern Atlantic (off south western Europe and the Canary Islands to South Africa) (Fig. 9). This species is benthopelagic: adults inhabit the outer shelf (180 m) and slope to at least 1,300 m depth, probably moving further from the bottom at night but ascending to feed in midwater during the night; often found over seamounts and underwater ridges. There are no estimates of migration behaviour. The species is oviparous; spawning in batches. Eggs, larvae and juveniles are pelagic.

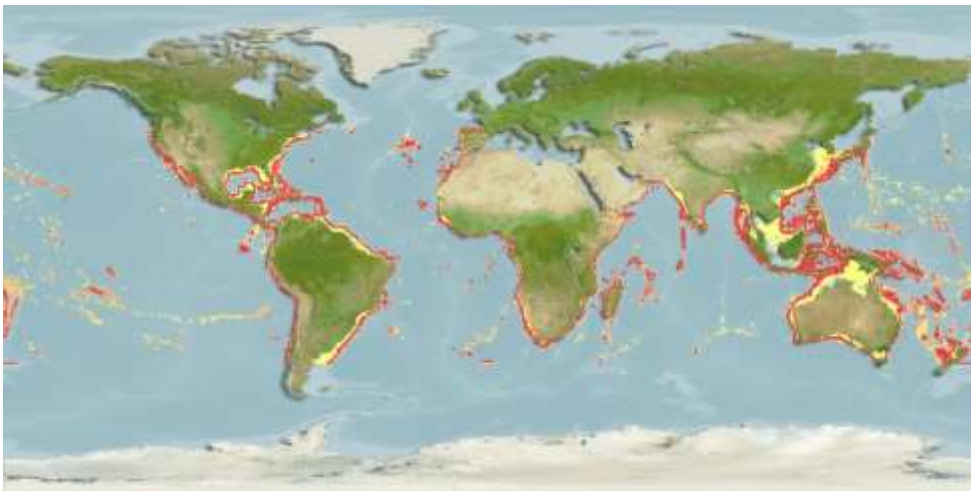

Figure 10: The distribution of Alfonsino (*B. splendens*) (source: FishBase).

3. Data available for assessments, life history parameters and other population information

3.1 Fisheries and surveys data

Non- availability of the historical data and fishing trends for fishing activities in the SEAFO CA prevent application of standard assessment methods. However, only catch and effort (per haul) data for a period of three years (2010-2012) are available for quantitative stock assessment.

3.2 Length data and frequency distribution

Using the data collected by Korean trawl fisheries between 2010 and 2013, the length frequency distributi ons were analysed (Table 3 and Fig. 10). The catch landing data in 2013 were not enough to represent the situation of the southern area of Division B1. The length of Alfonsino in the southern area of Division B1 w as the largest with average 26.5 cm and 28.0 cm at the 3rd quartile, with two modes at 22 cm and 27 cm in 2011. In the southern area of Division B1 the length of the fish was also the largest in 2011 and reached ab out 50 cm fork length. No trend appeared in 2012 (May-June) due to paucity of samples (23 samples). Ove rall length trends between the areas during 2012-2013 were asymmetric. The length of the species in the northern part was larger than that of southern part in 2012 and 2013.

Table 3: Results of length composition of Alfonsino collected by Korean vessels in the SEAFO CA (B1) (2010-2013)

	2010		2011		2012 (5~6)		2012(11)		2013	
	South	North	South	North	South	North	South	North	South	North
No. of samples	200	841	174	593	514	23	77	-	97	5
Minimum length	19.0	17.0	20.0	15.0	17.0	26.0	24.0	-	17.0	25.0
Maximum length	42.0	47.0	50.0	48.0	34.0	35.0	39.0	-	31.0	34.0
Average length	25.8	24.8	26.5	27.8	24.8	31.0	31.5	-	23.7	27.4
Median length	25.0	24.0	25.0	28.0	25.0	32.0	32.0	-	22.0	26.0
1st quartile length	23.0	22.0	23.0	25.0	23.0	30.0	29.0	-	21.0	25.0
3rd quartile length	27.0	26.0	28.0	31.0	26.0	32.5	34.0	-	27.0	27.0

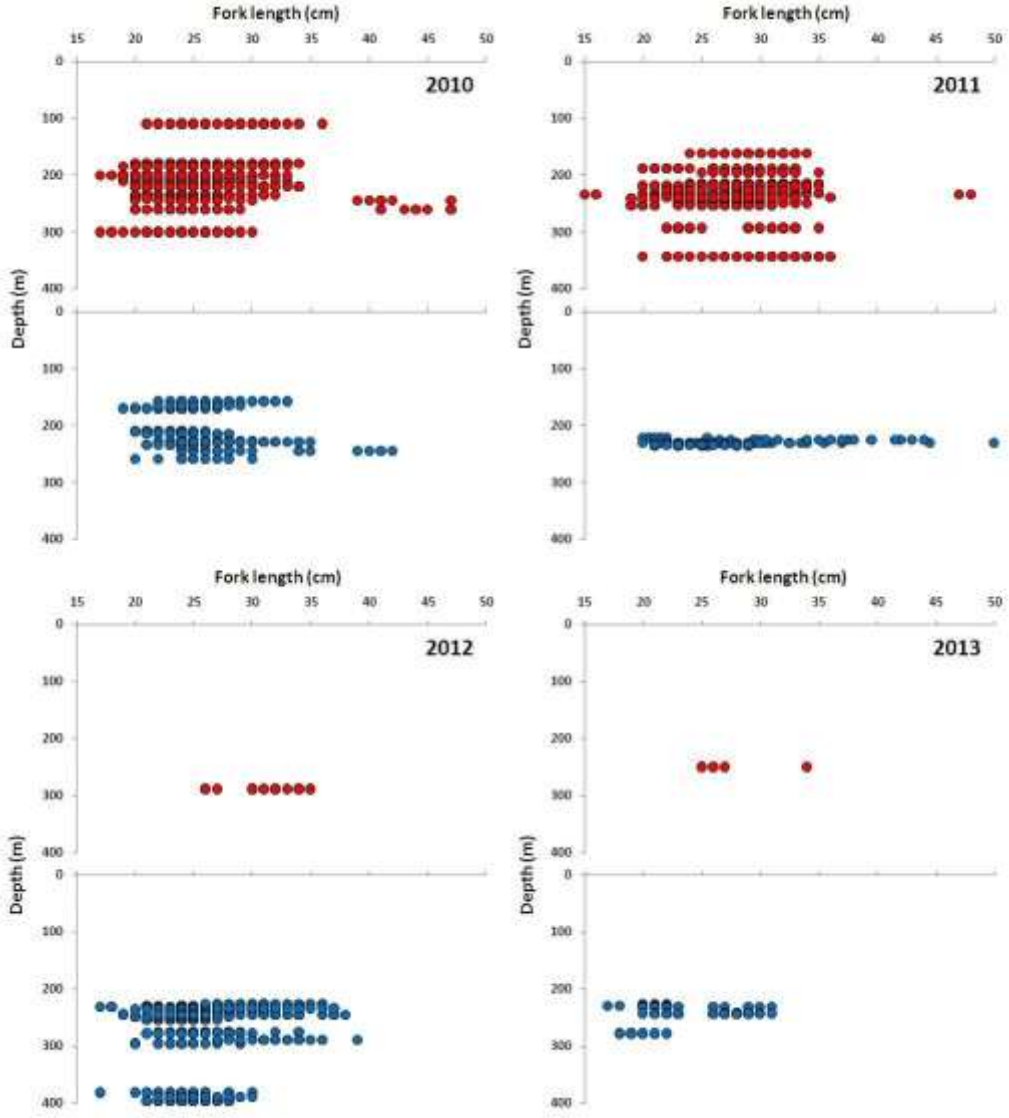

Figure 12: Fork length distribution of Alfonsino (*Beryx splendens*) by depth for 2010-2013.

Table 4: Summary of fork length distribution of Alfonsino (*Beryx splendens*) by depth for 2010-2013.

	2010		2011		2012(5~6)		2012(11)		2013	
	South	North	South	North	South	North	South	North	South	North
No. of Samples	841	200	174	593	514	23	77	-	5	97
Average Depth (m)	210.9	211.1	229.6	238.4	323.8	288.5	248.2	-	250.0	265.1
Average FL (cm)	25.8	24.8	26.5	27.8	24.8	31.0	31.5	-	27.4	23.7

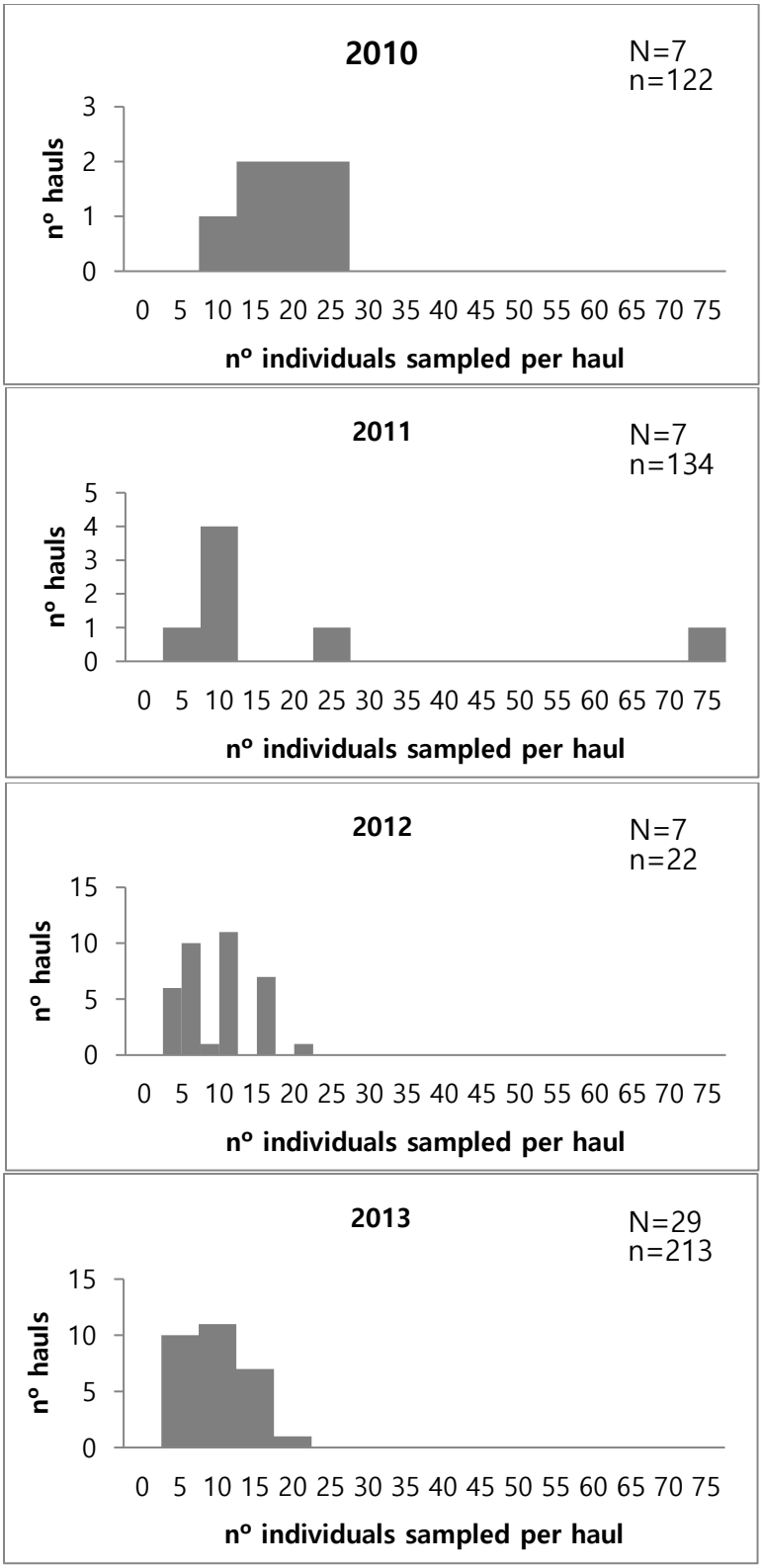

Figure 13: The number of individuals of Alfonsino per haul over a period of four year from 2010 to 2013 in the SEAFO CA.

Table 5: Number of sets by year, minimum and maximum number of individuals per set and the number of individuals sampled between 2010 to 2013 in the SEAFO CA.

Year	No. of Sets Observed	Mean Individuals	Min. Individuals	Max. Individuals	Mean sample size/tonnes
2010	7	17.429	10	25	0.92
2011	7	19.143	5	75	1.36
2012	29	7.345	1	16	0.06
2013	7	3.143	1	7	1.94

3.3 Length-weight relationships

Figure 13 shows the length and weight relationship of Alfonsino for 2010-2013. Two parameters of the length-weight relationship were 0.022 for α and 3.010 for β of combined sex of Alfonsino.

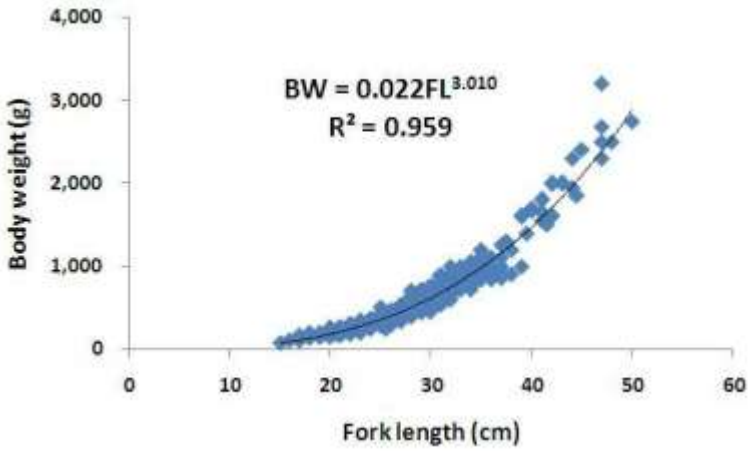

Figure 14: Relationship between length and weight of Alfonsino (*B. splendens*) in the SEAFO CA for 2010 - 2013.

3.4 Age data and growth parameters

The maximum observed age of Alfonsino in the Guinean Gulf was 20 years. The growth parameters of Alfonsino were estimated as K=0.097 year^-1, Linf=48 cm, and t0=-3.08 year^-1 using the specimens from Guinean Gulf (López-Abellán *et al*. 2008).

3.5 Reproductive parameter

The reproductive parameters of Alfonsino were analysed as follows. Spawning season was evaluated as the period from November to February (Nova Caledonia). Length at 1st maturity was estimated as fork length 39.67 cm for females (95% c.i.=39.34, 40.02 cm) and 36.88 cm for males (95% c.i.=36.45, 37.36 cm) (Flores et al. 2012). Fecundity was calculated as 270,000 – 650,000 eggs (source: FishBase).

The biological productivity of *B. splendens* is likely to be moderate to low in general (Anonymous, 2007). Alfonsinos are serial spawners and reproduce in the areas that they normally inhabit. Average size at sexual

maturity appears to be about 30–34cm (4–6 years old), and can vary between localities (González et al. 2003). The annual numbers and proportion of the fish by gonad maturity stage by Korean trawl fisheries during the period of 2010 - 2013 are presented in Table 6 and Figure 14. Time of spawning also varies markedly between seasons. The proportion of immature fishes was 99.4%, 91.4%, 98.6% and 97.1% in 2010, 2011, 2012 and 2013, respectively. The fish, which is in pre-spawning and spawning gonad stages, appeared from October indicating that the spawning season may start from sometime after October. To get more accurate reproduction results of Alfonsino in the SEAFO Area, there is a need to collect data for a few more years.

Table 6: Annual number of fish by maturity stages of Alfonsino (*B. splendens*) in the SEAFO CA for 2010 to 2013.

Year	Month	Maturity stage				
		Immature	Developing	Pre-spawning	Spawning	Spent
2010	Sep	882	66	6	0	0
	Oct	33	6	0	0	0
	Nov	0	20	0	0	0
2011	Jan	95	239	0	0	0
	Sep	37	1	0	0	0
	Oct	18	20	12	0	0
	Nov	26	77	34	2	0
2012	May	16	7	0	0	0
	Jun	452	32	0	0	0
	Nov	29	40	3	5	0
2013	Oct	42	4	0	0	0
	Nov	28	25	3	0	0

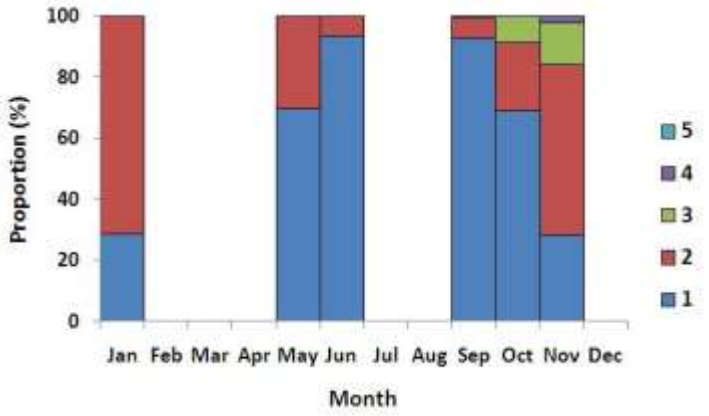

Figure 15: The proportion of maturity stage of Alfonsino in the SEAFO CA for 2010-2013. (1: immature, 2: developing, 3: pre-spawning, 4: spawning, and 5: spent).

3.6 Natural mortality

There is no available information and data in the SEAFO CA.

3.7 Feeding and trophic relationships (including species interaction)

There is no available information and data in the SEAFO CA.

3.8 Tagging and migration

No tagging and migration studies on Alfonsino have been done in the SEAFO Area.

4. Stock assessment

4.1 Available abundance indices and estimates of biomass

There is no available information and data in the SEAFO CA.

4.2 Data used

The data used are derived from fishing hauls in which total catch of *Beryx splendens* represented more than 80% of the total catch of *P. richardsoni* and *Beryx splendens* caught by Korean trawls around the Valdivia Bank. This criterion is used since the catches of these two species are negatively correlated, i.e., when one of these two species occurs in the haul the other does not.

In each haul the estimate of CPUE of *Beryx splendens* is represented as the ratio of total catch of the species by the haul duration time.

4.3 Methods used

Nominal CPUE was used to derive a perception of the development of the fishery in the period 2010-2012.

4.4 Results

The progression in CPUE over time showed marked variability and no clear trend.

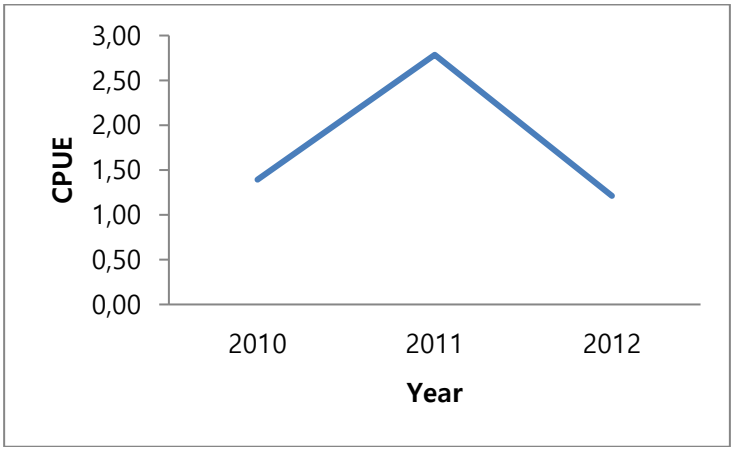

Figure 16: Plot of nominal CPUE (Catch per hour) for 2010-2012.

4.5 Discussion

It should be recognized that the data available for assessment is extremely sparse and represents a short time series. The perception of the stock as described is based on only 3 years of catch and effort data. Length frequency distributions could not be derived based on the insufficient length samples submitted to the Secretariat.

4.6 Conclusion

Catch and effort data per haul on Alfonsino were collected by Korean vessels for only 3 years from 2010 to 2012. These data, although short in series, can be used to get a perception of the trend in nominal CPUE.

4.7 Biological reference points and harvest control rules

No biological reference points could be determined and the SC suggests using an empirical Harvest Control Rule (HCR) to regulate the fishery until the data situation is improved. A candidate HCR consists of the average catch of the last three years to which a 20% uncertainty cap is applied.

ICES Harvest Control Rules, category 5: Data poor stocks (only landings data).Calculation of average catch for three years (2010- 2012) as C_{Y-1}

$$C_{Y-1} = \frac{\sum_{y-3}^{y-1} C_i}{3}$$

= (159+ 165+172)/3

=165

And calculation of the catch advise as

$$C_{Y+1} = 0.8 \times C_{Y-1}$$

= 0.8*165

= 132t

5. Incidental mortality and by-catch of fish and invertebrates

5.1 Incidental mortality (seabirds, mammals and turtles)

No by-catch of seabirds, mammals and turtles were reported.

5.2 Fish by-catch

In the case of Southeastern Atlantic fisheries, Alfonsino is often found in association with other fish species as, for example, in 2011 the following species (per ton) were caught; Boarfish (*Capros aper*) 14 tonnes, Blackbelly rosefish (*Helicolenus actylopterus*) 3 tonnes, Imperial blackfish (*Schedophilus ovalis*) 6 tonnes, Oilfish (*Ruvettus pretiosus*) 8 tonnes, and Silver scabbardfish (*Lepidopus caudatus*) 4 tonnes.

5.3 Invertebrate by-catch including VME taxa

The main method used to catch Alfonsino is with bottom trawling. Trawling for this species on seamounts impacts habitat (Clark and O'Driscoll, 2003, Koslow et al., 2001), but the precise impact of this on invertebrate populations on the seamounts is unknown.

5.4 Incidental mortality and by-catch mitigation methods

By-catch mitigation measures to reduce incidental mortality for seabirds, mammals and turtles are in place (see current conservation measures in section 6).

5.5 Lost and abandoned gear

There was no reported lost and abandoned gear from the trawl fisheries for Alfonsino in the SEAFO CA.

5.6 Ecosystem implications and effects

The main method to catch Alfonsino is bottom trawling and repeated trawl disturbances will alter the benthic community on a seamount. However, the precise impact of such trawling on the ecosystem as a whole is unknown. (see Conservation Measure 18-10).

6. Current conservation measures and management advice

Considering that the TACs set for alfonsino under CM 32/16 is reviewed every two years, and that the last review was done in 2016, no update or review of the TAC was conducted for 2017.

Alfonsino is a seamount-associated species that form aggregations, and the experience worldwide is that serial depletion of aggregations at different seamounts can happen. In the recent fisheries for the species in SEAFO the fishery was concentrated on a single seamount summit, the Valdivia Bank, where it was mainly a bycatch in the target fishery for pelagic armourhead. The only information available from 2015 is the limited observations from the RV Dr Fridtjof Nansen survey noting that only scattered specimens of the species occurred in the main fishing area.

It is also recognized that the last three year's interruption in the exploitation has provided potential for recovery of the resource in the main fishing area on Valdivia Bank. There is however not enough information from any source to determine with certainty whether recovery has happened or not happened.

The SC however recognised that without future fishery data nor survey information the basis for providing scientific advice will deteriorate. The SC therefore discussed what advisory option would be most appropriate while maintaining the potential for data provision from a fishery. It must also be taken into account that the alfonsino is mainly a bycatch and that the catches will depend on the activity level in the target fishery for armourhead.

The SC considered the TAC level advised in 2013 as precautionary at that time. Considering no fishing pressures last 3 years and development of the resource, The SC recommends a TAC of 200 t (status quo) for the SEAFO CA, of which a maximum of 132 tonnes may be taken in Division B1.

Other Conservation Measures that are applicable to this fishery can be seen in Table 7.

Table 7: Other Conservation Measures that are applicable to this fishery.

Conservation Measure 04/06	On the Conservation of Sharks Caught in Association with Fisheries Managed by SEAFO
Conservation Measure 14/09	To Reduce Sea Turtle Mortality in SEAFO Fishing Operations.
Conservation Measure 25/12	On Reducing Incidental Bycatch of Seabirds in the SEAFO Convention Area
Conservation Measure 30/15	On the Management of Vulnerable Deep Water Habitats and Ecosystems in the SEAFO Convention Area
Conservation Measure 31/15	On Total Allowable Catches and related conditions for Patagonian Toothfish, orange roughy, Alfonsino and Deep-Sea Red Crab in the SEAFO Convention Area in 2014

7. References

Anonymous. (2007). Information describing alfonsino (Beryx splendens) fisheries relating to the South Pacific Regional Fishery Management Organisation (Working Draft, 20 June 2007). SPRFMO-IV-SWG-09.

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APPENDIX X – 2016 Namibian Orange roughy Survey Results

Stock Status Advisory Report

Orange Roughy Resource 2017

The Fishery

Year	Landings (t)	TAC (t)
94/95	1 672	-
95/96	6 288	-
96/97	17 381	-
97/98	14 729	*12 000*
98/99	10 040	*12 000*
99/00	2 699	*6 000*
00/01	1 344	*1 875*
01/02	874	*1 875*
02/03	1 985	*2 400*
03/04	1 730	*2 650*
04/05	1 106	*2 600*
05/06	297	*2 050*
06/07	429	*1 100*
07/08	288	*900*
Total	61 062	

Figure 1: Map of the orange roughy Fishing grounds in Namibia.

Moratorium

- During March 2008, recommendation for a 3-year moratorium on orange roughy fishing
- Through MRAC, and endorsed by Cabinet
- The moratorium affected the biomass survey.
- Since then, no further research/survey was conducted.

Biomass survey 2016

- 12-30 July 2016 on board F/V Pemba Bay
- All four QMAs surveyed
- In total: **69.5 tonnes** of ORY caught
- Assistance from commercial skipper Andy Smith of New Zealand
- Challenge: At one station, about 140 tonnes was in the net of which half was released before net could be pulled onto the deck

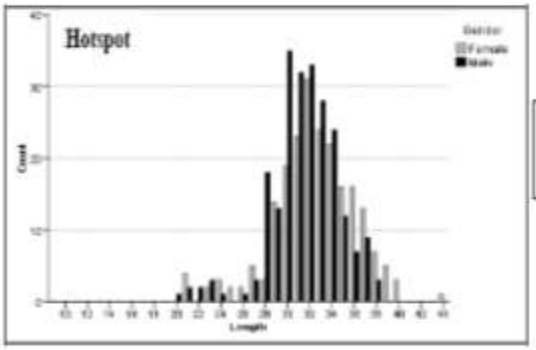
Biomass Survey results

Table 2: Acoustic estimates (tonnes) of orange roughy biomass population in QMAs. Coefficients of variance (in %) are given in parenthesis.

