Report of the Second Meeting of the Scientific Committee of the Southern Indian Ocean Fisheries Agreement (SIOFA)

La Réunion

13 – 17 March 2017

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Agenda Item 1 – Opening

1. The second meeting of the SIOFA Scientific Committee was opened at 9.00am on 13 March 2017 by Dr Ilona Stobutzki, Chairperson of the Scientific Committee. Dr Stobutzki welcomed participants to the meeting. She mentioned the Scientific Committee of 2016 noting the progress made and requests from the Meeting of the Parties.
2. Dr Olivier Deganmann (Director of Food, Agriculture and Forestry for Reunion) welcomed delegates to Reunion Island and the Parc de la Providence.
3. The Executive Secretary made a welcoming speech, noting the fact this was the first official event in the Secretariat's new location and he thanked the French administrative staff for help with preparations for the meeting.
4. Members and observers introduced themselves and their delegations. A list of Contracting Parties and Observers in attendance is at Annex A.

Agenda item 2 – Administrative arrangements

5. The agenda was adopted, with some minor additions (Annex B).
6. The meeting documents were confirmed (Annex C) and the table of agenda items with relevant papers at Annex D.
7. Mrs Anna Côme will act as rapporteur, with assistance from delegations.
8. The Chair reminded the Scientific Committee of the Terms of Reference and rules of procedure.

Agenda Item 3 – Guide to interpret terminology used in Scientific Committee reports

9. The Chair introduced Paper SC-02-03 (01) noting that the third Meeting of the Parties had requested that the SC develop a guide to assist the Meeting of the Parties in interpreting the terminology used in the SC reports. This was to ensure that the nature of SC advice is clearly understood. The paper presents a draft based on the Indian Ocean Tuna Commission Scientific Committee's guide and incorporating intersessional comments.
10. The SC included a definition of the term 'ADOPT' under level 3. The SC **adopted** the guide as Annex E.

Agenda Item 4 – Annual National Reports

11. Last year, SC agreed on guidelines for National Reports. All parties (present) have submitted their National Report and these were discussed.

Cook Island National: SC 02 04 (01)

12. Two Cook Islands deep-sea trawlers were vessels permitted to operate in the Agreement area in 2016. Three species represented 87% of their catch: alfonsino (64%), orange roughy (23%) and cardinalfish (7%). The Cook Islands vessel effort peaked in 2010 (621 fishing days for three vessels), then reduced and has been stable over recent years. The time series of information was corrected from previous years. Cook Islands provided catch and effort data from 2001-2016 to the Secretariat on the first day of the Scientific Committee meeting in accordance with CMM 2016/02 paragraph 9, note 4.

13. Cook Islands noted their major concern that CPUE in the fishery for alfonsino by Cook Island vessels has declined by 50% since 2013, and the number of midwater trawl shots for Alfonsino significantly increased from 2011 to 2016. The Cook Islands noted this may indicate a serious change in the abundance of these stocks, and recommended a higher priority be given to assessment of alfonsino in the SC Workplan.
14. The Cook Islands noted that at the end of 2016, three major Orange Roughy fisheries in New Zealand were certified by the Marine Stewardship Council. The Cook Islands suggested that this had changed the paradigm in understanding of management of deepwater fisheries. With improved technology, better approaches to modelling population dynamics in orange roughy, and a more considered and robust approach to setting up the management framework (harvest strategy, management strategy evaluation, appropriately estimated limit and target reference points or ranges, and harvest control rules), orange roughy fisheries have shown to be both managed and sustainable.
15. The Cook Islands suggested that, essentially, previous assumptions about the unmanageability of these fisheries are no longer warrented and that provided appropriate steps are taken by the management organisation to set and deliver a low and appropriate level of fishing mortality, deepwater fisheries can be sustainably utilised, and the SC notes this is important advice for the Meeting of the Parties to consider. A proposal to take Cook Islands vessels into an MSC pre-assessment is proposed for 2017.
16. The Cook Islands encounter protocol includes that 60 kg of live coral and/or 400 kg of live sponge may indicate a VME encounter, and this trigger was reached on one occasion in 2016. The Cook Islands notes that other RFMOs, such as SPRFMO are progressing towards spatial management as a standard conservation and management measure to minimise bottom fishing impacts, in preference to move-on rules.

National Report Korea: SC-02-04 (02)

17. Korean longline fishery in the high seas of the Indian Ocean started in 1999, and Korean trawl fishery initiated operating in the SIOFA area since 2000. The number of trawlers and longliners operating in the SIOFA Area between 2011 and 2013 were one and one-to-three vessels respectively; however, none of the fishing vessels have been operating in the SIOFA area since 2014. Major target species for Korean trawlers in the area have been pelagic armorhead and splendid alfonsino, while those of Korean longliners have been Patagonian toothfish and hapuka.
18. The annual observer coverage has been more than 50 % for bottom impacting gear fishery since 2009. Korea established a procedure to protect Vulnerable Marine Ecosystems from bottom fishing in the high seas in 2009. It consists of threshold of VME organisms, move on rule etc.
19. Korea presented paper SC-02-07 (01) which reports the status of their fisheries dataset in the high sea of Southern Indian Ocean. Data collection has changed since 2009. Before 2009 fishing vessels reported daily total catch and effort data. After 2009, fisheries data collection was improved and currently Korea collects catch data tow by tow. Korea advised that they will submit the verified historical data including VMEs data next year.

Australia National report: SC-02-04 (03) Rev2

20. Australian operators in the SIOFA Area are currently authorised by the Australian Government to target various species with mid-water and demersal trawl, dropline,

minor line, automatic longline and demersal longline. In the 2015/16 fishing season one Australian multipurpose trawler-longliner conducted a single trip. Australian fishing activities were restricted to Australia's demersal fishing footprint. Catch and effort data for 2016 are not yet available but will be provided to the Secretariat in accordance with CMM 2016/02. No interactions with vulnerable marine ecosystems or bycatch species were reported.

21. Australia clarified that tow by tow catch data had been submitted to the Secretariat. In terms of the SPRFMO Deep-water Working group meeting, 23-25 May 2017, Australia advised it will be chaired M. Galvez, the working group chair and will provide a report to SPRFMO SC. Interested Parties were likely to be able to attend as observers.

Japan National Report: SC-02-04 (04)

22. Japan presented a document that describes following seven items requested by the National Report Template, i.e., "Fisheries", "Catch, effort and CPUE", "Fisheries data collection and research activities", "VME Thresholds", "Biological sampling and length/age composition of catches", "Data verification mechanisms" and "Observer program". In the SIOFA convention area, Japan has been operating two different types of fisheries discontinuously for 40 years (1977-2016), i.e., trawl fisheries targeting splendid alfonsino and bottom longline fisheries targeting Patagonian toothfish. Based on accumulated information, the seven items are described within the report for both trawl and bottom longline fisheries.

23. Japan clarified that length frequency data have been collected and would be included next year. It was noted that there are no defined VME threshold levels for trawl fisheries, these will be established once the observer recognises that the operation is likely to come into contact with the sea floor or benthic organisms.

24. Japan presented a working paper SC-02-04 (05) describing the Japanese on-board scientific observer programs for a trawl fishery at SIOFA convention area. An observer training course was held twice for three candidates of scientific observers to implement 100 % on-board scientific observer coverage required for the trawl fishery under the CMM 2016/01. Cruise report, catch and effort data, length frequency data, and other biological information are collected according to the voluntary observer data list described in CMM 2016/02. Through the preparation and actual implementation of the observer program, difficulty is recognized for collection of some data listed in Annex B, CMM 2016/02. The Scientific Committee must consider the data listed in the Annex B in terms of necessity and feasibility of data collection.

25. Following Japan's request, it was advised that species identification guides for VMEs, corals, deep water sharks, were available from the FAO ABNJ Deep Seas Project. The FAO observer offered to forward these to Japan. Japan confirmed that where possible they take photos and preserve specimens which are sent for identification.

26. The SC noted the start of Japan's scientific observer program and the fact they anticipate 100% observer coverage. Japan raised concern with the ability of observers being able to collect all the data require in each operation. It was noted that the SC has been directed by the Meeting of the Parties to review the scientific observer data standards in 2018.

27. Japan noted that the observers record the data on paper forms and then this is transferred into an electronic template.

28. Japan clarified that for the longline vessels the observers use the CCAMLR observer templates in the SIOFA Area.

France (Territories): SC-02-04 (06)

29. This scientific report describes the France (Territories) licensed fishery in the SIOFA area from 2000 to 2015, in accordance with the requirement of CMM 2016/02. This report includes historical data and the annual data 2016. The France (Territories) fleet is composed of seven to eight longliners and one trawler. The main targeted catch in the south of the SIOFA area by the longliners is the Patagonian toothfish, *Dissostichus eleginoides* (TOP), annual catches vary between 11 and 22 tonnes. This last decade, each year only 2 vessels have fished, the effort is from 13 to 40 days per year and have done 41 to more than one hundred stations. The collection of biological data and Scientific observer programs is conducted following the CCAMLR Scheme of International Scientific Observation.
30. France (Territories) clarified that the trial of pots and vertical long lines had reported no catch.

EU Report: SC-O2-04 (07) Rev1

31. In 2016 two longline vessels, one from EU-France and another from EU-Spain, operated in the SIOFA Area, in the Saya de Malha Bank - Area 8 (EU-France) and Areas 1, 2 and 3b but mainly in Area 2 (Walters Shoals) by EU-Spain vessel. Since 2009 longline tuna vessels from EU-France, at the end of their tuna fishing trips, they regularly target demersal species in the SIOFA Area. For most recent years specific catch compositions were provided by fleet and SIOFA areas and also the fishing effort for the EU-Spain fleet. For this fleet and period, the Portuguese dogfish was the main species in the catches and the fishery was mainly concentrated in Area 2. The historical fishing footprint for EU-Spain fleet showed that fishing activity took place in Areas 1, 2, 3, 3b and 8, but the greatest density of fishing operations occurred in Area 2.
32. The EU clarified that in 2015, EU Spain vessels had moved from a gillnet fishery targeting deepwater sharks to a longline fishery targeting the same species. They noted they are looking towards the outcomes of the ecological risk assessment, to be discussed under Agenda Item 9.
33. The EU clarified that with respect to the fishing for demersal species on the Saya de Malha Bank, that these were vessels fishing in IOTC for tuna that changed their fishing operations at the end of tuna fisheries trips. It was noted the data from these fishing activities should be provided to the Secretariat in line with CMM 2016/02.
34. The EU advised that they intend to deploy an observer in June or July to cover the time of observation and to collect biological data on the deepwater sharks. Some size data are available.

National reports general discussion

35. There was general discussion on the catch data presented in the national reports; some Parties present catch weight by species and others percentage catch composition, without total catch. It was noted that while the national report guidelines require the former, as national reports were public documents, in some cases the data confidentiality requirements of Parties mean the data that can be presented is constrained. It was noted that in line with CMM 2016/02, these finer-scale data were expected to be submitted to the Secretariat.
36. There was general discussion about the potential value of vessels collecting information on sightings of other fishing vessels. This may contribute to understanding non-member fishing activity and potential catch.

37. The SC noted that Mauritius and the Seychelles had not provided national reports or historical data. The SC **requested** the Secretariat follow-up with Parties in terms of providing these in line with CMM 2016/02 and to assist the SC's work.

38. The SC noted that information from observers to the meeting that were fishing in the area on their fishing activities would be valuable. This would contribute to an understanding of the extent of non-member fishing activity and potential catch. The SC **requested** the Secretariat ask observers to provide this in future.

39. While the current observers to the meeting had not prepared reports, Thailand noted there were fishing activities in the area but these have stopped. China was not able to advise.

National Report guidelines

40. The SC noted the need to update the National Report guidelines adopted by SC1 to ensure they were consisted with the CMMs. Specifically, CMM 2016/02 requires the submission of National Reports and includes requirements with respect to the information on observer programs. Clarification was also requested in the guidelines on how Parties manage domestic confidentiality requirements.

41. The SC **adopted** the revised guidelines for national annual reports (Annex F Guidelines for the submission of annual national reports) and **requested** the Secretariat insert a new map (Annex F, Figure 1) to show the entire SIOFA area and area 8 from Table 1.

Agenda Item 5 - Scientific Data Standards

Agenda Item 5.1 Guidelines for evaluating and approving electronic observer programs for scientific data collection.

42. Australia presented paper SC-02-05(01) noting that it has been trialling electronic monitoring systems (EMS) in its domestic fisheries. These trials have focused on assessing the data that EMS can collect with 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 improves vessel logbook reporting where human at-sea observer coverage is not 100%. The working paper 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.

43. The Cook Islands advised that they are trialling electronic monitoring (Smart forms) in conjunction with the FAO ABNJ Deep Seas Project.

44. 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 guidelines to review how electronic monitoring equipment satisfies each data field in the data standards (CMM 2016/02).

45. The SC established a small working group (SWG) led by France (Territories), to develop guidelines for evaluating and approving electronic observer programs for scientific data collection.

46. The SC **recommended** the Meeting of the Parties adopt the Guidelines for evaluating and approving electronic observer programs for scientific data collection (Annex G Guidelines for evaluating and approving electronic observer programmes for scientific data collection)

47. The SC discussed that the approach applied to verify electronic monitoring could also apply to 'self-sampling' programs (where fishers collect scientific samples or data).

Agenda 5.2 An appropriate spatial resolution for the collection and reporting of data to facilitate effective stock assessment

48. The SC reiterated that the data standards, as described in CMM 2016/02 are the minimum required and noted that the proposed Stock Assessment Working Group (see paragraph 99) will provide advice on whether a finer resolution is required.

Agenda item 5.3 SIOFA Scientific database

49. The SC received a presentation of SIOFA scientific database development from Mr George Campanis. The databases developed included the SIOFA Vessel Registry, Catch and Effort, and Scientific Observer databases. The fields contained in the respective databases were based on data standards contained in CMM 2016/02 and 2016/07, and the confidentiality requirements from CMM 2016/03.

50. The Catch and Effort database is now established and contains historical tow-by-tow data for Australia and France Overseas Territories. Improvements to the database is currently ongoing and should be completed within 6 months. No Observer data were received by Members and therefore the structure of the SIOFA Observer Database could not be tested. Historic catch and effort data at a coarser scale provided by Cook Islands, EU and Japan, e.g. monthly or daily, will require an additional database which will be completed by SC3.

51. The SC discussed the importance of ensuring consistency in data submissions, which should be achieved by following the data standards CMM2016/02. In some cases further guidance may be needed by SC, for example, Mr Campanis noted that in some cases species were incorrectly identified in the data submission.

52. The SC noted that the progress on the database was very encouraging. The SC **requested** that the Secretariat finalise 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 bycatch research. The SC **requested** Parties to submit tow-by-tow observer and catch and effort data in line with CCM 2016/02, to the Secretariat for input into the SIOFA databases.

53. The SC **requested** that the Secretariat generate standard data summaries prior to the SC meeting to contribute to the annual review of fisheries. This includes, amongst others:

    - Spatial distribution of fishing effort and catch
    - Spatial distribution of VME Indicator species
    - Actual catches by species, Parties and SIOFA sub-area

- Number of samples observed per set/haul.

Agenda Item 6 - Vulnerable marine ecosystems

54. The Chair noted that paragraphs 5(b) and (d) of the SIOFA bottom fishing measure (CMM 2016/01) require the SC to provide advice to the Meeting of the Parties on these issues at its 2017 meeting.

Agenda Item 6.1 Maps of where VMEs are known to occur, or likely to occur, in the agreement area

55. France (Territories) presented paper SC-02-06 (02). From 2015 to 2016, a new protocol had been developed and tested to collect data about the macrobenthos by-catch specimens caught by the fishing vessels in the Southern Ocean. This approach is based on a standardized photographic protocol, implemented on board by the scientific observers. All the collected pictures of the benthic invertebrates have been sorted and registered in specific sets of data at the laboratory. A pipeline of treatment of the pictures, including taxonomic identification, allows to produce various analyses about species composition and community assemblages. Linked to the "Vulnerable Marine Ecosystems" conservation issue, the preliminary results obtained from the Kerguelen French EEZ highlight the spatial distribution of some sensitive marine ecosystems/habitats. All the data collected with this protocol is stored and managed within the global information system used for fisheries monitoring. The developed approach aims to reply to specific feasibility constraints, especially the need of non time-consuming protocols on board and the difficulty of taxonomic identification for the benthos.
56. Some georeferenced data on benthic species, which might include VME indicator organisms are available for the SIOFA Area. These data constitute a basic input for the SIOFA´s objective of mapping VMEs known to occur, or likely to occur, in the agreement area and the implementation of the UNGA resolutions. Nevertheless, to accomplish this objective, several aspects and concerns that need to be addressed were discussed.
57. For mapping purposes, the SC **agreed** that georeferenced 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, VMEs are detected in different patterns due to the nature of the gears. For example, for bottom longline, VMEs may be detected in parallel paths, while, for bottom trawl, in the same trawl paths.
58. For much of the SIOFA Area, data on seabed biodiversity and benthic community composition are not available, and ancillary information on other factors that influence the location of VMEs is commonly used to estimate the probability occurrence and suitability of areas for supporting VMEs. Regarding this modelling approach, some concerns were raised particularly the uncertainty of the predictions and model´s predictive capacity associated with the spatial scale adopted, as well as the quality and spatial disaggregation level of the matrix data for prediction. The predictive power is strictly dependent on the amount and level of spatial disaggregation of georeferenced data available.
59. The SC noted the existence of other sources of VME information, particularly the work undertaken by Southern Indian Ocean Deepsea Fishers Association (SIODFA) where Benthic Protected Areas were proposed.