Year	Johnies	Frankies	Rix	Hotspot	Total
1997	34 178 (21)	17 925 (25)	21 579 (15)		73 683 (12)
1998	3 570 (43)	4 940 (38)	7 572 (19)		16 082 (17)
1999		1 782 (25)			
2000		4 000-4 600 (30)			
2001		4 820 (16)			
2002		15 802 (21)			
2003		6 133 (27)	1 174 (51)		7307
2004	5 865	3 727 (26)			9 592
2005	2 132	7 734 (47)			9 866
2006	1 117 (16)	4 914 (27)	2 422 (64)		8 453
2007	2 910 (79)	2 264 (35)	2 439 (74)	*4 965 (71)**	12 578
2016	7 351 (53)	10 331 (62)	618 (67)	3 452 (43)	21 752

*Hotspot biomass was not included in stock assessment for that year

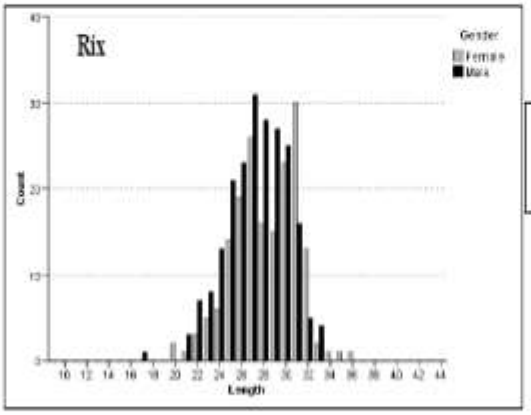
Survey size structure



	Male	Female
Mean length	31.5	32.5
N	227	215

Figure 2a: Hotspot length frequencies

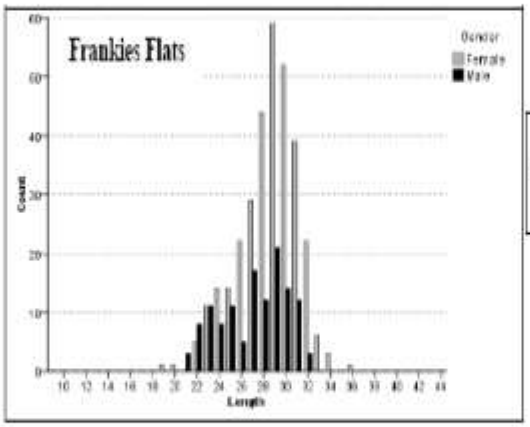
Survey size structure



	Male	Female
Mean length	27.3	28.2
N	212	178

Figure 2b: Rix length frequencies

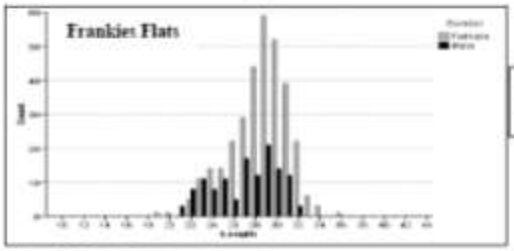
Survey size structure



	Male	Female
Mean length	27.1	28.5
N	125	323

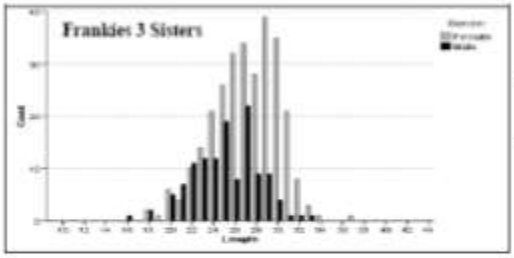
Figure 2c: Frankies Flats length frequencies

Survey size structure



	Male	Female
Mean length	27.1	28.5
N	125	323

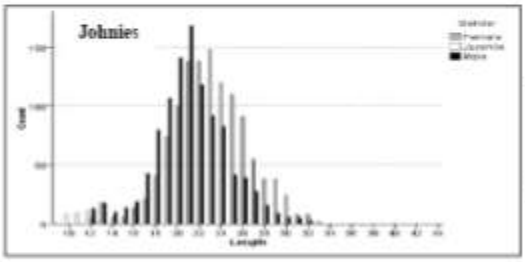
Figure 2c: Frankies Flats length frequencies



	Male	Female
Mean length	25.1	27.1
N	124	286

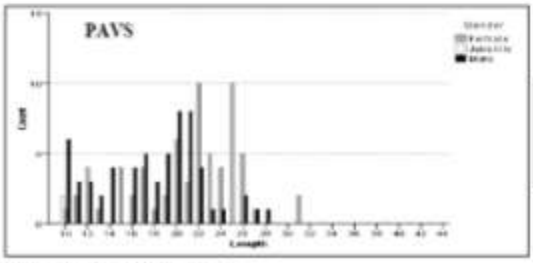
Figure 2d: Frankies 3 Sisters length frequencies

Survey size structure



	Male	Female	Juv
Mean length	21.1	22.83	11.2
N	1054	1203	31

Figure 2e: Johnies length frequencies



	Male	Female	Juv
Mean length	17.7	20.8	10
N	61	67	2

Figure 2f: PAVS length frequencies

Mean sizes / area

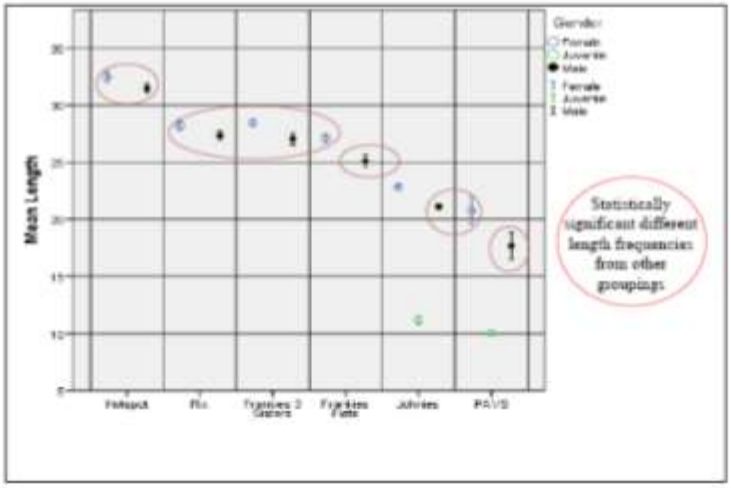


Figure 3: Mean length per gender for each of the areas. The error bars represent the 95% Confidence Intervals.

Maturity

Table 4: Proportions (%) of immature and mature orange roughy by sex and area.

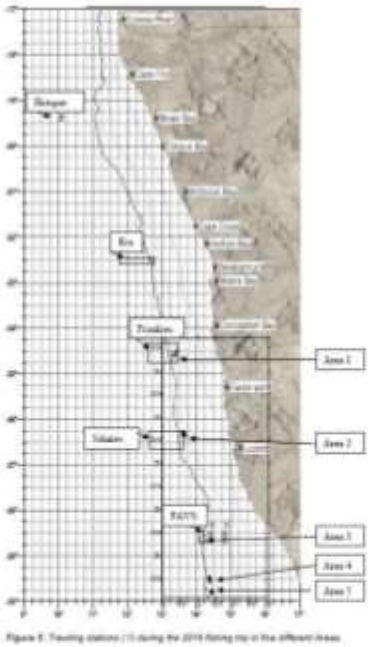
Mature is considered from gonad stage 3 to 6.

Area	Sex	% Immature	% Mature	Sample size (n)
Hotspot	Males Females	58.1 58.1	41.9 41.9	227 215
Rix	Males Females	72.6 89.9	27.4 10.1	212 178
Frankies 3 Sisters	Males Females	95.2 75.2	4.8 24.8	124 286
Frankies Flats	Males Females	26.4 23.2	73.6 76.8	125 323
Johnies	Males Females	85.4 83.1	14.6 16.9	1054 1203
PAVS	Males Females	90.2 91.0	9.8 9.0	61 67

Commercial fishing 2016

F/V Pemba Bay made one trip (14-30 August) after the survey

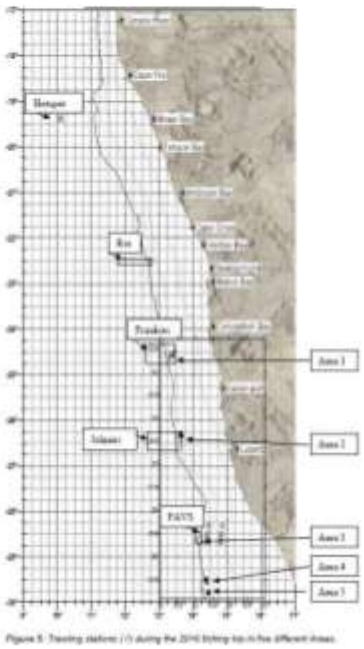
Area	Number of trawls
1	1 trawl
2	30 trawls
3	1 trawl
4	32 trawls
5	24 trawls



Catches by area 2016 (logbook data)

Area	Median	Mean	Number of trawls	Std. Deviation	Sum
1	148	148	1		148.5
2	702	2 449	30	3 226	73 482.0
3	54	54	1		54.0
4	3 600	3 406	32	4 733	108 999.0
5	1 424	2 220	24	2 047	53 298.0
Total	1 276.750	2 681	88	3 694	235 981.5

TOTAL = 236 t



Commercial size structure

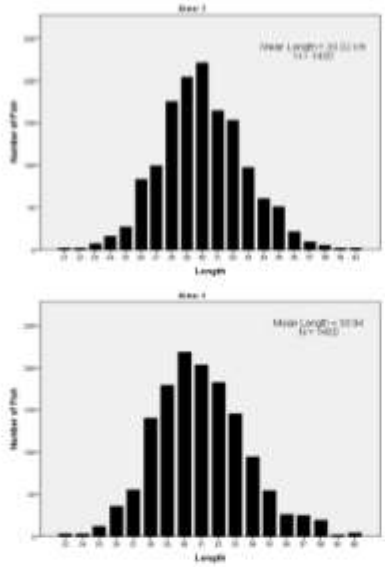


Figure 6. Length frequency graphs of orange roughy catches in Areas 2, 4 and 5 during the 2016 MV Pendua Bay fishing trip.

Catch per unit of effort

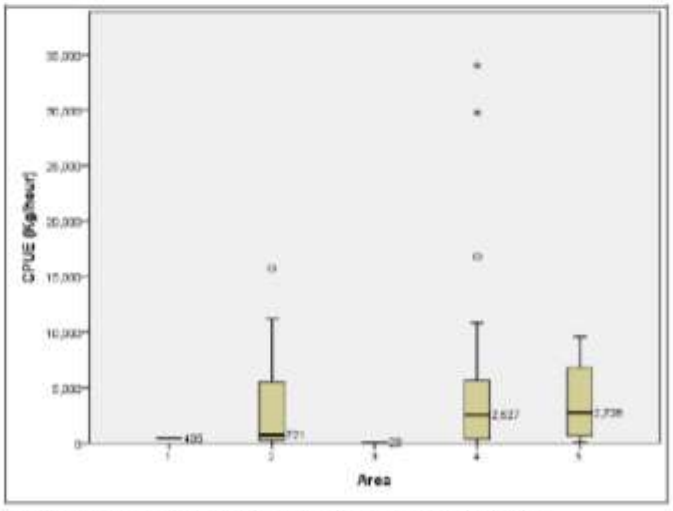


Figure 7: CPUE (Kg/h) distribution and median values for each area during 2016 fishing trip.

Orange roughy: from Statistics

Year	Landings (Mt)
2008	6
2009	5
2010	1
2011	1
2012	2
2013	2
2014	1
2015	6
2016	236

APPENDIX XI – Guidelines for revision of VME closures

Principles underlying evaluations of appropriateness of VME closures and possible protocols for revision of closures

Background

The issues of opening of SEAFO fishing closures, established to protect vulnerable marine ecosystems, have been raised several times during recent meetings of the Scientific Committee (SC) and the Commission. In 2014 the Commission noted that specific guidelines for re-opening of closed areas would be considered at the SC in 2015.

In 2015 the SC interpreted that task as restricted to evaluating what research activity is required to consider opening of closures. A set of pertinent research guidelines was worked out by Dr Bergstad from Norway and discussed by the SC. There was substantial but not full support for the proposal, but it was decided to present the proposed guidelines to the Commission for information. No action was, however, taken by the Commission on the matter.

In 2016 the issue was raised again in the SC, and under Agenda Item 19.6 entitled "**Further considerations of guidelines and principles underlying evaluations of appropriateness of closures and possible protocols for revision of closures"**, and the report states the following:
Japan proposed an approach for surveying closed areas using a commercial vessel as well as a protocol for reopening closed areas. Japan decided to withdraw the proposal because there was not sufficient support from the SC.

The SC agreed that Odd Aksel Bergstad will draft guidelines and principles underlying evaluations of appropriateness of closures and possible protocols for revision of closures for the SC meeting in 2017.

The present document is the response to the latter decision by the SC from 2016.

Background for establishing SEAFO closures and state of knowledge

The SEAFO fishing closures were established in response to a growing expectation from the international community that fisheries management organizations and states take action to protect vulnerable marine ecosystems (VMEs) against significant adverse impacts (SAIs) from fisheries deploying bottom-contact fishing gear. The international concern was expressed most clearly in the United Nation General Assembly (UNGA) Resolution 61/105 which strongly encouraged states and regional fisheries management organizations (RFMOs) to protect such ecosystems. Guidelines for responding to that resolution, and others that followed, were negotiated in a consultative process amongst states in FAO and adopted in 2009, see International Guidelines for the Management of Deep-sea Fisheries in the High Seas (FAO Guidelines) (http://www.fao.org/docrep/011/i0816t/i0816t00.htm). All RFMOs, including SEAFO, have

committed to these international concerns and guidelines, and one of the responses has been to close subareas of their convention/regulatory areas to fishing practices and gears known or likely to cause significant adverse impacts to VMEs. The understanding of the expression SAI is clarified in the FAO Guidelines (paragraphs 17-20), where a set of six factors to be considered is listed in paragraph 18.

Despite that the level of knowledge on the actual spatial distribution of VMEs was in many areas lacking or unsatisfactory, several RFMOs closed assumed representative areas likely to be inhabited by VMEs. The decisions were made on the basis of best available scientific information from the specific convention area and/or from general knowledge of the VME indicator species distribution patterns in other areas.

In the cases, as in SEAFO, where scientific evidence from observations of VME distributions at relevant spatial scales was largely lacking, the closing of specific areas was based on likelihood assessments rather than evidence of presence of VMEs in the areas closed. While it is assumed that correct decisions were made based on best available knowledge, the lack of direct mapping data also created the uncertainty that some areas may have been closed that do not contain VMEs, and other areas that do contain VMEs were left open to fishing.

In SEAFO the structural features exploited by fisheries are seamounts and seamount complexes, and such geomorphological features are universally recognized as areas likely to have VMEs. This is also reflected in the UNGA resolutions and the FAO Guidelines, e.g. paragraph 42 and Annex. In such areas, the FAO Guidelines calls for precautionary action, including amongst minimum requirements closing of areas until a functioning regulatory framework is developed to prevent SAI in other ways (FAO Guidelines paragraphs 63 and 66). On this basis and SC advice, SEAFO from 2006 onwards closed a representative selection of seamounts to fishing, without in most cases more than indicative data on VME presence.

Despite that some scientific research efforts were conducted in selected subareas of the SEAFO Convention Area in recent years, the scarcity of scientific information recognized by the SC when the closures were introduced largely persists. This situation continues to prevent the SC from making full and satisfactory assessments of the appropriateness of currently adopted fishing closures. While it is likely that most seamounts have VME indicator presence and many contain VMEs, it should also be recognized that seamounts are diverse features and that it cannot be universally assumed as a fact that all seamounts have VMEs and therefore require protection against bottom-touching fishing gears.

Requirements pertinent to evaluation of appropriateness of SEAFO fishing closures implemented to protect VMEs

Closures were introduced and placed in specific subareas of the Convention Area based on best available science and/or the best scientific judgment of the likelihood of VME occurrence in those specific areas. The guidance was the UNGA resolution 61/105 expression: ‘areas where VMEs occur or are likely to occur’.

Similar or better science or judgement must be required to evaluate appropriateness after closures have been established and prior to considering opening or modifying them.

On this background, opening of closures or revision of boundaries can only be considered if and when there is scientifically validated evidence to conclude either that A) VMEs do not occur in a closed area (or

are unlikely to do so), or as a minimum, that B) VMEs that occur in the closure are unlikely to suffer significant adverse impacts from fishing should the area be opened/modified.

It follows from the above requirements that scientific evidence and best evaluations are required which determines beyond reasonable doubt that preferably Pt A) or at least Pt B) are fulfilled. Scientific investigations pertinent to VME evaluations therefore have to be relevant but also sufficiently rigorous to generate data of sufficiently high quality and quantity. A set of 8 guidelines for such research was proposed in 2015 and included in the information paper presented to the Commission and is included here as Appendix 1.

It should be emphasized that the SC and Commission have obligations to assess whether or not an existing closure is appropriate because it protects VMEs. To follow the FAO Guidelines, an equally important task is to assess whether an alternative management measure for the closure area improves long-term protection against SAI and furthermore ensures long-term conservation and sustainable use of deep-sea fish stocks. Abandoning an existing closure without having made a full assessment of the appropriateness of alternative management measures would not be in line with the international guidelines.

Protocol for evaluating appropriateness of closures and revision of pertinent measures

The evaluation of the appropriateness of closures and, if deemed justified, proposing of new or amended closures are tasks under the mandate of the SC. The SC can take on such work without special requests from the Commission or as a result of such requests. The outcome may be a recommendation or, if a recommendation is not made, a report reflecting the work and conclusions reached by the SC. Making decisions on management actions following such evaluations obviously remains the responsibility of the Commission.

The following protocol is proposed:

1) A proposal for evaluation the appropriateness of closure(s) shall be submitted in writing to the SC for consideration during its next meeting. The proposal shall be accompanied by all pertinent scientific documentation facilitating assessments in relation to the requirements: A) VMEs do not occur (or are unlikely to do so), or as a minimum, B) VMEs that occur in the closure(s) are unlikely to suffer significant adverse impacts from fishing should the area be re-opened/modified.
2) Proposals may be submitted by Contracting Parties, or independently by SC members in their capacity as scientists contributing to the work of the SC.
3) The SC shall consider the proposal and decide if the scientific evidence and documentation provided are sufficient to initiate the evaluation as proposed. To carry out a new assessment, the SC must agree that new scientific information provided will change the original perception of actual VME presence, likelihood of presence, or at least likelihood of risk of 'significant adverse impacts'. The SC can decide to reject the proposal at this stage if the likelihood of a change in perception is deemed low and there is no agreement to pursue the matter further.
4) If the SC accepts that the documentation (including camera and video imagery) provided warrants an evaluation then the proposer should present the proposal and associated documentation to

the SC for consideration. The SC shall evaluate the proposal, and apply the documentation provided and any other relevant information, to decide whether or not the requirements A) or as a minimum B) under Pt. 1 are fulfilled.

5) If the SC decides, based on scientific evidence and best scientific judgement, that a revision is warranted, then the SC shall make a recommendation to the Commission for a revision of the closure(s) or associated management measures. If the SC decides to reject the proposal and makes no recommendation to the Commission, that decision shall be reflected in the report. Regardless of outcome, the SC shall in the report explain the background for its conclusions.
6) The Commission shall consider the recommendations/reports from the SC on the scientific evaluations of appropriateness of fishing closures and decide to maintain, amend or repeal existing management measures. Underlying the decision should be the Commission's evaluation of whether or not the action fulfills the requirements A) or B) above and satisfies obligations expressed in the Convention or other pertinent decisions. In accordance with the FAO Guidelines, paragraph 63, it must be shown that appropriate conservation and management measures have been established to both prevent 'significant adverse impacts' on VMEs and ensure long-term conservation and sustainable use of deep-sea fish stocks.
7) Should a closed area be opened, then such an area becomes a "new fishing area", and may become an "existing fishing area" if rules and procedures stipulated in CM 30/15 are fulfilled.

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Annex 1

Proposed research guidelines and requirements

1. **Scientific research activities in SEAFO closures should adhere to the guidelines for scientific research adopted by the Commission in 2014.**
2. **In order to generate data relevant for evaluation of VME presence, samplers and technologies which generate reliable data on occurrence, density and identity of VME indicator taxa shall be adopted.** Preferred technologies include *in situ* video or photographic samplers that provide visual documentation at the relevant spatial scale of seamounts, taking account of the bathymetry, geomorphology and substrates usually inhabited by VME taxa. If such visual approaches cannot be used, samplers with a documented ability to generate valid data on occurrence, density and identity of VME taxa must be applied. Relevant documentation comprises published validation experiments and design specifications.
3. **Technologies used in conjunction with those described in Pt. 2 to obtain samples for identification and documentation of VME taxa should be designed to minimize adverse impacts to VMEs but at the same time ensure sufficient sample sizes and quality to derive reliable data.** The use of samplers such as fishing gear and other invasive sampler which tend to cover large areas and sample indiscriminantly should be avoided in favor of less invasive and more targeted

samplers. If fishing gear has to be used, tow lengths or sample volumes should be minimised to a level deemed sufficient to provide necessary data.

4. **The scientific investigation must be designed in a manner so that accuracy is achieved and precision of the observations is maximized, at the relevant spatial resolution to facilitate assessment of VME presence in the closure.** Distribution and number of sampling units must be based on best available bathymetry data (preferable multibeam data), as well as best practice for statistical sampling designs and replication.
5. **Methods and sampling designs adopted must be documented, and descriptions must be sufficiently rigorous to facilitate repetition of the study by other researchers.**
6. **VME distribution data generated by habitat prediction modelling may be used to guide sampling effort, but such data alone do not constitute sufficient evidence for evaluating actual VME presence or absence and generate management advice.** Models provide valuable input in a planning phase of field investigations and field investigations provide necessary input to test and improve models, but the quality of current models is not sufficient to generate reliable stand-alone data.
7. **Reports from the field campaign(s) associated with the investigation shall be submitted to the SC for consideration, preferably in advance of the first meeting of the committee following the conclusion of the field campaign(s).** The reports shall provide, as a priority, the results most relevant for VME assessments, presented and evaluated in a manner facilitating immediate use by the SC. The reports and a copy of whatever data are associated with it shall be deposited in the SEAFO data repository. Data for which SEAFO does not have ownership shall not be transferred to third parties, and this restriction should preferably be regulated in an agreement between SEAFO and the data owner.
8. **Open publication of the cruise reports as well as informal outreach activity and formal publication of the results from investigations in closures is strongly encouraged by SEAFO, but these activities are responsibilities of the institution(s) conducting the research.** Co-operative reporting between investigators and SEAFO is encouraged.

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APPENDIX XII – Exploratory Fishing Checklist

FAO/ABNJ deep-seas project
Checklist, application and evaluation template for exploratory fishing applications
DRAFT – Tony Thompson 12 September 2017

Contents

1 SEAFO SC collaboration

21.4 FAO/ABNJ deep-sea project:
• SC in collaboration with FAO/ABNJ to develop a checklist, application and evaluation template for exploratory fishing applications (*Secretariat*).
2016 SEAFO SC Report (p. 12)

2 Reference documents:

CM 30/2015 on Bottom Fishing Activities and Vulnerable Marine Ecosystems in the SEAFO Convention Area Adopted by the Commission on 03 December 2015; Entered into Force on 15 February 2016 http://www.seafo.org/media/8933d489-854c-4c99-895e-66573c7010a4/SEAFOweb/CM/open/eng/CM30-15_pdf

Procedures and standards for the SEAFO Scientific Committee's consideration of proposals for exploratory fishing pursuant to CM 30/2015 Adopted by SC on 12 October 2016 http://www.seafo.org/media/a70ddf0d-1b1a-4d7e-bfd8-46914a5f0aa8/SEAFOweb/pdf/SC/open/eng/SC%20Procedures%20and%20Standards%20Appendix%20IV_pdf IN "2016 Report of the 12th SEAFO Scientific Committee", 6 October – 14 October 2016 Windhoek, Namibia http://www.seafo.org/media/4ca98f5f-c111-4bcf-875b-36ac3213b8b7/SEAFOweb/pdf/SC/open/eng/SC%20Report%202016_pdf

3 Contact details (for Executive Secretary)

Position	Name	Email
CP submitting fishing proposal		
Executive Secretary, SEAFO		
Chair, Commission		
Chair, Scientific Council		
SC Delegate, Angola		
SC Delegate, European Union		
SC Delegate, Japan		
SC Delegate, Republic of Korea		
SC Delegate, Namibia		
SC Delegate, Norway		
SC Delegate, South Africa		

4 Time line with completion dates (for Executive Secretary)

Initial Application

Item	From	To	Source	Target (+days)	Actual Date
Notice of Intent to fish (NoI)	Submitting CP	Executive Secretary	7.1	0	
Preliminary assessment (PA)	Submitting CP	Executive Secretary	7.1, 7.2 Annex 3		
NoI and PA	Executive Secretary	SC Chair	7.2		
NoI and PA (if re-submission required)	Executive Secretary	Submitting CP	Procedure 1		
NoI and PA	SC Chair	Executive Secretary	Procedure 3		
NoI and PA	Executive Secretary	SC Delegates	Procedure 3	0	
SC delegates assessment of risk to VMEs	SC Delegates	SC Chair		25	
SC assessment of risk to VMEs	SC Chair	Executive Secretary	7.2	30	
SC assessment of risk to VMEs	Executive Secretary	Commission Chair			
Permission for exploratory fishing	Commission	Executive Secretary	7.2		
Permission for exploratory fishing	Executive Secretary	CP proposing to fish		60	

1St Review of Exploratory Fishing Activities

Item	From	To	Date
SC Meeting (next)			
Results	Submitting CP	Executive Secretary	
Results	Executive Secretary	SC	
Review	SC	Executive Secretary	

2nd Review of Exploratory Fishing Activities

Item	From	To	Date
SC Meeting (next)			
Results	Submitting CP	Executive Secretary	
Results	Executive Secretary	SC	
Review	SC	Executive Secretary	

5 Notice of Intent – Checklist (for submitting CP and SC)

Required

Plan	Detail	Reference	Comment from submitting CP	Comments from SC
Harvesting plan	Target species	6.2(a) Annex 3(a)	[Yes/No]	[Yes/No/requires more detail]
	Duration and proposed dates of the fishery	6.2(a) Annex 3(a)		
	Areas to be fished (including coordinates and maps) and restrictions	6.2(a) Annex 3(a)		
	Fishing effort levels and restrictions	Annex 3(a)		
	Vessel details	Annex 3(a)		
	Type of bottom fishing gear	6.2(a) Annex 3(a)		
Mitigation plan	General	6.2(b)		
	Measures to prevent SAI to VMEs that may be encountered	6.2(b)		
Catch monitoring plan	General	6.2(c)		
	Recording/reporting of all species caught (target fish, bycatch fish, other species)	6.2(c)		
	Catch monitoring sufficient for assessment of activity, if required	6.2(d)		
Data collection plan	To facilitate identification of VMEs in the area fished	6.2(e)		
Observer coverage	Details of scientific observer coverage and competence	6.6 Annex 4		

Desirable

Plan	Detail	Reference	Comment from submitting CP	Comments from SC
Fine-scale data collection	Distribution of intended tows and sets, to the extent practicable on a tow-by-tow and set-by-set basis	6.2(f)	[Yes/No]	[Yes/No/requires more detail]
Gear monitoring	Monitoring of bottom fishing activities using gear monitoring technology, including cameras if practicable	6.2(g)		
Seabed mapping	Data from echo-sounders, etc	6.1 6.2(h)		

6 Preliminary assessment – Checklist (for submitting CP and SC)

Note: The submitting CP should also refer to CM30-15 (Annex 3) and the Standards (p. 20) where details of requirements are provided.

Plan	Detail	Reference	Comment from submitting CP	Comments from SC
Harvest plan	See "harvest plan" above	Annex 3(a)	[Yes/No]	[Yes/No/requires more detail]
Baseline information	Current state of target fishery resource	Annex 3(b)		
	Ecosystems, habitats and communities in the fishing area	Annex 3(b)		
VMEs	identification, description and mapping	Annex 3(c)		
VME impacts	Likely impacts, data collection, risk assessment	Annex 3(d, e, f)		
Mitigation measures	See "mitigation plan" above	Annex 3(g)		

7 Evaluation Checklist (for SC)

Item	Detail	Reference	Comments
SC Chair	Notice of Intent received	Procedure 1	[date]
SC Chair	Preliminary Assessment received		[date]
SC Chair	Is application complete (see above checklists above)*	Procedure 1	[Yes/No/requires more detail]
SC Delegates (one per CP)	assessments of impacts on VMEs	Procedure 6 Standards 2 (on p. 20) Standards 3 (on p. 21)	
SC Delegates	Angola	Procedure 6	[date sent, replied]
	European Union	Procedure 6	[date sent, replied]
	Japan	Procedure 6	[date sent, replied]
	Republic of Korea	Procedure 6	[date sent, replied]
	Namibia	Procedure 6	[date sent, replied]
	Norway	Procedure 6	[date sent, replied]
	South Africa	Procedure 6	[date sent, replied]
SC Chair	Summary of assessments from delegates and/or presented at SC Meeting	Procedure 8	
	Does the proposed bottom fishing activity have significant adverse impacts on VMEs?	7.3	
	If so, are there mitigation measures to prevent such impacts?	7.3	
SC Chair	Forward to Commission via SEAFO Secretariat	Procedure 9	

* If required, returned to Secretariat with draft letter to submitting CP asking for further information

APPENDIX XIV – FAO-CECAF Technical Workshop Feedback to SC

Report of the SEAFO attendance at the FAO/CECAF Technical workshop on deep-sea fisheries and vulnerable marine ecosystems in the eastern central Atlantic

Dakar, Senegal, 8–10 November 2016
Ivone Figueiredo

The workshop was organized as part of the FAO Deep-sea Fisheries Programme that supports the implementation of the International Guidelines for the Management of Deep-sea Fisheries in the High Seas. These guidelines provide guidance to States and regional fisheries management organizations or arrangements to ensure the long-term conservation and sustainable use of marine living resources in the deep seas including preventing significant adverse impacts of fisheries on vulnerable marine ecosystems.

The meeting took place in Dakar, Senegal, from 8 to 10 November 2016. FAO and CECAF provided technical expertise and secretariat services to the workshop, with logistical assistance from the Canary Current Large Marine Ecosystem Project based in Dakar, Senegal. The meeting was attended by 32 participants who contributed in their individual capacities to the discussions on the subjects of deep-sea fisheries and benthic habitats of the CECAF region. The main objectives of the workshop on deep-sea fisheries and VMEs were to:

- ensure that participants have a clear overview of current international instruments and processes related to deep-sea fisheries and VMEs in the high seas;
- review the existing (past and present) data and information on deep-sea bottom fisheries in the CECAF area, with a focus on fisheries operating in ABNJ waters, but including areas inside EEZs that are deeper than 200 m;
- compile and review information on deepwater physical features and benthic organisms that meet the VME criteria in the CECAF area, including similar areas that may be present in deep waters within EEZs and the ABNJ; and
- discuss the sustainability of bottom fisheries in the high seas within the CECAF area, and prepare recommendations for CECAF on deep-sea bottom fisheries issues and their monitoring.