60. The SC noted that the inclusion of other sources of VME species indicators information into the SIOFA VME map requires further discussion, particularly given their different level of spatial disaggregation.

61. The SC **requested** that the Secretariat create maps using the georeferenced data (referred to in paragraph 57). The SC **requested** that Parties provide or facilitate provision of other data available from surveys (such as those referred to in paragraph 59) to the Secretariat, to be incorporated into these maps.

62. The SC **requested** that the Secretariat work with the FAO ABNJ Deep Seas Project on their planned mapping of data on VMEs in the SIOFA Area.

Agenda Item - 6.2 Standard protocols for future protected areas designation (areas which should be closed to fishing)

63. The Chair recalled that the SC had been requested to provide standard protocols to assist the development of protected area designation, one tool available to the Meeting of the Parties to ensure implementation of UNGA Resolution and CMM 2016/01.

64. The SC interpreted that the Meeting of the Parties was requesting information to assist them to in considering management measures that may extend beyond fisheries control and to provide protection to areas that have been identified as needing specific protection.

65. The Cook Islands proposed that one criteria could be areas of abundant benthos and drew attention to the Benthic Protected Areas (described in SC-01 Info-15) and noted that these areas are closed by the Cook Islands, Australia and voluntarily by other vessels in SIODFA. The SC noted that the Meeting of the Parties requested additional information on a scientific basis for the establishment of these areas.

66. The SC had a general discussion on the type of criteria that could form part of the protocol, noting some of those used internationally and in different countries to identify spatial closures. The SC noted that several organisations have defined criteria of biodiversity that might be useful.

67. A SWG, led by the EU, was tasked with discussing and developing a draft protocol. To facilitate discussions, the Cook Islands provided a working document outlining the scientific criteria that were applied in the identification of the Benthic Protected Areas and these were taken into account in the SWG discussions.

68. The SC **agreed** that the proposed protocols should include the compilation and evaluation of relevant data, adopt the FAO Guidelines to identify VME habitats and define the criteria for identifying protected areas designation and that the SC will recommend future protected areas on the basis of the standard criteria.

69. The SC **agreed** that the draft criteria should be reviewed after the SC has considered the first submission of a working paper proposing a protected area.

70. The SC **recommended** that the Meeting of the Parties adopt the proposed standard protocols for future protected areas designation (Annex H SIOFA Standard Protocol for future protected areas designation), noting that these contain draft criteria.

Agenda Item 6.3 Progress towards a bottom fishing assessment standard

71. The Chair presented paper 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 CMM notes the United Nations General Assembly (UNGA) Resolution 61/105 and subsequent resolutions that call upon RFMOs to assess, on the basis of the best available scientific information, whether individual bottom fishing activities would have significant adverse impacts on vulnerable marine ecosystems (VMEs). The CMM 2016/01 directs the 2017 Scientific Committee to provide advice and recommendations on a SIOFA Bottom Fishing Assessment Standard (BFIAS) that takes into account the latest scientific information available. A SIOFA BFIAS will guide members in developing their assessment of bottom fishing activities and enable the Scientific Committee to evaluate these assessments. This paper provides a draft 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 Organisation BFIAS.

72. The SC **agreed** that the reference to exploratory fisheries was not currently necessary, because SIOFA has no definition of exploratory fisheries.

73. Participants indicated the necessity to consider:

    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.

74. A SWG was established, led by SC Chair, to reflect these discussions in the draft document.

75. The SC **recommended** that the Meeting of the Parties adopt the SIOFA Bottom Fishing Impact Assessment Standard, Annex I SIOFA Bottom Fishing Impact Assessment Standard. In making this recommendation, the SC **noted** that the BFIAS requires a definition of 'new fisheries' and **recommended** the Meeting of the Parties provide a definition to the SC for inclusion in the BFIAS.

76. The BFIAS reflects the timeframes as described in CCM 2016/02. The SC noted that these timeframes may permit fishing to occur for a year before the SC reviews the relevant bottom fishing impact assessment and this may mean the BFIA no longer reflects the fishery being assessed.

Agenda Item 7 - Current and historical status of fishing activities

77. The Chair recalled that CMM 2016/02 required the submission of historical catch and effort data to the Secretariat. These data will be important for the SC work on generating a SIOFA fishing footprint and stock assessments.

78. SIOFA Secretariat provided a summary of historical data submitted as of 13th March 2017. Data have been submitted to the Secretariat by four Contracting Parties; Australia providing data for years 2001-2015, EU providing data for 2000-2016, France (Territories) providing data for years 2006-2015 and Japan providing data for years 1977-2016. The Cook Islands provided catch and effort data from 2001-2016 to the Secretariat on the first day of the SC meeting in accordance with CMM 2016/02 paragraph 9, note 4. Korea provided a summary of their historic data, SC-02-07 (01).

79. Australia and France (Territories) have submitted data in a set-by-set and/or tow-by-tow resolution. EU and Japan have provided daily and monthly aggregated data, respectively. The Cook Islands provided data aggregated by day.

80. The Cook Islands noted that a GIS specialist has been recruited to work on the Cook Islands historical footprint data to define the actual fished footprint in the SIOFA Area, as had been undertaken by Australia for the SPRFMO Area. This work will form part of the Cook Island BFIA, and will support the SIOFA footprint assessment.

81. The SC **requested** Parties who had not yet provided the required data, or a comprehensive summary to provide this as soon as possible, to contribute to the SIOFA database development.

82. A SWG, led by Australia, was established to draft the Overview of Fisheries report. The SC discussed that aggregating the data across Parties may enable finer scale data to be presented. The creation of this report may identify data summaries that the SC requests from the Secretariat prior to its meetings.

83. The SC **recommended** that the Meeting of the Parties consider the Overview of Fisheries report (Annex J Overview of SIOFA Fisheries 2016).

Agenda Item 8 - Stock assessments

Agenda Item 8.1 Orange Roughy

84. The Chair noted the direction provided in CMM 2016/01, and that the SC will provide advice and recommendations to the Meeting of the Parties on the status of stocks of principle deep-sea resources targeted by the end of SC 2019.

85. The Cook Islands introduced paper SC-02-08(01) reporting on the workshop organized as part of the ABNJ Deep Seas Project's activities to improve knowledge on orange roughy and on acoustic methods and complementary technologies for estimating its abundance and biomass. The workshop examined SC-01-INFO-15 which summarized acoustic data from the SIOFA region collected between 2004 and 2015. Questions from all participants were answered and procedures in the assessment clarified. A general review was then conducted to scrutinize the main sources of uncertainty and bias that could affect the estimates: absorption and deadzone estimation, echotrace identification and delineation, survey (inference) area, biological and vessel noise, target strength and statistical procedures. The effects of different assumptions and methods were discussed and/or tested using selected test datasets. Approaches to disentangling observation and process errors were also discussed, as well as the need to define practical management/observation units. Finally, a series of recommendations was produced, both for reviewing the existing datasets and for conducting future surveys in the SIOFA area.

86. Cook Islands noted that a large set of acoustic survey data was available from 2004-2015, and that these had been collected by a single vessel. The Cook Islands suggested, that in future there was a need to encourage more vessels to collect and submit data, in accordance with the FAO Deepsea Guidelines.

87. Cook Islands clarified that the acoustic technologies in use have been regularly calibrated. One vessel is using a new broadband transducer, which might result in changes to estimates, but methods exist that will allow corrections to be made.

88. The Executive Secretary presented paper SC-02-08 (02), which describes the terms of reference for an analysis of orange roughy acoustic data that will support stock assessments, as required within the SC operational work plan. An outline of the terms

of reference and a workplan to address the objectives was provided and the meeting was invited to consider the proposal and timelines for this data review.

89. The SC thanked the industry involved for providing access to and consideration of these data in undertaking the work described in SC-02-08 (02). The funding that is available for the project will allow the review of one or two areas within the next 12 months.

90. The SC **requested** that the Secretariat discuss with the commissioned organisation whether a draft report can be made available to the proposed Stock Assessment Working Group by September 2017, or earlier.

91. The SC discussed the biological data needed for stock assessment, and noted key gaps especially knowledge of stock structure and age composition. The SC noted that standard protocols for orange roughy should be used and the Cook Islands circulated a paper that described a protocol (Age determination protocol for orange roughy (Hoplostethus atlanticus). (Horn, P.L.; Tracey, D.M.; Doonan, I.J.; Krusic-Golub, K. (2016), New Zealand Fisheries Assessment Report 2016/03). In terms of orange roughy stock structure, the Cook Islands drew attention to the information on in paper SC-01-INFO-16, and highlighted the recommendation from SC-02-08 (01) that to enable the estimation of the precision of biomass estimates at least three acoustic surveys of a stock within a year are required.

92. The SC noted that different assessment approaches would be appropriate, depending on how the Meeting of the Parties intended to manage the stocks. The SC also discussed that different assessment approaches, e.g. full quantitative assessments vs ERA approaches, have different data, resourcing and time requirements. The outcomes of the SPRFMO Workshop described in SC-02-INFO-03 may assist the SC in the application of assessment methods.

93. The SC **agreed** that stock assessment work needs to be progressed intersessionally.

Agenda Item 8.2 Alfonsino

94. The Cook Islands drew attention to the information provided in their national report (SC-02-04(01)) with respect to alfonsino. Interpreting catch per unit effort in targeted fisheries is complex and if not done appropriately can result in errors of interpretation. It can be useful to see how CPUE changes on an annual basis and, in the absence of other data, trends in CPUE provide the only indicator as to the state of a stock. However, to increase fishing effort in any fishery where there is a decline in CPUE is not considered as a precautionary practice. Decline in CPUE therefore indicates that further management steps should be taken to assess the state of the fishery.

95. The Cook Islands noted that alfonsino catch per unit effort (tonnes per hour fished) for the Cook Islands vessels has steadily reduced over recent years, and the Cook Islands noted their concerns about the state of this fishery and requested the SC establish a Working Group to develop management and harvest strategies for this fishery, to commence in 2017.

96. 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 standardisation,
    - the timeframe considered, e.g. last 5 years vs full time series,
    - disaggregated length frequency data.

97. The SC noted that data on alfonsino in SIOFA area were available from the fishing activities by the Cook Islands, Australia, Japan and Korea.

98. The SC **agreed** that the stock assessment work needed to be progressed inter-sessionally. A SWG, led by Australia, was formed to develop the terms of reference and work plan for a proposed Stock Assessment Working Group.

99. The SC **recommended** that the Meeting of the 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 SIOFA Stock Assessment Working Group ToR.

Agenda Item 8.3 Patagonian Toothfish

100. The Chair recalled the advice from SC1 that toothfish caught in the SIOFA area were likely to be part of a stock shared with the CCAMLR area. The Chair advised that there had been initial correspondence with CCAMLR noting the desire of the SC to collaborate on stock assessment.

101. The Chair summarised information that CCAMLR had provided on toothfish tagging and recaptures. She advised that CCAMLR holds tagging details for 496 Patagonian toothfish tagged using CCAMLR tags in the SIOFA area. These fish were tagged on a Uruguay flagged vessel in 2008. All were released in a region between 44.3 to 45.0 S and 43.5 to 45.3 E, to the north of the CAMLR Convention Area between the EEZs of South Africa and France. In 2016 Korea provided a summary to CCAMLR of tagged fish recaptured by their vessels in the SIOFA region that included eight CCAMLR issued tags, of which five could be linked to the 2008 release event in the region indicated above. The other three tags were supplied to Uruguay but no tagging details have been provided to CCAMLR. The Korean summary also included details of two fish that were tagged in the French EEZ around Crozet Island (within the CCAMLR Area) and recaptured further north.

102. The Chair reported that the CCAMLR Secretariat had asked the SC to consider:

- raising awareness among fishing nations of the potential for the recapture of tagged fish and that any such recaptures be reported to the SIOFA Secretariat. These reports should include the date and location of recapture, the colour and tag number (including alpha-numeric) of all tagged fish. A photograph of the tag(s) is often helpful for data reconciliation.
- the SIOFA Secretariat pass the data relating to the recapture of tagged toothfish in order that these can be linked to release events.
- the CCAMLR Secretariat provides the linked release and recapture information to the SIOFA Secretariat.
- in order to facilitate such a data exchange the Secretariats of CCAMLR and SIOFA draft a data exchange protocol as part of an arrangement to be agreed by both Commissions.

103. 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.

104. 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.

105. The SC discussed the potential value of releasing tags in the SIOFA area but noted that it required industry engagement and they had insufficient information to determine the value for stock assessment. The SC **requested** the Chair seek further information from CCAMLR on their tagging program and specifically, the value of tag releases in the SIOFA area for stock assessment.

Agenda Item 8.4 Other species

106. The SC noted that the ERA approach could be usefully applied to stocks of key target species or bycatch and species caught incidentally.

Agenda Item 9 Impacts of fishing on associated and dependent species

Agenda Item 9.1 Report on progress towards an ecological risk assessment for deepwater sharks in the SIOFA Area

107. Australia presented paper SC-02-09(01) 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 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 an 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 deepwater 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, gear description, 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 deepwater shark populations.

108. The SC welcomed the progress on this issue and the collaborative approach and thanked the Parties and researchers involved in the analysis and the industry involved in the data collection.

109. The SC **agreed** that the 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. This needs to be refined 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.

110. The SC **agreed** that the ERA approach could be usefully applied to stocks of key target species, bycatch and incidentally caught species. This was incorporated in the work plan for the proposed ERA WG (Annex L SIOFA Ecological Risk Assessment Working Group ToR).

111. SIODFA advised that they have had a shark data collection programme since 2006. Much data have been recorded including species identification, length, weight, sex, number of pups and photographs. Given there is an issue of shark conservation there would be benefit in analyzing this information. SIODFA's view was that the conservation of deepwater sharks would be most effectively addressed through a dedicated Elasmobranchs Working Group (EWG) rather than including this task in a more general stock assessment WG, which might detract from the task of addressing the status and management of targeted fisheries. SIODFA suggested a dedicated EWG would also facilitate involvement of experts who are not part of the SC and that further shark information may be obtained from vessel skippers, most of whom had a long involvement in the fishery, if they were asked

112. SIODFA noted that the term 'risk' has a specific meaning in statistics/decision theory - the product of the probability of an event happening, e.g. a stock collapse, and the loss associated with such an event. SIODFA suggested that this perception may benefit Parties in understanding the consequence of, or lack of, management decisions.

113. The SC noted that risk is explicitly defined in the ERA methodology as likelihood times consequence.

114. The SC **agreed** that the ERA work needed to be progressed inter-sessionally. A SWG, led by Australia, was formed to develop the terms of reference and work plan for a proposed ERA Working Group.

115. The SC **recommended** the Meeting of the 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 SIOFA Ecological Risk Assessment Working Group ToR.

116. The SC noted the expectation in CMM 2016/05 that the Meeting of the Parties would receive a recommendation from the SC in relation to the use of deepwater gillnets and that this work had been identified in the 2017 – 2019 Operational Work Plan adopted at SC1.

117. The SC **agreed** that this research remain on the updated Operational Work Plan (Annex Operational Workplan), reflecting the Meeting of the Parties expectation of SC advice on this issue.

Agenda Item 10 – Proposals to bottom fish in the Agreement Area in a manner at variance with Established Measures.

118. There were no proposals to be discussed.

Agenda Item 11 Cooperation with other RFMOs and international bodies

Agenda Item 11.1 FAO ABNJ Deep Sea Project update

119. FAO presented document SC-02-INFO-04. In 2016, the ABNJ Deep Seas Project, in association with the other projects of the FAO Deep-seas fisheries Programme, produced a range of publications including technical papers on the biology and assessment of alfonsino (www.fao.org/3/a-i5336e.pdf) and a report on VME –processes and practices (http://www.fao.org/3/a-i5952e.pdf), and an introduction to marine datasets of biodiversity importance in the Western Indian Ocean (http://wcmc.io/WIOdata).

120. In January 2017, the Project supported a workshop 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. Other project activities relevant to SIOFA that will be undertaken in 2017 include: training for countries on international obligations related to deep-sea fisheries and biodiversity conservation in the ABNJ; a review of traceability in deep sea fisheries; a review of rights based management; and an examination of monitoring control and surveillance practices (including capacity development opportunities for SIOFA countries). The project is also working with the Cook Islands to trial the use of cameras on its deep sea fishing vessels operating in the SIOFA Area to collect information on VMEs.

121. The SC welcomed regular updates from the project. The SC noted the planned work on compiling maps of VMEs in the Indian Ocean and the fact that this may assist in accelerating the VME mapping needed for the SC work and meeting CMM 2016/01. The SC also noted the project's planned work on assessing the likely impact of gear types and that this may assist in the SC work on advice on VMEs.

122. The SC **requested** the Executive Secretary engage with FAO ABNJ Project on:

- the planned mapping work, to accelerate the availability of these maps to the SC,
- the planned assessment of the likely impact of gear types, and
- possible support for the ERA work (Annex L SIOFA Ecological Risk Assessment Working Group ToR).

Agenda Item 11.2 Draft arrangement between SIOFA and CCAMLR

123. The Chair introduced paper SC-02-11(01) which provides a draft arrangement to facilitate cooperation between SIOFA and CCAMLR. The SC had no comments on the draft but noted the value of the arrangement in facilitating the SC work on stocks that are shared between the SIOFA and CCAMLR regions.

Agenda Item 12 – Scientific Committee Work Plan

Agenda item 12.1 Long term Research Plan

124. The SC **agreed** there was no need to update the long term research plan at this time.

Agenda item 12.2 2017-2019 Operational Work plan and Budget

125. The SC **adopted** an updated Operational work plan (Annex M SIOFA Operational work plan).

126. The SC **recommended** that the Meeting of the Parties allocate the following research activity budget:

- Stock Assessment Working Group activities, EU30,000
- ERA Working Group activities, EU30,000.

This allocation would support the engagement of relevant expertise to complete specific working group activities (for example a stock assessment), if required.

Agenda Item 13 – Advice to the Meeting of the Parties

127. Consolidation of advice to the Meeting of the Parties

The SC **recommended** the Meeting of the Parties adopt the Guidelines for evaluating and approving electronic observer programs for scientific data collection (Annex G Guidelines for evaluating and approving electronic observer programmes for scientific data collection). (Paragraph 46)

The SC **recommended** that the Meeting of the Parties adopt the proposed standard protocols for future protected areas designation (Annex H SIOFA Standard Protocol for future protected areas designation), noting that these contain draft criteria. (Paragraph 70)

The SC **recommended** that the Meeting of the Parties adopt the SIOFA Bottom Fishing Impact Assessment Standard, Annex I SIOFA Bottom Fishing Impact Assessment Standard. In making this recommendation, the SC **noted** that the BFIAS requires a definition of 'new fisheries' and **recommended** the Meeting of the Parties provide a definition to the SC for inclusion in the BFIAS. (Paragraph 75)

The SC **recommended** that the Meeting of the Parties consider the Overview of Fisheries report (Annex J *Overview of SIOFA* Fisheries 2016). (Paragraph 83)

The SC **recommended** that the Meeting of the 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 SIOFA Stock Assessment Working Group ToR. (Paragraph 99)

The SC **recommended** the Meeting of the 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 SIOFA Ecological Risk Assessment Working Group ToR. (Paragraph 115)

The SC **recommended** that the Meeting of the Parties allocate the following research activity budget:

- Stock Assessment Working Group activities, EU30,000
- ERA Working Group activities, EU30,000.

This allocation would support the engagement of relevant expertise to complete specific working group activities (for example a stock assessment), if required. (Paragraph 126)

128. Consolidation of SC requests

The SC noted that Mauritius and the Seychelles had not provided national reports or historical data. The SC **requested** the Secretariat follow-up with Parties in terms of providing these in line with CMM 2016/02 and to assist the SC's work. (Paragraph 37)

The SC noted that information from observers to the meeting that were fishing in the area on their fishing activities would be valuable. This would contribute to an understanding of the extent of non-member fishing activity and potential catch. The SC **requested** the Secretariat ask observers to provide this in future. (Paragraph 38)

The SC **adopted** the revised guidelines for national annual reports (Annex F Guidelines for the submission of annual national reports) and **requested** the Secretariat insert a new map (Annex F, Figure 1) to show the entire SIOFA area and area 8 from Table 1. (Paragraph 41)

The SC noted that the progress on the database was very encouraging. The SC **requested** that the Secretariat finalise 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 bycatch research. The SC **requested** Parties to submit tow-by-tow observer and catch and effort data in line with CCM 2016/02, to the Secretariat for input into the SIOFA databases. (Paragraph 52)

The SC **requested** that the Secretariat generate standard data summaries prior to the SC meeting to contribute to the annual review of fisheries. This includes, amongst others:

- Spatial distribution of fishing effort and catch
- Spatial distribution of VME Indicator species
- Actual catches by species, Parties and SIOFA sub-area
- Number of samples observed per set/haul

(Paragraph 53)

The SC **requested** that the Secretariat create maps using the georeferenced data (referred to in paragraph 57). The SC **requested** that Parties provide or facilitate provision of other data available from surveys (such as those referred to in paragraph 59) to the Secretariat, to be incorporated into these maps. (Paragraph 61)

The SC **requested** that the Secretariat work with the FAO ABNJ Deep Seas Project on their planned mapping of data on VMEs in the SIOFA Area. (Paragraph 62)

The SC **requested** Parties who had not yet provided the required data, or a comprehensive summary to provide this as soon as possible, to contribute to the SIOFA database development. (Paragraph 81)

The SC **requested** that the Secretariat discuss with the commissioned organisation whether a draft report can be made available to the proposed Stock Assessment Working Group by September 2017, or earlier. (Paragraph 90)

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. (Paragraph 103)

The SC **requested** the Executive Secretary engage with FAO ABNJ Project on:

- the planned mapping work, to accelerate the availability of these maps to the SC,
- the planned assessment of the likely impact of gear types, and
- possible support for the ERA work (Annex *ERA WG*).

(Paragraph 122)

129. Consolidation of SC adoptions

The SC included a definition of the term 'ADOPT' under level 3. The SC **adopted** the guide as Annex E. (Paragraph 10)

The SC **adopted** the revised guidelines for national annual reports (Annex F Guidelines for the submission of annual national reports) and **requested** the Secretariat insert a new map (Annex F, Figure 1) to show the entire SIOFA area and area 8 from Table 1. (Paragraph 41)

The SC **adopted** an updated Operational work plan (Annex M SIOFA Operational work plan). (Paragraph 125)

Agenda Item 14 – Future Meeting Arrangements

130. There were no offers to host SC3.

Agenda Item 15 – Other business

Agenda Item 15.1 Transparency issues

131. The SC **agreed** that transparency is key to the credibility and functioning of its scientific work.

Agenda Item 16 – Adoption of the meeting report

132. The meeting report was adopted at 5:03pm, on 17th March 2017

Agenda Item 17 – Close of the meeting

133. The Chair closed the meeting at 5:06pm, on 17th March 2017.

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Agenda

2nd Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA) Scientific Committee

13-17 March 2017, SIOFA Secretariat, C/O DAAF, Parc de la Providence, Saint-Denis, La Réunion

Meeting Room - Salle Vanille, Bâtiment B

Chair: Dr Ilona Stobutzki

The provisional agenda for the 2nd meeting of the SIOFA Scientific Committee has been developed to focus on the areas of work identified in SIOFA CMM 2016/01 and CMM 2016/02, the Scientific Committee Work Plan (MoP3 Annex G) and Research Plan (SC1 Annex G) and previous Ordinary Meetings Meeting of SIOFA and to meet the governance requirements set out in the Scientific Committee's terms of reference.
The agenda items 5 - 9 follow the Scientific Committee Work Plan and will be informed by the activities agreed in the Operational Plan (SC1 Annex O)

1. Opening

    1.1 Opening statement from the Chair
    1.2 Introduction of participants

2. Administrative arrangements

    2.1 Adoption of the agenda
    2.2 Confirmation of meeting documents
    2.3 Appointment of rapporteurs
    2.4 Review of functions and terms of reference

3. Guide to interpret terminology used in Scientific Committee reports

    The Meeting of the Parties, at the 3rd Ordinary Meeting in 2016 requested that the Scientific Committee develop a guide to assist the Meeting of the Parties to interpret the terminology used in its meeting reports to ensure that the nature of the advice provided by the Scientific Committee is clearly understood.

4. National Annual Reports

    In accordance with paragraph 8 of CMM2016/02 each Contracting Party, CNCP and PFE shall provide to the Scientific Committee an annual report. In accordance with paragraph 12 of CMM 2016/01 and Annex 1 thereof, each Contracting Party, CNCP and PFE shall report in their National Report any VME encounter above the thresholds established under paragraph 11 of CMM 2016/01 to the Scientific Committee including action taken in respect of the relevant site.

5. Scientific data Standards

Including advice to the Meeting of the Parties on:

5.1 Guidelines for evaluating and approving electronic observer programs for scientific data collection

5.2 An appropriate spatial resolution for the collection and reporting of data to facilitate effective stock assessment.

5.3 SIOFA scientific database

6. Vulnerable marine ecosystems

Including advice to the Meeting of the Parties on:

6.1 Maps of where VMEs are known to occur, or likely to occur, in the agreement area

6.2 Standard protocols for future protected areas designation (areas which should be closed to fishing)

6.3 Progress towards a bottom fishing assessment standard

6.4 Discussion on Benthic Protected Areas

7. Current and historical status of fishing activities

In accordance with paragraph 9 of CMM2016/02 each Contracting Party, CNCP and PFE shall provide to the Secretariat, by 31 January 2017, historical catch, effort and if available, observer data from vessels flying their flag operating in the Agreement at any time during the period 2000-2015, and any previous years where available.

NOTE: *The Secretariat urges timely submission of data by 31 January in order to enable development of the SIOFA database.*

Each Contracting Party is requested to present a summary of data provided.

8. Stock assessments

At SIOFA 1, the Meeting of the Parties agreed that the SIOFA Scientific Committee should, as part of its work plan, determine requirements for stock assessments for deep sea fisheries.

8.1 Orange Roughy

Verbal Report of the Orange Roughy Acoustics Workshop, FAO-ROME, 30 Jan – 03 Feb 2017 tbc

8.2 Alfonsino

Information paper to be circulated – Global review of Alfonsino (Beryx spp.), their fiheries, biology and management FA0, 2012.

8.3 Patagonian Toothfish

8.4 Other species

8.5 Report on Australia's intent to convene a stock assessment framework (and VME impacts assessment framework) workshop in May 2017

9. Impacts of fishing on associated and dependent species

At SIOFA 1, the Meeting of the Parties agreed that the SIOFA Scientific Committee should, as part of its work plan, determine the impacts of fishing on associated and dependent species, in particular deep sea sharks and seabirds

9.1 Report on progress towards an ecological risk assessment for deepwater sharks in the SIOFA Area

10. Proposals to bottom fish in the Agreement Area in a manner at variance with Established Measures

In accordance with paragraph 20 of CMM 2016/01 a Contracting Party, CNCP and PFE seeking to authorise any vessel flying its flag shall submit to the Scientific Committee, at least 30 days prior to an ordinary meeting of the Scientific Committee, a proposal to undertake that activity or activities.

11. Cooperation with other RFMOs and international bodies

In accordance Article 16 of the SIOFA Agreement which requires that Contracting Parties, acting jointly under the Agreement, shall cooperate closely with other international fisheries and related organizations in matters of mutual interest, in particular with the SWIOFC and any other regional fisheries management organization with competence over high seas waters adjacent to the Area.

11.1 FAO ABNJ Deep Seas project update

11.2 Draft Arrangement between SIOFA and CCAMLR to enhance the conservation and rational use of stocks and species of interest to both parties.

At the SIOFA SC1 the Scientific Committee requested that the SIOFA Secretariat or Scientific Committee Chair approach CCAMLR Secretariat and Scientific Chair to discuss collaborating on stock assessments for toothfish. At the 2016 annual meeting of CCAMLR (CCAMLR-XXXV) the Commission recommended that CCAMLR and SIOFA consider developing a formal arrangement to promote cooperation and collaboration on issues of mutual interest.

12. Scientific Committee Work Plan

12.1 Long term Research Plan

Review and updating if required

12.2 2017 – 2019 operational work plan and budget

Review and updating if required. Discussion on science budget to provide advice to the Meeting of the Parties.

13. Advice to the Meeting of Parties

14. Future meeting arrangements

The Scientific Committee is asked to agree to (approximate) dates and location for the 3rd meeting of the SIOFA Scientific Committee.

15. Other business

15.1 Transparency issues

16. Adoption of the meeting report

17. Close of meeting

2nd Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA) Scientific Committee

13-17 March 2017, SIOFA Secretariat, C/O DAAF, Parc de la Providence, Saint-Denis, La Réunion

Meeting Room - Salle Vanille, Bâtiment B

SC-02-04 - List of Meeting Documents

SC-02 -01	Meeting notice Rev1	Relevant agenda items
SC-02 -02	Provisional agenda for the SIOFA Scientific Committee meeting Rev1	2
SC-02 -03	Provisional agenda for Heads of Delegation meeting	N/A
SC-02 -04	List of Meeting Documents Rev 1	N/A
SC-02 -05	Table of agenda items and related papers Rev1	N/A
SC-02 -06	Scientific Committee Terms of Reference	N/A
SC-02 -07	SIOFA SC2 List of Participants	N/A
SC-02 -03 (01)	Guide to interpret terminology used in SC reports (SC Chairperson)	3
SC-02 -04 (01)	Review of Fisheries – National Report (Cook Islands)	4
SC-02 -04 (02)	Review of Fisheries – National Report (Republic of Korea)	4
SC-02 -04 (03)	Review of Fisheries – National Report (Australia) Rev2	4
SC-02 -04 (04)	Review of Fisheries – National Report (Japan)	4
SC-02 -04 (05)	On-board scientific observer program of Japanese trawl vessels (Japan)	4
SC-02 -04 (06)	Review of Fisheries – National Report (French Territory)	4
SC-02 -04 (07)	Review of Fisheries – National Report (European Union) Rev1	4
SC-02 -05 (01)	Informing the development of guidelines for evaluating and approving electronic observer programs in SIOFA (Australia) Annex A - EM data collection Annex B - Commonwealth E Monitoring Programme	5

SC-02 -06 (01)	Draft SIOFA Bottom Fishing Impact Assessment Standard (SC Chairperson)	6
SC-02 -06 (02)	Development of a photographic protocol for macrobenthos bycatch monitoring in the French fisheries of the Southern Ocean and first preliminary results obtained in the Kerguelen EEZ (French Territory)	6
SC-02 -07 (01)	Summary of Korean fisheries data in SIOFA Area (Republic of Korea)	7
SC-02 -08 (01)	Indian Ocean Orange Roughy acoustic survey ABNJ review (Cook Islands)	8.1
SC-02 -08 (02)	Orange Roughy acoustic data review, approach and timelines (SIOFA Secretariat)	8.1
SC-02 -09 (01)	Ecological risk assessment for deepwater sharks in the Southern Indian Ocean (Australia)	9.1
SC-02 -11 (01)	Draft Arrangement between SIOFA and CCAMLR to enhance the conservation and rational use of stocks and species of interest to both parties (SC Chairperson)	11.2`
SC-02-INFO-01	Global Review of Alfonsino (Beryx spp.), Their Fisheries, Biology and Management (Japan)	8.2
SC-02-INFO-02	SIOFDA Undertakes Collaboration with two marine researchers (SIOFDA)	8
SC-02-INFO-03	Report on proposed deepwater stock assessment and VME impact assessment framework workshop (Australia)	8, 10
SC-02-INFO-04	ABNJ Deep Sea Project update to the SIOFA SC (FAO)	11.1

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Table of agenda items and related papers

Agenda Item	Related Papers
1. Opening 1.1 Opening statement from the Chair 1.2 Introduction of participants	*No papers provided for this item.*
2. Administrative Arrangements 2.1 Adoption of the agenda 2.2 Confirmation of meeting documents 2.3 Appointment of rapporteurs 2.4 Review of functions and terms of reference	SC -02 -02 - Provisional Agenda SC -02 -04 - List of Meeting Documents SC -02 -06 – Scientific Committee Terms of Reference SC -02 -07 – SIOFA SC2 List of Participants
3. Guide to Interpret Terminology used in Scientific Committee Reports	SC-02 -03 (01) – Guide to interpret terminology used in SC reports (SC Chairperson)
4. National Annual Reports	SC-02 -04 (01) – National Report (Cook Islands) SC-02 -04 (02) – National Report (Republic of Korea) SC-02 -04 (03) – National Report (Australia) Rev2 SC-02 -04 (04) – National Report (Japan) SC-02 -04 (05) – On-board scientific observer program of Japanese trawl vessels (Japan) SC-02 -04 (06) – National Report (French Territory) SC-02 -04 (07) – National Report (EU) Rev1
5. Scientific Data Standards	SC-02-05 (01) – Informing the development of guidelines for evaluating and approving electronic observer programs in SIOFA (Australia) Annex A EM data collection Annex B Commonwealth E Monitoring Program

6. Vulnerable Marine Ecosystems	SC-02-06 (01) – Draft SIOFA Bottom Fishing Impact Assessment Standard (SC Chairperson) SC-02 -06 (02) - Development of a photographic protocol for macrobenthos bycatch monitoring in the French fisheries of the Southern Ocean and first preliminary results obtained in the Kerguelen EEZ (French Territory) SC-02-INFO-03 – Report on proposed deepwater stock assessment and VME impact assessment framework workshop (Australia)
7. Historical Status of Fishing Activities	SC-02-07 (01) – Summary of Korean fisheries data in SIOFA Area (Republic of Korea)
8. Stock Assessments 8.1 Orange Roughy 8.2 Alfonsino 8.3 Patagonian Toothfish 8.4 Other species 8.5 Report on Australia's intention to convene a stock assessment framework workshop in May 2017	SC-02-08 (01) – Indian Ocean Orange Roughy acoustic survey ABNJ review (Cook Islands) SC-02-08 (02) – Orange Roughy acoustic data review, approach and timelines (SIOFA Secretariat) SC-02-INFO-01 – Global Review of Alfonsino (beryx spp.), Their Fisheries, Biology and Management (Japan) SC-02-INFO-02 – SIOFDA Undertakes Collaboration with two marine researchers (SIOFDA) SC-02-INFO-03 – Report on proposed deepwater stock assessment and VME impact assessment framework workshop (Australia)
9. Impacts of Fishing on Associated and Dependent Species	SC-02-09 (01) – Ecological risk assessment for deepwater sharks in the Southern Indian Ocean (Australia)
10. Proposals to bottom fish in the Agreement Area in a manner at variance with Established Measures	SC-02-INFO-03 – Report on proposed deepwater stock assessment and VME impact assessment framework workshop (Australia)
11. Cooperation with other RFMOs and International Bodies 11.1 FAO ABNJ Deep Seas project update 11.2 Draft Arrangement between SIOFA and CCAMLR	SC-02-11 (01) – Draft Arrangement between SIOFA and CCAMLR to enhance the conservation and rational use of stocks and species of interest to both Parties (SC Chairperson) SC-02-INFO-04 – ABNJ Deep Seas Project update to the SIOFA SC (FAO)

12. Scientific Committee Work Plan 12.1 Long term research plan 12.2 2017 – 2019 operational work plan and budget	*No papers provided for this item*
13. Future meeting arrangements	*No papers provided for this item*
14. Other business	*No papers provided for this item*
15. Adoption of the report	*No papers provided for this item*
16. Close of business	*No papers provided for this item*

SIOFA SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

Level 1: From the Scientific Committee to the Meeting of Parties:

RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from the Scientific Committee to the Meeting of Parties, which is to be formally provided to the Meeting of Parties for its consideration/endorsement. The intention is that the Meeting of Parties will consider the recommended action for endorsement under its own mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: From the Scientific Committee to a Contracting Party, the SIOFA Secretariat, or other body (not the Meeting of Parties) to carry out a specified task:

REQUESTED: This term should only be used by the Scientific Committee if it does not wish to have the request formally adopted/endorsed by the Meeting of Parties. For example, if the Scientific Committee wishes to seek additional input from a Contracting Party on a particular topic, but does not wish to formalise the request beyond the mandate of the Scientific Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: General terms to be used for consistency:

AGREED: Any point of discussion from a meeting which the Scientific Committee considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the Meeting of Parties.