There was also a Part 2 within which the SponGES project was presented. The main objectives of this Part were to:

- inform participants about the project and what it is aiming to achieve;
- communicate key science findings of the SponGES project results thus far to managers and policy-makers;
- discuss the perceived relevance of the findings and identify gaps that need to be addressed in order to inform management and policy-makers about the implementation of the ecosystem approach; and
- identify steps for facilitating the uptake of scientific knowledge on SponGES to management

<u>SEAFO contribution</u>:

SEAFO, represented by Ivone Figueiredo, as it was requested by the SEAFO Executive Secretary and SC members at the 2016 SC meeting, gave a presentation on the identification and protection of VMEs in the South East Atlantic Fisheries Organization (SEAFO). The presentation consisted of a brief summary of SEAFO — a regional fishery management organization in the southeast Atlantic Ocean and bordering CECAF to the north — and of its main objectives. The criteria adopted by SEAFO to select VME closed areas were also referred, being stressed that initially and since no in situ knowledge on VME occurrence, the adopted criteria were based on the likelihood of occurrence of vulnerable habitats and ecosystems.

The adopted conservation measures to protect biodiversity and VME's in the SEAFO Convention Area were presented, given special emphasis on two aspects: i) the definition and regulation of bottom fishing activities in the SEAFO Convention Area, and ii) on the adopted VME encounter protocols. After the presentation there was a general discussion during which it was clarified that all coastal States of the southeast Atlantic are contracting parties, and that their representatives participate in the discussions for new fisheries, through the Scientific Committee, and negotiations in the Commission meetings. The role of the Scientific Committee in SEAFO was also explained, particularly on what concerns science advice on issues related to fisheries management, existence of VMEs and what research is available to support this, and proposals for exploratory fishing outside the bottom fishing footprints.

The issue of data confidentiality and how it is handled in SEAFO was also briefly mentioned. It was concluded that the model followed by SEAFO, i.e., the existence of SEAFO Secretariat that host for all data reported to it, could constitute a model for CECAF in terms of data storage and management.

APPENDIX XV – FAO-EAF Nansen Program 2019 Update

The EAF-Nansen Programme 2017-2021

Supporting the Application of the Ecosystem Approach to Fisheries management considering climate and pollution impacts

Science Plan

Table of Contents

8 ACRONYMS

ABNJ	Areas Beyond National Jurisdiction
ASCLME	Agulhas and Somali Currents Large Marine Ecosystem
BCC	Benguela Current Commission
CCLME	Canary Current Large Marine Ecosystem
CECAF	Fisheries Committee for the Eastern Central Atlantic
EAF	Ecosystem Approach to Fisheries
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
GCLME	Guinea Current Large Marine Ecosystem
GEF	Global Environment Facility
IAEA	International Atomic Energy Agency
ICES	International Council for the Exploration of the Sea
IMR	Institute of Marine Research
IOC	Intergovernmental Oceanographic Commission
LME	Large Marine Ecosystem
Norad	Norwegian Agency for Development Cooperation
NORM	Naturally Occurring Radioactive Materials
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
POP	Persistent Organic Pollutants
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organization
SEAFO	South East Atlantic Fisheries Commission
SAPPHIRE	ASCLME Strategic Action Programme Policy Harmonisation and Institutional Reform
SWIOFC	South West Indian Ocean Fisheries Commission
SWIOFP	South West Indian Ocean Fisheries Project
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

Preface

This document includes overall principles and main thematic areas for the research component of the EAF-Nansen Programme, including the use of the RV *Dr Fridtjof Nansen* as a key tool for field work. The document summarizes identified research needs and should be used as the overall framework for planning science-related activities in the timeframe 2017-2021.

This document was prepared on the basis of a series of consultations held with national and international partners, including:

- ✓ An initial scoping meeting with potential UN and global/regional partners in Paris in 2012 (FAO EAF- Nansen Project 2013 a).
- ✓ A stakeholder consultation with current partners in connection with the EAF-Nansen Annual Forum in Dar-es-Salaam in 2013 (FAO EAF-Nansen Project, 2013b).
- ✓ A technical workshop with the involvement of international partners (including IMR, the United Nations Environment Programme [UNEP], IOC of UNESCO, the International Atomic Energy Agency [IAEA], Grid-Arendal and secretariats of the LME projects and others) in Bergen in June 2015 that laid the basis for this science plan.
- ✓ Regional consultations with partners held to ensure that regional and national priorities are adequately addressed and to ensure ownership of the Programme by its stakeholders. These included meetings organized in collaboration with the BCC for South West Africa (Cape Town, November 2015), with the SWIOFC for the South Western Indian Ocean (Durban, January 2016) and with CECAF for North West Africa and the Gulf of Guinea (Praia, October 2016).
- ✓ Annual forum of the EAF-Nansen project, Abidjan October 2016.

Gabriella Bianchi (FAO and later IMR) coordinated the inputs from different partners and was responsible for drafting the document. Substantive inputs for the preparation of this document were received by FAO staff (Kwame Koranteng, Merete Tandstad and Pedro Barros), and several IMR scientists (Kathrine Michalsen, Svein Sundby and Olav Kjesbu). Harald Loeng (IMR) helped with the final review.

The science plan is meant for use as guidance on the scope and principles of the research component of the EAF-Nansen Programme by national and international, present and future partners. A more detailed description of the scientific themes are given in the Implementation plan.

9

Summary

This Science Plan complements the project document for the Nansen Programme (Supporting the Application of the Ecosystem Approach to Fisheries management considering climate and pollution impacts). It provides greater detail on the main research areas, principles to be applied and regions that the Programme will cover during its first five years of operation. Three main research areas are identified, dealing with impacts of fishing, oil/gas activities and presence of pollutants, and climate variability and change on marine resources and ecosystems. These three main research areas are further subdivided into ten main themes. Data will be collected through the surveys with the RV Dr *Fridtjof Nansen* but data collected through the previous phases of the Nansen Programme, as well as data from open access databases, will also be used to address the research questions of this Science Plan.

1. Introduction

1.1 Background

Since 1975 FAO and partners, through the Nansen Programme (and more recently the EAF-Nansen Project), have supported developing countries in fisheries research and management in their efforts to enhance food security. Fisheries and environmental surveys with the research vessel *Dr Fridtjof Nansen* have been an important and integral part of the program throughout its phases. The Programme has developed into a unique mechanism for cooperation, knowledge generation and exchange of technology and lessons learned in developing regions and particularly in Africa. Since 2006 the EAF-Nansen Project has been implemented through FAO, in close collaboration with the Norwegian Institute of Marine Research (IMR), with the goal of contributing to improved fisheries management and the implementation of the ecosystem approach to fisheries (EAF). Overall, evaluations have shown the project to be relevant, well performing and successful.

Based on the decision in 2012 to build a new research vessel, FAO was asked to develop a new project document to cover a period of five years. The Nansen Programme will continue to strengthen regional and country specific efforts to reduce poverty and create conditions to assist in the achievement of sustainable food and nutrition security through the application of the ecosystem approach to fisheries. It will support stakeholders in fisheries research and management institutions in the partner countries in their efforts to manage their fisheries in a sustainable manner.

The EAF-Nansen Programme is designed around the following three main areas of work which also form the basis for three project sub-outcomes one of which (on capacity development) is cross-cutting (Fig. 1):

1. Strengthening the knowledge base for the sustainable management of fisheries in the face of increasing fishing pressure, climate variability and change, pollution and other anthropogenic stressors.
2. Supporting improved fisheries policy and management in line with EAF including taking into consideration the risks and opportunities related to climate and other environmental variability and change.
3. Developing capacity at the institutional and human resources levels, including the promotion of gender equality and effective participation of women in all Programme activities. This will be an important and cross-cutting component of the Programme, underlying most if not all of the planned outcomes and outputs of the Programme.

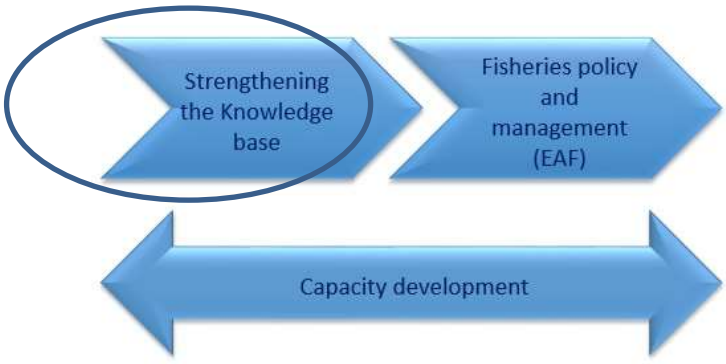


Figure 1. Main components of the EAF-Nansen Programme

This science plan covers the component related to “Strengthening the knowledge base”.

The plan was developed based on various consultations held with partners based on which three main themes were identified corresponding to the main drivers of change of marine ecosystems:

- Fishing pressure and demand for fish products that keep increasing in most areas of the developing world, and lack of information on the **state and dynamics of fish resources**, **their productivity and the effect of fisheries on them** strongly limits effective management.

- Increasing discharge of **pollutants** and increasing offshore human activity, such as oil exploration, pollution from land- and ocean-based activities, and microplastics perceived as a new threat to marine life.
- **Climate variability and change** that is expected to affect marine ecosystems structure and functioning in various ways, for example nutrient availability to the euphotic zone, distribution and migration of species and fish production. Because climate change impacts differ between regions, each area needs to be carefully observed. In particular, there is conflicting information as to the consequences of climate change on coastal upwelling, a crucial element in the biological production of many areas of the African coastal zone and the effects of these on fisheries structure and productivity.

The science plan is built around these themes. Basic knowledge on overall ecosystem properties and functions (ecosystem characterization) is important to ensure improved monitoring of impacts of any activity or other pressure (or compounded activities) taking place in the marine environment as well as for improved planning of new activities. The knowledge generated through the EAF-Nansen Programme can be integrated into sectoral analysis or as part of overall marine spatial planning/ecosystem based management[1]. The Programme will contribute to this process, by combining the knowledge acquired through the activities of the R/V *Dr. Fridtjof Nansen*, including in the past, and other knowledge already available in the literature or produced through analysis supported by the EAF-Nansen Programme or other partners. This work is a first step towards integrated ecosystem assessments that today are advocated as the basis for establishing sustainable governance of ocean-based activities.

1.2 Knowledge-based decision making in fisheries and the role of the EAF-Nansen Programme

One of the key principles of the EAF is that decision making related to issues that are perceived as important for the sustainability of a fishery/ecosystem should not be delayed, i.e. precautionary measures should be taken based on the "best available knowledge", including on traditional ecological knowledge. This is consistent with the precautionary approach. However, the current situation of limited knowledge on impacts of fisheries in many regions and of the impacts of external drivers on marine resources and ecosystems is suboptimal. For example, the precautionary approach would entail reducing resource harvesting far below what could be the maximum sustainable yield in a situation of uncertainty on the actual resource status.

Furthermore, the high level of uncertainty of the possible impacts of climate change and other external drivers on marine resources and ecosystems does not allow coastal countries to get prepared to changes that might have significant impacts on communities, national economies and ecosystems overall. The EAF-Nansen Programme therefore bases its structure on the notion that knowledge on marine ecosystems and on the effect of fisheries and other human activities on them, including on their biodiversity and dynamics, is a fundamental element for decision making in a situation where ocean uses are increasing. In this context, provision of knowledge is seen as an essential aspect of the Nansen Programme. Given the huge challenge of covering various aspects of marine ecosystem dynamics, the Programme will collaborate closely with other research initiatives to ensure maximum coordination and best use of available resources.

1.3 Promoting uptake of science into decision making

A key challenge is to ensure that the knowledge generated through scientific work is actually used as the basis for decision making.

[1] http://www.unesco-ioc-marinesp.be/uploads/documentenbank/d87c0c421da4593fd93bbee1898e1d51.pdf

To effectively utilize science in management and decision-making, pathways and mechanisms for incorporating scientific information into these processes need to be established. It is also critical to use approaches for trans-disciplinary knowledge exchange to sustainable use and management of natural resources". The Programme would make use of specific guidelines for trans-disciplinary knowledge exchange. The EAF-Nansen Programme would provide a good platform for knowledge exchange between FAO and coastal countries in Africa and among the countries and partners.

It is recognised that an ecosystem-based approach to management has the potential to significantly enhance the sustainability of fisheries. Policy makers are paying closer attention to the ecological impacts of fishing (expanding beyond target species to non-target species, food webs and habitats). In order to implement this approach a suite of scientific data and derived information is needed to support the decision making.

The EAF-Nansen Programme is working to ensure that data collected can be developed into the information needed to support management decision making at national, regional and global scales. At the National level there is a need to support the development of policy frameworks and pathways that allow for the incorporation of the relevant information into the decision making process (management cycle). In addition to the mechanism, ecosystem-based fishery management plans are required that consider the interconnections between species, their physical and biological environments, and human influences.

One of the strengths of the EAF-Nansen Programme is its ability to work at different levels of fisheries governance systems and thereby increase the probability that the link between the knowledge generated by the Programme and its uptake by management is established. At the national level, the Programme will have the ability, through the EAF process, to engage multiple actors when working on scientific research products in order to generate awareness about these products and to enhance their legitimacy. Furthermore, it is also particularly important to ensure a continuous dialogue with end-users in government in an ongoing manner throughout the duration of the Programme as this will ensure that the end product is relevant and supports the achievements of agreed objectives in a given context. It is also important to have close consultations with fishers and fishers communities and other stakeholders that may need to adhere to possible new measures or who would be impacted by them. Strengthening or establishing the regular management cycle of knowledge based decision making, a must in fisheries management, will contribute to establishing the right processes for uptake of knowledge into decision making.

The Programme also is intended to pay attention to the individual contexts of end-users in governments to tailor the scientific research products in a way that ideally suits the end-users' specific needs and challenges (management questions). The idea is that production of science and uptake by users should not be a linear process but rather something that is produced and taken up through an inclusive and interactive process that plays out amidst a complex web of actors and issues (Fig. 2).

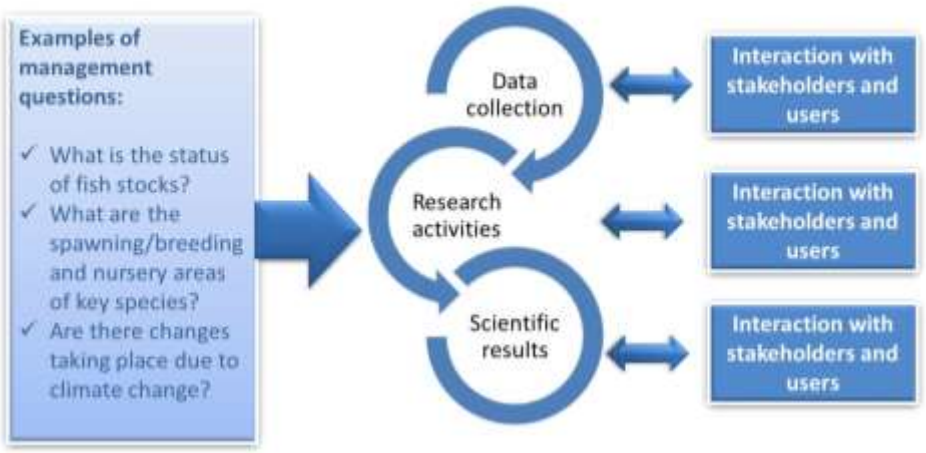


Figure 2. Scientific activities respond to demands from management and are carried out in close collaboration with stakeholders and users.

The above is valid also at the regional and global scales. The close collaboration with Regional Fisheries Bodies (RFBs), Regional Fisheries Management Organizations (RFMOs), Regional Seas Programmes (RSP), the BCC and other partners such as the LME projects, in designing, delivering and using the knowledge generated by the Programme is considered essential for improving uptake at the regional level. In designing the Programme and its science plan, these partners have been consulted at different stages of its development. FAO is in a very good position to ensure optimal coordination and collaboration with regional Programmes and mechanisms around Africa given that several of the programmes fall under FAO's responsibility or are in partnership with FAO. Likewise, at the global scale, close collaboration with relevant IGOs (e.g. IOC-UNESCO, UNEP, IAEA,) and international research partners and financial mechanisms (e.g. GEF, AfDB, WB) should ensure maximum utilization of the data and science produced by the Programme. An overview of the flow from data to management in the EAF-Nansen Programme is included in Figure 3.

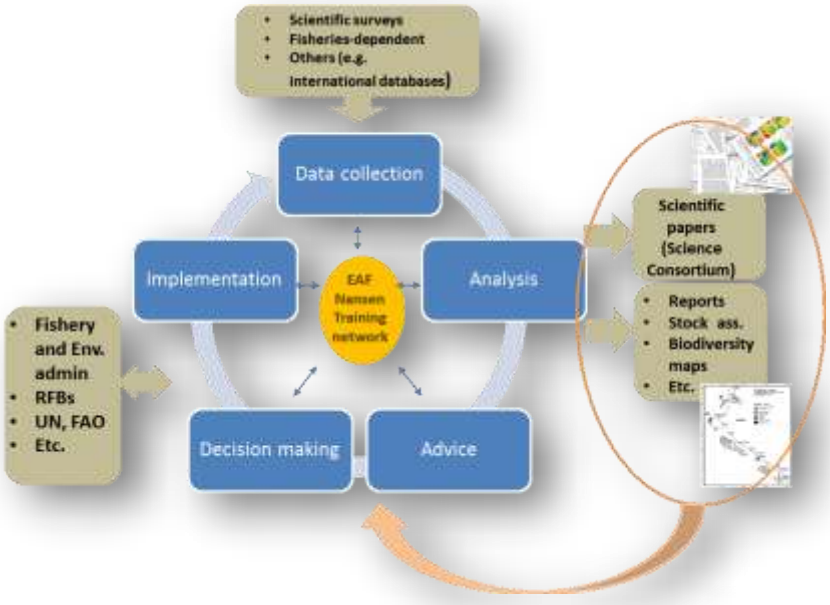


Figure 3. From Data to management in the EAF-Nansen Programme

2. Main research areas

Considering that this science plan is part of a development programme, it is important to ensure that research activities address the development objectives set for the overall Nansen Programme. Therefore, in identifying main research areas to be covered by the programme, principles have been established and are presented in Box 1.

Prior to initiation of new regional field studies on ecosystems and climate change, a state-of-the-art report will be developed to summarize key physical and anthropogenic drivers of the ecosystems under investigation, as well as on their structure and functioning. Trends in climate and abundance of species and organism groups (including plankton if available) will be analysed, for each of the main regions/ecosystems in Africa. This report is intended to result from a consultative process with participating countries and partners in each region, as the basis for developing more specific field and research activities.

Box 1 Principles for selection of research projects

1) Sustainable fisheries management is still at the heart of the Programme and improving knowledge on distribution, abundance and structure of main stocks and the effects of fisheries on them will be given priority, particularly as regards main transboundary resources.
2) The research should improve understanding of key biological parameters, the role of fishery resources in the broader ecosystem context, how they are affected by fishing pressure as well as by climate variability and change and the impacts of fisheries and other stressors on resources and the environment.
3) Research should primarily address regional issues (e.g. shared fishery resources/stocks), but could be "localized" in nature (e.g. study of recruitment processes for any important regional stock).
4) The EAF-Nansen Programme should operate primarily within countries EEZs but work in ABNJ can also be included in collaboration with RFMOs
5) To the extent possible, research activities should take cognizance of and coordinate with national, regional and international fisheries and marine research programmes
6) Research should primarily be linked to management needs, either tactical (short-term) or strategic (long-term), contributing to "global public goods", i.e. research that can be important from a strategic view point but does not necessarily directly address immediate needs.

The science activities proposed in the new phase of the EAF-Nansen Programme can be classified into the following main categories:

(1) Fishery resources, associated/impacted species and fisheries (mapping the distribution of and assessing the abundance, structure and dynamics of main fishery resources, including understanding of key biological parameters and the impacts of fisheries);
(2) Understanding the impacts of oil/gas activities, land-based pollution, including marine debris and microplastics;
(3) Understanding the impacts of climate change on fish stocks and ecosystems, including setting up monitoring systems.

These main categories are presented in the conceptual framework shown in Figure 3, showing that fishery resources are at the heart of the Programme but this science plan aims at elucidating impacts of various stressors (not only fisheries) on them. Furthermore, the need for expanding the understanding to marine ecosystems, their properties and dynamics is addressed. Ecosystem baselines and monitoring systems will be put in place from which data will be generated to understand the system dynamics, including what is due to impact by anthropogenic or other external stressors. The information generated will not only be useful for fisheries administrations but more generally in the context of marine spatial planning/ecosystem based management.

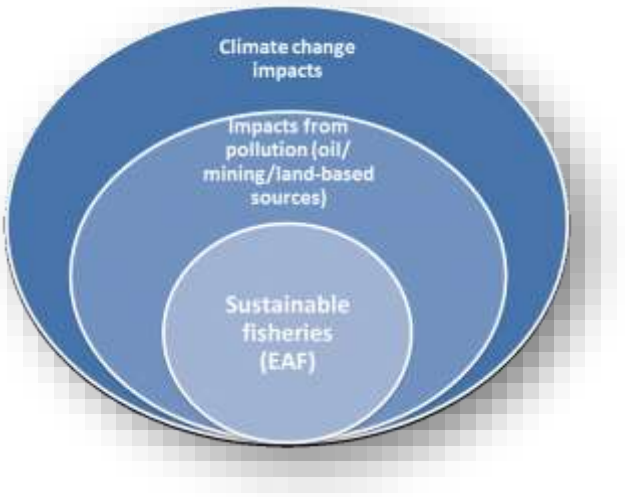


Figure 3: Conceptual framework for the content of the EAF-Nansen Programme

The above conceptual framework translates into three main research topics in turn subdivided into a total of 10 themes (Fig. 4). Detailed descriptions of the themes are being developed by international teams.

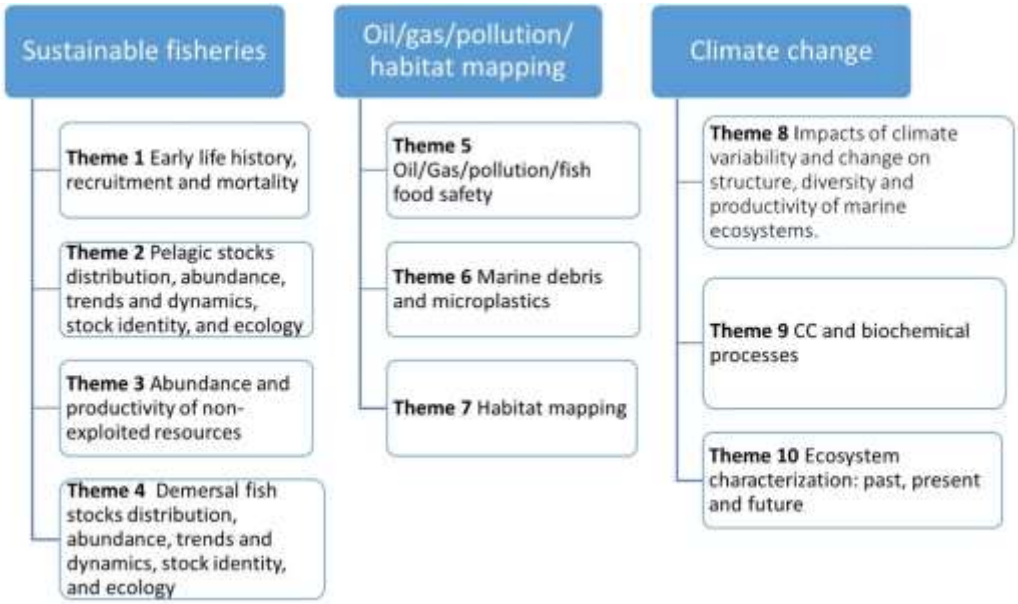


Figure 4. Research topics and themes

2.1 Topic 1. Sustainable fisheries

Fisheries are complex socio-ecological systems that operate in a dynamic environment. To manage them sustainably requires significant efforts and investments, particularly in terms of data and information needs. The implementation of the Ecosystem Approach to Fisheries has added new challenges to resource management, becau se the knowledge base for decision-making needs to be wider than under traditional fisheries management systems that focused on target stocks dynamics and less on broader ecosystem considerations.[2] Given the interest in finding new resources, mesopelagic fish has recently received much attention, especially after recent estimates indicate a biomass of at least one order of magnitude higher than previous estimates of about 1,000 million tonnes. There are some concerns on the validity of these estimates and also because very little is known of the biology, ecology, diversity, and productivity of this group of fishes

Over the years the Nansen programme (and the EAF-Nansen project) has already provided valuable data and training for a number of countries and regions, and the vessel will continue to be instrumental in providing data and information on the abundance, distribution and habitats occupied by fishery resources, filling knowledge gaps necessary for their sustainable management.

Key management questions that will be addressed include:

- Are resources shared? If so, what is the zonal attachment of main shared resources
- What is stock status (in relation to carrying capacity and sustainability)?
- What are the main variables that control the distribution and abundance of key exploited fisheries species?
- Where are critical habitats (spawning and recruitment areas) of target populations
- What is the diversity and ecological role of mesopelagic fish?
- What is the potential of non-exploited resources (e.g. mesoplelagic fish)?
- What indicators can cost-effectively be used in the management of tropical multi-species fisheries?

Theme 1 is intended to contribute knowledge on natural history characteristics of exploited fish stocks including determining their spawning and nursery grounds and the ecology of early life stages. This information is particularly critical for determining zonal attachment in the context of shared stock management, but also for overall ecosystem based management and marine spatial planning .

Theme 2 deals with abundance estimation, distribution, stock identity and ecology of pelagic species, with main emphasis on shared stocks. While the RV *DR. F. Nansen* will also be used to resume existing time series of pelagic stock biomass, responsibility for monitoring shared stocks is with the countries bordering respective regions and the EAF Nansen Programme will continue its work to strengthen capacity of the countries involved with monitoring and assessing their resources.

Theme 3 covers fish resources that are not yet or only marginally exploited, such as mesopelagic fish. Focus will be put on understanding their biology, diversity and ecological role that mesopelagic fish plays as the basis for sustainable utilization. Efforts will be put in improving existing estimates. This theme will also cover jelly fish, trying to understand their ecological role and dynamics particularly in areas where they may be increasing in abundance.

[2] As we expand this knowledge, it is also recognized that social and economic aspects of fishery systems need to be incorporated into the knowledge base. This science plan, however, only covers mainly natural science aspects while the social and economic components will be addressed separately.

Theme 4 is about abundance estimation, distribution, stock identity and ecology of demersal fish. As for pelagic fish, the EAF-Nansen Programme will support developing knowledge on stock identity, particularly in the case of large or commercially important stocks. Assessment and ecology of highly diverse tropical systems will also represent a focal area for this theme. For these resources and ecosystems, however, the approach will be different and methods specifically developed for assessing tropical fish both at the species and at community level will be adopted.

Links to management

a. Support existing and establishment of regional assessment working groups

Regional mechanisms for stock assessment (Working Groups) exist as part of FAO's RFBs The Programme will strengthen these efforts, including ensuring integration of the knowledge gained from the surveys and the research work described above into regional assessments. This work will result in regional resource assessments and related advice for managing shared stocks.

b. Establish platforms for dialogue between scientists, managers, and stakeholders

This aspect has already been described in section 1.3. Mechanisms that are part of existing regional collaborative efforts will be strengthened to ensure integration of research results into the management process.

c. Provide biological information for integrated assessments of fisheries (including social, economic and environmental considerations)

Integrated assessment of fisheries is part of the EAF process and the knowledge gained through Themes 1-4 will be used for these assessments. Strengthening understanding the relationship between ecological and human aspects of a fishery will also be considered here (e.g. bio-economic analysis of fisheries).

2.2 Topic 2. Oil/gas, pollution, habitat mapping

This research topic aims at increasing knowledge on impacts of important pressures on marine ecosystems. It includes three themes, one related directly to oil/gas and mining activities (**Theme 5**), one to marine debris and microplastics (**Theme 6**) and one to bottom habitats (**Theme 7**).
Key management questions include:

- How can the state of the environment be monitored after oil/gas extraction activities have been initiated? How can meaningful baselines be established?
- Does pollution have an impact on productivity of fish stocks?
- Does pollution affect safety of fish products for human consumption?
- Are there areas of concentration of marine debris that may affect fishery resources, ecosystems or fishing activities?
- Are microplastics entering the food web and affecting productivity and safety?
- Are there vulnerable habitats that may be affected by human activities?

Theme 5 supports setting up coastal/offshore environmental monitoring baselines as the basis for monitoring trends over time and to assess the possible impacts of oil/gas/mining industries. Such environmental monitoring will include both the water column and benthic habitats. The results may be used to develop and report on national environmental indicators for these industries. As part of this theme ecotoxicological studies will be carried out on fish and marine organisms collected from water, sediments and benthos, with the help of internationally accredited laboratories.

Theme 6 addresses specifically the extent to which marine debris and microplastics are present in marine ecosystem in marine areas of Programme implementation. Recent studies (Rochman et al., 2015) have shown that anthropogenic debris are ubiquitous, also in the marine environment and that a high percentage of fish samples from Indonesia and California contained plastic particles in their stomachs. will attempt to build knowledge on marine debris and microplastics at sea, mainly through mapping and identification of concentration hotspots using the RV *Dr. F. Nansen* opportunistically throughout its range of deployment.

Theme 7 is to provide information on bottom habitats, and particularly on the presence of vulnerable habitats for which special care is required when planning activities that may affect them. This theme is related to Theme 5 inasmuch as it gains knowledge that can be used for environmental impact assessment of oil/gas/mining activities. However, this activity will also be important for identifying vulnerable marine habitats, which is also of interest for fisheries management. Bottom habitat studies will primarily be dedicated to the deep sea of ABNJs, where knowledge on species and habitat diversity is still very poor while pressure exist to limit impacts by fisheries on these. However, and where there may be interest by coastal states, preliminary studies within EEZs can be conducted from multibeam echosounder data.

Links to management

a. National and regional environment and fisheries agencies will be major partners for the three themes. However, the EAF Nansen Programme will not deal directly with environmental management as its main counterparts are fisheries management institutions and these are expected to take action as it may be required vis-à-vis responsible agencies.
b. The information gained through Theme 7 (Habitat mapping) will be of relevance to different agencies for marine spatial planning and to fisheries agencies to reduce the impacts of fishing on bottom habitats. Furthermore, work in ABNJs will be coordinated in close cooperation with relevant RFMOs (e.g. SEAFO, SIOFA, etc.) and results will continue feeding into decision making processes of these RFMOs.

2.3 Topic 3. Understanding the impacts of climate change and other anthropogenic impacts, including setting up monitoring systems

While climate change is projected to affect marine ecosystems globally, knowledge on the actual impacts at the regional and local scales is still very poor. Climate change can affect marine ecosystems in many ways, including currents and overall oceanographic features, primary productivity, recruitment, mortality, and distribution of marine organisms. The intensity of climate change impacts may be significantly different in different systems depending. Relevant management questions include:

- Are there changes taking place in the marine environment that could be attributed to climate change?
- What is the contribution of climate-related drivers in explaining the distribution, migration patterns and abundance of stocks?
- What are the main climatic drivers in the different sub-regions bordering the African continent, and what are the expectations of change as a result of climate change?
- How will climate change affect coastal upwelling processes geographically and spatially?
- How will climate change affect ocean biochemical processes leading to biological and fish production, such as nutrient enrichment, oxygen depletion and ocean acidification?

- How will food webs change as a result of climate change in the tropical equatorial regions versus the east-boundary upwelling regions?
- How will climate change affect the distribution and production of fish species?

This research topic includes three main themes:

Theme 8 will look at the possible impacts of climate change on ecosystem structure and functioning in different ways. For example, appropriate high-resolution ocean models can be developed to improve understanding of ecosystem structure and functioning in general, and to investigate the effects of different harvesting strategy on foodweb dynamics or the effects of regional climate change on the drift of fish eggs and larvae.

Theme 9 will focus on understanding how climate variability and change affects ocean biochemical processes. This will be addressed by conducting studies on biochemical processes such as nutrient enrichment, primary production and carbonate formation. An increased effort will be put on the role of hypoxia and acidification on marine ecosystems A key question is to understand how this will be altered with climate change and how it will impact on marine life, and what possible mechanisms of adaptation may develop. Another key issue is to address how the synergistic effect of low-oxygen and acidic waters is impacting marine organisms. A base line study on observing oxygen and pH including variables of the carbonate system should be established at key coastal sections from shallow nearshore regions close to large river mouths out to oceanic and mesopelagic layers in the offshore regions.

Theme 10 is about ecosystem characterization as the basis for ecosystem monitoring. From the renewable resources perspective, information on main ecological characteristics, identification of bioregions and zones of particularly sensitive or ecologically important areas is key to the process of coordinating the planning and development not only of fisheries but more broadly of any activities at sea. In addition to providing a description of main and spatially-defined ecosystem features as a fundamental piece of information to enable coastal countries to plan activities at sea minimizing negative impacts on productivity, biodiversity and overall resilience of the system, ecosystem characterization provides the basis for ecosystem monitoring, including to detect possible climate-related impacts. An example of a possible output from ecosystem characterization is presented in Box 2.

Box 2. Example of an output from ecosystem characterization activity

1) Abundance, distribution and key biological parameters of main fishery resources (from Theme 1)
2) Geomorphology and sediment characterization to understand and document the relationship between geomorphology and sedimentology and key species distribution.
3) Oceanography (including setting baselines for pH levels, identification of retention areas and local upwelling, internal tides and waves, etc.) to understand and monitor system dynamics.
4) Biological communities, e.g. plankton, nekton (especially fish), benthos, seabirds to understand and document species composition, abundance and distribution as the basis to maintain species diversity, including identification of vulnerable habitats/ecosystems and hotspots of biodiversity.
5) Ecosystem processes: to identify and understand key ecosystem processes related to productivity/resilience of ecosystems, to sustain fisheries productivity and ecosystem health. These include, for example, availability of food at various trophic levels, physical and biological aspects of recruitment processes, juvenile fish predation (including cannibalism), apex predation and overall trophic relationships.
6) Ecosystem services. How to optimize the use of the resources, integrating ecological and socioeconomic aspects, to provide long-term benefits to society.
7) Mapping "threats" to the ecosystems. Identification of potential sources of impacts (e.g. non sustainable fishing, aquaculture, pollution, tourism, oil, mining, shipping, as climate variability and change, ocean acidification disasters, diseases, introduced/invasive species etc.) and their effect on the ecosystem.
8) Spawning/breeding and nursery grounds. Locate spawning/breeding and nursery areas for key species to protect vulnerable life stages and to ensure continued productivity of the species/fishery (also dealt with, in part under section 1 - Fishery Resources).

In summary, knowledge gained as part of all research themes contributes to ecosystem characterization. Ecosystem characterization should be the basis for setting baselines at ecosystem level, selecting indicators and setting up monitoring systems (Figure 5).

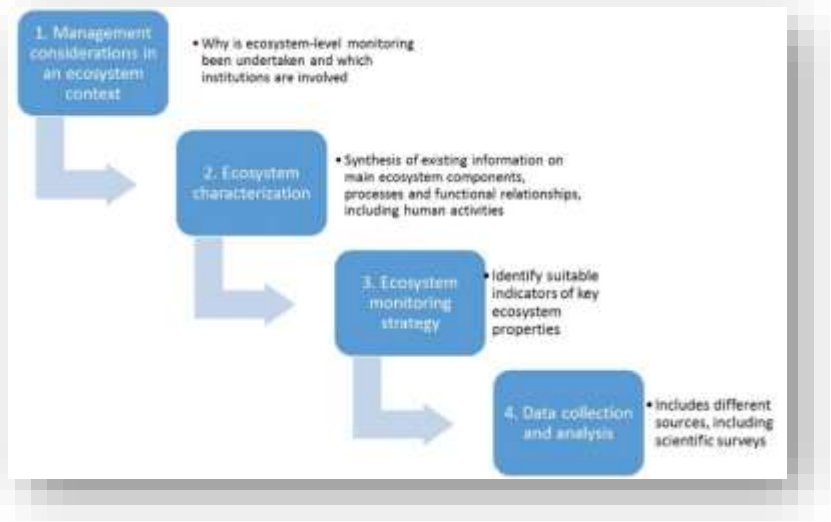


Figure 5. Conceptual framework linking management to ecosystem-level monitoring

How a research vessel can contribute to collecting key information in the context of ecosystem monitoring within an ecosystem approach to fisheries also discussed in connection with an expert meeting held in FAO in 2012 (ftp://ftp.fao.org/fi/DOCUMENT/eaf_nansen/Reports/EAF-NansenReportNo14_en.pdf).

Ecosystem characterization can also result in outputs such as publications (e.g. atlases) spatially describing marine ecosystems, their features and dynamics to be used for EAF management and, more broadly, marine spatial planning. Data and information are required to produce the above documentation. Existing and relevant scientific literature should be carefully examined and information gaps identified. Data collected through the surveys with the R/V *Dr. Fridtjof Nansen* provide an opportunity to fill some information gaps or validate existing information.

3. Implementation

Implementation of the science plan will be the result of collaborative efforts by all programme partners. A primary mechanism for implementation of the Science Plan, identified in the EAF-Nansen Programme document, is the "Science Consortium". This is defined as the ensemble of research institutions, both national or international, that cooperate in the achievement of the scientific goals of the EAF-Nansen Programme. The Science Consortium is guided by a Steering Committee consisting of IMR, FAO, Norad and selected institutions from partner countries and is coordinated by IMR. The Consortium is to facilitate collaboration among relevant academic and research institutions in partner countries and counterparts in Norway for marine scientific research on tropical and sub-tropical ecosystems.

Fig. 6 provides an overview of the Structure of the Science Consortium and its relationship to decision making mechanism of the EAF-Nansen Programme.
The Science Consortium will explore possibilities of securing scholarships for MSc and PhD students from partner countries either for full or part-time study.

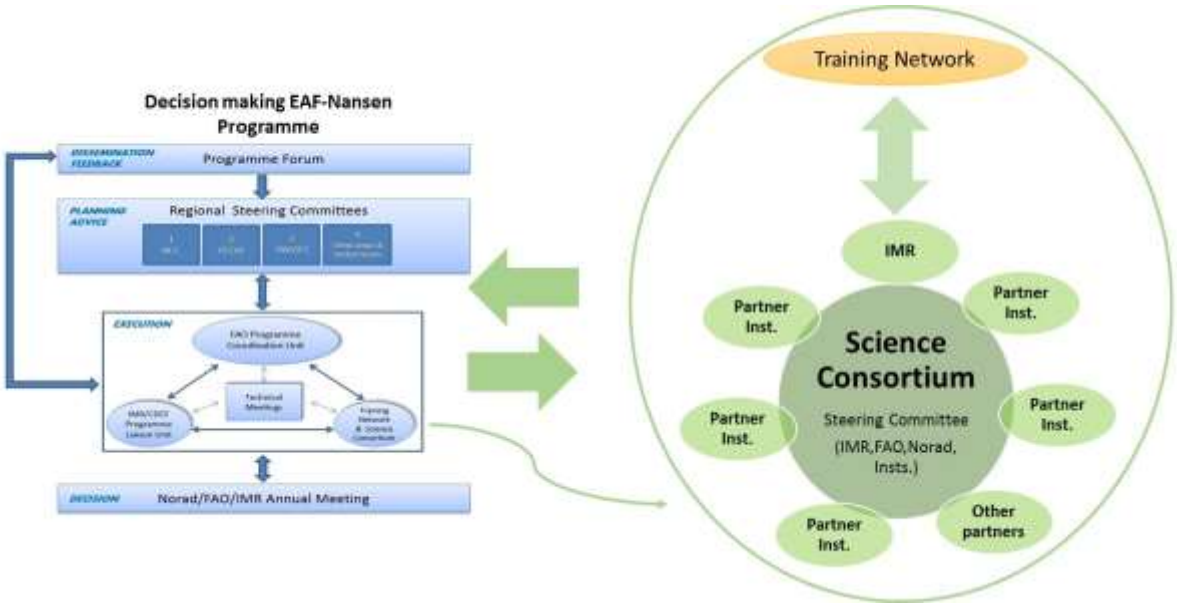


Figure 6. Science Consortium and relationship to decision-making of the EAF-Nansen Programme

4. Synergies with other programmes

The EAF-Nansen Programme will continue the excellent collaboration with Regional and Sub-regional Fisheries Bodies. So far such collaboration are established mainly with African countries, but it is extremely important to do the same in other regions where the EAF-Nansen Programme will be working. Examples of successful collaboration is with the Fishery Committee for Eastern Central Atlantic (CECAF), the South West Indian Ocean Fisheries Commission (SWIOFC), the Fishery Committee for West Central Gulf of Guinea (FCWC), the Regional Fisheries

Commission (COREP) and the Sub-Regional Fisheries Commission (SRFC)) and RFMOs (SEAFO and SIOFA). Two of the most productive marine regions in the world occur along the African coast. These are the Canary Current ecosystem off northwest Africa and the Benguela Current ecosystem off southwest Africa. These regions are characterised by "upwelling" leading to high productivity and high fish biomass. Highly productive areas are also found in the Gulf of Guinea and particularly in the region off Côte d'Ivoire, Ghana, Togo and Benin. The main resources in these regions, and related ecosystems, are shared among the respective coastal countries thus requiring that systems are established to manage these resources jointly and provide adequate knowledge. The Nansen Programme has over the years collaborated with all these regions, in various forms. However, except for the Benguela region, collaboration has been on an ad hoc basis and mainly only covered resource and ecosystem assessments and recently fisheries management in line with EAF. At present all these regions are part of LME Programmes and the opportunity exists for creating strong synergies and collaboration with the programmes.

As these LME Programmes move towards implementation of their Strategic Action Programmes (SAPs), in the case of ASCLME, CCLME and GCLME, or as part of the activities of the Benguela Current Commission (BCC), around Africa, and BoBLME in South Asia, the EAF- Nansen Programme can provide support to research, capacity development, policy and management efforts in close cooperation with these Programmes, thus considerably strengthening the probability of achieving desirable outcomes and impacts. It should be noted that the overall objectives of these programmes are fully consistent with the goals of the EAF-Nansen Programme.
Resources will also be allocated in support of international efforts for example the 2nd International Indian Ocean Expedition.

5. Surveys with the RV *Dr. Fridtjof Nansen*

The new RV Dr. Fridtjof Nansen is equipped for advanced and multidisciplinary marine research and is available to the programme from early May 2017. This state of the art vessel has significantly enhanced capacity in relation to earlier vessels

With the expanding scope of the research to be carried out in the context of the EAF-Nansen Programme, and to support implementation of its Science Plan, the survey objectives and related sampling strategy have been expanded to support research on life cycle, stock identity, trophic relationship of pelagic fish, and environmental conditions. Attention will also be given to emerging issues such as the actual abundance of mesopelagic fish, as a possible new resource, the role of jellyfish in the pelagic ecosystem, occurrence of microplastics and oceans acidification, levels of nutrients in fish with regards to nutritional security, and environmental contaminants including emerging contaminants and microorganisms in fish with regards to pollution and food safety. Regarding the EAF-Nansen Programme Science Plan, all surveys are expected to contribute to most of the themes described in the Science Plan (see Figure 7). The research vessel Dr Fridtjof Nansen will be a key tool for the results to be achieved by the Programme.

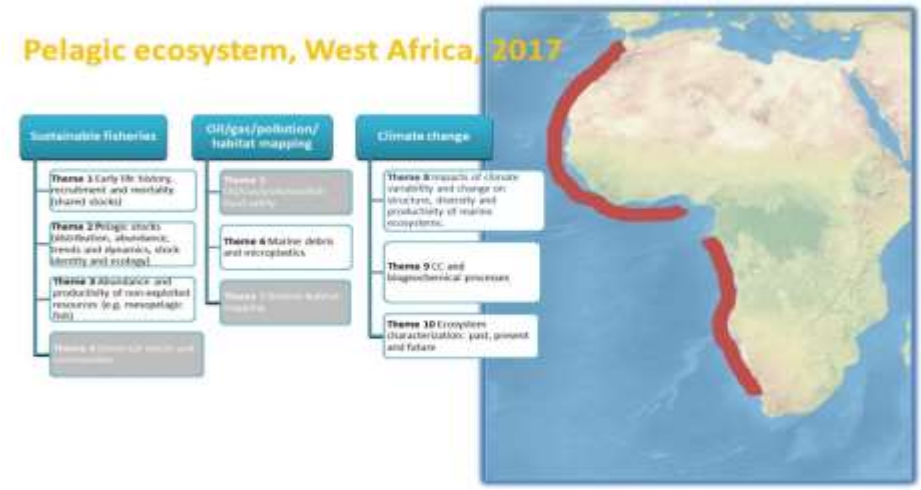
Capabilities	Present	New
Length overall (m)	56.8	74.5
Beam (m)	12.5	17.4
Draft (m)	6.6	6.4
Main engine (kW)	1 980	4 500
Gross Registered Tonnage	1 444	3 900
No of cabins	23	32
No of berths (beds)	28	45
No of laboratories	3	7
Lecture room/auditorium	No	Yes
ICES 209 noise class	No	Yes
Dynamic positioning system	No	Yes
Work boat	No	Yes
Marine mammal/seabird observatory	No	Yes

Figure 7. Main features of the new *Dr Fridtjof Nansen* and comparison with the former vessel

The table below provides an overview of implementation areas for the coming three years and a brief description of the main research topics that will be addressed, by main area, and figure 8 the main geographic areas the R/V *Dr Fridtjof Nansen* will work during the first three years (2017-2019).

	Region	Purpose
May-December 2017	West Africa (Morocco to South Africa)	Abundance and distribution of pelagic resources, environmental conditions within which they are

		encountered, and aspects of their early life history. The pelagic ecosystem will be sampled in relation to: • Main pelagic stocks (Theme 2) • Early Life History (Theme 1) • Mesopelagic fish and Jellyfish (Theme 3) • Food safety (Theme 5) • Occurrence of marine debris and microplastics (Theme 6) • Top predators (sea mammals and sea birds) Theme 10 • Hydrographic conditions (Theme 8, 9, 10) • Phytoplankton,zooplankton, ichthyoplankton (Theme 10) *(see details of the survey for 2017 below)*
Jan-May 2018	South Africa to Tanzania	Abundance and distribution of pelagic and demersal resources, ecosystem and habitat studies: • Main pelagic and demersal communities (Theme 2 and 4) • Mesopelagic fishes and jellyfish (Theme 3) • Bottom habitat studies and identification of VMEs/EBSAS (Theme 5, 7) • Occurrence of marine debris and microplastics (Theme 6) • Hydrographic conditions, plancton (Theme 8, 9, 10)
June-Aug 2018	Joint management zone (Mascarine Plateau)	• Bottom habitat studies and identification of VMEs (Theme 7) • Hydrographic conditions, plancton (Theme 8, 9, 10) • Mesopelagic fishes (Theme 3) • Occurrence of marine debris and microplastics
Sept-Dec 2018	Bay of Bengal	PROGRAMME TO BE DECIDED BASED ON A REGIONAL MEETING
Jan-Dec 2019	West Africa, including ABNJs	Abundance and distribution of demersal resources, (with special emphasis to demersal stocks) environmental conditions within which they are encountered, and aspects of their early life history. The demersal ecosystem will be sampled in relation to: • Main demersal stocks (Theme 4) • Demersal communitites (Theme 4) • Early Life History (Theme 1) • Mesopelagic fish (Theme 3) • Top predators (sea mammals and sea birds) Theme 10 • Hydrographic conditions (Theme 8,9,10) • Phytoplankton, zooplankton, ichthyoplankton (Theme 8,9, 10)



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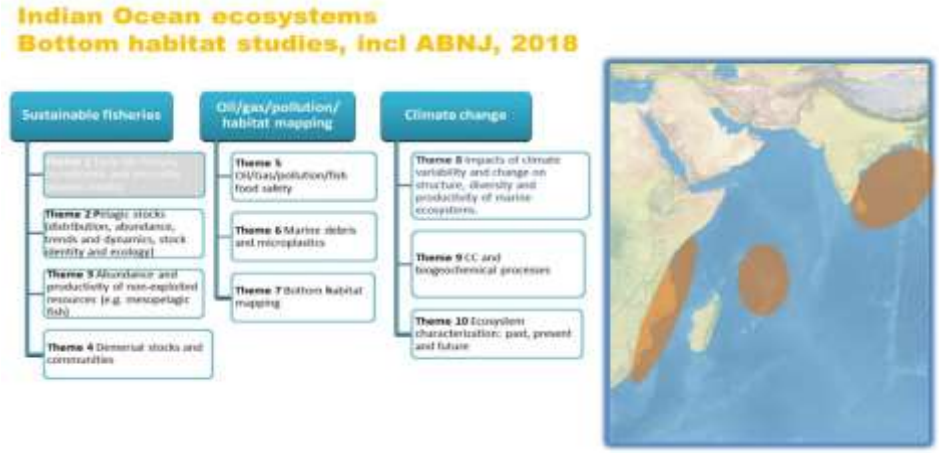

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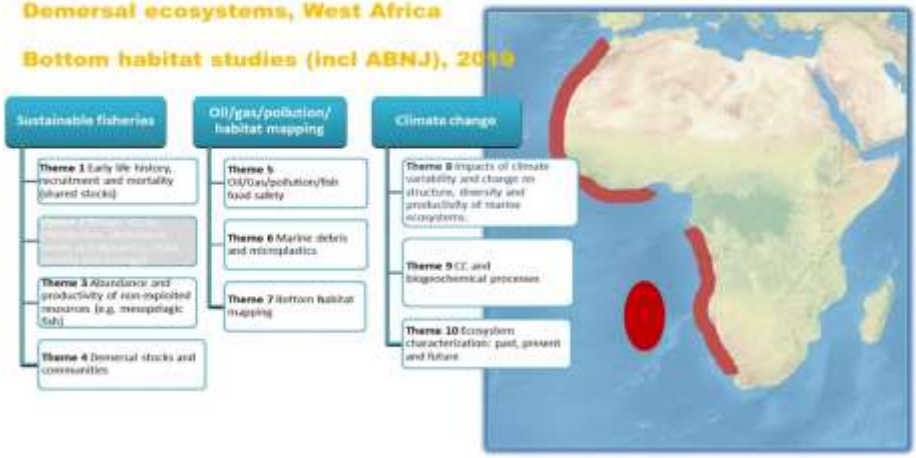

c)

Fig 8 (a-c). Maps showing surveys with the RV *Dr Fridtjof Nansen* and related research themes for the period 2018-2022.

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APPENDIX XVI – Stock Management Strategy (HCR)

Analysis of current SEAFO stocks management strategies and their application in exceptional circumstances

European Union

SEAFO Stocks Management Strategies

A. Toothfish and Deep-sea red crab stocks

The SEAFO Commission (SEAFO CC) adopted Harvest Control Rule (HCR) has a straightforward application considering the trend of a biomass index (e.g. the CPUE) over time. Based on the slope value, the catch limit (TAC) to future years is calculated based on the current year's TAC as follows:

$$TAC_{y+1} = \begin{cases} TAC_y \times (1 + \lambda_u \times slope) & if \quad slope \geq 0 \quad \text{...rule 1} \\ TAC_y \times (1 + \lambda_d \times slope) & if \quad slope < 0 \quad \text{...rule 2} \end{cases}$$

where slope = measure of the trend in CPUE for the recent 5 years.

- λ_u : TAC control coefficient if slope > 0 (Stock appears to be increasing) : λ_u=1
- λ_d : TAC control coefficient if slope < 0 (Stock seems to be decreasing) : λ_d=2

The TAC generated by the HCR is constrained to ± 5% of the TAC in the preceding year.

B. Alfonsino stocks

Due to the limited data available to provide scientific advice, an Empirical Harvest Control Rule (HCR) to regulate the fishery was adopted by SEAFO CC. If more and better data will be made available a revision of the HCR should be envisaged.

The adopted HCR corresponds to the average catch of the last three years, but to cope with the stock status uncertainty an additional 20% cap is applied. This strategy is similar to that adopted in ICES Category 5 stocks, i.e. data poor stocks for which only landings data are available.

Following that the advice TAC corresponds to the mean of catches for the last three years as $\overline{C_y}$

$$\overline{C_y} = \frac{\sum_{i=y-2}^{y} C_i}{3}$$

and the catch advise for the following year, i.e. C_{Y+1}, is given as:

$$C_{Y+1} = 0.8 \times \overline{C_y}$$

Current situation

Deep-sea red crabs

In 2016, no catches were recorded outside SEAFO Division B1, so the 2017 recommended TAC was only applied to Division B1.

TAC2017 = TAC2016* (1 + (2 * slope))
TAC2017 = 190 t * (1 + (2 * -0.1213)) = 144 t (This would imply a reduction of *24%*)

Constrained by rule
TAC2017 = 180 t (*-5% constrain of 2016 TAC*)

Important to note that SEAFO Scientific Committee (SEAFO SC) emphasized that, despite that there was no fishery in 2016, the adopted HCR was applied under the assumption that the CPUE trend derived in 2015 has been maintained. However, the validity of that assumption is uncertain.

Note: When the slope is persistently negative along the years, a more precautionary constraint should be studied (e.g. 15%).

What have to be the approach in the absence of data from recent years?

Toothfish

For the Toothfish stock, the adopted HCR requires, as basic input, a 5-year time-series of recent CPUE data. At its 2016 meeting, the SEAFO SC explored the results derived from CPUE standardizations using generalized linear models (GLM). The analysis indicated that the variance explained by the GLM model was too low to get reliable and meaningful estimates. In face of these results the SC recommended further efforts on data analysis.

The SC then resorted to deriving CPUE series for separate fishing areas for which the more wide continuous time-series of catch and effort data are available in the SEAFO database, i.e. the Meteor and Discovery seamounts. Constraining to the 2011 agreed footprint, only Japanese data were available, i.e. from the Contracting Party taking the major bulk of the catch in all years. So, to guarantee data consistency, the advice on TAC only relies on the Japanese data time series.

It is uncertain whether the two nominal CPUE series, i.e. the Meteor and Discovery CPUE series, reflect biomass trend. In the absence of other alternatives, the CPUE series from Meteor and Discovery were considered valid for the derivation of TACs using the recommended and accepted HCR and the weighted average of the CPUE slopes on Meteor and Discovery.

TAC2017 = TAC2016 * (1 + (1 * slope))
TAC2017 = 264 t * (1 + (1 * 0.007)) = 266 t (*0.008% increase*)

Note: How to proceed in this situation of uncertainty and also in case of a hypothetical absence of data from recent years?

Alfonsino

In the last three years (including 2016) there were no catches of Alfonsino and due to that the SEAFO SC was unable to apply the adopted HCR.

To overcome this situation, the SEAFO SC considered that the 2013 TAC advice was precautionary and as since 2013 no fishing took place, the Alfonsino stock was likely to have developed. Based on that assumption the SEAFO SC recommended a TAC of 200 t (*status quo*) for the SEAFO CA, of which a maximum of 132 tonnes could be taken in Division B1.

Note: How to proceed in this situation of lack of information?

Exceptional Circumstances Protocol

1. Background

In 2014, the SEAFO Commission (SEAFO CC) adopted a new management strategy for Toothfish, Deep-sea Crabs and Alfonsino stocks, based on Harvest Control Rules (HCR). The HCRs will be applied to automatically adjust the TAC based on the recent trend in the CPUE or catches.

Exceptional circumstances provisions are intended to respond to an event or observation which is outside of an expected range. In such cases, Commission may have reasons to over-ride the TAC provided by the HCR and/or also require the HCR to be reviewed/revised. To this effect, the SEAFO SC will annually monitor the situation and provide advice to Commission on whether or not 'exceptional circumstances' may be occurring.

2. Exceptional Circumstances

Exceptional circumstances may include catches in excess of the range tested or observed CPUE outside the expected range. These should therefore be considered at a primary level. Other indicators that should be considered at a secondary level of importance:

- **Data Gaps**
  - Incomplete/Missing annual catches or standardized CPUE data; and
  - Lack of fishing activity.

Ongoing SEAFO SC analysis related to these stocks may also identify other situations which warrant consideration as exceptional circumstances.

Advice provided by the SEAFO SC that suggests the occurrence of exceptional circumstances, should be based on compelling evidence and should include sufficient detail to allow Commission to take an informed decision on implementation of the HCR and possible next steps.

3. Implementation

When the SEAFO SC advice indicates that exceptional circumstances are like to be occurring, the SEAFO Commission will consider a range of responses/possible courses of action taking into account the degree and type of circumstance noted. The responses/courses of action that will be considered, in this sequence, are:

a. Review the information, but maintain the HCR as the management tool; additional research/monitoring may be recommended to determine if the signal detected warrants moving to step 2;
b. Advance the review period, and potentially revise the HCR, but implement the HCR outputs;
c. Set a catch limit that departs from the HCR, and revise the HCR.

APPENDIX *XVII – Proposal for Scientific and Technical Cooperation on the Walvis Ridge*

REPUBLIC OF NAMIBIA

Scientific and technical cooperation on the Walvis Ridge EBSA

BACKGROUND

Ecologically or Biologically Significant Marine Areas (EBSAs) are special places of the ocean. They meet one or more of the seven scientific criteria that were adopted by the Conference of the Parties to the Convention on Biological Diversity (CBD) during its ninth meeting in 2008. The criteria include: uniqueness or rarity; special importance for key life-history stages; special importance for threatened species or habitats; vulnerability, fragility, sensitivity, or slow recovery; biodiversity; biological productivity; and naturalness.