NOTED/NOTING: Any point of discussion from a meeting which the Scientific Committee considers to be important enough to record in a meeting report for future reference.

RECALLED: To bring back from memory, remember decisions taken in the past that still need action or could serve as the basis of new request.

ADOPTED: Any procedural item which the Scientific Committee will use as a guide in their work, such as their Agenda or Terminology Guide.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **ACKNOWLEDGED/ RECOGNISED; SUGGESTED**).

GUIDELINES FOR THE SUBMISSION OF ANNUAL NATIONAL REPORTS TO THE SIOFA SCIENTIFIC COMMITTEE

Purpose of annual national reports

Contracting Parties, Cooperating non-Contracting Parties and participating fishing entities shall submit national reports to the Scientific Committee (SC) on an annual basis at least 30 days before its annual meeting in order to keep the SC informed, in a concise format, of their fishing, research and management activities over the previous year.

Such annual reports do not replace data submissions under any CMM developed for the collection, reporting, verification and exchange of data; nor do they replace submission of detailed scientific papers.

- Catch and effort data should still be submitted to the SIOFA Secretariat in accordance with the any prescribed data submission standards and procedures.
- Detailed information or scientific analyses on aspects of fisheries should continue to be presented in specific scientific papers to SC meetings.

The SC may review these guidelines periodically and update them as required to take into account new reporting requirements established under CMMs or other best practice standards.

It is proposed that national reports submitted to the SIOFA SC be made publicly available on the SIOFA website once available.

Template for the submission of National Reports

Annual national reports should include the following sections of specific relevance to the work of the Scientific Committee:

Description of fisheries

A general overview description of the fisheries of the flag state concerned over the previous five years, providing summarised information on:

- Fleet composition (number of vessels by gear type and size and how this has changed by year).
- Summary tables of effort (trawl fisheries - hours trawled, longline fisheries - number of hooks set, other gears-units appropriate to the gear) and total catches by year, gear-type, season and area[1]. With respect to area, data should be provided, at a minimum, by the sub-areas at Attachment 1 of these guidelines.
- Brief description of significant changes and new developments in fisheries over the past year.

[1] These guidelines recognise that, where appropriate, data confidentiality will be maintained as it relates to the application of relevant national legislation.

Catch, effort and CPUE summaries

Overall summary figures of trends in nominal effort, retained catch (tonnes or kilograms as appropriate) and discards (tonnes or kilograms as appropriate) and CPUE in the SIOFA Area over the history of the fishery, including:

- Trends in nominal fishing effort by gear type over time.
- Trends in catch by species for the main target, bycatch, associated and depended species.[2]
- Trends in nominal CPUE by gear type for the main species contributing to catches.

Fisheries data collection and research activities

Brief description of the fisheries data collection systems implemented, and the research and assessment activities conducted, including:

- Description of the statistical data collection systems in use, and how these have changed or been improved over the past year.
- Description of fisheries sampling programs or surveys conducted, scientific analyses and stock assessments undertaken, or other relevant research activities conducted.
- Information on other SIOFA-related research activities over the past year and future research plans.

VME Thresholds

(for bottom fishing activity only)

- Describe threshold levels for encounters with VMEs and any move-on protocols
- For operations that exceeded the pre-determined VME threshold, provided details of the VME taxa observed including (wet) weight, number of taxa, the corresponding effort information and total weight of catch of the operation; and any action taken in respect of the relevant site.

Biological sampling and length/age composition of catches

- Overview summary of the coverage of biological and size-frequency sampling conducted.
- Simple summary table or figure showing length and/or age-frequency distribution of the target species by gear, and how this has changed over the past five years.

Description of data verification mechanisms

- Brief description of data verification mechanisms used. For example:
    - Position verification through VMS
    - Scientific observer programs to collect verification data on catch, effort, catch composition (target and non-target) discards and other details of fishing operations.
    - Vessel trip, landing and transhipment reports; and
    - Port sampling.

[2] A table of relevant scientific names and associated common English name should be provided in an annex to report.

Summary of observer and port sampling programs

- Brief description of observer and port sampling programs conducted, and how these have changed or been improved over the past year and any problems encountered during the previous year.
- Information on observer programme design and coverage rates achieved and the type of data collected.

- Information on the level of observer coverage focused on recording bycatch of seabirds, marine mammals, reptiles and other species of concern.
- Reporting of observed bycatch by species and fishery for all seabirds, marine mammals, reptiles and other species of concern.
- Sampling coverage achieved by port sampling programs, over the past year.

Relevant social and economic information (optional)

- Brief description of relevant social or economic information related to the fisheries.
- Future prospects of the fishery
- Onshore development

2017 Version, adopted at the 2nd meeting of the SIOFA Scientific Committee

Attachment 1

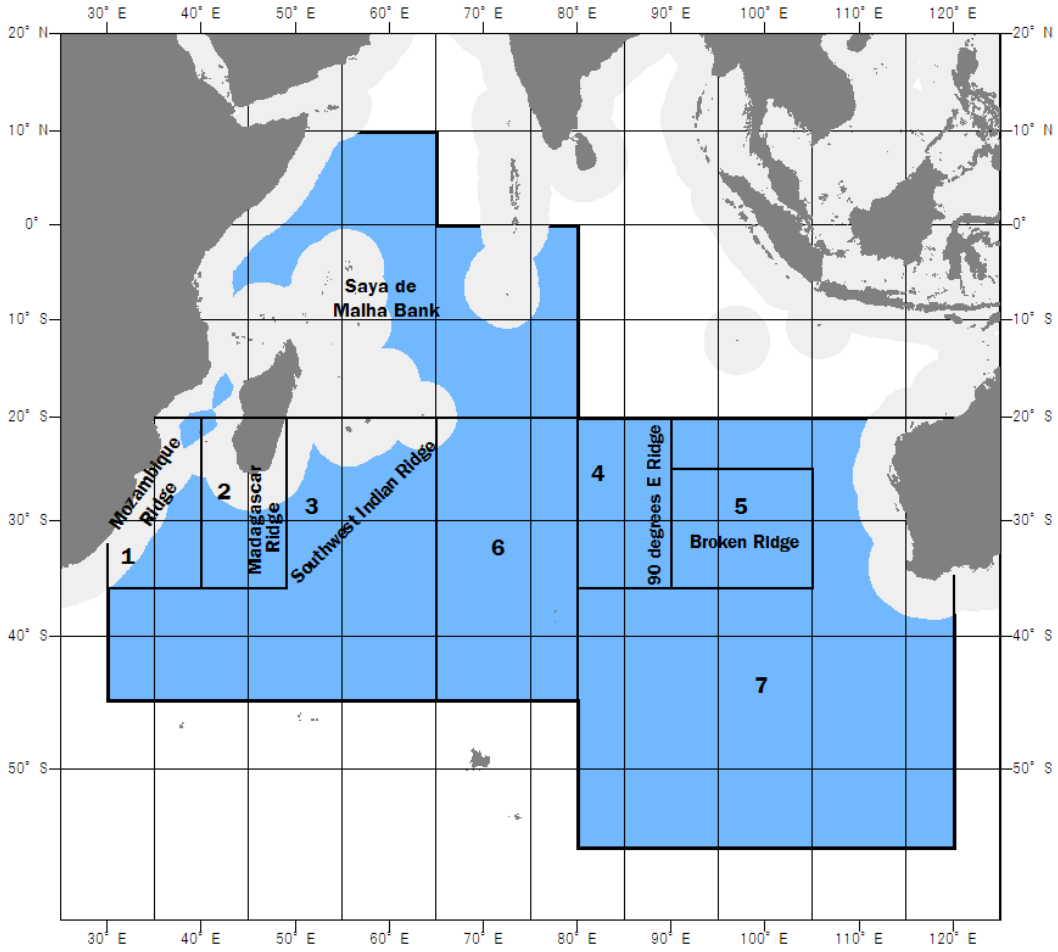
Sub-areas for reporting catch and effort data[3]

Table 1

	Area	Lats NS		Longs E	
1	Mozambique Ridge	S 20°	S 36°	-	40°
2	Madagascar Ridge	S 20°	S 36°	40°	49°
3a	Northern SW Indian Ridge	S 20°	S 36°	49°	65°
3b	Southern SW Indian Ridge	S 36°	S 45°	30°	65°
6	Mid-Indian Ridge	S 20°	S 45°	65°	80°
4	Ninety Degree East Ridge	S 20°	S 36°	80°	90°
5	Broken Ridge	S 25°	S 36°	90°	105°
7	SE Indian Ocean	S 20°	S 55°	80°	120°
8	North of 20°	N 10°	S 20°	-	80°

[3] Source for Table 1 and Figure 1: FAO Fisheries Report No. 677: report of the "*SECOND AD HOC MEETING ON MANAGEMENT OF DEEPWATER FISHERIES RESOURCES OF THE SOUTHERN INDIAN OCEAN"* held in Fremantle 20 -22 May 2002

Figure 1


30° E
40° E
50° E
60° E
70° E
80° E
90° E
100° E
110° E
120° E
20° N
10° N
0°
10° S
20° S
30° S
40° S
50° S
Saya de Malha Bank
Mozambique Ridge
Madagascar Ridge
Southwest Indian Ridge
90 degrees E Ridge
Broken Ridge
1
2
3
4
5
6
7

SIOFA Guidelines for evaluating and approving Electronic Observer Programs for scientific data collection

'electronic observer program' means a program that uses electronic monitoring equipment in place of, or in conjunction with, a human observer or human observers on board a vessel that is capable of generating, storing and transmitting data to competent authorities[1].

In the context of the above definition the SC developed guidelines for evaluating and approving electronic observer programs for scientific data collection.

1. During the early stages of the development of an electronic observer program the Scientific Committee should review how the proposed program can satisfy each data standard field. The SC noted that current electronic monitoring equipment cannot collect all data fields specified in CMM2016/02. Given this situation, the SC agreed that electronic monitoring can currently complement rather than replace on-board observers. Consequently, it is not feasible for these guidelines to assist with evaluation and approval of electronic monitoring programs. In the interim, until electronic monitoring programs are fully developed, the Scientific Committee can only review how electronic monitoring equipment satisfies each data field specified in CMM2016/02 rather than provide an evaluation of an Electronic Observer Program. The approval of collection of data fields by electronic monitoring should free-up observers to undertake other observation activities.

2. The proposing Contracting Party, CNCP or PFE should provide the Scientific Committee with a working paper that demonstrates for each proposed data standard field, that the electronic observer program provides equivalent or better information than an at sea observer.

3. Evidence to substantiate the performance of the proposed electronic observer program should include a comparison between the electronic observer program and an at-sea observer for each data standard field as appropriate. This should include information demonstrating direct measurement (e.g. metering of vessel hydraulics to record start and end times of an operation) or comparisons between at-sea observer collected data and the electronic observer program derived data

4. The proposal should describe measures in place to address potential system failure.

5. The proposal should outline how the electronic observer program will be audited to ensure that it continues to provide equivalent or better data than an at-sea observer once approved.

6. If the electronic observer program changes substantially, such as with technology development, the proposing member would need to resubmit to the Scientific Committee a new application for evaluation and approval.

[1] CMM 2016/01 (d)

The SC will evaluate proposed electronic observer programs to collect scientific data, during its regular meetings, through an intersessional working group or intersessionally as directed by the Chair.

SIOFA Standard protocol for future protected areas designation

- Compile the available information regarding incidental by-catch of VME indicator species and respective habitats within SIOFA CA including from:
    - Fishery dependent data;
    - Survey and research data;
    - Other sources of information.
- Make available the data for the proposed area.
- Adopt the FAO guidelines to identify VME habitats and define the criteria for identifying protected areas designation.
- SIOFA SC will recommend future protected areas on the basis of the standard criteria.

Rationale the SC should consider when making recommendations to the MoP on any protected area proposal

1. VME encounter reported for the area proposed
    a. Closure may be warranted if there is consistent triggering of VME move-on rules, indicating potential VME.

2. Bioregional representation
    a. Area is known to contain unique, rare or distinct habitats or ecosystems that fishing operations will disturb and that are deemed to be desirable and acceptable.
    b. Area is known to contain unique, rare or distinct, habitats or ecosystems that bottom fishing operations will disturb.
    c. Area with a comparatively higher degree of naturalness because of the lack of or low level of human-induced disturbance or degradation, as an example considering historical fishing activities.

3. Geographic and/or unique representation
    a. The area proposed is known to contain unique or unusual geomorphological features that fishing operations may damage.

4. Biodiversity representation
    a. The area is known to contain unique, rare (occurs only in few locations) species, populations or communities,
    b. The area is known to contain high diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.
    c. The area is known to contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.

5. Scientific Interest
    a. The area, excluding existing fishing grounds, has a history of scientific research associated with understanding ecosystem and biodiversity processes in the SIOFA region and fishing activities would compromise current and future research.

6. Ecosystem hotspot, threatened species
    a. There is substantive evidence that the area is of special importance for life history stages of species and/or threatened species. E.g. An area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.

Other considerations for determining boundaries of protected areas

Dimensions of the Area

b. The recommended area should, as far as practicable, include continuous depth.
c. Area designation should be based on seafloor features such as geomorphic features
d. Size and shape should be orientated to account for inclusion of connectivity corridors and biological dispersal patterns within and across closures.
e. Boundary lines should be simple, as much as possible following straight latitudinal/longitudinal lines.
f. Boundary lines should be as simple, as possible. E.g., where possible coinciding with existing regulatory boundaries.
g. The size and shape of each area should be set to minimise socio-economic costs.

Other principles to be considered in formulating recommendations for fishing closures

7. All available information should be considered in decision-making and the precautionary principle applied.
    a. Recommendations must be informed by the available information. All available information should include ecological, environmental, social, cultural and economic aspects of the marine environment that is available without unreasonable cost, effort or loss of timeliness.
    b. Recommendations to implement spatial management measures should not be postponed because of a lack of full scientific certainty, especially where significant or irreversible damage to ecosystems could occur or indigenous species are at risk of extinction.

8. Adverse impacts on existing users should be evaluated.
    a. Where there is a choice of several sites, which if protected would add a similar ecosystem or habitat to the closure network, and only one, or some of the sites are to be closed, the site(s) recommended should minimise adverse impacts on existing users. Where there is a choice to be made among minimum impact sites, selection may also be guided by:
    (a) ease of management and enforcement; and (b) if there are other benefits such as education or eco-tourism

9. The rationale used to recommend spatial management measures should be consistent.

10. There should be an evaluation of existing closures when making recommendations and explanation as to how a new management measure will assist in achieving MoP objectives.
    a. An enumeration of spatial management measures should be prepared to assess progress towards achieving the policies.

Next steps

11. The SC has agreed to these draft criteria for recommending protected areas.

12. Create a dedicated Working group within SIOFA SC to analyse the information and prepare a report to be considered by SIOFA SC meeting (at least 30 days before the meeting)

13. The SC will review these criteria after the first submission of a working paper proposing a protected area recommendation. The criteria will be revised accordingly and agreed as criteria for recommending protected areas.

14. The SC will continue to revise the criteria on an ad-hoc basis thereafter under the principle of continuous improvement.

SIOFA Bottom Fishing Impact Assessment Standard

Contents

1. Introduction

Following the adoption of UNGA Resolution 61/105 in 2006[1], 64/72 in 2009[2] and 66/68 in 2013[3] on deep-sea fisheries, the management of bottom fisheries and protection of deep-sea ecosystems on the high seas has been a priority for the international community.

Measures to implement these UNGA Resolutions have been put in place by a number of States and through RFMOs, including those active in high seas bottom fisheries in the Southern Ocean, North East Atlantic, North West Atlantic and South East Atlantic Oceans.