EBSAs encompass many different types of marine ecosystems in different regions, and refer to areas that hold the greatest variety of species and productivity of living organisms compared to surrounding areas. They contain rare or endemic species, are important for threatened species, or are home to unique features or communities of fauna and flora. Such areas also often play a critical role in key ecological functions and processes, and are required for species to survive and thrive.

The identification of EBSAs is a matter for States and competent intergovernmental organizations, in accordance with international law, including the UN Convention on the Law of the Sea. Organized under the auspices of the Convention on Biological Diversity (CBD) in 2013, the competent authorities identified the EBSAs of the South-Eastern Atlantic EBSAs. These EBSAs were then endorsed by the CBD Conference of the Parties (COP) in 2014. Since this initial delineation, no follow-up work has gone into enhancing and updating the existing scientific EBSA descriptions and neither into exploring options to inform policy- and decision-makers in terms of more effective marine management.

Under the framework of the Benguela Current Convention (BCC), the three Contracting Parties (i.e. Angola, Namibia & South Africa) are advancing the work on EBSAs under a regional project called the "Marine Spatial Management and Governance Project", formally known as the "MARISMA Project" (see ANNEX 1). The aim is to review the region's EBSAs within or across national jurisdictions in terms of the completeness and quality of the criteria rankings, and refine the boundaries of the delineated areas. Any other areas that meet the EBSA criteria are being identified, mapped and described according to the CBD's standards. Following the review and the identification process, the status of all the EBSAs will be assessed in order to develop appropriate management measures that are necessary to sustainably manage

the key features in each EBSA. This information will inform the Marine Spatial Planning (MSP) processes in each of the three Contracting Parties to the BCC.

WALVIS RIDGE EBSA

The Walvis Ridge had been identified as an EBSA in 2013 (with participation of SEAFO) and was subsequently endorsed by the CBD COP in 2014. The current and 2014 adopted EBSA description only identifies the section of the Walvis Ridge in the Area Beyond National Jurisdiction (ABNJ).

Based on the current work under the BCC, Namibia has evaluated potential EBSAs in its Exclusive Economic Zone (EEZ). One of the possible new areas is the section of the Walvis Ridge extending into its EEZ (Fig. 1). The Namibian Government considers this potential EBSA as one of the highest priority new areas screened during its national EBSA process and intends to seek CBD endorsement for it. In the process of identifying the Namibian section of the Walvis Ridge that meets the EBSA criteria, the Namibian Government has carried out an initial multi-variate analysis (incorporating all available oceanographic, ecological, geological and economic data) to see whether it would be possible to have a refined Walvis Ridge EBSA which included both the Namibian and High Seas portions of the ridge. The analysis has thus not only led to the envisaged delineation of the Namibian Walvis Ridge EBSA section; but it also revealed that: a) the original description text for the entire Walvis Ridge EBSA could be improved, and b) the original boundary delineation should be revisited because a possible new boundary for the entire EBSA in the ABNJ (SEAFO area) (Fig. 1) could reduce the overall footprint of the EBSA significantly by tightly enveloping key features of the seamount complex. Also, the analysis indicates that the EBSA feature extends not only into the Namibian but also the UK Territorial Island EEZs.

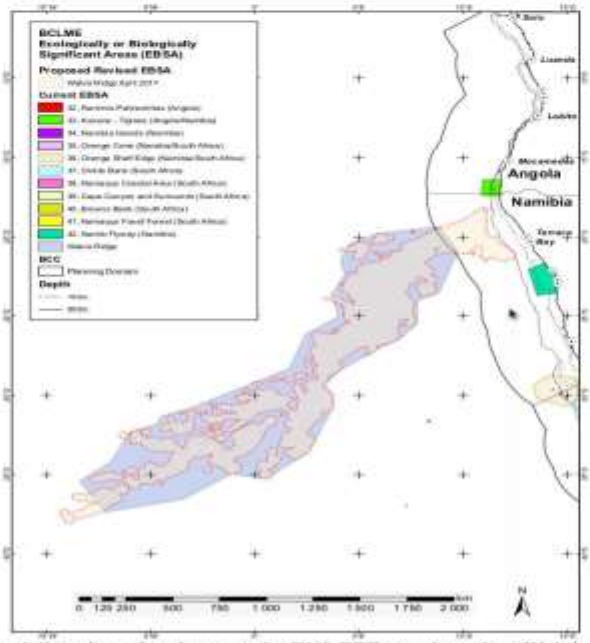


Figure 1: Exploratory boundary delineation of an integrated ABNJ-EEZ transboundary Walvis Ridge EBSA. The map shows the current EBSA boundary (pale blue) and the potential refined boundary (yellow outlined by red dashed line), extending into the Namibian (and UK) EEZ portions of the Walvis Ridge.

The extension of the Walvis Ridge area, meeting the EBSA criteria, into the Namibian EEZ is more than three times as large as the extension into the UK territory, and constitutes an area of roughly 71 000 km^2. In terms of the total Namibian EEZ area this extension equates to a 12.6% coverage area – which is a substantial area.

PROPOSED COOPERATION & EXPECTED BENEFITS

Namibia intends to inscribe the Namibian sections of the Walvis Ridge as an EBSA endorsed by the global community. However, as this is a single system and feature, the Government would like to explore the potential to move towards a revised/rationalized single EBSA for the entire Walvis Ridge that covers both the portions in the Namibian EEZ and the current High Seas EBSA.

In order to ensure a coherent approach to delineating the Walvis Ridge as one single ecological and geomorphological transboundary unit that crosses the ABNJ-EEZ-administrative border, the Namibian Government and the BCC's Regional Working Group on EBSAs believe that a process and dialogue with SEAFO and other competent authorities to review and update the existing EBSA description, and add the Namibian section of the Walvis Ridge to the existing description and boundary extent, is therefore required and beneficial for all parties involved. This includes an alignment with the VME process under SEAFO.

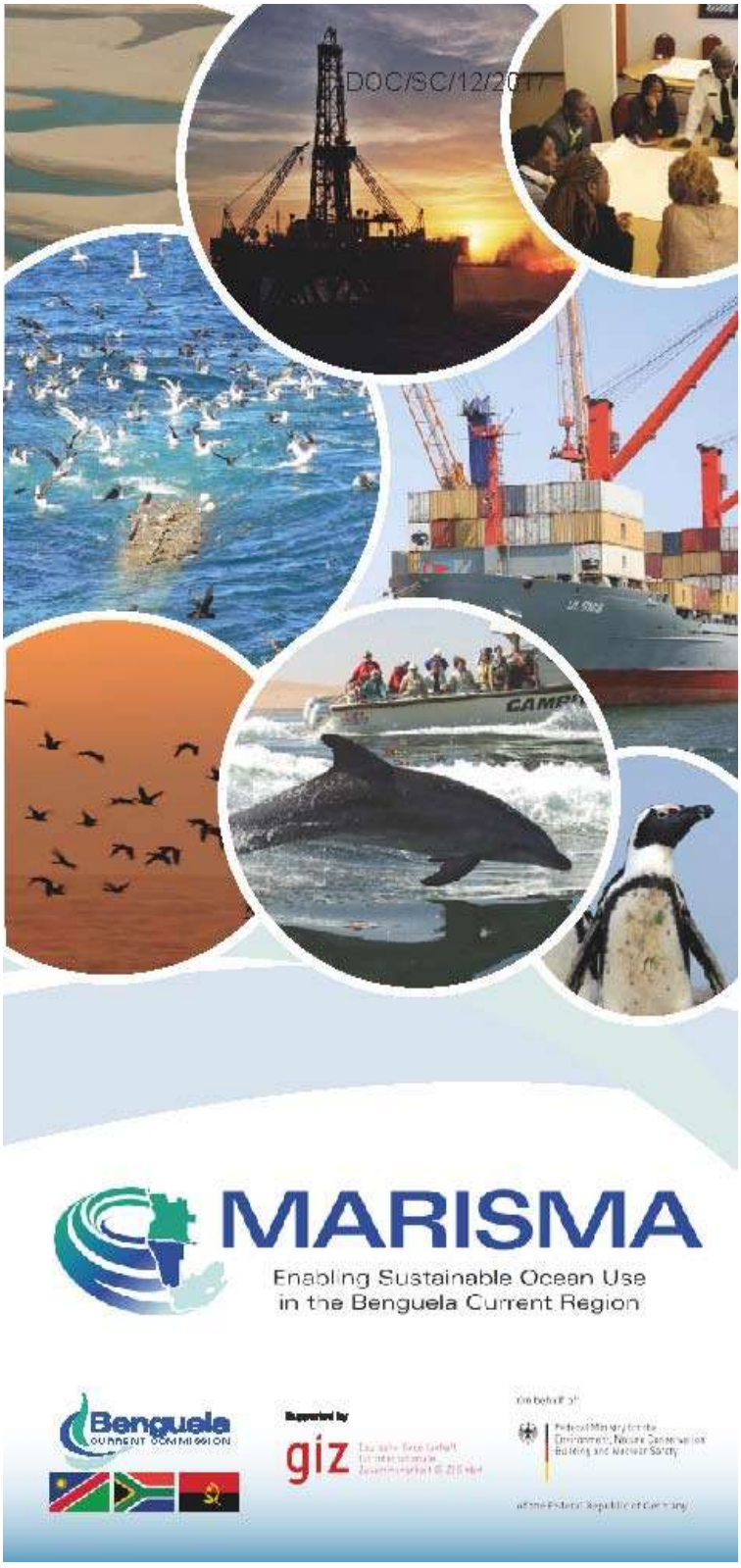
Such scientific and technical cooperation and dialogue could deliver the following benefits:

- ensuring a consistent approach in securing the spatial integrity of the Walvis Ridge EBSA and its overlapping VMEs (ANNEX 2 presents a technical overview of possible stages and considerations to date and for a possible future process);
- ensuring synergies on future research in the entire Walvis Ridge area (e.g. concerning VMEs);

In addition, the Walvis Ridge EBSA presents an opportunity for the BCC, its Contracting Parties (in particular Namibia) and other competent authorities (in particular SEAFO) to interact on High Seas issues of mutual concern and interest. This is beneficial from a scientific and technical point of view, but might also present an opportunity to scope possibilities for developing and further improving coherent marine management approaches. Such processes could eventually lead to strengthened regional ocean governance for the sustainable management of the shared and transboundary ABNJ-EEZ marine environment of the Benguela Current upwelling system, thereby securing the provision of its associated socio-economic services that are of importance for all concerned users and interest groups.

An international cooperation project, called the STRONG High Seas project (see ANNEX 3), is interested to support the proposed cooperation process – in addition to the MARISMA project. This is a good opportunity to strengthen the implementation success of the envisaged cooperation, enable and enhance capacity development, and to use the Walvis Ridge EBSA as an opportunity to engage with other regions and stakeholders to learn from and with them on similar issues.

Namibia is committed to take a leading role for coordinating such scientific and technical cooperation process as suggested, in full collaboration with all concerned parties and stakeholders.


DOC/SC/12/2017
MARISMA
Enabling Sustainable Ocean Use
in the Benguela Current Region
Benguela
CURRENT COMMISSION
giz

DOC/SC/12/2017

Current of Plenty: The Benguela Current Large Marine Ecosystem

The Benguela Current Large Marine Ecosystem (BCLME) is situated in the south-east Atlantic, stretching along the coast of southern Angola, the entire Namibian coast and the west and southern coast of South Africa as far as Port Elizabeth in the East. It is one of the most productive ocean regions in the world with unique marine biological diversity. Commercial fisheries, maritime transport and the extraction of non-living natural resources such as oil, gas, diamonds and other minerals, are key industries in the BCLME.

Sharing is Caring: The Benguela Current Commission

In recognition of their unique transboundary natural capital, the governments of Angola, Namibia and South Africa founded the Benguela Current Commission (BCC) in 2007 to promote the trilateral management of the shared ecosystem. The three member states recognized the need to take cooperative action under the Benguela Current Convention in order to achieve the ecosystem-based management and governance of the BCLME's marine biodiversity and natural resources. The aim is to realize a holistic vision that best enhances the socio-economic development potential of their exceptional ocean space so that tangible and lasting benefits are provided to all industries and the country's societies. With the ratification and commencement of the convention by the countries in 2015, the BCC is empowered and institutionalised as the regional organisation responsible for implementing the intergovernmental agreements for the conservation and sustainable use of the BCLME.

DOC/SC/12/2017

COOPERATION FOR SUSTAINABLE DEVELOPMENT: THE MARISMA PROJECT

The MARISMA project is a partnership between the BCC, its member states Angola, Namibia and South Africa and the government of Germany in pursuit of the sustainable development of the BCLME. Unlocking the BCLME's economic potential for sustainable growth is essential to achieving the regional development goals. The cooperation project therefore supports the BCC and its member states in maximizing socio-economic benefits whilst ensuring the safeguarding of the marine ecosystem's health and services provision.

PROJECT DETAILS

Funded by: The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), the Benguela Current Commission (BCC) and its member states Angola, Namibia and South Africa.

This project is part of BMUB's International Climate Initiative (IKI). BMUB supports this initiative on the basis of a decision adopted by the German Parliament.

Implemented by: The German Development Cooperation (GIZ) in partnership with the BCC.

Duration: August 2014 – April 2020

Funding: Up to EUR 8.900.000 (German contribution) with significant in-kind contributions by the BCC and its member states.

DOC/SC/12/2017

MARISMA:

ENABLING SUSTAINABLE OCEAN USE

The project's approach to enable sustainable ocean use in the Benguela Current focuses on implementing "Marine Spatial Planning" (MSP). MSP is a decision-making process that guides where and when human activities occur in the ocean. Making sure the correct activity takes place in the right place helps the region's ocean economy to grow sustainably – benefitting humans and the environment alike. MSP helps sectoral decision-makers to plan in a more complementary way. It reveals spatial conflicts and synergies between uses, and it encourages the shared use of marine areas to benefit as many industries as possible.

MSP also helps to maintain a healthy ecosystem by integrating conservation objectives for marine biodiversity – a prerequisite for sustainable ocean development. The project therefore supports the BCC member states in identifying those areas of the BCLME that have high natural values, the so called "Ecologically or Biologically Significant Marine Areas" (EBSAs).

The countries are moving the region's EBSAs "from maps to action" through linking scientific information to management actions. This involves the review of the 15 EBSAs that have so far been described for the BCLME and description of new areas. A systematic conservation planning approach is used in this process to determine the status of the EBSAs. This allows for the identification of priority areas that may require enhanced risk aversion in the management of human activities – which in turn informs the MSP processes.

MSP is an integrative process that engages a wide range of stakeholders. Government departments, industry, NGOs and communities cooperate in working towards an agreed marine spatial plan that is supported by as many stakeholders as possible and implemented by public authorities.

DOC/SC/12/2017

PLANNING FOR SUSTAINABILITY: MARISMA PROJECT APPROACH

The project applies a "learning-by-doing" approach that comprises multiple interventions both at national and regional levels to ensure sustainable capacity development. The aim is to enable and provide concrete learning opportunities and experiences through the practical implementation of MSP and description of EBSAs. Based on the analysis and mapping of the current and potential future distribution of human activities in the planning areas, one marine spatial plan is developed per country. This prototype planning exercise is linked with the development of an enabling environment at national and regional levels. This entails supporting the development of strategic frameworks, for example national ocean policies and a regional strategy for transboundary MSP. The work on EBSAs enables the countries to move towards science-based management of their (transboundary) marine biodiversity.

MARISMA ensures that all project activities are designed in a way that capacities are enhanced and further developed, and existing competencies in the region are used – for example through knowledge transfer and on-the-job training. The project implements a strategy for communication and public awareness in order to increase appreciation of the benefits that come with MSP and EBSAs. Lessons learned are captured and shared nationally, across the three countries and globally.

For more information contact:

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www.benguelacc.org/marisma

MARISMA
Benguela Current Marine Spatial Management and Governance Project

Benguela Current Commission

Supported by giz

On behalf of: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of the Federal Republic of Germany

APPENDIX XVIII – Potential for SEAFO/FAO workshop on deap sea crabs

Potential for SEAFO/FAO workshop on deep-sea crabs

Draft – Tony Thompson – 7 November 2017

Contents

Background

The SEAFO Scientific Committee is interested in collaborating with the FAO ABNJ Deep-seas Project on "Deep-sea pot fisheries". SEAFO SC had approval from the SEAFO Commission to support and host a workshop in Swakopmund, Namibia, in 2017.

> SEAFO 2016 SC Report, page 12 (http://www.seafo.org/media/4ca98f5f-c111-4bcf-875b-36ac3213b8b7/SEAFOweb/pdf/SC/open/eng/SC%20Report%202016_pdf)
>
> *21.4 FAO/ABNJ deep-sea project:*
>
> - Explore the possibility of convening an international workshop on deep-sea pot fisheries (*Secretariat*).
>
> *22. Budget for 2017*
>
> SEAFO SC participation in the FAO ABNJ project:- Budget estimate: N$ 50 000. The funding is requested in order to host the deep sea pot fishery workshop in Swakopmund, Namibia.

This was not organised owing to limited response from Contracting Parties following enquiries from the Executive Secretary of SEAFO, Dr Lizette Vogues. The Executive Secretary followed up with communications with Dr Odd-Aksel Bergstad (Norway) and Mário Rui Pinho (Azores) who provided lists some experts who work on crab fisheries and may be interested in the workshop (see Annex 1).

Mário Rui Pinho (Azores) also suggested the following topics that could form the bases of a workshop:

1 -Atlantic Deep sea crab resources;
2- Life history aspects;
3 - Fisheries (or potential for fisheries);
4 - Stock assessment tools;

5- Management and conservation aspects.

It was later suggested that a "desk study" may be more appropriate start to the understanding of global deep-sea crab fisheries and how this may could support the management of the SEAFO crab fishery. A workshop, if required, could follow on from this.

Some of the more significant deep-sea crab fisheries together with some notes on their management are listed in Annex 2 and Annex 3. A summary of the SEAFO crab fishery is provided in Annex 4.

Conclusions

The deep-sea crab fisheries are very large in the NW and NE Atlantic catching several thousand tonnes in some years. Assessments for stock abundance, in the larger crab fisheries, seem to be by independent surveys, and these are used to indicate trends and to set quotas. Some of the crab fisheries off Greenland have declined following heavy exploitation. The smaller fisheries do not have independent surveys and used landings and CPUE to try to estimate trends in the stock size and to set quotas accordingly.

The SEAFO deep-sea crab fishery is very small and actually did not occur in 2016. It seems unlikely that this fishery will provide enough information to accurately determine stock trends and set meaningful quotas.

Impacts for crab fisheries using pots seem minimal, though lost gear has been reported in the SEAFO area. The SEAFO gear using a floating main line would seem to be important to minimize impacts on VME type species, and consideration could perhaps be given to making this mandatory.

VMEs do exist around the SEAFO crab fishery on Valdivia bank, and these have been closed to all gears except longlines and pots. Experiments, perhaps using camera systems, could help quantify impacts, if any, on VME type species.

A workshop would probably be of only marginal help to the management of the SEAFO crab fishery, unless it expands. It could, however, be of great benefit globally if participants from eastern Canada, Greenland, Russia and Norway could attend, as these countries have important crab fisheries that are attempting to use more analytical type models in their assessments of stock size and quota setting.

Annex 1: People working on or connected with deep-sea crab fisheries

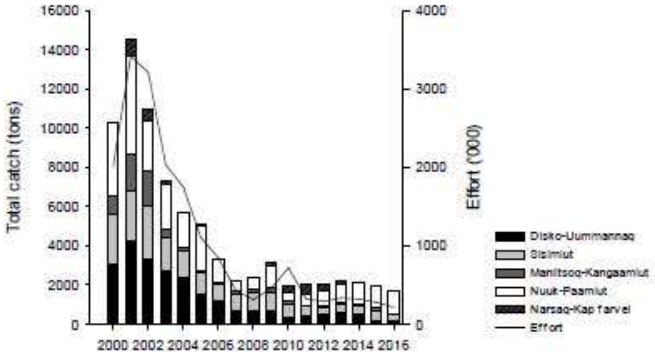
Contact	Work area	Location
Eric Maletzky esmaletzky@gmail.com	*Chaceon erytheiae*	Namibia and the SEAFO SC (Stock Coordinator)
AnnDorte Burmeister anndorte@natur.gl	chair of ICES crab working group	
Martin Robinson martin.robinson@gmit.ie	*Chaceon affinis*	Uk fishery
Mário Rui Pinho mario.rr.pinho@uac.pt	*Chaceon affinis*	Archipelagos: Azores
Manuel Biscoito manuel.biscoito@cm-funchal.pt	*Chaceon affinis*	Madeira
José António Gonzalez pepe.solea@ulpgc.es Luís Lopez-Abellan luis.lopez@ca.ieo.es	*Chaceon affinis*	Canaries
Antonie Chute?	*Chaceon quiquedens*	USA (NOAA)
Melville Smith from Australia	*Chaceon Maritae*	West Africa
Paulo Ricardo Pezzuto PEZZUTO@univali.br	*Chaceon notalis*	Brazil
Omar Defeo odefeo@dinara.gub.uy	*Chaceon notalis*	Uruguay
Mr. Jan H. Sundet jan.h.sundet@imr.no	Snow crab fishery *Chionoecetes opilio*	Barents Sea
Pablo Duran Munoz (Pablo.duran@vi.ieo.es)	Chaceon	NEAFC waters and the EU EEZ

Annex 2. High Seas deep-sea crab fisheries

NE Atlantic	NEAFC	Snow crab Chionoecetes opilio Barent's sea loophole 200-400 m? Red crab *Chaceon (Geryon) affinis* – Rockall plateau and trough (small fishery) 600-1200 m One of the German/Spanish vessels turned to potting in 2003 (Hareide *et al.* 2005). That fishery does not appear to have persisted. During 2008–12, there was some additional potting for crab on the slope of the Plateau, apparently straddling between the Irish EEZ and the High Seas (Gerritsen and Lordan 2014). Irish pot fishery for crab also reported.
NW Atlantic	NAFO	Snow crab Canadian fishery 50-600 m http://www.dfo-mpo.gc.ca/fm-gp/sustainable-durable/fisheries-peches/snow-crab-eng.htm 2013 landings (EEZ and HS) = 98000 t.
Central Atlantic	WECAFC CECAF	None
SE Atlantic	SEAFO	Red crab *Chaceon erytheiae 280-1150 m. Valdivia Bank. <200 t.*
SW Atlantic	none	No crab fishery
Mediterranean	GFCM	No crab fishery. Norway lobster at 300–550 m trawl fishery
North Pacific	NPFC	, including alfonsino, warty oreo and even crabs. There was a brief Russian crab pot fishery when 1-2 vessels fished for tanner crab *Chionoectes tanneri,* red crab *Geryon* spp. or *Chaceon erytheiae* and king [reported as snow] crab *Paralomis* spp. during 2002–2003, which followed earlier Japanese explorations in 1977. The Russian fishery worked on Showa, Yomei, Nintoku and Koko seamounts in the Emperor and Hawaiian Ridge chain. Bycatches of unidentified spider crabs were reported.
South Pacific	SPRFMO	No crab fishery. Chilean hake trawlers discovered a resource of galatheid squat lobsters ("langostino" to the seafood trade: primarily *Cervimunida johni* and *Pleuroncodes monodon*). In 2006, there were also two vessels trapping for lobster in the High seas of the region, under the flag of Belize. They took 65 t that year (Bensch *et al.* 2009).
Indian Ocean	SIOFA	No crabs
Southern Ocean	CCAMLR	There have been attempts to develop other fixed-gear fisheries in the region. Notably, a pot fishery for lithodid crabs (*Paralomis spinosissima* and *P. formosa*) was attempted around South Georgia from the 1992/93 season. That only lasted three years (Kock 2000).
Arctic Ocean		

Annex 3: EEZ deep-sea crab fisheries

West Greenland snow crab (*Chionoecetes opilio*) No analytical assessment have been conducted, and currently the stock is assessed based on stock indies from logbooks and research survey. Managed by quota restrictions in 6 areas. Stock reported as declining, and management restrictions aim to stop decline (but rebuilding of stock not expected unless there are further reductions). Nevertheless, in attempt to improve the quality of assessment, the SPiCT model and other models recommend in ICES report "ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice (ICES WGCRAB 2016)



Canada Snow crab (*Chionoecetes opilio*): distribution better known recently. Biomass estimated by trawl survey (in southern Gulf of St. Lawrence) using kriging with external drift (KED). Abundance of pre-recruits used to forecast recruitment to fishery over next 4 years.

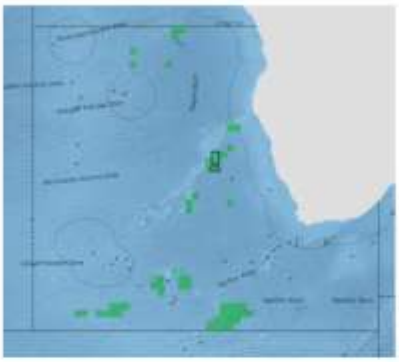
Norwegian King crab (*Paralithodes camtschaticus*): 22 year history. Stock assessed by two IMR cruises and quotas set. Stable landings over the last 8 years. 550 fishers, Quota at 1000-2000 t. 200 boats.

Norwegian Snow crab (*Chionoecetes opilio*) New colonisation. Barents Sea, mainly in Russian EEZ. Rapid expansion of fishery over last 5 years. Landins in 2016 around 5000 t. Management proposal under development.

Annex 4: Summary of SEAFO Deep-sea red crab *Chaceon erytheiae* fishery

Fishery

Pots on Valdivia Seamount complex since 2005 at 280-1150m deep. No fishing in 2016. One Korean vessel in 2015. Japan fish extensively 2005-2010. Namibia 2011-2014. Naminbia, Spain and Portugal fished for a few years 2001-2008. No fishery outside of SEAFO area B1.



Other bottom fisheries in the area

Orange roughy trawl fishery

Gear

Japanese beehive pots (or similar) hung 18 m apart from a floating main line 5m above the sea floor (if it floats). Typically a single set will have 200-400 pots and a mainline up to 7 km long.

No reports of any lost gear (in Stock Status Report). However, the Nansen survey said "13.8 Frequent video observations of lost pots and rope were made in Vema and some in Valdivia. These items could not be aged, but may well have been abandoned/lost many years ago."

Landings and discards

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0	0	5	24	307	389	808	39	196	200	175	198	196	135	104	0

Effort

Table 1: The total number of sets from which deep-sea red crab catches were derived for the period 2010-2015.

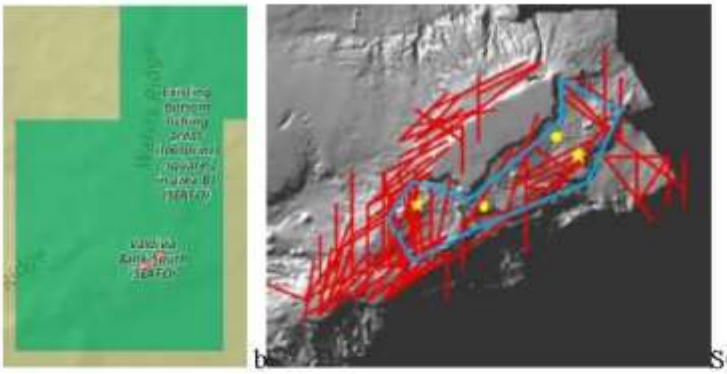
2010	2011	2012	2013	2014	2015
181	133	129	103	107	73

Management

TAC for area B1 by HCR based on landings trend. [data points seems scattered so likely no significant trends line]

Closures in the area

An area was closed to protect VMEs effective 15 February 2016 on Valdivia Bank for all fishing except pots and long lines (CM30/15).



b SC report 2015p. 14

knolls and rugged terrain areas which have rich coral presence. In some knolls to the south and southeast of the Valdivia Bank the density and diversity was such that the features would be classified as coral gardens and/or reefs, indeed more well developed features than in all other areas explores (Fig. 2). These features would in all likelihood be classified as VMEs. (SC 2015 report)

Bycatch

Reported as negligible – 5 kg teleost in 2010. A total of 1343 kg of king crab *Lithodes ferox* caught in 2015 only.

Incidental bycatches of VME indicator species have been minimal, and to date no bycatches exceeding the encounter thresholds have been recorded from the SEAFO deep-sea red crab fishery.

Ecosystem impacts

Assumed negligible as it's a pot fishery, but depletion of crab resource is a possibility.

Nansen survey says "13.9 In Ewing, lost trawl gear was observed in one of the summit dives. On the main Valdivia Bank and Valdivia West summit what was suspected to be trawl door skid marks on the bare rocky substrate were observed. No evidence of impacts of trawling or pot fishing was observed in areas of soft sediments, including the extensive areas with coral rubble. In areas with high densities of live (and dead) coral that may be regarded as candidate VMEs, the impression from the video records is that the benthic communities are intact and not impacted by fishing."

An area closure to the south of Valdivia Bank, explicitly identified as being closed to all fishing except for pots and set longlines.