UNGA Resolution 61/105 calls on high seas fishing nations and RFMOs to take urgent action to protect vulnerable marine ecosystems (VMEs) from destructive fishing practices. In particular, Resolution 61/105 calls on States to:

- Conduct impact assessments to determine whether bottom fishing activities would have significant adverse impacts on VMEs, and ensure effective management to prevent such impacts, or else prohibit the activity;
- Close areas of the high seas to bottom fishing where VMEs are known or likely to occur unless fishing in these areas can be managed to prevent significant adverse impacts to such ecosystems; and
- Establish and implement protocols requiring vessels to cease fishing in areas where an encounter with VMEs occurs and to report the encounter so that appropriate measures can be adopted in respect of the site.

This is further encouraged in UNGA Resolution 64/72, paragraph 113 which, *inter alia*, also encourages States and RFMOs to implement measures in accordance with FAO International Guidelines for the Management of deep-sea fisheries in the high seas ("the FAO Guidelines", FAO 2008).

Of note, UNGA Resolution 64/72, paragraph 119(a) states that fishing should not be permitted until impact assessments have been carried out and made publicly available.

The third meeting of SIOFA parties adopted CMM 2016/01 *Conservation and Management Measure for the Interim Management of Bottom Fishing in the SIOFA Agreement Area* which notes the expectations within the UNGA Resolutions. This CMM 2016/01 also directed the Scientific Committee (SC) to develop a SIOFA Bottom Fishing Impact Assessment Standard (BFIAS).

The CMM 2016/01 identifies that BFIAs shall be prepared, to the extent possible, in accordance with the FAO Guidelines and meet the standards of the SIOFA BFIAS (once adopted). The BFIAS, therefore, seeks to be consistent with the FAO Guidelines.

2. Purpose of the Standard

The purpose of the BFIAS is to provide a minimum standard for assessing the potential impacts of proposed bottom fishing activities on VMEs and deep sea fish stocks. The potential impacts include consideration of past fishing activity and the cumulative effects of fishing. This standard is intended to guide SIOFA parties in preparing the required bottom fishery impact assessments (BFIAs), and to guide the Scientific Committee when reviewing these assessments. It is intended to constitute the standardised approach to be taken by all participants when preparing risk and impact assessments for high seas, bottom fishing activities in the SIOFA Area.

[1] Particularly paragraphs 80 and 83-87
[2] Particularly paragraphs 117 and 119-127
[3] Particularly paragraphs 128-137

The BFIAS aims to assist the Meeting of Parties implement the SIOFA and so is consistent with the objectives (Article 2) and principles (Article 4)) of that agreement:

SIOFA Article 4

In giving effect to the duty to cooperate in accordance with the 1982 Convention and international law, the Contracting Parties shall apply, in particular, the following principles:

(a) measures shall be adopted on the basis of the best scientific evidence available to ensure the long-term conservation of fishery resources, taking into account the sustainable use of such resources and implementing an ecosystem approach to their management;

(b) measures shall be taken to ensure that the level of fishing activity is commensurate with the sustainable use of the fishery resources;

(c) the precautionary approach shall be applied in accordance with the Code of Conduct and the 1995 Agreement, whereby the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures;

(d) the fishery resources shall be managed so that they are maintained at levels that are capable of producing the maximum sustainable yield, and depleted stocks of fishery resources are rebuilt to the said levels;

(e)** fishing practices and management measures shall take due account of the need to minimize the harmful impact that fishing activities may have on the **marine environment;

(f) biodiversity in the marine environment shall be protected; and

(g) the special requirements of developing States bordering the Area that are Contracting Parties to this Agreement, and in particular the least-developed among them and small island developing States, shall be given full recognition.

The BFIAS is guided by the CMMs adopted to date (As at March 2017).

The definitions (Annex A) and process in the BFIAS aim to be consistent with international principles and contribute to achieving the main objectives articulated in the FAO Guidelines:

11. The main objectives of the management of deep sea fisheries are to promote responsible fisheries that provide economic opportunities while ensuring the conservation of marine living resources and the protection of marine biodiversity, by:

i. ensuring the long-term conservation and sustainable use of marine living resources in the deep seas; and

ii. preventing significant adverse impacts on VMEs (FAO 2008)

The BFIAS aims to ensure that areas containing VMEs and low productivity deep sea resources are protected from significant adverse impacts due to bottom fishing, by ensuring that management decisions are informed by reliable and robust impact assessments based on the best data available.

As SIOFA management measures for bottom fisheries are developed and implemented , and as information improves on distribution of VMEs, abundance of low productivity deep sea resources and the impacts of bottom fishing activities in the SIOFA Area, this standard should be updated and amended accordingly.

3. Area of Application

The BFIAS applies to all bottom fishing operations within the SIOFA Area as defined in the Agreement. The BFIAS is intended to apply to all fishable depths within the SIOFA Area.

4. Bottom Fishery Impact Assessment Process

The process for preparing, submitting, evaluating and commenting on impact assessments prepared in accordance with this standard consists of the following steps:

1. Participants[4] are required to prepare bottom fishery impact assessments for all proposed bottom fishing activities in the SIOFA Area, irrespective of the proposed scale, area or previous history of such fishing activities. This includes new fisheries (defined in Annex A).
    - The BFIA should be submitted to the SIOFA Secretariat, at least 30 days prior to the commencement of the SC meeting[5]. Participants that have prepared a BFIA prior to the CMM 2016/01 entering into force should submit the BFIA to the SC as soon as possible.
    - For fishing commencing after CMM 2016/01 entering into force, BFIAs are to be prepared and submitted to the SIOFA Secretariat prior to commencement of any bottom fishing evaluated under the assessment.
    - Fishing may then proceed in accordance with the management and mitigation measures proposed in the assessment while the assessment is being evaluated.
    - The Secretariat will forwarded the BFIA to the SC for evaluation.
2. The SC is required to evaluate all BFIAs received and provide written advice, through the SIOFA Secretariat at the annual SC meeting, as to:
    a. The likely cumulative impacts of bottom fishing activity from vessels flying the flag of a participant in the Agreement Area; and
    b. Whether each BFIA meets an appropriate standard in light of international standards and the SIOFA BFIAS.
3. Scientific Committee comments on assessments are to be documented in its meeting reports.
4. Flag states are required to respond to the written comments provided by the SC regarding areas of concern or inadequacy of the BFIA. This response will require a revised BFIA to be submitted for SC evaluation.
5. Participants are required to prepare a new BFIA if a substantial change in the fishery has occurred, such that it is likely that the risk or impacts of the fishery may have changed. Changes that might trigger a re-assessment would include: expansion in fishing effort or catch, changes in intended fishing areas, management measures or the use of new gear.

[4] Participants is used to refer to contracting parties, cooperating non-contracting parties and participating fishing entities

[5] CMM 2016/01 paragraphs 14-17 provide guidance on timelines.

5. Bottom Fishery Impact Assessment Sections

In developing a BFIA, terms should be used as defined in Annex A and reference made to Annex B in terms of understanding the distribution of VMEs.

The FAO Guidelines (FAO 2008) provide guidance on the content of impact assessments for deep sea fisheries:

47. *Flag States and RFMO/As should conduct assessments to establish if deep-sea fishing activities are likely to produce significant adverse impacts in a given area. Such an impact assessment should address, inter alia:*

> *i. type(s) of fishing conducted or contemplated, including vessels and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing (harvesting plan);*
>
> *ii. 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;*
>
> *iii. identification, description and mapping of VMEs known or likely to occur in the fishing area;*
>
> *iv. 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;*
>
> *v. identification, description and evaluation of the occurrence, scale and duration of likely impacts, including cumulative impacts of activities covered by the assessment on VMEs and low-productivity fishery resources in the fishing area;*
>
> *vi. risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be significant adverse impacts, particularly impacts on VMEs and low-productivity fishery resources; and*
>
> *vii. the proposed mitigation and management measures to be used to prevent significant adverse impacts on VMEs and ensure long-term conservation and sustainable utilization of low-productivity fishery resources, and the measures to be used to monitor effects of the fishing operations.*

48. Risk assessments referred to in paragraph 47 (vi) above should take into account, as appropriate, differing conditions prevailing in areas where DSFs are well established and in areas where DSFs have not taken place or only occur occasionally. (FAO 2008)

Following these guidelines, BFIA for proposed bottom fishing activities in the SIOFA Area should provide information under the following sections:

5.1. Description of the Proposed Fishing Activities

Assessments shall contain a detailed fishing plan, providing a quantified description of the planned fishing activities, including:

- Details of the vessels to be used, providing all vessel data required in terms of the SIOFA
- Data Standards for vessel data, and confirmation that they appear on the list of approvedSIOFA vessels submitted by flag states to the SIOFA Secretariat.
- Detailed description of fishing methods (trawls, hook and lines, traps, gillnets, tangle nets) to be used, including a description and gear plan, providing the information

needed to evaluate potential impacts, such as net or bottom line types, net dimensions or bottom line lengths / number of hooks, trawl-door type, size and weight, footrope dimensions and type, ground gear (bobbins, rock-hopper gear, etc), range in fishing height off bottom, net opening and any factors affecting gear selectivity.

- Seabed depth range to be fished.
- Target species, and likely or potential by-catch species.
- Intended period and duration of fishing.
- Effort indices: How many vessels, how many tows (cumulative effects), estimated tow durations or distance (ranges).
- Estimated total catch and discard quantities by target and bycatch species.

In instances where new fisheries are being undertaken, assessments shall provide a quantified description of the planned fishing activities, including:

- Details of the vessels to be used, providing all vessel data required in terms of the SIOFA Data Standards for vessel data, and confirmation that they appear on the list of approved SIOFA vessels submitted by flag states to the SIOFA Secretariat.
- Detailed description of fishing methods (trawls, hook and lines, traps, gillnets, tangle nets) to be used, including a description and gear plan, providing the information needed to evaluate potential impacts, such as net or bottom line types, net dimensions or bottom line lengths / number of hooks, trawl-door type, size and weight, footrope dimensions and type, ground gear (bobbins, rock-hopper gear, etc.), range in fishing height off bottom, net opening and any factors affecting gear selectivity.
- Seabed depth range to be fished.
- Target species, and likely or potential by-catch species.
- Intended period and duration of fishing.
- Effort indices: How many vessels, how many tows (cumulative effects), estimated tow durations or distance (ranges).

Given the nature of new fisheries, the expected or planned characteristics of the fishery in terms of the above information should be provided. Once the new fishery has concluded, detailed quantification of the above information should be submitted to the Secretariat.

5.2. Mapping and Description of Proposed Fishing Areas

Maps of the proposed fishing areas in relation to available information on VMEs and seabed bathymetry should be presented including:

- Maps of the intended fishing areas, at the appropriate resolution in relation to the most recent SIOFA maps of historically fished areas.
- Area, or topographic features likely to support such VMEs, including geospatial data available from the Secretariat, or appropriate sources..
- Mapping of all known VMEs, or evidence of VMEs, in the proposed fishing areas, in particular, all geospatial data available from the Secretariat on distributions of known VMEs or evidence of VMEs.

- Mapping of the results of predictive habitat modelling for VMEs in the SIOFA area, as appropriate.
- Baseline data and description of the proposed fishing areas, presenting any available information that might be useful to assessing the potential impacts of fishing – such as past history of fishing, seabed type, depth ranges, location / presence of any known seabed topographic features and VMEs.

Where possible, the SIOFA Secretariat will make the SIOFA geospatial maps of VMEs, bathymetry, predicted VME habitat and historically fished areas available to facilitate mapping of proposed fishing activities in context with this baseline geo-spatial information.

To facilitate evaluation of the relationship between proposed fishing areas, an appropriate SIOFA bottom fishing footprint and existing VME maps, participants should provide all maps related to proposed fishing activities to the Secretariat in a compatible GIS format, for inclusion in the SIOFA geo-spatial database (where possible, noting confidentiality restrictions).

5.3. Impact Assessment

Scoping of Issues of Concern

The initial step in a risk assessment process should be a scoping. This includes explicitly stating the management objectives against which the risk will be assessed and the identification of all of the potential issues of concern (hazards) related to the proposed fishing activities. These will be guided by the UNGA Resolutions 61/105 and 64/72, the SIOFA CMM 2016/01 and the FAO Guidelines.

The risk assessments should evaluate the potential impact of the 'hazards':

- Fishing activity, this will need to be evaluated for each gear type used by a participant's vessels (e.g. trawling, longlining, etc.)
- Loss of bottom fishing gear, including the risk of ghost fishing and ongoing physical impact of lost gear.
- For each activity (hazard) to be evaluated a brief description of the expected impacts should be provided, in terms of what may be affected and how.

Risk Assessment

The level of risk posed by each activity (hazard) should be assessed in a transparent, scientific manner. Determining the level of risk for each activity should be based on quantifiable criteria where possible. Where qualitative criteria are used due to data gaps, qualitative judgements should be underpinned as far as possible by quantitative analyses, and sufficient documentation should be provided to enable the Scientific Committee to determine if the assigned risk levels are appropriate.

In determining the level of risk (low, medium, high) posed by an activity, the elements that should be specifically evaluated are:

1. **Intensity -** The intensity or severity of the impact at the specific site affected. This may be quantified by previous studies or an expert evaluation of the magnitude of the impact. e.g. *None* (no detectable impact); *Low* (some physical damage to some taxa/colonies); *Medium* (substantial damage to a small proportion of colonies/taxa, or small damage to a large number of taxa at the site, likely to modify biological and ecological processes e.g. reproduction) or *High* (significant damage to a significant proportion, where environmental functions and processes are significantly altered such that they temporarily or permanently cease).

2. **Duration –** how long the effects of the impact are likely to last.
3. **Spatial extent** – The spatial impact relative to the extent of the VMEs (e.g. will fishing impact 5%, 30% or 80% of the VME distribution) and whether there may be offsite impacts (e.g. will reproduction be impacted at a broader spatial scale).
4. **Cumulative impact** - The frequency of the impact will influence the risk, with activities occurring repeatedly at a site likely to have a greater risk. This will depend on the amount of fishing effort and should be considered in relation to the recovery of the VMEs/taxa.

Overall Risk. The overall risk classification of an activity is then evaluated from the combination of the criteria used. The method for combining these criteria to assign low, medium or high risk to an activity should be detailed in the assessment report.

- Low: Where the impact will have a negligible influence on the environment and no active management or mitigation is required. This would be allocated to impacts of low intensity and duration, but could be allocated to impacts of any intensity, if they occur at a local scale and are of temporary duration.
- Medium: Where the impact could have an influence on the environment, which will require active modification of the management approach and / or mitigation. This would be allocated to short to medium-term impacts of moderate intensity, locally to regionally, with possibility of cumulative impact.
- High: Where the impact could have a significant negative impact on the environment, such that the activity(ies) causing the impact should not be permitted to proceed without active management and mitigation to reduce risks and impacts to acceptable levels. This would be allocated to impacts of high intensity that are local, but last for longer than 5-20 years, and/or impacts which extend regionally and beyond, with high likelihood of cumulative impact.

The risk assessment should be based on criteria that are independent, such that they provide separate measures of risk. Criteria should also be quantifiable, preferably with the method of quantification and ranking categories determined beforehand.

If a robust stock assessment for deep sea stocks is available, with relevant reference points, this would constitute a high standard of risk assessment; the outputs of the stock assessment, relative to the reference points, indicates the risk to the stocks. This should be worked towards for key stocks.

Where there are data limitations a robust expert based risk assessment should be used which considers the criteria above.

Examples of different risk assessment approaches include:

- CSIRO Ecological Risk Assessment for Effects of Fishing: ERAEF is a hierarchical framework that moves from a Level 1 qualitative analysis through to a more focussed semi-quantitative Level 2 to Level 3 which is model based and fully quantitative. This approach leads to a rapid identification of high risk activities, and evaluation of how fishing impacts on ecological systems (Hobday *et al*. 2007).
- ICES: There have been two main approaches to assessing the sensitivity of habitat to fishing: i) ranking sensitivity of habitat units (physical and biological) to disturbance; and ii) ranking the impacts of the gear. ICES conclude that these approaches should be combined.
- NOAA EIS: Spatial and temporal analysis of the distribution of habitat type, distribution of biota, habitat use, habitat sensitivity, dynamics of fishing effort.

- MarLin: Approach consists of i) Identify “key / important” species in habitat/biotype; ii) Assess biotype sensitivity based on key species; iii) Assess recoverability of key/important species (Tyler-Walters *et al*. 2001).
- UK Department for Environment, Food & Rural Affairs: (DEFRA) Guidelines for Environmental Risk Assessment and Management.
- CCAMLR An impact assessment framework for bottom fishing methods in the CCAMLR convention area (Sharp et al. 2009).