IUU fishing

Some up to 2012, none since.

APPENDIX XIX– Letter from EAF-Nansen Programme

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

Viale delle Terme di Caracalla, 00153 Rome, Italy
Fax: +39 0657053152
Tel: +39 0657051
www.fao.org

Our Ref.:
Your Ref.:

23 November 2017

Dear Ms Vogues,

Scientific surveys with the R/V *Dr Fridtjof Nansen* and collaboration with the EAF-Nansen Programme

I have the pleasure to contact you regarding the upcoming programme of work of the EAF-Nansen Programme and in particular the cruise schedule for the R/V Dr Fridtjof Nansen.

In May 2017, a new Phase of the EAF-Nansen project started named: "Supporting the application of the ecosystem approach to fisheries management considering climate and pollution impacts" (EAF-Nansen Progarmme) with a new state of the art research vessel also named *Dr Fridtjof Nansen* as an integral part of the programme. The Programme is a collaboration between the Norwegian agency for development cooperation (Norad), the Food and Agriculture Organization of the United Nations (FAO) and the Norwegian Institute of Marine Research (IMR).

In January and February 2015, the R/V *Dr Fridtjof Nansen* conducted a 29-day cruise in the South East Atlantic Fisheries Organisation (SEAFO) convention area. The cruise was a collaboration between SEAFO and the Food and Agriculture Organization of the United Nations (FAO), and supported by three projects: the EAF-Nansen project, the ABNJ Deep Seas Project and the FAO-Norway Deep sea fisheries project. The cruise generated new scientific knowledge on Vulnerable Marine Ecosystems (VMEs) and fisheries for the SEAFO region which was used by the SEAFO Scientific Committee (SC) to develop scientific advice for the commission. Associated capacity development activities were also conducted to further explore the data from the survey.

SEAFO has later expressed, both through its SC and also in the planning meetings on the development of the new EAF-Nansen programme, its interest in possible future collaboration for conduct of further surveys in the future.

Dr Lizette Voges
Executive Secretary
South East Atlantic Fisheries Organisation (SEAFO)
Swakopmund
NAMIBIA

It is therefore our pleasure to announce that the EAF-Nansen Programme has allocated time for a survey in the SEAFO region in its survey programme for 2019, around the same time period as for the 2015 survey. We would therefore be grateful if SEAFO could confirm its continued interest in such a collaborative activity as soon as possible to confirm the survey in the 2019 survey programme. As for the 2015 survey, the planning of the 2019 survey would be a collaboration between SEAFO, the EAF-Nansen Programme and other partners as appropriate. The technical specifications of the new R/V *Dr Fridtjof Nansen* is provided in the Appendix.

We look forward to hearing from you.

Best regards.

Merete Tandstad
Programme Coordinator
EAF-Nansen Programme
Marine and Inland Fisheries Branch (FIAF)

Main Characteristics of the research vessel:

Name:	DR FRIDJTOF NANSEN
Date of construction:	2016
Home port:	Bergen, Norway
Nationality/flag:	Norwegian (*)
Owner:	The Government of Norway (Norad – Norwegian Agency for Development Cooperation)
Type of vessel:	Fishery and Oceanographic Research Vessel
Class:	DNV-GL +1A1, E0, ICE-C, SPS, DYNPOS-AUT, NAUT-AW, COMF-C(2)V(2), BWM-T, TMON, Recyclable, CLEAN Compliant With IMO Res. MSC.266(84) Code of Safety for Special Purpose Ships 2008
Survey methods:	Fisheries Resource Monitoring, Ecosystem investigations, Oceanographic/Environmental Surveys, Bottom Habitat Mapping, Single- and Multibeam Ecosounder Surveys, Integrated Data Logging, Hydro acoustic, Trawl
International Radio call-sign:	LDLG
Telephone:	+47 5590 6460
Email:	dfnansen@imr.no
Length overall:	74.50 m
Length between p.p.:	66.10 m
Breadth moulded:	17.40 m
Depth to lower deck:	5.90 m
Depth to main deck:	8.60 m
Design draft:	5.80 m
Gross tonnage:	3853 GT
Survey speed:	11 knots
Accommodation:	45 persons (Scientists/Others 30, Officers/Crew 15)
Main propulsion system:	3000 KW (2 x AC electric motors in tandem, each 1500 kW)
Winches, Cranes, Handling Equipment:	Electric winches, make Rapp Marine AS

Oceanographic equipment:

- CTD winch, 4500 m - ø8,18 mm, SWL 3,0 t.

- CTD/Sonde/pod winch, 4000 m - ø18,5 mm, SWL 4,1 t.
- General purpose winch, 2500 m - ø12,7 mm, SWL 4,2 t.
- Benthos winch, 2500 m - ø12,7 mm, SWL 4,2 t.
- Multipurpose el/opt. winch, 3000 m - ø13,6 mm, SWL 4,1 t.
- Plankton net winch, 4500 m, ø8 mm, 3,0 t.

Fishing systems:

- 2 Trawl winches, 4500 m - ø26 mm, SWL 41,7 t.
- Pelagic net drum, 14 m3, SWL 40 t.
- Demersal split net drum, 6+8 m3, SWL 2 x 26,6 t.
- Gilson winch, 190 m, SWL 10 t.
- 3 Work winches, SWL 3 t.
- System for haul of gillnet, pots and long line.
- Scanmar Trawl Geometry and Catch Monitoring instrumentation
- Pelagic (Åkra and MultPelt trawl)
- Demersal trawls (Gisund)
- Traps

Hydro acoustic Equipment:

- Echo sounders (EK 80)
- Omni-directional Fisheries sonar (SH 90, SU 90)
- Scientific sonars (MS70, ME 70)
- LSSS Post Processing System

Plankton and Benthos sampling:

- Phytoplankton-net,
- Water samples from Niskin bottles
- WP2 (180 mμ)
- Juday (90 mμ),
- Multinet medium (HYDROBIOS, 180 mμ)
- Van Veen grab

Bottom habitat mapping:

- Multibeam ecosounders (EM710, EM302)
- subsurface bottom profiler (SBP 300)
- Dynamic positon system
- High precision Acoustic position system
- CAMPOD: near range sonar, still cameras, video camera with pan and tilt, CTD
- Video Assisted MultiSampler (VAMS): 5 grabs, still cameras, video camera, Remote operated vehicle (ROV)

Work boat:

Length overall: 10.40 m

Breadth of hull:	3.25 m
Draught (at base line):	0.68 m
Displacement:	8.0 tons
Crew and Passengers:	2+8
Gross tonnage:	3853 GT
Engine:	Volvo D6, 435HP at 3.500RPM
Max speed:	18-20 knots

APPENDIX XX– FAO/ABNJ Project Update

About the ABNJ Deep Seas Project

The *Sustainable Fisheries Management and Biodiversity Conservation of Deep Sea Living Resources in Areas Beyond National Jurisdiction* Project (ABNJ Deep Seas Project) is a five-year project supported by the Global Environment Facility (GEF), and implemented jointly by the Food and Agriculture Organization of the United Nations (FAO), and the United Nations Environment Programme (UN Environment). The UN Environment project component is executed though the UN Environment World Conservation and Monitoring Centre (UNEP-WCMC).

The Project is designed to enhance sustainability in the use of deep-sea living resources and biodiversity conservation in the areas beyond national jurisdiction (ABNJ) through the systematic application of an ecosystem approach. It brings together over 20 partners who work on deep-sea fisheries and conservation issues in the ABNJ globally. The Project aims to:

1. strengthen policy and legal frameworks for sustainable fisheries and biodiversity conservation in the ABNJ deep seas;
2. reduce adverse impacts on VMEs and enhance conservation and management of components of EBSAs;
3. improve planning and adaptive management for deep-sea fisheries in the ABNJ; and
4. develop and test methods for area-based planning.

Project components 1, 2, and 3 are led by the FAO, and Component 4 is led by UNEP-WCMC.

More information is available from http://www.fao.org/in-action/commonoceans/en/.

Within FAO, the ABNJ Deep Seas Project is an integral part of the Deep-sea Fisheries Programme and many of the activities have contributed to or benefited from co-financing with other projects under that Programme. Some of these projects are now phased out, and follow-up activities are managed through the ABNJ Deep Seas Project.

How SEAFO is involved

SEAFO is an important partner of the ABNJ Deep Seas Project. SEAFO has been involved in the design and development of the Project and has agreed to contribute to activities that promote collaboration and sharing of experiences in deep-sea fisheries and associated biodiversity as well as specific activities on capacity building for developing countries. This contribution is coordinated by the SEAFO Secretariat.

SEAFO activities associated with the ABNJ Deep Seas Project will contribute an estimated USD 1 700 000 of project co-financing.

Recent project activities include:

The Project Steering Committee

The second meeting of the Project Steering Committee (PSC) was held in February 2017 (http://www.fao.org/3/a-i7356e.pdf), and chaired by the Executive Secretary of SIOFA. The PSC noted the satisfactory progress of the project to date and adopted the 2017 project work plan.

Orange roughy stock assessment — use of acoustics data

The Project supported a workshop (http://www.fao.org/3/a-i7566e.pdf) to review the methodological approach and uncertainties associated with the use of acoustics data in the assessment of orange roughy in the Southern Indian Ocean in January 2017. The outcomes of this meeting were presented and discussed at the Scientific Committee meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA), in March 2017.

Side events at the BBNJ PrepCom meetings in New York

FAO has organized a side event at the last three sessions of the BBNJ PrepCom in New York, to share knowledge and experiences of regional bodies in relation to fisheries management in the ABNJ.

A review of the international legal and policy instruments related to deep-sea fisheries and biodiversity conservation in the ABNJ

This work focused on the international obligations relating to deep-sea fisheries and biodiversity conservation. It included an analysis of current policy and legal instruments, and identification of the challenges in the implementation of current management requirements. The review was published in early 2017 (http://www.fao.org/3/a-i7009e.pdf). The review was presented at a side event for the third session of the UNGA BBNJ PrepCom in March/April 2017.

Updating the VME Portal and DataBase

The VME Portal provides general information on VMEs, and the VME DataBase contains information on VME-related measures in ABNJ for each regional fisheries body, including NEAFC. The Project supports the ongoing maintenance and updating of the systems (www.fao.org/in-action/vulnerable-marine-ecosystems/en/).

Global reviews and best practices for the assessment and management of key deep-sea species

A global review of alfonsino, their fisheries, biology and management was published (www.fao.org/3/a-i5336e.pdf) in June 2016. A review of orange roughy biology and assessment is currently being prepared for publication.

2nd edition of the Worldwide Review of Bottom Fisheries in the High Seas

The 2009 Worldwide Review of Bottom Fisheries in the High Seas is being updated and expanded. A meeting of experts from the eight deep-sea RFMOs was held in May 2016 to confirm the nature and extent of the work, and the review itself is expected to be published in late 2017. The preliminary findings were presented at a side event during the Workshop to Review the implementation of the United Nations General Assembly Resolutions on Deep-sea fishing[1] (New York, 1-2 August 2016). A brochure highlighting these findings is available (http://www.fao.org/3/a-i6619e.pdf).

Regional VME processes and experiences with their application

In 2015, FAO organized a workshop with regional experts to discuss experiences with applying VME-related measures, such as encounter protocols and impact assessments. The report of this workshop is available at http://www.fao.org/3/a-i6452e.pdf

In late 2016, the report *Vulnerable Marine Ecosystems – processes and practices in the high seas* was published (http://www.fao.org/3/a-i5952e.pdf) and summarizes the regional processes and practices in place for VMEs and their management.

Deep-sea fisheries and VME regional workshops

The ABNJ Deep Seas Project collaborated on the organization of two VME regional workshops in 2016. The first was for the Mediterranean region, held in collaboration with the General Fisheries Commission for the Mediterranean (GFCM) in July (report can be downloaded here: http://www.fao.org/3/a-i6685e.pdf), and the second was held for the eastern central Atlantic region, in collaboration with the Fishery Committee for the Eastern Central Atlantic (CECAF) in November (report can be downloaded here: http://www.fao.org/3/a-i7609b.pdf). SEAFO experts

[1] United Nations General Assembly Division for Ocean Affairs and the Law of the Sea (DOALOS) Workshop to Discuss Implementation of Paragraphs 113, 117 and 119 to 124 of resolution 64/72 and paragraphs 121, 126, 129, 130 and 132 of resolution 66/68 on Sustainable Fisheries

contributed their knowledge and experiences on VME and deep-sea fisheries management to both workshops. Other workshop reports from this series of deep-sea fisheries and VME workshops can be found here:

Indian Ocean 2012 - http://www.fao.org/3/a-i3311e.pdf
Southeast Atlantic 2013 - http://www.fao.org/3/a-i4923e.pdf
North Pacific 2014 – http://www.fao.org/3/a-i5319e.pdf
Western Central Atlantic 2014 - http://www.fao.org/3/a-i4329e.pdf

Identification guide for deep-sea cartilaginous fishes of the south eastern Pacific Ocean

Work to develop regional species identification guides for deep-sea species was supported by a recent project funded by Norway, and supported by the ABNJ Deep Seas Project. Both a species catalogue and a field identification guide dedicated to the identification of deep-sea cartilaginous fishes of the south eastern Pacific Ocean were published in 2016. The identification guide, available in both English (http://www.fao.org/3/a-i6349e.pdf) and Spanish (http://www.fao.org/3/a-i6349s.pdf), were tested during a training workshop that was held in Chile in November 2016 and supported by the ABNJ Deep Seas Project. The workshop was attended by scientists from countries bordering the South and Central Eastern Pacific Ocean. Other identification guides include those for the Indian Ocean and south-eastern Atlantic Ocean.

Data collection manual

A biological data collection manual, based on the additional requirements for reporting on VMEs that are included in the FAO *International Guidelines for Deep-sea Fisheries in the High Seas,* was published in late 2016 (http://www.fao.org/3/a-i6353e.pdf). The manual is structured into colour coded sections corresponding to taxonomic groups with a set of described and illustrated methodologies required to collect biological data from marine species in the field.

Review and synthesis of the values of the sectors operating in the ABNJ

The project is undertaking a review of fishing, mining, oil and gas, waste disposal, cable laying, shipping and pharmaceuticals activities in the ABNJ. It will describe the nature and extent of the activities of these sectors; and where possible, quantitative/monetary valuation information. The report is currently being prepared for publication.

Report on lessons leaned on the scientific methods for describing EBSAs

The CBD Secretariat has reported on practical options for further enhancing scientific methodologies and approaches on the description of areas meeting the EBSA criteria, based on experiences from 12 regional workshops.

Area-based planning

Reviews of institutional arrangements and legal instruments in the Southeast Pacific and Western Indian Ocean have been completed (http://wcmc.io/WIOdata and http://wcmc.io/SEPdata). Global marine datasets of biodiversity importance to these regions have been identified and published (South East Pacific can be downloaded here: http://www.fao.org/fileadmin/user_upload/common_oceans/docs/SEP_Data_Inventory_final.pdf; and the Western Indian Ocean can be downloaded here: http://www.fao.org/fileadmin/user_upload/common_oceans/docs/WIO_Data_Inventory_final.pdf). Area based planning workshops were held in Southeast Pacific (with CPPS countries) and Western Indian Ocean (with Nairobi convention countries) resulting in capacity development assessments.

Deep-sea sponges in the North Atlantic

FAO is collaborating with the Horizon 2020 SponGES project, which aims to develop an integrated ecosystem-based approach to preserve and sustainably use deep-sea sponge ecosystems of the

North Atlantic. The ABNJ Deep Seas Project is assisting the SponGES Project by identifying the types of information needed to improve understanding of the economic elements of the sponge resources in the North Atlantic region, and devising a draft methodology to estimate the value of sponges (this will be reviewed with experts from the SponGES Project to understand the practical limitations of the methodology). Furthermore, the ABNJ Deep Seas Project supports exchange between SponGES and fisheries experts. Information material from this project are available and science-policy dialogues, initiated by FAO, are ongoing.

2017 activities of interest to SEAFO stakeholders:

- The ABNJ Deep Seas Project partnered with the Deep-Ocean Stewardship Initiative and its working group of climate change experts to better **understanding the consequences of climate change for deep sea ecosystems and deep-sea fisheries**. The working group met on 25-26 August in Woods Hole, USA to discuss questions including: What are the major climate change features affecting the deep ocean and its associated biodiversity? What impacts might these features have on the functioning of deep sea ecosystems? How might climate impacts affect deep-sea fish and fisheries? Which regions and fisheries might be most vulnerable? Which other species are vulnerable? What essential ocean variables are important to monitor in order to assess the risks to deep sea species and communities due to climate change?

  The project supported scientists and experts from seven of the eight regional bodies managing deep-sea fisheries (including SEAFO) to participate in the workshop and contribute their expert knowledge. The project also supported the participation of a deep-sea coral and sponge expert from the SponGES project to cover the non-fish species than might also be vulnerable to climate change. A report from the meeting is being prepared and is expected to be published in early 2018.

- Collaboration and support to the ongoing work of Sealord Ltd. on the **development and testing of improved fishing systems**, including implementation of real time fibre-optic winch systems on vessels in the Indian Ocean; the collection of wideband acoustic data on vessels in the Indian Ocean, evaluation of species composition, and bottom habitat identification.

- An electronic application for reporting at-sea observations from deep-sea fishing vessels is being developed by the Information Technology Division of FAO. This application, **SmartForms,** will include an initial set of forms for VME reporting requirements, developed in consultation with regional partners. It will be available for testing by project partners interested in deploying the application in 2018.

- Support for the **trialing of electronic monitoring systems** on deep-sea fishing vessels operating in the ABNJ to collect information on VMEs. In collaboration with the Cook Islands (Ministry of Marine resources), examine the technical aspects of whether VME encounters can be observed satisfactorily using an onboard camera monitoring system i.e. verification of VME encounters, and (some level of) identification and quantification of VMEs.

- Support to activities related to improving the assessment of **orange roughy** and other deep-sea species.

- A global review of **traceability** in deep-sea fisheries is underway, including an examination of catch documentation schemes and ecolabelling opportunities; and a value chain analysis.

- An examination of **monitoring control and surveillance** practices in deep-sea fisheries in the ABNJ is underway. This will include an examination of ways Secretariats might better exchange information (such as IUU lists).

- An analysis of the **EAF practices** implemented by regional bodies with a mandate for the management and conservation of deep-sea fishing in the ABNJ is underway.

For 2018

- A global review of **rights based management** for deep-sea fisheries in the ABNJ.
- The ABNJ Deep Seas Project is collaborating with NPFC on a workshop scheduled for 12-15 March 2018, in Japan. The workshop will address the **protection of vulnerable marine ecosystems in the North Pacific Fisheries Commission Area: applying global experiences to regional assessments**. This workshop presents another opportunity for VME experts from deep-sea fisheries RFMOs to come together to discuss management of VMEs using global expertise.

Find out more about the ABNJ Deep Seas Project

- Contact: Chris O'Brien (chris.obrien@fao.org) and Jessica Fuller (Jessica.fuller@fao.org)
- Visit the ABNJ Programme and the ABNJ Deep-seas Project website: http://www.fao.org/in-action/commonoceans/en/

The *Sustainable Fisheries Management and Biodiversity Conservation of Deep Sea Living Resources in Areas Beyond National Jurisdiction* Project (ABNJ Deep Seas Project) is a five-year project supported by the Global Environment Facility, and implemented by the Food and Agriculture Organization of the United Nations, and the United Nations Environment Programme. The UNEP project component is executed though the UNEP World Conservation and Monitoring Centre.

The Project is designed to enhance sustainability in the use of deep-sea living resources and biodiversity conservation in the ABNJ through the systematic application of an ecosystem approach. It brings together over 20 partners who work on deep-sea fisheries and conservation issues in the ABNJ globally. The partnership includes regional organizations responsible for the management of deep-sea fisheries, Regional Seas Programmes, the fishing industry, and international organizations. The Project aims to:

- strengthen policy and legal frameworks for sustainable fisheries and biodiversity conservation in the ABNJ deep seas;
- reduce adverse impacts on VMEs and enhanced conservation and management of components of EBSAs;
- improve planning and adaptive management for deep sea fisheries in ABNJ; and
- develop and test methods for area-based planning.

The ABNJ Deep Seas Project started in September 2015 and is one of four projects under the GEF Common Oceans Programme. More information is available from http://www.fao.org/in-action/commonoceans/en/

APPENDIX XXI– Report on SIOFA SC Meeting

REPORT OF THE ATTENDANCE AT THE SOUTHERN INDIAN OCEAN FISHERIES AGREEMENT (SIOFA) 2017 SCIENTIFIC COMMITTEE

Saint-Denis (La Réunion), 13th to 17th March 2017

Luis J. López-Abellán and Ivone Figueiredo
EU representatives at the SIOFA SC

At the 2016 SEAFO Scientific Committee annual meeting nominated Luis López Abellán (EU) to represent SEAFO at the SIOFA SC meetings, considering the interest of collaboration with SIOFA Scientific Committee and to explore common issues.

The second SIOFA Scientific Committee meeting was held at the SIOFA Headquarter in Saint-Denis (La Réunion) from 13th to 17th March. The meeting was attended by members: Australia, Cook Islands, European Union, France (Territories), Japan and Korea. Some observers also attended the meeting: SIODFA (Southern Indian Ocean Deepsea Fishers Association), FAO, Thailand and China. Mauritius and the Seychelles did not send representatives to the SC meeting.

Written National Reports on current fishing activities were provided by Australia, the Cook Islands, the European Union, France (Overseas Territories), the Republic of Korea and Japan. All members of the Scientific Committee presented oral summaries of those National Reports.

Scientific data standards

Guidelines for evaluating and approving electronic observer programs for scientific data collection

Australia presented the Meeting Document SC-02-05(01) noting that it has been trialing electronic monitoring systems (EMS) in their domestic fisheries. These trials aimed to assess if the data that EMS collect have equivalent or better accuracy and precision than human at-sea observers. The design of the EMS has been structured to complement existing human at-sea observer programs. The outcomes of the trials indicate that EMS information improves vessel logbook reporting when human at-sea observer coverage is not 100%. The MD submitted also includes a preliminary evaluation of the SIOFA data standards that an EMS can provide equivalent or better accuracy and precision than human at sea observers. At this stage of EMS development there a more data fields that can be collected by electronic monitoring in line fisheries than trawl fisheries.

The SC recommends the Meeting of Parties to adopt the guidelines for evaluation and approving electronic observer programs for scientific data collection (Annex G). The SC noted that electronic observer programs cannot collect all necessary data fields for SIOFA Fisheries. Given this, the SC noted that electronic monitoring complements rather than replaces on-board observers and could free-up observers to undertake other activities. Therefore, the SC could not develop guidelines to approve an

electronic observer program as a whole, but rather review how electronic monitoring equipment satisfies each data filed in the data standards (CMM 2016/02).

SIOFA Scientific Database

The SIOFA scientific database in development was presented by Mr George Campanis. The SC requested that the Secretariat finalize the database as soon as possible noting that the data were critical to the SC's ability to generate data summaries, data input for stock assessment, mapping, ERA and by-catch research. The SC further urged requested Members to submit tow-by-tow observer and catch and effort data in line with CMM 2016/02 to the Secretariat for input into the respective SIOFA databases.

In order to contribute to the annual review of fisheries, the SC requested that the Secretariat generate standard data summaries prior to the SC meeting. This include, amongst other:

- Spatial distribution of fishing effort and catch
- Spatial distribution of VME indicator species
- Actual Landings by species, Parties and SIOFA sub-area
- Number of samples observed per sets/hauls

The SIOFA Secretariat is in the process of appointment of a datamanager.

Vulnerable marine ecosystems

Maps of were VMEs are known to occur, or likely to occur, in the agreement area

For mapping purposes, the SC agreed that geo-referenced data on benthic species should be made available on a haul by haul basis. It was also noted that depending on the fishing gear used, VME are detected in different patterns due to the nature of the gears.

For much of the SIOFA Area, data on seabed biodiversity and benthic community composition are not available, As a consequence, ancillary information on other factors that may influence the occurrence of VMEs are commonly used to estimate the probability of occurrence and suitability of areas for supporting VMEs. Regarding this modeling approach, some concerns were raised, particularly the uncertainty of the predictions and model's predictive capacity associated with de spatial scale adopted, as well as, the quality and spatial disaggregation level of the matrix data for prediction. It was stress that the predictive power is strictly dependent on de amount and level of spatial disaggregation of geo-referenced data available.

The SC noted the existence of other sources of VME information, particularly the work undertaken by the Southern Indian Ocean Deep-sea Fishers Association (SIODFA) where Benthic Protected Areas were proposed. The SC noted that the inclusion of other sources of VME indicator species information into the SIOFA VME map requires further discussion, particularly given their different level of spatial disaggregation, and that a specific work plan needs to be established to progress this work.

The SC requested that the Secretariat to create maps using the geo-referenced data. The SC requested that Parties provide or facilitate provision of other data available from surveys to the Secretariat, to be incorporated into these maps.

Standard protocols for future protected areas designation (areas which should be closed to fishing)

During the SC general discussion on the type of criteria that could form part of the protocol took place, noting some of those used internationally and in different countries to identify spatial closures. The SC noted that several organizations had defined criteria of biodiversity that might be useful.

The SC agreed that the proposed protocols should include the compilation and evaluation of relevant data, adoption of the FAO guidelines to identify VME habitats and the definition of criteria to identify protected areas designation and that the SC will recommend future protected areas on the basis of the standard criteria. It was agreed that the draft criteria should be reviewed after the SC has considered the first submission of a working paper proposing a protected area.

The SC recommended the Meeting of Parties adopt the proposed Standard protocols, noting that they contain draft criteria for future protected areas designation.

Progress towards a bottom fishing assessment standard

The Chair presented the Meeting Document SC-02-06 (01), noting that the third Meeting of the Parties to SIOFA adopted CMM 2016/01, Conservation and Management Measure for the Interim Management of Bottom Fishing in The SIOFA Agreement Area. This document provided a draft for SIOFA BFIAS to facilitate Scientific Committee discussion and drafting. The draft draws on international standards, the FAO International Guidelines for the Management of deep-sea fisheries in the high seas deep sea fisheries guidelines and the South Pacific Regional Fisheries Management Organization BFIAS.

Participants indicated the necessity of considering:
a) The inclusion of cumulative impact across the overall fishery in addition to the cumulative impact of one flag-state's fishing activity;
b) Both effectiveness and weakness of predictive habitat modelling;
c) Clarity of the operative objectives of the BFIAS; and
d) The structure of the document about the background, definition, and practical procedures of BFIAS.

The SC recommended the Meeting of Parties adopt the SIOFA BFIAS, Annex I. In making this recommendation, the SC noted that the BFIAS requires a definition of 'new fisheries' and recommended the Meeting of Parties provide a definition to the SC for inclusion in the BFIAS.

Current and historical status of fishing activities

The SIOFA Secretariat is in process of collecting data in a set-by-set and/or tow by-tow resolution.

Stock assessments

Orange Roughy

The Executive Secretary presented the Meeting Document SC-02-08 (02) which describes the terms of reference for an analysis of orange roughy acoustic data that will support stock assessment, as required within the SC operational work plan. An outline of the terms of reference and a work plan to address the objectives was provided and the meeting was invited to consider the proposal and timelines for this data review.

The SC agreed that the stock assessment work needed to be progressed intersessionally.

Alfonsino

The SC discussed the need to review and understand the data and summaries provided, including:

- how representative the data are, e.g. sampling protocols, spatial and temporal coverage and by fleet;
- how CPUE series have been generated including appropriate standardization;
- the timeframe considered, e.g. last 5 years vs full time series;
- disaggregated length frequency data.

The SC recommended the Meeting of Parties agree that the SC Chair convene a Stock Assessment Working Group for the purpose of progressing the stock assessment work, with the terms of reference and work plan in Annex K of the report.

Patagonian Toothfish

The SC requested the Chair continue to discuss with CCAMLR the value of potential collaboration with CCAMLR on toothfish stock assessments. However it was noted that the stock is also shared with the French and South African EEZs, so assessments should cover the range of the stock.

In terms of tagging, some Parties noted they collect and provide data on tag recaptures in the SIOFA area. The SC recommended the Meeting of the Parties agree to make their toothfish fishers aware of the potential to catch tagged fish and encourage them to provide information on tag recapture that can be forwarded to the Secretariat.

Impacts of fishing on Associated and dependent species

Report on progress towards an ecological risk assessment for deepwater sharks in the SIOFA Area

Australia presented the Meeting Document SC-02-09(01), which is a progress report towards the development of a quantitative ecological risk assessment (ERA) for deepwater sharks in the SIOFA area. The ERA methods proposed are Productivity Susceptibility Analyses (PSA) and Sustainability Assessment for Fishing Effects (SAFE). The SAFE method provides an absolute measure of risk to species by estimating both a proxy for fishing mortality rate and associated quantitative reference point. A preliminary PSA has

been completed identifying 58 species that have the potential to be at high risk to the effects of fishing. This means these species have a high probability of being depleted to a level that may result in long-term recruitment failure (assuming all of the stock distribution is subject to fishing). The next steps include undertaking a residual risk analyses and the SAFE analyses to verify the risk identified. The risk identified supports the reporting of all interactions with deep water sharks associated with current fishing activities to the Secretariat for analyses by the SC. This should include species identification, length, weight, time of capture, location of capture and gear description and sex determination and genetic samples (stock delineation) if possible. A precautionary approach for fishery development or expansion, given the preliminary results, would place the onus on the flag state to demonstrate that their fishing will not adversely impact deep water shark populations.

The SC agreed that key elements in progressing this analysis, included:

- Refining the list of species considered for each gear. Currently the species list considered is based on the species distribution and this needs to be refined with based on available catch data and other relevant information.
- Undertaking the SAFE analyses with fishing footprints. The preliminary analysis assumes the fishery occurs across the Area. If fishing footprints, by *gear*, are used this will give a more realistic estimate of fishing mortality, through the SAFE analysis.
- In terms of the spatial scale of footprints. If the analysis is first undertaken at a coarser spatial scale, e.g. 20 minute grids, any high risk species can be identified and the analysis conducted at a finer spatial scale of the species.

The SC agreed that the ERA work needed to be progressed intersessionally. The SC recommended the Meeting of Parties agree that the SC Chair convene an ERA Working Group for the purpose of progressing the stock assessment work, with the terms of reference and work plan in Annex L.

ADDENDUM

NOTES ON THE 2017 DEEP WATER WORKSHOP OF THE SOUTH PACIFIC REGIONAL FISHERIES MANAGEMENT ORGANISATION (SPRFMO)

Luis J. López-Abellán

The objective of the workshop, given the importance of this activity for the next Scientific Committee meeting of the SPRFMO, was to aid the development of a revised bottom fishing measure for SPRFMO. The main topics to be covered during the workshop were to:

a) review the assessments undertaken for demersal species in the EEZs of Australia and New Zealand in order to draft an assessment framework that outlines the techniques and their data needs that are applicable for assessing the status of demersal fishery resources. The purpose of the framework should be to guide SPRFMO's work towards setting appropriate reference points and establishing harvest control rules for each species. It should also identify potential data needs and opportunities for improvement;
b) review the Bottom Fishery Impact Assessment Standards to ensure they take account of the latest scientific information and guidelines;
c) review approaches for identifying, mapping and predicting VMEs; and,
d) review approaches for identifying spatial management options.

Delegates from five members attended the Workshop, Australia, New Zealand, Chile, China and the EU. Australia and New Zealand presented large delegations to confront views on how to tackle the issues regarding stocks managed inside EEZs, outside these. Also representatives from SIODFA, High Seas Group and Deep Sea Conservation Coalition were present.

To reach this general objective, 15 presentations were shown, 12 into the Stock Assessment theme and 3 in the Vulnerable Marine Ecosystems theme. These presentations were the base for discussions on:

- **Stock assessment**

  - Draft Assessment Framework
  - Use of Acoustic Data in Stock Assessments of Aggregating Demersal Fish Stocks
  - Application of CPUE time-series in Stock Assessments of Aggregating Demersal Fish Stocks
  - Review of Recent Orange Roughy Stock Assessments in New Zealand, Australia, and SPRFMO

- **Vulnerable Marine Ecosystems**

  - VME Mapping
  - Using Spatial Mapping/Zonation
  - Bottom Fishing Impact Assessment Standard

The workshop intends to develop advice for the SPRFMO Scientific Committee on an Assessment/Harvest Framework, including potential limit and target reference points for demersal species.

This workshop was mainly focused on bottom/midwater trawl fisheries targeting bathypelagic species as *Hoplostethus atlanticus* (Orange Roughy) or *Beryx* spp. (Alfonsinos), which are the most important in the region. As the SPRFMO Science Committee is requested to provide scientific advice on stock status for over 30 demersal species, the SC should undertake a SICA (Scale Intensity Consequence Analysis) to prioritise species for stock assessment, but were the species identified in the SICA analysis with sufficient data for analyses under the data limited assessment level but with insufficient data for a full stock assessment, a SAFE (Sustainability Assessment for Fishing Effects) or other data limited method should be applied.

Regarding the stock assessment, the Workshop focused on Orange Roughy assessment and how to face the harvest strategies, considering the Australian and New Zealand approaches. The group is considering the following Assessment Levels:

(1) Full Benchmark Assessments that are able to utilise catch data from fishery monitoring in combination with stock abundance from independent surveys, catch rates and biological data with the purpose of estimating depletion levels and fishing mortality rates;

(2) Data Limited that may utilise catch only or simple indicators to track stock status (e.g. CPUE, size composition);

(3) Research Assessments where new methods or data types are applied which may require substantive review of the methods; and

(4) Update Assessments where previous accepted assessments are updated with new data.

An important aspect raised was the scale that should be used for management (management units), Seamounts or complex of seamounts seems to be the best option rather than large areas.

Recommendations on VME (draft version):

1. Prepare a review paper for consideration by the Scientific Committee on the application of spatial management, VME indicator taxa and thresholds, and move-on rules to inform SPRFMO on the options that may best satisfy its requirements to protect VME's.

2. Continue to develop spatially explicit impact assessments and predictive habitat mapping at a range of scales to identify areas of high risk to VMEs from fishing.

3. Apply spatial planning decision-support tools to provide scientific advice on the location of areas open and closed to demersal fishing to achieve the objectives of the SPRFMO Convention.

Stock Assessment - Session

Assessment Framework

In relation to the stock assessment framework item a draft was provided for discussion with the following objectives:

1. Develop a shared understanding of the application of different stock assessment methods for use in a future SPRFMO bottom fishing harvest strategy, using orange roughy stock assessments as examples.
2. Explore and document mechanisms by which methodological uncertainties can be made explicit to the Scientific Committee and how this relates to provision of scientific advice by the SC to the Commission.
3. Consolidate the above and discuss how these components might form part of a broader SPRFMO bottom fishing harvest strategy.

Also examples on potential reference point for demersal fisheries in the SPRFMO were raised:

1. Consider reference points used by different countries and how limit and target reference points may need to be applied to assist with provision of scientific advice on bottom fishing to SPRFMO.

Tools as:
Fishpath: A Decision Support System for Assessing and Managing Data- and Capacity- Limited Fisheries;

And,

cases of Management Strategy Evaluation (MSE).

Use of Acoustic Data in Stock Assessments of Aggregating Demersal Fish Stocks

Estimate biomass of orange roughy aggregations for input into fisheries assessments with low cv's and cost effective to reduce both process and observation error:

- Robust Species Identification (both relative and absolute error)
    - Frequency identification
    - Visual and capture verification
    - Scattering model – historic knowledge of densities
- Robust Target strength (absolute error and potential relative error)
    - In situ measurements across frequencies
- Visually verified
    - Scattering model
    - Representative of survey fish

Survey strategy
    - Survey sampling design needs to be done depending on the objectives and behaviour of orange roughy in the region
    - Reduce dead zone uncertainty

The use of multi-frequencies (38 Khz and 120 Khz) overlapped contribute to de discrimination of species aggregations, together the Acoustic Optical System (AOS), both increases the lines of evidences.

Application of CPUE time-series in Stock Assessments of Aggregating Demersal Fish Stocks

Works on the development of spatially disaggregated CPUE indices for SPRFMO orange roughy stocks; Bayesian spatial and spatiotemporal models; and constrains of using of catch and effort data were presented.

Review of Recent Orange Roughy Stock Assessments in New Zealand, Australia, and SPRFMO

In this section, 5 presentations on recent stock assessments in the region were analyzed:

- Estimation of Orange roughy biomass using physical seamount characteristics.

- Work used to assess the orange roughy stocks in SPRFMO using a spatially disaggregated CPUE and Bayesian biomass dynamics model.

- Method used to assess the status of Orange roughy stocks in the Australian EEZ.

- Method used to assess the status of Orange roughy stocks in the New Zealand EEZ.

- Approaches to assess stock assessment using catch- only methods.

New approaches using statistical modeling (GAM) showed deficiencies in alternate CPUE series used for demersal stock assessments, having them only an informative value. Also studies using spatially disaggregated CPUE series for use in demersal stock assessments were presented.

Vulnerable Marine Ecosystems – Session

New Zealand presented works on developing predictive models for the distribution and abundance of VME indicator taxa at a range of spatial scales from the entire SPRFMO Convention Area to five individual seamount features. Key issues of spatial scale, data requirements, data availability and mobilization, modeling approaches, uncertainty associated with models will be discussed. **It was noted that the scale in using predictive models is crucial, correlation between predictions and evidences increases when geographical scale is reduced towards seamount scale. VME seems to be concentrated in the steeper slopes, sometimes representing 0.09% of the seamount.**

It was presented the development and potential use of spatial decision support tools for evaluating trade-offs in spatial management for bottom fisheries in the SPRFMO Convention Area using predicted maps of VMEs or VME indicator taxa and the distribution of fishing. The practical utility of the tool was demonstrated, and further data requirements identified, for future use of ZONATION as part of the decision-making process for the design of spatial management measures for vulnerable marine ecosystems.

Regarding the bottom fishing impact assessment, methods development for spatially-explicit bottom fishing impact evaluation within SPRFMO were introduced, on the step of fishery footprint estimation:

Objective 1: to estimate the cumulative spatial footprint (and impact) on possible VME taxa of New Zealand fishing effort in the SPRFMO Area.

Objective 2: to examine to what extent estimates of footprint (and impact) are affected by the spatial scale at which fishing effort data is reported or aggregated.

Objective 3: to generate spatially explicit footprint (and eventually, impact) maps in the SPRFMO area.

APPENDIX XXII– Notice of Intent and Preliminary Impact Assessment

PART I NOTICE OF INTENT

for the 2018 exploratory fishings by Japan
Required information stipulated in (a) to (h), item 2, Article 6, Conservation Measure 30/15

(a) harvesting plan, which outlines target species, proposed dates, areas and the type of bottom fishing gear to be used. Area and effort restrictions shall be considered to ensure that fishing occur on a gradual basis in a limited geographical area;

(1) Harvest plan

- Target species

  Patagonian toothfish (*Dissostichus eleginoides)*

- Proposed dates

  March-August 2018 (subject to change by fishing and environmental conditions)

- Areas (BOX 1, page 2)

  Discovery area (five 1°x1° areas)

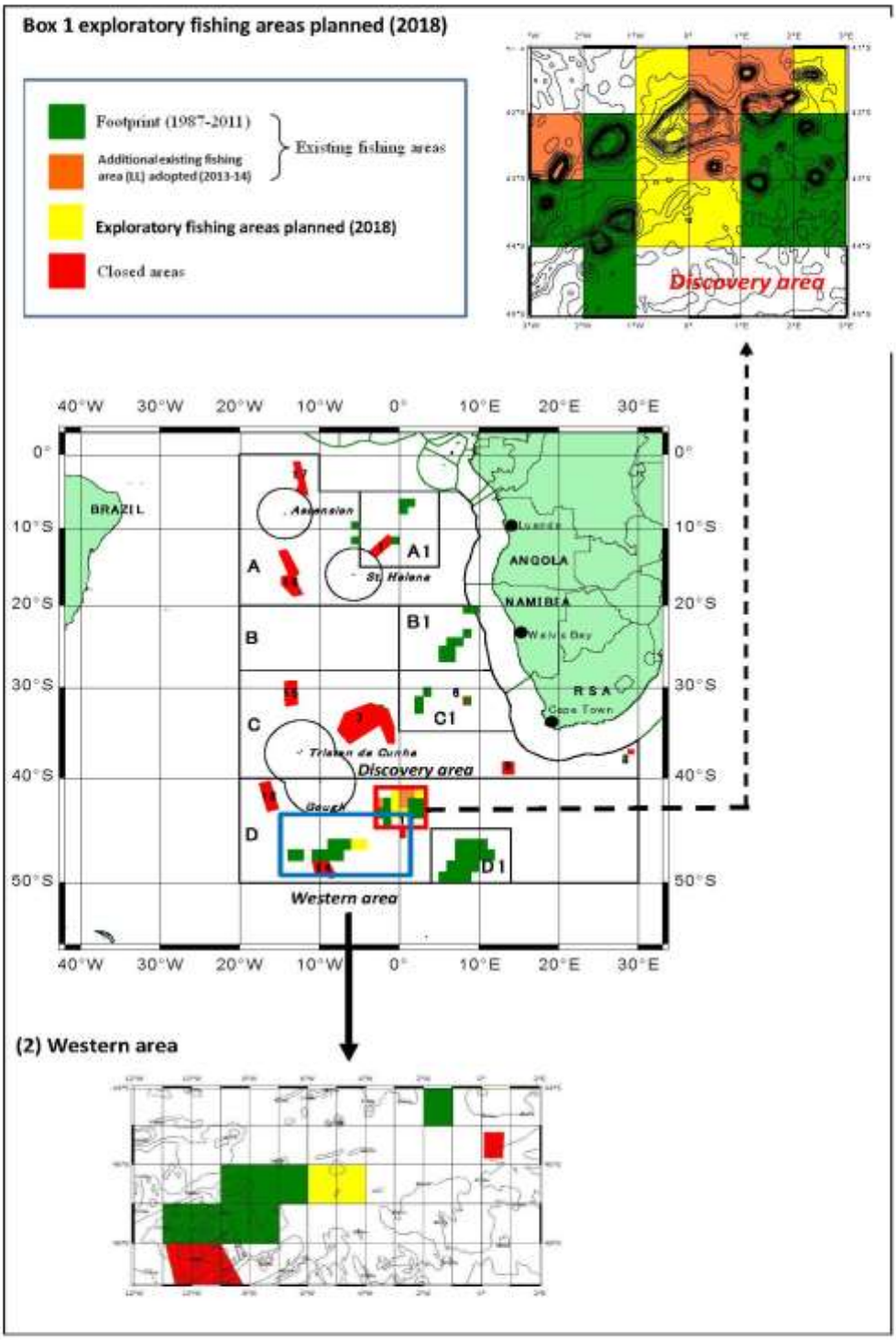
  S41-42°W1-0°
  S41-42°E2-3°
  S42-43°W1-0°
  S43-44°W1-0°
  S43-44°0-E1°

  Western area (two 1°x1° areas)

  S46-47°W6-5°
  S46-47°W5-4°

- Type of bottom fishing gear to be used.

  Bottom longline fishing gear (trot line)
  (the gear specification is available in page 7)


Box 1 exploratory fishing areas planned (2018)
Footprint (1987-2011)
Additional existing fishing area (LL) adopted (2013-14)
Existing fishing areas
Exploratory fishing areas planned (2018)
Closed areas
Discovery area
40°W 30°W 20°W 10°W 0° 10°E 20°E 30°E
0°
10°S
20°S
30°S
40°S
50°S
BRAZIL
Ascension
St Helena
A
A1
B
B1
C
C1
D
D1
ANGOLA
NAMIBIA
Walvis Bay
RSA
Cape Town
Tristan da Cunha
Gough
Discovery area
Western area
(2) Western area

(a) Continued

(2) AREAS AND EFFORT RESTRICTIONS

The exploratory fishing will be conducted by following two steps to restrict areas and effort:

Step 1

- This is the self-restriction referred to requests in the application of the CCAMLR exploratory bottom fishing rules, i.e., on the first entry of the research area, the first 10 hauls shall be research hauls and must satisfy following criteria;
- Each research haul must be separated by not less than 3 nautical miles (NM) from any other research haul, distance to be measured from the geographical mid-point of each research haul;
- Each haul shall comprise at least 3,500 hooks and no more than 5,000 hooks; and
- Each haul shall have a soak time of not less than 6 hours, measured from the time of completion of the setting process to the beginning of the hauling process.

Step 2

- On completion of 10 research hauls, the vessel will gradually continue the exploratory fishing;
- Exploratory data stations should be set in such a way that it covers the exploratory area representatively above the 2000m depth isobar *(this was suggested and agreed by the Commission meeting in 2014 and also stipulated in Item 3, ANNEX 5, Article 7, CM15/30 to fulfil one of conditions for new fishing grounds);*
- Catch in the exploratory fishing should be restricted under TAC followed by the exploratory fishing protocol; and
- FV No. 3 Shinsei maru will furthermore restrict fishing efforts for exploratory fishings to limit P. toothfish catch less than 15% of its TAC.

(b) mitigation plan, including measures to prevent significant adverse impact to VMEs that may be encountered during the fishery;

- Trot line is the least bottom contact gear amongst other relevant bottom fishing gears such as bottom trawls, pots and Spanish longlines, which satisfies the Item 5, Article 6 (exploratory bottom fishing) in CM30/15, i.e., *Preference shall be given by the relevant Contracting Party to exploratory bottom fishing using fishing gear and methods with the least bottom contact, at times when impacts are likely to have the least adverse impacts on organisms other than the target species.*

- More conservative and precautionary methods of the encounter protocol stipulated in Article 8 and Annex 6 in CM 30/15, are planned to be implemented, i.e., the longer move-away distance (2miles) is applied than 1 mile in the current rule.

(c) catch monitoring plan, including recording/reporting of all species caught;

- During the exploratory fishing, one certified scientific observer will be assigned to collect relevant scientific information including catch and bycatch for all species (see Box 2 for details) in order to fulfil requirements stipulated in the Exploratory Bottom Fishing Protocol (Article 6 and 7 in CM 30/15). The observer will use the SEAFO official observer forms to record and report. In the exploratory fishing, more scientific information is collected than in commercial fishing (Table 1).

BOX 2 Catch monitoring plan

- Patagonian tooth fish (*Dissosticus eleginoides*)
  - Total catch in weight/line
  - Length measurement / Maximum 50 fish/line
  - Weight, sex, maturity, gonad state / Maximum 30 fish/line

- Rattail (*Macrourid* spp.)
  - Total catch in weight/line
  - Length and weight measurement / Maximum 10pcs/line

- Other by-catch species
  - Total catch in weight/line by the lowest taxon possible

- VME
  - VME data according to interim VME data collection protocol set out in Annex 4 of Conservation Measure 30/15.

Table 1 Comparisons of data collection specs between exploratory fishing and commercial fishing.

Data collection			
Commercial fishng (Existing bottom fishing area)		**Exploratory fishing (New bottom fishing area)**	
Patagonian toothfish		Patagonian toothfish	
Type	Quatinty	Type	Quatinty
Total cathch weight / line		Total cathch weight / line	
Length	20 samples/line	Length	50 samples/line
Gonad stages	20 samples/line	Gonad stages	30 samples/line
Gonad weight	20 samples/line	Gonad weight	30 samples/line
Individual weight	20 samples/line	Individual weight	30 samples/line
Sex	20 samples/line	Sex	30 samples/line
Otoliths	5 samples/line	Otoliths	5 samples/line
Bycatch species		Rat tail	
Number of each speices / line		Total cathch weight / line	
		Length	10 samples/line
		Individual weight	10 samples/line
		Bycatch species excepted Rat tail	
		Number of each speices / line	

(d) a sufficient system for recording/reporting of catch, detailed to conduct an assessment of activity, if required;

- SEAFO official observer forms agreed by SC will be used to record and report catch and all activities of exploratory fishing, in addition to extra biological samples as shown in Table 1. They have been sufficiently details to conduct assessments of activity in the past exploratory fishings for five years (2012-2016). Hence, SEAFO SC also acknowledged the exploratory fishing reports by FV No 3 Shinsei-maru in the past.

(e) data collection plan to facilitate the identification of VMEs in the area fished;

- One scientific observer will use the SEAFO VME ID guide to identify VME species and will take photos for double checks as in the past exploratory fishings by FV No 3 Shinsei-maru. In addition, the observer will use the high performance electronic scale suitable on board to measure VME species weights as detailed as the gram unit.

And make every effort to also include the following information for (f) and (g)

(f) fine-scale data collection plan on the distribution of intended tows and sets, to the extent practicable on a tow-by-tow and set-by-set basis;

- The exploratory fishing will collect the fine scale (set by set) data for all operations as in the past (2012-2016) and locations will be reported as detailed as the second level.

(g) plans for monitoring of bottom fishing activities using gear monitoring technology, including cameras if practicable;

- The observer will keep all records as details as possible on fishing activities as in the past, i.e., gear specifications, number of hooks deployed, soaking time, lost gear (hooks, main and branch lines), catch, bycatch (especially VME species, sea birds, sea turtles and sharks) information and all other relevant information.

PART II: PRELIMINARY IMPACT ASSESSMENT

Requested by Annex 3, Article 7.1, CM 15/30

1. ***A Notice of Intent shall contain all elements (a)-(g) specified in CM 30/2015 Art. 6.2. The harvesting plan needs to comprise effort and effort limitation, also area restrictions, to ensure that the fishing is conducted on a gradual basis.***

- All elements (a)-(g) specified in CM 30/2015 Art. 6.2 and "effort limitation and area restrictions" are fully described in Page 1-6 of this document.

2. **The CPs preliminary assessment shall as a minimum demonstrate that every effort has been made to provide the information requested in Article 7.1, Annex 3.**

(a) type(s) of fishing conducted or contemplated, including vessels and gear types, fishing areas, target and potential by catch species, fishing effort levels and duration of fishing (harvesting plan);

- Type of fishing is "Bottom longline (trot line) fishing method" used by FV No.3 Shinsei maru. The trot line is the least bottom contact gear amongst other relevant bottom fishing gears such as bottom trawls, pots and Spanish longlines, which satisfies the Item 5, Article 6 (exploratory bottom fishing) in CM30/15. Specification of the gear and the vessel are provided in Fig. 1 and Box 3 respectively.

- Regarding the harvest plan (fishing areas, target and potential by catch species, fishing effort levels and duration of fishing), refer to pages 1-6.

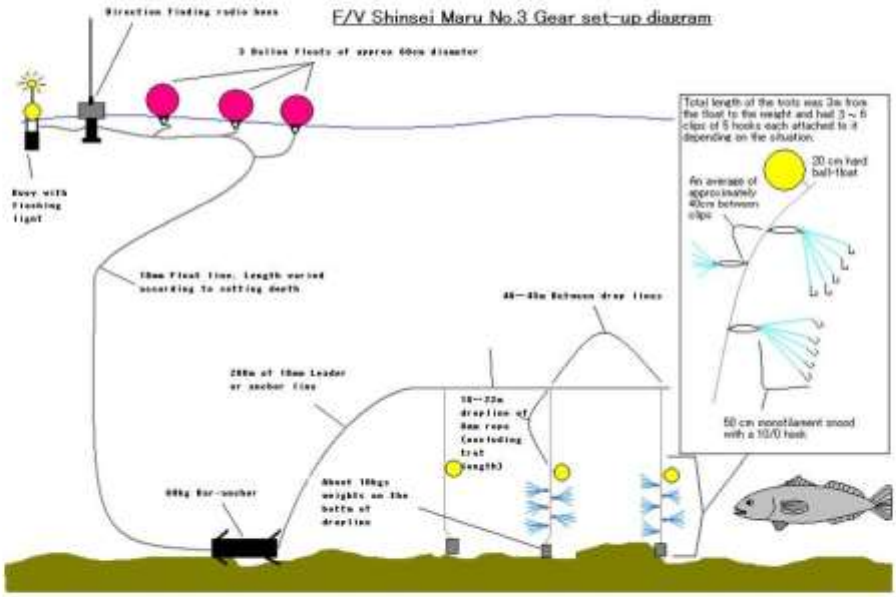


Fig.1 Fishing gear configuration (trot bottom long line)

Box 3 Specification of FV No 3. Shinsei Maru

(1)	Name of fishing vessel	Shinsei Maru No.3
	Previous names (if known)	Same as above
	Registration number	128862
	IMO number (if issued)	8520094
	External markings	Vessel marked with name and international radio call sign. White hull and white superstructure
	Port of registry	Yaizu – Japan
(2)	Previous flag (if any)	N/A
(3)	International Radio Call Sign	JAAL
(4)	Name of vessel's owner(s)	TAIYO A&F CO.,LTD.
	Address of vessel owner(s)	4-5, TOYOMI-CHO, CHUO-KU, TOKYO, JAPAN
	Beneficial owner(s) if known	Same as above
(5)	Name of licence owner	Same as the owner
	Address of licence owner (operator)	
(6)	Type of vessel	Longline fishing vessel
(7)	Where was vessel built	Shimizu, Shizuoka, Japan
	When was vessel built	1985
(8)	Vessel length overall LOA (m)	47.2
(9)	Details of the implementation of the tamper-proof requirements of the VMS device installed	The vessel is fitted with MAR-GE Argos VMS system. This is a sealed unit which has own GPS inside to ensure the independence from other acoustic devices and protected with official seals that indicate whether the unit has been accessed or tampered.
(10)	Name of operator	Same as the owner
	Address of operator	Same as the owner
(11)	Names and nationality of master and, where relevant, of fishing master	Master: Fujimori Kojima, Japanese Fishing master: Masayuki Matsumura, Japanese
(12)	Type of fishing method(s)	Bottom longline
(13)	Vessel beam (m)	8.7
(14)	Vessel gross registered tonnage	735
(15)	Vessel communication types and numbers (INMARSAT A, B and C)	INMARSAT -FB: 773190498 INMARSAT –C: 432521000@satmailc.com
(16)	Normal crew complement	33
(17)	Power of main engine(s) (kW)	735
(18)	Carrying capacity (tonne)	250M/T
	Number of fish holds	4 holds
	Capacity of all holds (m^3)	502.4 m^3
(19)	Any other information in respect of each licensed vessel they consider appropriate (e.g. ice classification) for the purposes of the implementation of the conservation measures adopted by the Commission.	N/A

(b) best available scientific and technical information on the current state of fishery resources and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;

- This exploratory fishing targets Patagonian toothfish. SC (2013) report (page 7) noted that the current harvesting rate (Patagonian toothfish) is below Fmsy based simple stock assessments conducted by the FAO expert. This is due to the limited number of bottom longline vessels having been operating (1-3 vessels) (2002-2012) in the SEAFO CA. Afterwards (2013-2017), number of operating vessels (fishing efforts) has been decreased to only one. Therefore, the harvesting rate is below Fmsy.

- In addition, P. toothfish catch has been below TAC levels (45% of TAC in average after TAC established in 2008 to 2017) (Table 2). In addition, the average catch by the exploratory fishing is 17 t (19% of the total catch and 8% of TAC in average during the 2012-2016 exploratory fishing period) (Table 2). The current nominal CPUE used for harvest control rule for 2017-2018 TAC shows no decreasing trend in last five years (Fig. 2) (SC report, 2016).