Interactions with VMEs

This section should specifically address the expected and potential interaction and impacts of the proposed fishing gear on VMEs:

- What impacts are likely to result from the fishing gears to be used? All impacts should be identified, characterised and quantified or ranked. All interactions of fishing gear with the seabed will have some impact, but the nature and severity will be species / habitat dependent. Information on known or likely species and habitats in the proposed fishing area should be used to evaluate potential impacts of the fishing gears to be used.
- What will the probability, likely extent (% of habitat targeted) and intensity of the interaction between the proposed fishing gear/targeting practices on the VMEs in the proposed fishing areas be?
- What are the characteristics of the habitats and benthic communities which may be impacted? Are the fished seabed features likely to support VMEs? Do these VMEs include fragile or biogenic habitat-forming species? What proportion of the estimated distribution range of these VMEs areas will the proposed fishing activities impact? How widespread or rare are the VMEs / species? How vulnerable are the VMEs to impact by the fishing gears to be used?
- How diverse is the ecosystem in the proposed fishing areas, and will the fishing activity reduce this biodiversity? Do the proposed fishing areas contain rare species which do not occur elsewhere? What are the levels of endemism - could fishing lead to localised / global extinctions?
- What is the likely spatial scale and duration of the impacts? Will impacts be cumulative with previous impacts in the area? The overall scale of impact will be the product of spatial scale, duration and cumulative impact on VMEs and low productivity resources. Loss of substantial areas of habitat forming coral could have a prolonged impact on the environment, whereas other faunal groups may be able to recover quickly. To the extent possible, rates of recovery, regeneration and re-colonisation should be quantified or estimated.
- Are there any other threats or issues of concern expected from the proposed fishing activities, such as gear loss and ghost fishing, incidental bycatch discards, protected or endangered species mortalities, effects on ecosystem functioning?

In instances where new fisheries are intended to be undertaken the assessment should include:

- What impacts are likely to result from the fishing gears to be used? All impacts should be identified, characterised and ranked. Information on known or likely species and habitats in the proposed fishing area should be used to evaluate potential impacts of the fishing gears to be used.

- What will the probability, likely extent (% of habitat targeted) and magnitude of the interaction between the proposed fishing gear / targeting practices on the VMEs in the proposed fishing areas be?
- What are the characteristics of the habitats and benthic communities which may be impacted? Are the fished seabed features likely to support VMEs?
- How diverse is the ecosystem in the proposed fishing areas, and will the fishing activity reduce this biodiversity? Do the proposed fishing areas contain rare species which do not occur elsewhere?
- What is the likely spatial scale and duration of the impacts? The overall scale of impact will be the product of spatial scale, duration and cumulative impact on VMEs and low productivity resources. To the extent possible, rates of recovery, regeneration and re-colonisation should be quantified or estimated.
- Are there any other threats or issues of concern expected from the proposed fishing activities, such as gear loss and ghost fishing, incidental bycatch discards, protected or endangered species mortalities, effects on ecosystem functioning?

Where quantitative risk assessment approaches are used, evaluations of interactions will be directly provided by those assessments.

5.4. Information on Status of the Deep-sea Stocks to be Fished

This section should provide information on the estimated state of the deepwater stocks of the intended target and by-catch species. Such information should include:

- A list of the intended target and likely by-catch species.
- Tables of historic catches and catch trends of these species in the intended fishing area.
- Tables, figures of analyses of historic nominal and/or standardised CPUE trends in these species.
- Results of any surveys conducted on the stocks to be fished.
- Results of the most recent stock assessments that have been conducted for the stocks to be fished, if any such stock assessments have been conducted.
- Any other information relevant to understanding the status and sustainability of target and bycatch species.

In instances where new fisheries are being undertaken the assessment should include:

- A list of the intended target and likely by-catch species.
- Tables of historic catches and catch trends of these species in the intended fishing area, if available.
- Results of any surveys conducted on the stocks to be fished.
- Results of the most recent stock assessments that have been conducted for the stocks to be fished.
- Any other information relevant to understanding the status and sustainability of target and bycatch species.

5.5. Monitoring, Management and Mitigation Measures

Monitoring, management and mitigation measures would be expected to address the risks identified in the impact assessment. This section should detail proposals for how the fishing activities will be planned and managed to avoid or minimise significant adverse impacts on VMEs and ensure long term sustainability of deep sea fish stocks. There should be a detailed description of specific monitoring, management and mitigation measures that are currently in place or planned to be implemented to reduce impacts to acceptable levels. Proposed management measures must be specifically designed to achieve the following results for each level of significance.

Effective monitoring measures should be implemented to ensure the effectiveness of the measures and to detect any change in the degree of impact which would prompt the need for a re-assessment.

In addition to proposed management or mitigation measures, the following monitoring measures should be implemented including the use of observers, should follow the SIOFA Data Standards and include:

1. VMS positional information should be collected in accordance with the SIOFA Data Standards. Provide details of VMS systems to be operated on vessels, including who these will report to, reporting frequency and reporting accuracy.
2. Details of catch and effort data collection systems to be used, including catch and effort reporting systems to the flag states concerned, and additional systems to be implemented specifically for the proposed activity. Report how these data collection systems comply with the SIOFA Data Standards. These monitoring systems should specifically address how retained and discarded by-catches are to be monitored and reported. There should also be reporting systems in place to record whether a VME has been encountered during fishing.
3. Details of any scientific observer coverage planned for the proposed fishing activity, including levels of coverage, how deployments will be designed to achieve statistically representative coverage of the proposed fishing activities, and what information observers will be collecting. Observer data should be collected in accordance with the SIOFA Observer Data Standard.
4. Description of the data that will be provided to the SIOFA Secretariat for the fishing activity including, as a minimum, data required in terms of the adopted SIOFA data standards, but also describing other information (e.g. seabed bathymetry or mapping, VME identification and characterization) that will be provided. Details regarding the reporting of evidence of a VME to the SIOFA Secretariat should be included.

Where quantitative risk assessment approaches are used, these approaches should also be used to evaluate the effectiveness of proposed mitigation measures, by quantitatively evaluating the reduction in risk resulting from those mitigation measures (see e.g. Penney & Guinotte 2013).

6. New Fisheries

The bottom fishing impact assessment for new fisheries (Defined in Annex A) would be expected to consider all the elements of Section 5, except where differences have been identified. The following section describes these differences.

6.1. Description of the Proposed Fishing Activities

Expected fishing duration, number of tows, catch rates, total catch and discards should be provided. Once information is available from the new fishery the impact assessment would be updated using this data.

6.2. Impact Assessment

Where little information is available, predictive approaches should be used to evaluate the likelihood of interaction with, and potential impact on, VMEs. All assumptions used in the impact assessment should be clearly stated. This section should include a trigger for when a new assessment should be completed.

6.3. Information on Status of the Deepwater Stocks to be Fished

Predictive approaches and information from other fisheries should be used to inform the assessment of impact on deepwater stocks to be fished.

6.4. Monitoring, Management and Mitigation Measures

In situations where new or exploratory fisheries are being undertaken monitoring and precautionary measures are critical. As outlined in the FAO Guidelines:

65. *Precautionary conservation and management measures, including catch and effort controls, are essential during the exploratory phase of a DSF, and should be a major component of the management of an established DSF. They should include measures to manage the impact of the fishery on low-productivity species, non-target species and sensitive habitat features.*

Implementation of a precautionary approach to sustainable exploitation of DSFs should include the following measures:

> *i. precautionary effort limits, particularly where reliable assessments of sustainable exploitation rates of target and main by-catch species are not available;*
>
> *ii. precautionary measures, including precautionary spatial catch limits where appropriate, to prevent serial depletion of low-productivity stocks;*
>
> *iii. regular review of appropriate indices of stock status and revision downwards of the limits listed above when significant declines are detected;*
>
> *iv. measures to prevent significant adverse impacts on vulnerable marine ecosystems; and*
>
> *v. comprehensive monitoring of all fishing effort, capture of all species and interactions with VMEs*

Therefore, assessments for new fisheries must include a description of the monitoring, mitigation and precautionary management measures that will be in place, as outlined above. Details regarding the reporting of evidence of a VME to the SIOFA Secretariat should be included.

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Annex A Definitions

The BFIAS requires clear and specific operational definitions of risk, VMEs and significant adverse impacts. The FAO Guidelines currently provide the most comprehensive international definitions of these terms and the relevant aspects have been directly incorporated in the definitions below. Any definitions used in relevant SIOFA CMMs have also been incorporated.

A.1. Bottom Fishing

Bottom fishing means fishing using any gear type likely to come in contact with the seafloor or benthic organisms during the normal course of operations (CMM 2016/01).

A.2 New Fisheries

[We recommend MoP provide a definition]

A.2 Risk

The definition of risk for an assessment needs to be based on clearly stated objectives. The risk that is being assessed is then the risk of not achieving those stated objectives.

The high level objectives from SIOFA CMM 2016/01 are:

1. That there are no significant adverse impacts from bottom fishing on VMEs
2. That deep sea fishery resources, including target fish stocks and non-target species are managed for long-term sustainability.

These objectives need to be operationalized so that they become measurable and the risk can be assessed. This should be clarified in the impact assessment.

A.3. Low Productivity Deep Sea Resources

The FAO Guidelines (paragraph 13) recognize that marine living resources exploited by deep sea fisheries in the high seas often have low productivity, can only sustain low exploitation rates and are slow to recover once depleted. Key biological characteristics of these low productivity species include maturation at relatively old ages; slow growth; long life expectancies; low natural mortality rates; intermittent recruitment of successful year classes; and spawning that may not occur every year (FAO 2008). Species with these characteristics within the SIOFA area will be considered to constitute low productivity resources, and need to be managed in accordance with the relevant guidelines and best practices for sustainable management of such resources.

A.4. Vulnerable Marine Ecosystems

The FAO Guidelines outline criteria to identify VMEs, specifically:

42. A marine ecosystem should be classified as vulnerable based on the characteristics that it possesses. The following list of characteristics should be used as criteria in the identification of VMEs.

i. Uniqueness or rarity – an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas or ecosystems. These include:

- *habitats that contain endemic species;*
- *habitats of rare, threatened or endangered species that occur only in discrete areas; or*
- *nurseries or discrete feeding, breeding, or spawning areas.*

ii. Functional significance of the habitat – discrete areas or habitats that are necessary for the survival, function, spawning/reproduction or recovery of fish stocks, particular life-history stages (e.g. nursery grounds or rearing areas), or of rare, threatened or endangered marine species.

iii. Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities.

iv. Life-history traits of component species that make recovery difficult – ecosystems that are characterized by populations or assemblages of species with one or more of the following characteristics:

- *slow growth rates;*
- *late age of maturity;*
- *low or unpredictable recruitment; or*
- *long-lived.*

v. Structural complexity – an ecosystem that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features. In these ecosystems, ecological processes are usually highly dependent on these structured systems. Further, such ecosystems often have high diversity, which is dependent on the structuring organisms.

The above characteristics should guide the identification and specific definition of VMEs in the SIOFA Area. However, to provide operational definitions for use during fishing operations, it is necessary to use the above characteristics to develop lists of specific taxa (orders, families, genera or species) which are considered to contribute to VMEs in the SIOFA Area. Annex 1 of the FAO Guidelines provides a list of examples of potentially vulnerable species groups, communities and habitats, as well as features that potentially support them and should be used as the basis for determining what constitutes VME taxa in the SIOFA area.

FAO Guidelines Annex 1. Examples of potentially vulnerable species groups, communities and habitats, as well as features that potentially support them.

The following examples of species groups, communities, habitats and features often display characteristics consistent with possible VMEs. Merely detecting the presence of an element itself is not sufficient to identify a VME. That identification should be made on a case-by-case basis through application of relevant provisions of these Guidelines, particularly Sections 3.2 and 5.2.

Examples of species groups, communities and habitat forming species that are documented or considered sensitive and potentially vulnerable to DSFs in the high-seas, and which many contribute to forming VMEs:

i. certain coldwater corals and hydroids, e.g. reef builders and coral forest including: stony corals (Scleractinia), alcyonaceans and gorgonians (Octocorallia), black corals (Antipatharia) and hydrocorals (Stylasteridae);

ii. some types of sponge dominated communities;

iii. communities composed of dense emergent fauna where large sessile protozoans (xenophyophores) and invertebrates (e.g. hydroids and bryozoans) form an important structural component of habitat; and

iv. seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e. endemic).

Examples of topographical, hydrophysical or geological features, including fragile geological structures, that potentially support the species groups or communities, referred to above:

i. submerged edges and slopes (e.g. corals and sponges);

ii. summits and flanks of seamounts, guyots, banks, knolls, and hills (e.g. corals, sponges, xenophyphores);

iii. canyons and trenches (e.g. burrowed clay outcrops, corals);

iv. hydrothermal vents (e.g. microbial communities and endemic invertebrates); and

v. cold seeps (e.g. mud volcanoes for microbes, hard substrates for sessile invertebrates).

(FAO 2008)

For the purposes of BFIAs, VMEs are defined as: any marine ecosystem whose integrity is threatened by significant adverse impacts resulting from physical contact with bottom gears in the normal course of fishing operations, including, inter alia, reefs, seamounts, hydrothermal vents, cold water corals, cold water sponge beds and low productivity or vulnerable species.

The definition of VMEs will need to be reviewed periodically, in the light of improved information on VMEs in the SIOFA area.

The unit of analysis for the impact assessment for VMEs is suggested to be ‘VMEs’ as a group rather than individual taxa. As more information becomes available (such as the location of different types of VMEs) it may be more appropriate to undertake the impact assessment for different types of VMEs, such as particular benthic communities or assemblages.

In terms of deep sea fish stocks the unit of analysis should be the stock, although data availability may similarly constrain the unit of analysis to the species or resource assemblage level. As more information becomes available it may be more appropriate to update assessments to the stock level.

A.5. Predictors to Evaluate Likelihood of Occurrence of VMEs

The FAO Guidelines note (paragraph 45) that, “where site-specific information is lacking, other information that is relevant to inferring the likely presence of vulnerable populations, communities and habitats should be used”. This is reflected in the examples provided in FAO Guidelines Annex 1, shown above.

The Southern Indian Ocean Deepsea Fishers Association (SIODFA) has undertaken work that can contribute to the mapping of VMEs and understanding the likelihood of occurrence in the SIOFA Area. However, for much of the SIOFA Area, data on seabed biodiversity and benthic community composition are not available. Therefore, ancillary information on other factors that influence the location of VMEs will need to be used to predict likelihood and suitability of areas for supporting VMEs.

Predictive Habitat Modelling

Benthic biodiversity data are scarce for the SIOFA Area and so use of predictive habitat models can be considered as an approach to identify areas where VMEs are likely to occur. This can contribute to the quantitative evaluation of the risk of significant adverse impacts and the effectiveness of any proposed management and mitigation measures (Anderson et al. 2016).

While existing global habitat models may be useful for risk assessments, the development of regionally-tailored, high resolution, predictive models for the SIOFA area are likely to be more applicable. These should be of the highest resolution permitted by available bathymetric data, and should be designed to predict occurrence of the VME species of interest in the SIOFA Area.

Development of regionally tailored models will require, where possible, the collection of high resolution data on bathymetry and bycatch of VMEs and participants should include provisions for the collection of such data into conditions for bottom fisheries in the SIOFA Area. Where possible and appropriate, use should also be made of opportunities presented by presence of fishing vessels in the SIOFA Area to collect seabed imaging information (using underwater video or cameras) to validate and improve regional habitat prediction models.

Seabed Depth Range and Topography

Seabed depth range and topography are good indicators of seabed geology, and therefore of substratum suitability for supporting VME species. In the absence of benthic biodiversity data and predictive habitat modelling, risk assessments should use depth and analysis of topography, particularly depth range, slope, rugosity and specific topographic features, as indicators of habitat likely to support VMEs. The FAO Guidelines recognizes the following as being features that potentially support species, groups or communities which may contribute to forming VMEs:

- *Submerged edges and slopes; summits and flanks of seamounts, guyots, banks, knolls, and*
- *hills; canyons, trenches and hydrothermal vents.*

A.6. Significant Adverse Impacts

The FAO Guidelines provide guidance on what would constitute a significant adverse impact on VMEs:

17. Significant adverse impacts are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in a manner that: (i) impairs the ability of affected populations to replace themselves; (ii) degrades the long-term natural productivity of habitats; or (iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types. Impacts should be evaluated individually, in combination and cumulatively.

18. When determining the scale and significance of an impact, the following six factors should be considered:

i. the intensity or severity of the impact at the specific site being affected;

ii. the spatial extent of the impact relative to the availability of the habitat type affected;

iii. the sensitivity/vulnerability of the ecosystem to the impact;

iv. the ability of an ecosystem to recover from harm, and the rate of such recovery;

v. the extent to which ecosystem functions may be altered by the impact; and

vi. the timing and duration of the impact relative to the period in which a species needs the habitat during one or more of its life-history stages.

19. Temporary impacts are those that are limited in duration and that allow the particular ecosystem to recover over an acceptable time frame. Such time frames should be decided on a case-by-case basis and should be in the order of 5-20 years, taking into account the specific features of the populations and ecosystems.

20. In determining whether an impact is temporary, both the duration and the frequency at which an impact is repeated should be considered. If the interval between the expected disturbance of a habitat is shorter than the recovery time, the impact should be considered more than temporary. In circumstances of limited information, States and RFMO/As should apply the precautionary approach in their determinations regarding the nature and duration of impacts.

When evaluating the potential significance of adverse impacts of bottom fishing activities in the SIOFA Area, the above factors should all be considered. Assessments should evaluate the impact that each type of fishing gear is likely to have on areas likely to contain VMEs, both on a per set basis and cumulatively. Paragraph 20 of the FAO Guidelines states that "*In circumstances of limited information, States and RFMO/As should apply the precautionary approach in their determinations regarding the nature and duration of impacts*".

Each BFIA will need to detail how the above factors were used to develop a definition of 'significance' for the purposes of the assessment. This should include at a minimum the criteria:

- The intensity or severity of the impact at the specific site affected (i.e. are entire colonies/habitats destroyed, or just a few branches broken), this will be gear specific (and may link be guided by the Hierarchy of Bottom Fishing Impacts (Table 1);
- The ecological consequence of a given impact (which depends on the distribution, density, and recovery potential of the organisms in question), including estimation of the likelihood of interaction;
- The spatial extent of the impact relative to the extent of the VME and whether there may be offsite impacts;
- The frequency of the impact and the cumulative fishing effort. The rate of impact (on a temporal and geographical scale) in relation to rates of recovery of taxa needs to be considered.

Many of these criteria are difficult to measure directly for deep sea fisheries and so assumptions must be made based on studies conducted elsewhere or expert input. All assumptions must be clearly documented in the impact assessments to ensure transparency.

A..7. Hierarchy of Bottom Fishing Impacts

The intent of UNGA Resolutions (61/105 and 64/72) and SIOFA CMM 2016/01 is to prevent significant adverse impacts on fragile benthic species in deep water. While some benthic ecosystems are more vulnerable to disturbance than others, they are also differentially vulnerable to the impacts of different bottom fishing gears.

Gear type and how the gear is to be fished is an important component of the evaluation of any fishing plan. Gear impact should be evaluated as a product of:

- the typical seabed impact footprint per set or tow of the gear type to be used,
- the planned number of fishing events (to provide an estimate of the overall extent of physical impact),
- the likelihood of encountering vulnerable species in proposed fishing areas (including the proportion of planned deployments occurring in new areas), and
- the expected degree of impact by the gear type concerned.

This will enable an index of potential disturbance to be generated. Default rankings of expected level of impact by gear type are provided in Table A1. This ranking of gear impacts may be revised as necessary, following scientific analyses undertaken in the SIOFA Area.

Table A1 Ratings of benthic habitat and bycatch impacts for each gear class. Ratings scale from 1 (very low) to 5 (very high)

Gear class	Benthic habitat		Suggested consideration
	Physical	Biological	
Dredge	5	5	Not assessed
Gillnet – bottom	3	2	Not assessed
Gillnet – midwater	1	1	Not assessed
Hook and line (dropline)	1	1	None proposed
Longline – demersal	2	2	Impact on biological habitat likely higher than previously recognized
Longline – pelagic	1	1	Not assessed
Pots and traps	3	2	None proposed
Purse seine	1	1	Not assessed
Trawl – demersal	5	5	None proposed
Trawl – midwater	1	1	Some mid-water trawls targeting bentho-pelagic species come in contact with bottom

Sources: impact ratings were by Chuenpagdee et al. (2003) with rating considerations proposed by (Williams et al. 2011b), who only assessed and proposed considerations for gear types used by the Australian fishing fleet in the SPRFMO area.

Annex B Distribution of Vulnerable Marine Ecosystems

To implement bottom fishing management measures details of species or higher level taxa known or likely to contribute to VMEs in the Southern Indian Ocean, and the catching of which could indicate evidence of such VMEs, need to be established. The CMM 2016/01 states:

11. Until the Meeting of the Parties has acted on the Scientific Committee's advice on SIOFA threshold levels pursuant to paragraph 6(b), Contracting Parties, CNCPs and PFEs shall establish and apply to vessels flying their flag threshold levels for encounters with VMEs, taking into account paragraph 68 of the FAO Deep-sea Fisheries Guidelines. These threshold levels shall be disclosed in the measures referred to in paragraph 9(1).

12. Until the Meeting of the Parties has acted on the Scientific Committee's advice on the most appropriate response to a VME encounter pursuant to paragraph 6(c), Contracting Parties, CNCPs and PFEs shall require any vessel flying their flag to cease bottom fishing activities within:

(a) For bottom or mid water trawling, or fishing with any other net - two (2) nautical miles either side of a trawl track extended by two (2) nautical miles at each end;

(b) For longline and trap activities - a radius of one (1) nautical mile from the midpoint of the line segment;

(c) For all other bottom fishing gear types - a radius of one (1) nautical mile from the midpoint of the operation

where evidence of a VME is encountered above threshold levels established under paragraph 11 in the course of fishing operations. Contracting Parties, CNCPs and PFEs shall report any such encounter in their National Reports to the Scientific Committee in accordance with the guidelines at Annex 1, including any action taken by that Contracting Party, CNCP or PFE in respect of the relevant site.

Implementation of these measures requires definitions of:

- Evidence of a VME to trigger the move-on provisions of CMM 2016/01, described in paragraph 12 (a,b,c); and
- Existence of areas known or likely to contain VMEs, to trigger the management requirements of the relevant interim measure.

A protocol to determine 'evidence of a VME' is required to enable a rapid assessment and immediate management response during actual fishing operations at sea, to limit immediate impact on areas which appear to support significant quantities of VME species. In contrast, 'designating a VME' requires a scientific analysis to integrate data from individual encounters and assess information on occurrence of VMEs across larger spatial scales, in order to identify, map and designate areas which are considered to constitute actual VMEs.

Paragraph 119(b) of UNGA Resolution 64/72 states that States and RFMOs are to "conduct further marine scientific research and use the best scientific and technical information available to identify where vulnerable marine ecosystems are known to occur or are likely to occur."

B.1. Detection of 'evidence of VMEs'

UNGA resolution 64/72 in paragraph 119 (c) calls on RFMOs and States to *establish and implement appropriate protocols for the implementation of paragraph 83 (d) of its resolution 61/105, including definitions of what constitutes evidence of an encounter with a vulnerable marine ecosystem, in particular threshold levels and indicator species, based on the best*

available scientific information and consistent with the Guidelines, and taking into account any other conservation and management measures to prevent significant adverse impacts on vulnerable marine ecosystems, including those based on the results of assessments carried out pursuant to paragraph 83 (a) of its resolution 61/105 and paragraph 119 (a) of the present resolution.

SIOFA CMM 2016/01 paragraph 12 is intended to apply in cases of unexpected interactions with VMEs during individual fishing operations, in areas where no other pre-determined management action has been implemented to prevent significant adverse impacts. In developing a protocol to detect evidence of a VME, the appropriate scientific analyses should be conducted and the following principles should be considered:

Principles for a Protocol to Identify 'Evidence of a VME'

- Evidence of a VME needs to be defined in a way which makes this measure implementable at sea. The protocol should be rapid to implement at the end of each tow or set, and should not require a high level of taxonomic identification expertise. Relatively few, higher order taxonomic groups should be used, rather than individual species or genera.
- The evidence must be defined in terms of benthic bycatch made during individual bottom fishing operations (e.g. trawl tows or line sets).
- Evidence should be derived from species which possess the characteristics considered to make them vulnerable to deep sea bottom fisheries, as defined in the FAO Guidelines. Emphasis should be placed on taxonomic groups which may contribute to forming VMEs (FAO 2008, Annex 1) in the SIOFA Area.
- A measure of quantity needs to be incorporated to allow the protocol to distinguish between a sporadic capture of a single organism which may not indicate evidence of a VME and a quantity of by-catch which is considered to constitute evidence of a VME.
- The thresholds chosen to indicate evidence of encounter with a VME should be based on analysis of bycatch data for the fishery and gear type concerned, or a comparable fishery using the same gear type. The thresholds should be also be precautionary.
- Higher ranks / scores should be accorded to species considered more vulnerable to fishing impacts, or which are considered to be strong indicators of VMEs. The protocol should also incorporate some measure of biodiversity, to accord higher scores to bycatches of many species, as opposed to a single species.

B.2. Designation of Taxa Constituting Evidence of a VME

The FAO Guidelines (paragraph 42) identify characteristics of species or communities that should be considered to be vulnerable to impacts of bottom fishing. Annex 1 of the FAO Guidelines provides examples of taxonomic groups of organisms which have those characteristics, and which could contribute to forming VMEs (FAO 2008). A CCAMLR VME Workshop (CCAMLR 2009) expanded on the FAO guidelines to develop a set of criteria that characterise species constituting VMEs:

Habitat-forming *– One of the main characteristics of the structural species within VMEs is the degree to which they create habitat that could be used by other organisms. Organisms that are large, with a strong three-dimensional shape, or which create a complex surface by clustering in high densities, or changing the character of the substratum (e.g. sponge spicule mats), create habitats for other organisms.*

Longevity *– Mortality of long-lived organisms can result in long recovery periods to regenerate unfished age structure, from decades to centuries. Vulnerability of these species is proportional to longevity.*

Slow growth *– Organisms which grow slowly will take a longer time to attain a large size or reproductive maturity. Slow growth rates of organisms are correlated with high longevity, but independent of age, slow growth requires longer times to generate maximum size.*

Fragility *– The potential for damage or mortality resulting from physical disturbance from bottom fishing gear.*

Larval dispersal potential *– The range of dispersal by larvae and propagules influences the ability of a species to recolonise impacted areas. Species which brood larvae, or otherwise have limited dispersal abilities, are less resilient to fishing disturbance because new recruits may not be available from a nearby source, and recruitment, recolonisation and recovery could be delayed. Organisms with high dispersal potential have a higher probability of supplying larvae to a disturbed area and are therefore more resilient.*

Lack of adult motility *– Motility in itself should not exclude taxa from being vulnerable or less resilient to bottom fishing gear, as organisms which can move to some degree may still meet all the other criteria of vulnerability. However, the lack of motility does add some degree of vulnerability and decreases resilience because as adults those organisms cannot redistribute themselves in response to a direct disturbance, adjust their position if altered in some way, or move into a disturbed area to recolonise.*

Rare or unique populations *– Vulnerable taxa containing species that create dense, isolated populations are intrinsically vulnerable because they have a more limited potential for recovery. This criterion also indicates vulnerability to physical disturbance and is independent of the habitat-forming characteristics of the taxon.* (CCAMLR 2009)

Taxonomic groups which meet the above criteria, and which have been encountered in bottom trawl fisheries in the SPRFMO Area, are described in Table B1 Taxa such as bryozoans and feathery hydroids have been excluded from this list because they are generally not retained by bottom fishing gears. Table 2 provides an example of taxonomic groups that could be used to identify evidence of a VME within the SIOFA area.

Table B1. Example of a list of taxonomic groups which could be used to identify evidence of a VME in the South Pacific Ocean, based on the work of Parker et al. (2009)

Taxonomic Group	**Common Name**
Phylum: Cnidaria	
Class Anthozoa:	
Order: Actiniaria	anemones
Scleractinia	stony corals
Antipatharia	black corals
Alcyonacea	soft corals
Gorgonacea	sea fans
Pennatulacea	sea pens
Class: Hydrozoa:	

Taxonomic Group	Common Name
Order: Anthoathecatae	
Family Stylasteridae	hydrocorals
Unidentified corals	corals
Phylum: Echinodermata	
Class: Crinoidea	sea lilies
Order: Brisingida	armless stars

Parker et al. (2009) describe a 'VME Evidence Protocol' for bottom trawl fisheries in the SPRFMO Area, combining the taxa with VME vulnerability scores and weight thresholds determined from analysis of historical New Zealand bottom trawl benthic by-catch data. This VME evidence protocol may be transferable to the SIOFA Area. VME taxonomic lists may need to be developed separately for separate regions of the SIOFA area, and for different gear types.

Overview of SIOFA fisheries 2016

Fleet composition

In the six years 2011 to 2016 (the most recent years reported by all parties), between 7 and 15 vessels fished each year in the SIOFA Area, across all the parties (Table 1).

Table 1. Provisional list of vessels (trawl, bottom longline and gillnet) undertaking fishing in the SIOFA area by members.

Flag	Gear	Year					
		2011	2012	2013	2014	2015	2016
Australia	Trawl	1	1	1	1	1*	1*
	Bottom Longline	0	0	0	0	1*	1*
Cook Islands	Trawl	3	3	2	2	2	2
European Union	Bottom Longline	2	2	2	1	1	2
	Gillnet	0	0	1	1	1	0
France Overseas Territories	Bottom Longline	2	2	2	2	2	2
Japan	Trawl	1	2	2	1	2	2
	Bottom Longline	0	0	1	0	0	0
Korea	Trawl	1	1	1	0	0	0
	Bottom Longline	1	1	3	0	0	0
Total Trawl		**6**	**7**	**6**	**4**	**4**	**4**
Total Bottom Longline		**5**	**5**	**8**	**3**	**2**	**4**
Total Gillnet				**1**	**1**	**1**	

*vessel is multipurpose (trawl and bottom long-line)

Fishing Effort

Provisional estimates of aggregated Trawl effort (days) across all members varied between 674 and 789 between 2011 and 2014 (Table 2). In 2015, this increased to 1065 days (Table 2). Trawl hours are also reported except for the Cook Islands where reporting at this level is not applicable.

The provisional estimate of aggregated Longline effort (Number of hooks) has varied between 634,682 hooks in 2014 and 2,696,938 in 2012 (Table 2).

Table 2. Provisional estimates of effort in the SIOFA fisheries between 2011 and 2015. Note Cook Islands are currently unable to report trawl hours. Total trawl hours excludes the Cook Islands. Longline hook numbers for the European Union between 2011 and 2014 are currently not available.

Flag	Gear	2011	2012	2013	2014	2015
Australia	Trawl days	132	104	32	63	12
	Trawl hrs	294	252	62	106	14
	Longline hooks	0	0	0	0	1,800
Cook Islands	Trawl days	599	490	524	523	501
European Union	Longline hooks	na	na	na	na	2,221,000
	Gillnet km	0	0	5,442	4,945	1,121
France Overseas Territories	Longline hooks	509,414	503,478	731,883	634,682	443,492
Japan	Trawl days	58	90	118	126	356
	Trawl Hrs	550	528	1,001	707	2,260
	Longline hooks	0	0	96,480	0	0
Korea	Trawl days	50	238	217	0	0
	Trawl hrs	286	623	233	0	0
	Longline hooks	355,192	2,193,460	1,023,252	0	0
Total Trawl days		**839**	**922**	**891**	**712**	**869**
Total Trawl hrs*		**1130**	**1403**	**1,296**	**813**	**2,274**
Total hooks		**864,606**	**2,696,938**	**1,851,615**	**634,682**	**2,664,492**
Total Gillnet km		**0**	**0**	**5,442**	**4,945**	**1,121**

Catch composition

The catch of trawl vessels is predominantly alfonsino and orange roughy. Species also caught by trawling include pelagic armourhead, bluenose warehou, violet warehou, ocean blue-eye trevalla and oreo dories, cardinal fish, hapuku wreckfish.

The catch of longline vessels differs between two groups. There are longline vessels (reported by Japan, Korea and France Overseas Territories) that catch Patagonian toothfish and associated species such as blue antimora. The other longline vessels catch hapuku wreckfish and ocean blue-eye trevalla, pelagic armourhead, deepwater sharks (Squalidae), alfonsino, rubyfish and common mora.

The catch of the gillnet vessels is predominantly deepwater sharks (Squalidae), there is uncertainty on the species composition within this group.

Catch volume

Provisional catch time series for 2006 to 2015 for Alfonsino, Orange Roughy, Patagonian Toothfish and deepwater sharks are presented in Figures 1, 2, 3 and 4 respectively.

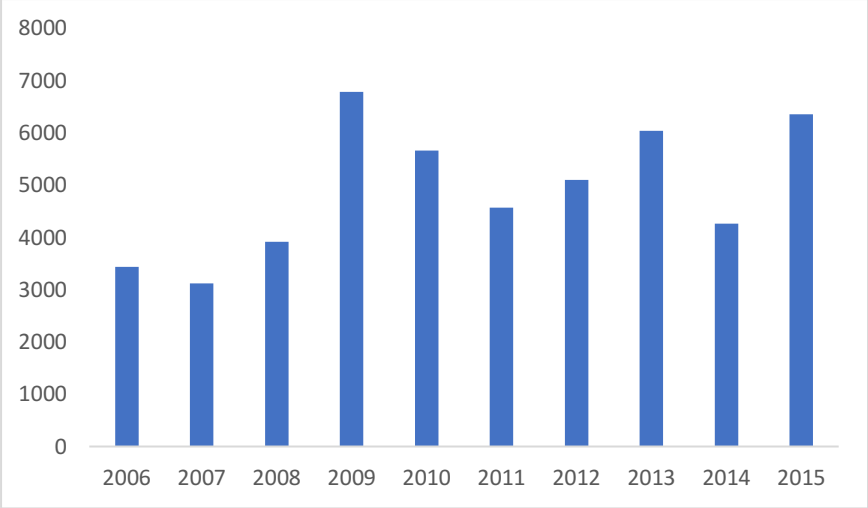

Figure 1 Provision catch annual catches (tonnes) between 2006 and 2015 (x-axis) for alfonsino. Note this catch history does not include the historical or current catch of non-contracting parties.