Table 2 Information on Catch, TAC and exploratory fishing on P. Toothfish

Year	No of boats operated	Total Catch (t)	TAC (t)	% (Total catch/TAC)		Catch by Explorary fishing		
						t	% of the total catch	% of the TAC
2002	1	18						
2003	3	393						
2004	2	130						
2005	2	173						
2006	3	170						
2007	3	413						
2008	3	202	260	78				
2009	3	148	260	57				
2010	3	81	200	41				
2011	2	221	230	96				
2012	2	125	230	54	exploratory	44	35	15
2013	1	64	230	28	fishing RV3	27	43	19
2014	1	85	276	31	No Shinsei	8	10	4
2015	1	59	276	21	maru	2	3	1
2016	1	60	264	23	completed	2	3	1
2017	1	60	266	23	No exploratory fishings			
Ave (2008-2017)	2	150	249	45	Ave (2012-2016)	17	19	8

(BOX 1 continued)

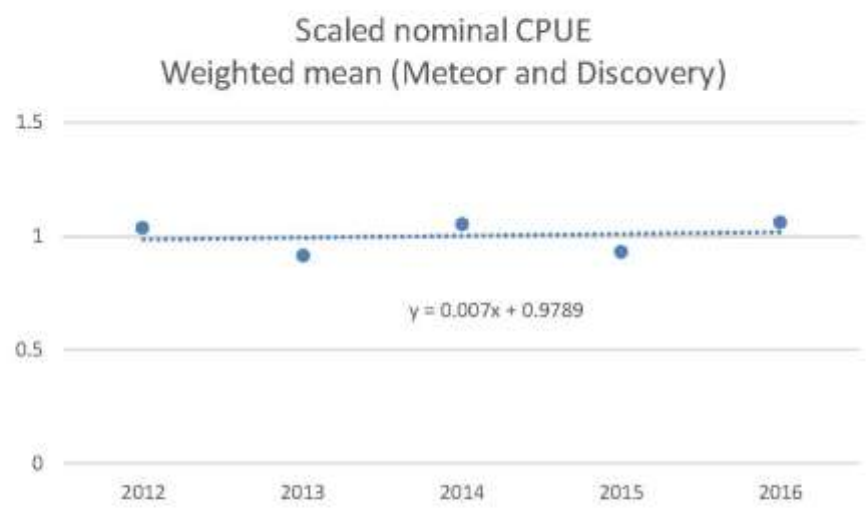


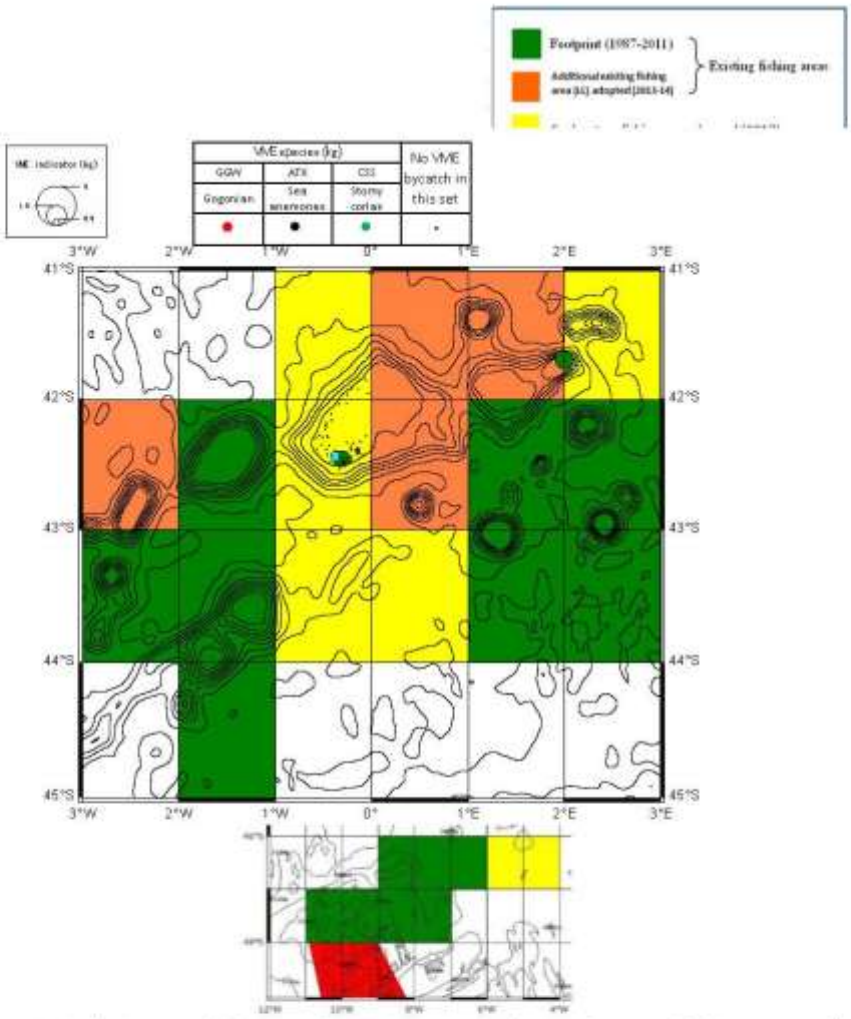
Fig. 2 Nominal CPUE trend (2012-2016) used for harvest control rule to decide TAC (2017-2018) (SC report) (2016)

- There is the baseline information on the ecosystems, habitats and communities in the exploratory fishing areas planned for 2018. Such information has been collected and accumulated by the past Patagonian toothfish exploratory fishings by FV No 3 Shinsei Maru (2012-2016), i.e., VME information (page 11-12), catch and bycatch information, lost gear, biological and ecological data, which are fully described in past exploratory fishing reports available in the SC reports.

(c) identification, description and mapping (geographical location and extent) of VMEs known or likely to occur in the exploratory fishing area;

- Map 1 describes distributions and densities of VME species in the exploratory fishing areas planned for 2018 (1°x1° area with yellow markers). This information is based on the SEAFO VME database (2012 and 2014-2016), which are originally from the Japanese exploratory fishings by FV No 3 Shinsei Maru.

- In these areas, there are 54 exploratory fishing operations (sets) in three years (2012 and 2014-2016). Amongst 54 sets, there are 6 occurrences (sets) (11%) of VME bycatches (0.61 kg in average, i.e., 6% of the threshold value) and no occurrences in 48 operations (89%). Table 3 shows species names and quantities (Kg).



Map 1 Distribution and density of VME species in the exploratory fishing areas planned for 2018 (yellow marker 1°x1° area) based in the SEAFO VME database (2012 and 2014-2016).

Table 3 List of VME species and weight by exploratory fishings by Japan with the trot line by year and location (2012 and 2014-2016) (SEAFO VME database) (note: blanks mean no VME bycatch)

Year	LAT (S)	lat_m	EW	LONG	long_m	VME species (kg)		
						GGW	ATX	CSS
						Gogonian	Sea anemones	Stony corlas
						●	●	●
2012	42	23.71	W	0	8.43		0.2	
2012	42	27.34	W	0	18.51			1.25
2012	42	26.19	W	0	22.45	0.7		
2012	42	22.18	W	0	8.54	0.15		
2012	41	41.72	E	2	0.22			1.4
2012	42	23.00	W	0	12.00			
2012	42	17.00	W	0	3.00			
2012	42	29.00	W	0	17.00			
2012	42	30.00	W	0	7.00			
2012	42	32.00	W	0	20.00			
2012	42	29.00	W	0	13.00			
2012	42	24.00	W	0	22.00			
2012	42	20.00	W	0	15.00			
2012	42	22.00	W	0	13.00			
2014	42	21.04	E	0	24.29			
2014	42	15.14	E	0	31.12			
2014	42	10.54	E	0	37.72			
2014	42	16.93	E	0	25.65			
2014	42	26.21	W	0	12.26			
2014	42	25.59	W	0	5.62			
2014	42	19.79	W	0	6.84			
2014	42	20.24	W	0	11.47			
2014	42	26.72	W	0	18.12			
2014	42	23.61	W	0	22.59			
2014	42	28.86	W	0	18.46			
2014	42	23.38	W	0	27.93			
2014	42	21.12	W	0	31.00			
2014	42	12.77	W	0	27.94			
2014	42	10.61	W	0	27.93			
2014	42	6.86	W	0	24.98			
2014	42	2.31	W	0	19.79			
2014	42	2.26	W	0	15.43			
2014	42	17.14	W	0	27.17			
2014	42	18.06	W	0	34.37			
2014	42	13.71	W	0	28.57			
2014	42	9.66	W	0	24.38			
2014	42	17.51	W	0	30.43			
2014	42	12.03	W	0	28.37			
2015	42	25.10	E	0	15.77			
2015	42	22.36	E	0	21.61			
2015	42	18.92	E	0	23.00			
2015	42	15.44	E	0	29.81			
2015	42	17.29	E	0	45.49			
2015	42	14.59	E	0	39.59			
2015	42	10.39	E	0	20.38			
2015	42	13.98	E	0	25.73			
2015	42	5.17	E	0	29.46			
2015	42	7.58	E	0	25.41			
2016	42	25.30	W	0	8.00	0.01		
2016	42	28.26	W	0	14.52			0.58
2016	42	25.77	W	0	19.97			
2016	42	23.53	W	0	13.00			
2016	42	29.22	W	0	25.26			
2016	42	25.60	W	0	27.37			
2016	42	21.60	W	0	26.26			
2016	42	23.37	W	0	34.02			
2016	42	17.70	W	0	26.94			
2016	42	16.56	W	0	32.00			

(d) identification, description and evaluation of the occurrence, character, scale and duration of likely impacts, including cumulative impacts of the proposed fishery on VMEs in the exploratory fishing area;

- Map 1 (page 11) suggests that VME species are rarely and incidentally caught by the exploratory fishings due to the usage of the least bottom contact trot bottom longline fishing methods in the past six years. Hence, there are no cumulative impacts on VME species. In addition, more strict, conservative and precautionary methods of the encounter protocol (Article 8 and Annex 6 in CM 30/15) as explained (b), page 4, will be implemented. Thus, SAI on VME is expected to be nil.

(e) data and methods used to identify, describe and assess the impacts of the activity, the identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;

- Available VME data are from the Japanese exploratory fishing (2012-2016). Methods for the impact assessments are based on simple mapping of these VME data in the planned areas for the 2018 exploratory fishing (Map 1). There are gaps in the VME data (map), i.e. there are areas with enough VME information, while areas with nil information, where no exploratory fishings nor surveys in the past. Thus, to fulfill missing VME information, it is essential to encourage to conduct exploratory fishings and/or surveys.

- Information (2012-2016) suggest that there are very few VME bycatch (none in 89% sets), while there are VME bycatch in 11% of the total sets and the average weight of VME bycatch per set are much lower, 0.61Kg which is 0.6% of the threshold value.

- Based on the VME bycatch information to now in the Patagonia tooth fishing grounds (D area of the SEAFO CA), there are very low probabilities to encounter VME species. Even there were the VME bycatch, the weights are expected to be very low (for example, 0.61 Kg in average in past exploratory fishing). This is because the trot bottom longline method is the least bottom touch and VME safe gear.

- In addition, as there are no VME information for some of 2018 exploratory fishing areas, it is meaningful and valuable to collect VME bycatches in order to accumulate VME information for the future.

(f) risk assessment of likely impacts by the fishing operations to determine which impacts on VMEs are likely to be significant adverse impacts; and

- Exploratory fishing by FV No 3 Shinsei Maru have been using the least bottom contact trot bottom longline fishing methods in the past 5 years (2012-2016). There have been negligible impacts in the exploratory fishing areas, i.e., 89% of the sets had no VME bycatch, while 11% of the sets made VME bycatches and the average weight is 0.61 Kg (only 6% of the threshold or SAI value).

- The 2018 exploratory fishing use the same gear and same fishing area and apply more conservative encounter protocol than the current one (see (b), page 4). Thus, it expected that there will be nil chance to experience SAI.

(g) mitigation and management measures to be used to prevent significant adverse impacts on VMEs and the measures to be used to monitor effects of the fishing operations.

- Basically, mitigation and management measures stipulated in CM 30/15 (On Bottom Fishing Activities and Vulnerable Marine Ecosystems in the SEAFO Convention Area) are fully applied. Especially following Articles and Annexes are important measures to prevent SAI and FV Shinsei Maru 3 will completely comply i.e., Article 6 (Exploratory bottom fishing), Article 7 (Assessment of proposed exploratory bottom fishing), Article 8 (Encounter with possible VMEs), Annex 3 (Assessments of Bottom Fishing Activities), Annex 4 (VME Data Collection Protocol), and Annex 6 (VME indicators and threshold values).

- In addition, more strict, conservative and precautionary method of the encounter protocol stipulated in Article 8 and Annex 6 in CM 30/15, will be applied, i.e., the longer move-away distance (2miles) is applied than 1 mile in the current rule.

3. Additional elements to be considered for evaluation of SAI.

a) Experience for other areas in the region or similar fishing elsewhere.
b) Potentially cumulative effects of several exploratory fishing experiments in the same or overlapping areas.

Both a) and b) are relevant for evaluating SAI. If it can be documented that relevant experiences from the same experiments elsewhere did not cause SAI, then that would favour approval of the proposed exploratory fishing.

Not Available

APPENDIX XXIII– Data Request From New Zealand

DATA REQUEST FROM NATHAN WALKER

From: Nathan Walker [mailto:Nathan.Walker@mpi.govt.nz]
Sent: Monday, May 8, 2017 6:55 AM
To: gcampanis@seafo.org; info@seafo.org
Cc: Marie-Julie Roux <Marie-Julie.Roux@niwa.co.nz>; Edward Abraham <edward@dragonfly.co.nz>
Subject: Data request

Good afternoon,

New Zealand's Ministry for Primary Industries, MPI, is asking permission to access non-public domain effort and observer data aggregated by month and 5x5 degree squares for all fishing activities conducted under SEAFO jurisdiction, from 1 January 2005 to 31 December 2015.

Aggregated fishing effort information (no. vessels, no. sets, no. hooks, no. tows, hours fished) and data on seabird mortalities (no. observed mortalities by species; total no. observed fishing events) will be used to conduct a southern hemisphere seabird risk assessment. This assessment has been commissioned by the New Zealand Ministry for Primary Industries (MPI project PRO2013-13) and is conducted in partnership between NIWA and Dragonfly Science. It is intended that a descriptive summary of the collated datasets from all contributing RFMOs will be put together as an (internal) Final Research Report submitted to MPI and distributed among all data providers/fishing agency. Separate permission to publish the results of this assessment will be sought at the time of preparing the manuscript(s).

More specifically, the following fields and aggregated information are sought:

- No. vessels
- No. fishing events
- No. tows
- No. sets
- No. hooks
- Flag
- Fishing duration
- No. observed mortalities (seabirds) by species (where available)
- No. observed fishing events
- Avg percentage of individual fishing events observed (e.g., percentage of set observed for longline effort)

By:

- 5x5 degree grids
- Calendar year
- Calendar month
- Gear type
- Flag
- Target species

Information on the type of seabird mitigation used (and year of implementation) for each fishing gear type is also requested.

Aggregated, non-public domain data is requested to minimise data gaps resulting from privacy measures such as the 3 vessels rules and to efficiently distinguish fishing practices in the assessment using a combination of gear type, flag and target species.

We thank you very much in advance for considering this data request. Please let me know if there is another mechanism for requesting data from your RFMO.

Regards,

Nathan

Nathan Walker | Principal Scientist | Aquatic Environment
Fisheries Management Directorate | Regulation & Assurance Branch
Ministry for Primary Industries - Manatū Ahu Matua |
Pastoral House 25 The Terrace | PO Box 2526 | Wellington | New Zealand
Telephone: 64-4- **819 4457** | Mobile: **021 702 794** | Web: www.mpi.govt.nz

APPENDIX XXIV– Data Request for Tissue Samples

DATA REQUEST FOR ANTIMORA SPECIES

>>> From: orlov [mailto:orlov@vniro.ru]
>>> Sent: Tuesday, 28 February 2017 9:32 AM
>>> To: info@seafo.org; bvanzyl@seafo.org; gcampanis@seafo.org;
>>> asnyders@seafo.org
>>> Subject: assistance required
>>>
>>> Dear colleagues,
>>>
>>> I urgently need your assistance in conducting of research project dealing with taxonomy, distribution, microevolution and biology of Antimora spp. worldwide.
>>>
>>> SEAFO area is a part of the range of velvet cod (blue antimora)
>>> Antimora rostrata and I urgently need tissue samples for genetic
>>> analysis of this species. I know that deepwater fisheries in SEAFO
>>> area (e.g. for orange
>>> roughy) is prohibited but some vessels are still fishing for toothfish where Antimora bycatch is quite common. Is there any opportunity to get tissue samples from this fishery?
>>>
>> As for requirements, I need tissue samples from 50 specimens. The best and easiest is to sample small piece of dorsal or anal fin preserved in ethanol (proportion of tissue and alcohol should be no less than 1:5).
>> Each fin clip is put in 2 ml plastic vial and stored in freezer or refregirator. If you plan to send observer to fishing vessel, who will collect biological information from fishery, it would be great to collect otolits and scales from Antimora as well.
>>
>> If you need vials for tissue samples, please let me know and I'll send you them to address you will provide.

>>> Many thanks for consideration.
>>>
>>> With best wishes,
>>>
>>> Dr. Alexei Orlov, DrSc.
>>>
>>> Head of the Lab,
>>>
>>> Russian Federal Research Institute of Fisheries and Oceanography,
>>>
>>> Moscow, Russia

From: Bergstad, Odd Aksel [mailto:odd.aksel.bergstad@imr.no]
Sent: Monday, March 13, 2017 9:48 AM
To: Paulus Kainge <Paulus.Kainge@mfmr.gov.na>; Lizette Voges <lvoges@seafo.org>; Beau Tjizoo <Beau.Tjizoo@mfmr.gov.na>; George Campanis SEAFO <gcampanis@seafo.org>; Hannes Holtzhausen <Hannes.Holtzhausen@mfmr.gov.na>; Ivone Figueriedo EU SC <ifigueiredo@ipma.pr>; John Kathena <John.Kathena@mfmr.gov.na>; Luis Lopaz Abellan EU SC <luis.lopez@ca.ieo.es>; Miguel Antonio Angola SC <amiguelandre4@gmail.com>; Takeshi Shibata Japan SC <kani@maaruha_nichiro.co.jp>; Tsutomu Nishida Japan SC <tnishida@affrc.go.jp>
Cc: Dielobaka Ndombele SEAFO CHAIR <dielobaka@gmail.com>
Subject: RE: Request for tissue sample collection of Antimora rostrata in SEAFO area

Dear Paul, Lizette and SC members,

The SC encourages scientific research in the SEAFO CA, and so does the Commission. Any new information would be appreciated. So we should make an effort to help the Russian genetics project.

However, unless we get new cruises as e.g. the 2015 Nansen cruise, which was developed in consultation with SEAFO and FAO, new scientific information has to be gathered by Contracting Parties or others.

The most relevant CP to provide samples to the Russian-led study would seem to be Japan, and I would simply encourage Tom and the fishing vessel operator to consider how to approach this collaboration.

The Secretariat has the mandate to provide contact details to Tom and Japan. If, in a response to Orlov, the Secretary wishes to mention that the SC encourages such research, that's fine and I can't see that it requires any particular process.

Knowing about the 2015 Nansen cruise, Alexei Orlov approached me earlier about the same issue. However, unfortunately we did not collect tissue samples at that time. I encouraged him to contact Tom.

Best regards

Odd Aksel

APPENDIX XXV – Proposal for CM on banning of gillnets

EXPLANATORY MEMORANDUM

EU PROPOSAL FOR A CONSERVATION MEASURES ON THE BANNING OF GILLNETS

The EU proposes that the SEAFO Recommendation 2/2009 on the banning of gillnets becomes binding. As indicated by the SEAFO Scientific Committee, although lately there are no deep-water gillnet fisheries in SEAFO, the knowledge available on the effect of deep-water gillnet fisheries over similar habitats as in the SEAFO Convention Area show that their use may have significant negative effects on those ecosystems. As noted by the SEAFO 12th Scientific Committee held on 6-14 October 2016 in Windhoek, Namibia, "the technical basis for Recommendation 2/2009 regarding gillnet fishing is still valid" (SEAFO 12th Scientific Committee Report, point 17, page 9).

Issues of concern are that abandoned or lost nets that become entangled on three-dimensional features and that can maintain high ghost fishing catch rates for relatively long periods ranging from several months to several years.

EU proposal

Conservation Measure xx/16 on the Banning of Gillnets in the SEAFO Convention Area

The Commission hereby adopts the following Conservation Measure pursuant to articles 6 and 7 of the Convention:

1. Contracting Parties shall ensure that vessels flying their flag prohibit the use of large-scale provided pelagic driftnets[1] and all deepwater gillnets[2] in the Convention Area.

2. Contracting Parties whose flagged vessels seek to transit the Convention Area with gillnets onboard shall:

[1] 'Large-scale pelagic driftnets' (drift gillnets) are defined as a gillnet or other net or a combination of nets which is more than 2.5 kilometers in length the purpose of which is to enmesh, entrap or entangle fish by drifting on the surface or in the water.

[2] 'Deepwater gillnets' (trammel net, set nets, anchored nets, sink nets) are defined as strings of single, double or triple netting walls, held vertically, on or near the bottom, in which fish will gill, entangle or enmesh. Deepwater gillnets consist of single or, less commonly, double or triple netting mounted together on the same frame ropes. Several types of nets may be combined in one gear. These nets can be used either alone or, as is more usual, in large numbers placed in line ('fleets' of nets). The gear can be set, anchored to the bottom or left drifting, free or connected with the vessel.

a) Give at least 36 hours advanced notice to the Secretariat prior to entering the Convention Area. In particular, Members shall report the expected entry and exit dates and length of gillnet carried onboard;
b) Ensure their vessels operate a vessel monitoring system polling once every two hours while in the Convention Area;
c) Submit VMS position reports to the Secretariat within 30 days of the vessel leaving the Convention Area; and
d) If gillnets are accidentally lost or fall overboard from the vessel, report the date, time, position (using WGS84) and length (meters) of gillnets lost to the Secretariat as soon as possible and within 48 hours of the gear being lost.

3. This Conservation Measure replaces Recommendation 2/2009 on Banning of gillnets.

APPENDIX XXVI– Proposal for revision of CM 04-06

EXPLANATORY MEMORANDUM

EU PROPOSAL TO AMEND CONSERVATION MEASURE 04-06 TO PROHIBIT THE DIRECT FISHING OF DEEP-WATER SHARKS AND THE FINNING OF SHARKS CAUGHT IN THE SEAFO CONVENTION AREA

In view of the SEAFO Scientific Committee's considerations regarding deep-water sharks (SEAFO 12th Scientific Committee Report, point 16, page 8) and in line with the precautionary approach enshrined in Articles 3 and 7 the SEAFO Convention, the EU proposes that the SEAFO Recommendation 1/2008 on the banning of deep-water shark directed fisheries becomes compulsory.

Regarding shark finning ("finning"), it refers to the removal and retention of shark fins while discarding the rest of the carcass at sea. The actual ratio of fins to carcass varies by species and it can be difficult or impossible to weigh fins and carcasses at sea. Having fins naturally attached to carcasses maximizes the enforceability of a finning prohibition and allows for more accurate collection of data on sharks that are landed.

Throughout the world, finning can lead to unsustainable levels of shark mortality. The high market value of shark fins, as compared to that of shark meat, drives the wasteful practice of finning. In addition, the removal of shark fins prior to landing impedes the collection of species-specific scientific data that are essential for monitoring bycatch. Keeping the shark with fins naturally attached through landing allows for more accurate species identification and proper tracking of the number of sharks caught and Retained.

The wasteful practice of shark finning is inconsistent with provisions adopted in the 1995 United Nations Food and Agriculture Organization's (FAO) Code of Conduct for Responsible Fisheries and the 1999 FAO International Plan of Action for the Conservation and Management of Sharks. These documents include provisions to ensure the conservation and management and long-term sustainable use of fisheries resources, including sharks.

A number of RFMOs have responded by adopting measures to address shark finning, such as the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Inter-American Tropical Tuna Commission (IATTC), the Indian Ocean Tuna Commission (IOTC), and the Western Central Pacific Fisheries Commission (WCPFC). There have been some challenges in enforcing these measures, which require the weight ratio of shark fins to carcasses retained on a vessel to be above specified levels.

The North-East Atlantic Fisheries Commission (NEAFC) recently adopted Recommendation 2015:10 on Conservation of Sharks Caught in Association with Fisheries Managed by NEAFC, which includes a fins attached requirement to ensure the shark finning ban in the NEAFC Convention area. The Northwest Atlantic Fisheries Organisation (NAFO) adopted fins naturally attached policy at its 2016 Annual Meeting.

1

Amendment to Conservation Measure 04/06 on the Conservation of Sharks Caught in Association with Fisheries Managed by SEAFO

Draft proposal by the European Union

The Parties to the SEAFO Convention

RECALLING that the United Nations Food and Agriculture Organisation (FAO) International Plan of Action of Sharks calls on States, within the framework of their respective competencies and consistent with international law, to cooperate through regional fisheries organisations with a view to ensuring the sustainability of shark stocks as well as to adopt a National Plan of Action for the conservation and management of sharks (defined as elasmobranchs);

CONSIDERING that many sharks are part of ecosystems in the SEAFO area, and that sharks are captured in fisheries targeting species covered by the SEAFO Convention;

RECOGNISING the need to collect data on catch, effort, discards and trade, as well as information on the biological parameters of many species, in order to conserve and manage sharks;

RECALLING that SEAFO adopted Recommendation 1/2008 concerning the banning of deep-water shark catches;

MINDFULL of CCAMLR CM 32-18 (2006) that bans directed fishing on shark species in the Convention Area;

RECALLING that the United Nations Food and Agriculture Organization (FAO) International Plan of Action for Sharks calls on States, within the framework of their respective competencies and consistent with international law, to cooperate through regional fisheries organizations with a view to ensuring the sustainability of shark stocks as well as to adopt a National Plan of Action for the conservation and management of sharks;

RECOGNIZING the need to improve the collection of species-specific data on catch, effort, discards, biological parameters and trade as a basis for improving the conservation and management of shark stocks;

RECALLING that the FAO International Plan of Action for Sharks calls on States to encourage full use of dead sharks, to facilitate improved species-specific catch and landings data and monitoring of shark catches and the identification and reporting of species-specific biological and trade data;

FURTHER RECALLING that United Nations General Assembly, adopted consensus Resolutions every year since 2007 (62/177, 63/112 , 64/72, 65/38, 66/68, 67/79, 68/71, 69/109 and A/RES/70/75), calling upon States to take immediate and concerted action to improve the implementation of and compliance with existing regional fisheries management organization or arrangement measures that regulate shark fisheries and incidental catch of sharks, in particular those measures which prohibit or restrict fisheries conducted solely for the purpose

of harvesting shark fins, and, where necessary, to consider taking other measures, as appropriate, such as requiring that all sharks be landed with each fin naturally attached;

AWARE that despite regional agreements on the prohibition of shark finning, sharks' fins continue to be removed on board and the rest of the shark carcass discarded into the sea;

EMPHASISING the recent recommendations of IOTC and WCPFC Scientific Committees and WCPFC Technical and Compliance Committee that the use of fins-to-carcass weight ratios is not a verifiable means of ensuring the eradication shark finning and that it has proven ineffective in terms of implementation, enforcement and monitoring;

NOTING the adoption of Recommendation 2015:10 on Conservation of Sharks Caught in Association with Fisheries Managed by the North-East Atlantic Fisheries Commission (NEAFC), which establishes the fins attached policy as exclusive option for ensuring the shark finning ban in the NEAFC Convention area;

FURTHER NOTING the recent adoption of the fins naturally attached policy by NAFO at its 2016 Annual Meeting;

AWARE that despite regional agreements on the prohibition of shark finning, sharks' fins continue to be removed on board and the rest of the shark carcass discarded into the sea;

The Commission hereby adopts the following conservation measure pursuant to articles 6 and 7 of the Convention:

Have agreed as follows:

1. Directed fishing on deep-water shark species in the Convention Area, for purposes other than scientific research, is prohibited. This prohibition shall apply until such time as the Scientific Committee has investigated and reported on the potential impacts of this fishing activity and the Commission has agreed on the basis of advice from the Scientific Committee that such fishing may occur in the Convention Area.

2. Any by-catch of shark, especially juveniles and gravid females, taken accidentally in other fisheries, shall, as far as possible, be released alive.

~~1.~~3. Each Contracting Party shall annually report data for catches of sharks, in accordance with SEAFO data reporting procedures, including available historical data, estimates of discards (dead and alive) and size frequencies.~~.~~

~~2.~~4. Each Contracting Party shall take the necessary measures to require that their fishermen fully utilise their entire catches of sharks. Full utilisation is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins, to the point of first landing.

5. Contracting Parties shall prohibit the removal of shark fins at sea and the retention on board, transhipment and landing of shark fins.

6. Without prejudice to paragraph 5, in order to facilitate on-board storage, shark fins may be

partially sliced through and folded against the carcass, but shall not be removed from the carcass before the first landing.

~~3. Each Contracting Party shall require their vessels to not have onboard fins that total more than 5 % of the weight of sharks onboard, up to the first point of landing. Contracting Parties that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5 % ratio through certification, monitoring by an observer, or other appropriate measures.~~

~~4. The ratio of fin to body weight of sharks described in paragraph 3 shall be reviewed by the Scientific Committee and report back to the Commission in 2008 for revision, if necessary.~~

7. Contracting Parties shall take the necessary measures to~~Fishing vessels are~~ prohibit their fishing vessels~~ed~~ from retaining on board, transhipping or landing any fins harvested in contravention of~~of~~ this Ceonservation M~~m~~easure.

~~5.~~8. Contracting Parties shall prohibit offering for sale, selling or purchasing shark fins that are taken, landed or possessed in contravention of this Conservation Measure.

~~6.~~9. In fisheries that are not directed at sharks, Contracting Parties shall encourage the release of live sharks, especially juveniles, to the extent possible, that are caught incidentally and are not used for food and/or subsistence.

10. Each Contracting Party shall, where possible, undertake research to:

a) identify ways to make fishing gears more selective, with the aim to reducing sharks by-catch;
b) improve knowledge on key biological/ecological parameters, life-history and behavioral traits, migration patterns of key shark species;
c) identify key shark mating, pupping and nursery areas; and
d) improve handling practices for live sharks to maximise post-release survival.

~~7. identify ways to make fishing gears more selective (such as the implications of avoiding the use of wire traces).~~
~~8. Each Contracting Party shall, where possible, conduct research to identify shark nursery areas.~~

11. The Commission shall consider appropriate assistance to d~~D~~eveloping~~–~~ Contracting Parties~~States~~, Parties to the Convention, for the collection of data on their shark catches.

~~9.~~12. The Scientific Committee shall annually review the information reported by Contracting Parties and shall, as necessary, provide recommendations to the Commission on ways to strengthen the conservation and management of sharks within SEAFO fisheries.

~~10.~~13. This Conservation Measure replaces Recommendation 1/2008 on the banning of deep-water shark catches and applies only to sharks caught in association with fisheries managed by the SEAFO. ~~This resolution applies only to sharks caught in association with~~

~~fisheries for species covered by the SEAFO Convention.~~