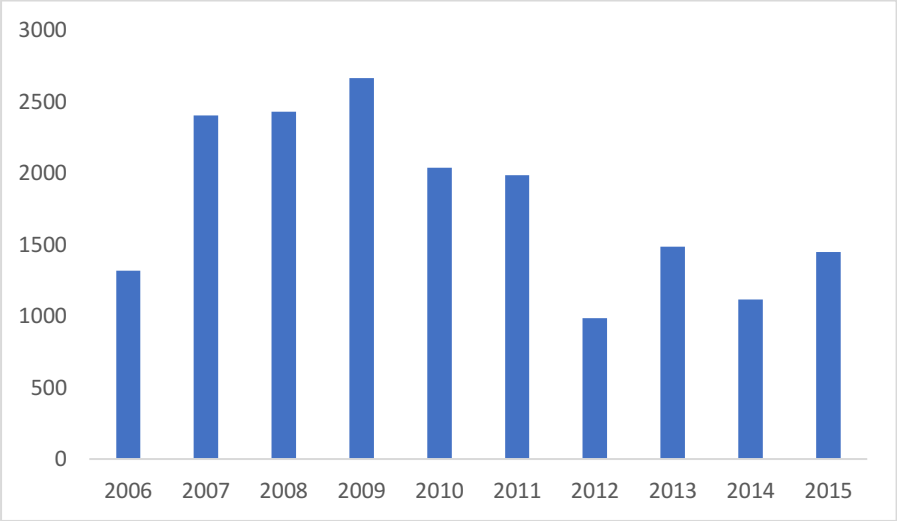

Figure 2 Provision catch annual catches (tonnes) between 2006 and 2015 for orange roughy (x-axis). Note this catch history does not include the historical or current catch of non-contracting parties

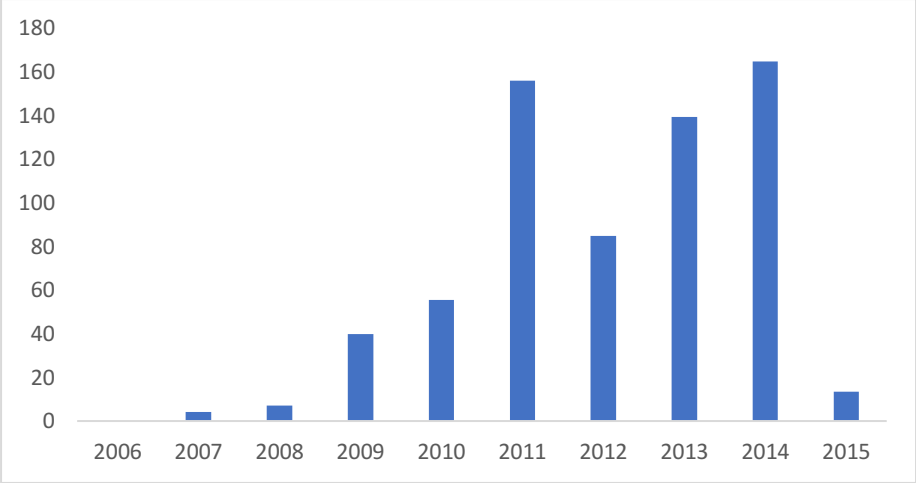

Figure 3 Provisional annual catches (tonnes) between 2006 and 2015 (x-axis) for Patagonian Toothfish. Note this catch history does not include the historical or current catch of non-contracting parties.

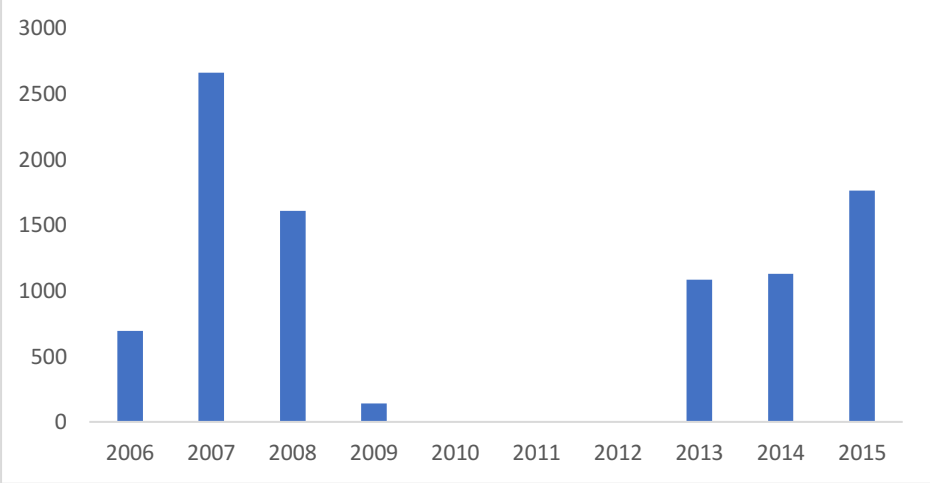

Figure 4 Provisional annual catches (tonnes) between 2006 and 2015 for deepwater sharks. Note this catch history does not include the historical or current catch of non-contracting parties

Vulnerable Marine Ecosystems

One of the tools SIOFA implements to manage impacts on Vulnerable Marine Ecosystems (VME) from fishing is the application of move-on rules when thresholds of VME indicators are reached. Table 3 provides a summary of the thresholds and move-on rules applied by each Flag.

Observer programs

SIOFA requires its members to implement Scientific Observer programs. Table 4 provides a summary of the observer programs implemented by each Flag.

Table 3. Summary of VME thresholds and Management Responses that were provided in the 2017 National Reports submitted to SC3.

Flag	VME Threshold	Management Response
Cook Islands	Trawl tow, the presence of more than 60 kg of live coral and/or 400 kg of live sponge.	Reported to Cook Islands within 24 hrs of encounter
	If any subsequent trawl within 1nm of the encounter trawl contains more than 30 kg of live coral/and or 200 kg of live sponge	The vessel must not fish within 5nm of that area until the Ministry of Marine Resources has completed an investigation. However, if the vessel deploys an underwater camera system on the trawl net, and the Cook Islands Observer verifies that no substantial VME structures are present, fishing can continue.
		Cook Islands vessels intending to transit any Benthic Protected Area shall: a. Give at least 24 hours advance notice to MMR prior to entering or exiting any Benthic Protected Areas; b. Ensure their vessel monitoring system polls once every hour while in the Benthic Protected Area; and c. Require that fishing gear is properly stowed before entering, and in transit through, a Benthic Protected Area and not able to be deployed.
Korea	The threshold for all bottom fishing vessels: > 60kg of coral per set or over 800kg of sponges per set.	If the amount of VME that exceeds the weight specified in the criteria, the vessel shall apply a 2 nmiles move-on rule to resume its fishing operation. The vessel shall relocate its fishing position until it reaches a point where no VMEs are confirmed. In accordance with Article 15 of Distant Water Fisheries Development Act, an automatic location communicator shall be installed on all vessels conducting bottom fishing activities, and an observer shall be on board each vessel for over 50% of the total number of days fished during the trip.
Australia	Trawl > 50 kg of corals or sponges in a shot for trawlers	In the SIOFA area of waters (a) if the combined catch of coral or sponge in any one trawl shot exceeds 50kgs the holder must cease fishing within an area two nautical miles either side of the trawl track extended by two nautical miles at each end of

	Line >10 kg of corals or sponges per 1000 hooks or 1200 metre section of line (whichever is shorter)	the trawl track; or (b) if the combined catch of coral or sponge in any one shot for line method exceeds 10kgs for any 1000 hook section of line or a 1200 metre section of line, whichever is the shorter; the holder must cease fishing within a radius of one nautical mile from the midpoint of the line segment. The holder most not fish in that area using the same method as used for that shot that triggered the limit until AFMA notifies otherwise. In the SIOFA area of waters if a vessel exceeds the catch limit for coral and sponge then as soon as practicable, but in any event no later than 24 hours after the shot, the concession holder must notify AFMA's Service One section. The notification must include details of the shot including the location.
Japan		Following Article 11 CMM 2016/01, Japan temporally establishes threshold levels for encounters with VMEs and move-on protocols. For trawl fisheries, as they operate in the mid-water, no threshold levels have been established. The threshold levels will be established when the observer recognizes that the operation is likely to come in contact with the seafloor or benthic organisms. As for the bottom longline fisheries, Japan applies those used in CCAMLR.
European Union		The EU-Spain bottom longline fleet is applying the rules adopted by the Fishing Administration, similar to those applied in SEAFO and CCAMLR in the definition of the VME encounter and thresholds, together with the protocols adopted in the CMM 2016-01.

Table 4. Summary of Observer Programs that were provided in the 2017 National Reports submitted to SC3.

Country		**Position**
Australia	Coverage	Trawl gear – 100% since 2010
		Non-trawl – 20%
	Training	AFMA operated: Need relevant scientific or fishing experience: currently 16
	Collection	Data on vessel characteristics, fishing activity, catch composition, discarding and bycatch. Do not record bycatch of marine mammals, seabirds or marine reptiles
	Port Sampling	No: Landings monitored thru verified catch disposal records
Cook Islands	Coverage	35% since 2015; Aiming for 100% by 2017/2018
	Training	In development
	Collection	
	Port Sampling	No: Vessels are monitored by port landing state
EU	Coverage	IOTC scientific observation system
	Training	
	Collection	
	Port Sampling	No
France (overseas territories)	Coverage	
	Training	
	Collection	
	Port Sampling	
Japan	Coverage	100%
	Training	Initiated September 2016
	Collection	Trawl Fisheries: items listed in Annex B, CMM 2016/02 Bottom longline fisheries: use CCAMLR
	Port Sampling	
Korea	Coverage	
	Training	Initiated 2012: overseen by NIFS; must have specified scientific or fishing experience
	Collection	
	Port Sampling	No

FAO species codes and alternative names used by members of the Scientific Committee

FAO common name	FAO species code	Scientific name	Alternative common name
Alfonsinos nei	ALF	Beryx spp.	Alfonsino
Splendid alfonsino	BYS	Beryx splendens	Alfonsino
Bluenose warehou	BWA	Hyperoglyphe antarctica	Blue-eye trevalla, Antarctic butterfish
Orange roughy	ORY	Hoplostethus atlanticus	
		Schedophilus labyrinthicus*	Ocean blue-eye trevalla
Violet warehou	SEY	Schedophilus velaini	Indian Ocean trevalla
Pelagic armourhead	EDR	Pentaceros richardsoni	Southern boarfish
Patagonian toothfish	TOP	Dissostichus eleginoides	
Common mora	RIB	Mora moro	Ribaldo
Wreckfish	WRF	Polyprion americanus	
Portuguese dogfish	CYO	Centroscymnus coelolepis	
Hapuka	HAU	Polyprion spp.	Antarctic butterfish (Japan?)
Rubyfish	RYG	Plagiogeneion rubiginosum	
		Plagiogeneion spp.	Rubyfish
Smooth oreo dory	SSO	Pseudocyttus maculatus	
Spiky oreo	ONV	Neocyttus rhomboidalis	
Blue antimora	ANT	Antimora rostrata	
Hapuku wreckfish	WHA	Polyprion oxygeneios	Hapuku
Cardinalfishes nei	APO	Apogonidae	
Cardinal fishes nei	CDL	Epigonidae	Deepwater cardinalfishes
Oreo dories nei	ORD	Oreosomatidae	
Blackbelly rosefish	BRF	Helicolenus dactylopterus	

*scientific name unaccepted, accepted species name is *Schedophilus velaini*, however reported in some fisheries as *Schedophilus labyrinthicus*

SIOFA Stock Assessment Working Group

Terms of Reference

Chair: Japan

Objectives and background

Paragraph 6a of CMM 2016/01 actions the SIOFA Scientific Committee to provide advice and recommendations to the Meeting of the Parties on the status of stocks of principal deep-sea fishery resources targeted, and, to the extent possible, taken as bycatch and caught incidentally in these deep-sea fisheries, including straddling fishery resources by 2019.

Stock Assessment in the SIOFA jurisdiction is currently challenged by the lack of an analysis and review process for available data held by Parties across the key fish stocks. The SC recommended that a working group be established under the SIOFA Scientific Committee to progress work related to stock assessments required to address this action.

Initially, the working group will focus on assessments for orange roughy and alfonsino in the SIOFA Agreement Area. The formation of the IWG will be useful in promoting engagement of specialist scientists in the stock assessment process, which is fundamental to success. Equally, it will enable the scientific committee to review assessments with the knowledge that all members and participants have had the opportunity to review data, contribute to the structure of the assessment models and identify research needs/priorities and management advice before the assessments are reviewed by the SC

Under these Terms of Reference, participants will commit to involvement in the process. All 'rules' of the SA-IWG will be consistent with the SC Terms of Reference, and so are not included here. The SA-IWG ToR will be focused on the practical aspects of progressing work related to stock assessments in SIOFA.

Terms of Reference

1. The SA-IWG will be tasked with developing a research and review plan for implementation of stock assessments and related processes for progressing the objectives of the SIOFA SC and Meeting of the Parties. In the short-term, the SA-IWG will:
    a. Assist with the timely provision of data to support the implementation of the SA-IWG for orange roughy and alfonsino.

    In the medium to long-term, the SA-IWG will:
    b. Assist with review of methods and outputs used for stock assessments and provide advice to the SC on a harvest strategy and fisheries reference points for SIOFA fisheries.
2. To facilitate timely development of stock assessments, and in the absence of an established and populated SIOFA Fisheries Database, Parties agree to provide the necessary and available data to the working group within two months of a request, noting that appropriate data confidentiality protocols (as per CMM 2016/03 and domestic data and privacy policies) will apply.
3. The requesting party will need to confer with the data custodian to ensure the appropriate data confidentiality agreements and other relevant processes are followed.

Interim dates and other issues for stock assessment

- Within the close of SIOFA SC2 and 1 month prior to SIOFA SC3, participants agree to:

  Alfonsino
  - Undertake analyses of any CPUE time series and length frequency data for the SIOFA alfonsino stocks. These analyses need to demonstrate that the CPUE and length frequency series satisfies the assumption that any trend is indexing the abundance of the stock and not changes in fisheries behaviour or data bias.
  - Provide a summary of available biological information to SC3.
  - Prepare and submit a paper to SIOFA SC3 on the outcomes of the above alfonsino CPUE analyses)
  - Consider availability of other abundance indices, relative or absolute, that could provide input to alfonsino stock assessments and other methods to evaluate the status of alfonsino stocks.
  - Consult the FAO global alfonsino report and other relevant information to assist with stock assessments and other methods to evaluate the status of alfonsino stocks.

  Orange Roughy
  - Provide a summary of orange roughy stock structure information and propose a delineation of management stocks. Identify a priority orange roughy stock for assessment and provide a summary of the data available for that stock.
  - Agree on an assessment model and undertake a preliminary assessment to estimate current fishing mortality (and if feasible current biomass and biomass prior to fishing). If feasible (given the method) project biomass trends for the next 5 years given current fishing mortalities.
  - Propose biomass and fishing mortality reference points for these stocks for consideration by SC3.
  - Prepare and submit a paper to SIOFA SC3 on the outcomes of the above orange roughy stock assessments.

  General stock assessments
  - Provide advice to the SIOFA secretariat on the design needs of SIOFA data bases for the purposes of stock assessment.

SIOFA Ecological Risk Assessment Working Group

Terms of Reference

Chair: Australia

Objectives and background

Paragraph 6a of CMM 2016/01 actions the SIOFA Scientific Committee to provide advice and recommendations to the Meeting of the Parties on the status of stocks of principal deep-sea fishery resources targeted, and, to the extent possible, taken as bycatch and caught incidentally in these deep-sea fisheries, including straddling fishery resources by 2019.

The SIOFA Scientific Committee has proposed that ecological risk assessment is a practical approach for addressing the potential and current effects of fishing on target stocks and also those caught incidentally in SIOFA's deep-sea fisheries. The SC recommended that a working group be established under the SIOFA Scientific Committee to progress work related to ecological risk assessments required to address this action.

Initially, the working group will focus on an ERA for deepwater sharks in the SIOFA Agreement Area. This ERA could be used as a model for future ERAs, or for example, as a basis for the expansion of the deepwater sharks ERA to all relevant species across the SIOFA area (where data are available).

Such a model will be useful in promoting engagement of scientists in the ERA process, which is fundamental to success.

Under these Terms of Reference, participants will commit to involvement in the process. All 'rules' of the ERA WG will be consistent with the SC Terms of Reference, and so are not included here. The ERA-IWG ToR will be focused on the practical aspects of progressing work related to ERAs in SIOFA.

Terms of Reference

1. The ERA-IWG will be tasked with developing a research and review plan for implementation of ERAs and related processes for progressing the objectives of the SIOFA SC and Meeting of the Parties. In the short-term, the ERA WG will:
    a. Assist with the timely provision of data to support the implementation of the ERAs for deepwater chondrichthyans being undertaken by Australia and Japan.

    In the medium to long-term, the ERA-IWG will:
    b. Assist with review of methods and outputs used for the deepwater chondrichthyans ERAs and provide advice to the SC on the applicability of the methods to be used more broadly across SIOFA fisheries.
2. To facilitate timely development of ERA processes, participants agree to provide the necessary and available data within two months of a request, noting that appropriate data confidentiality protocols (as per CMM 2016/03 and domestic data and privacy policies) will apply
3. The requesting party will need to confer with the data custodian to ensure the appropriate data confidentiality agreements and other relevant processes are followed.
4. All other rules of the ERA-IWG will be consistent with the SC Terms of Reference.

Interim dates and other issues for deepwater sharks ERA

- Within two months of the close of SIOFA SC2, participants agree to provide the following data:

    - Fishing effort footprint for demersal and midwater trawl, line gears and gillnet gears for the period 2011–2016, where available, at a 20 minute (or finer) resolution (as shapefiles)
    - If finer scale data can be provided, the mid-point of a polygon will be selected and a 20 minute cell used for the first run (i.e. the 'worst case scenario')
    - Shark catch data for the aforementioned gears, to be used for 1) verifying the species list and 2) understanding the potential susceptibility of various sharks to certain gears
- The ERA-IWG will prepare and submit a working paper on the deepwater chondrichthyans ERAs to SC3 for review and consideration. The paper will be co-authored by the ERA WG/SIOFA SC.
- Provide advice to the SIOFA secretariat on the design needs of SIOFA data bases for the purposes of ecological risk assessment.
- This working paper will form the first draft of a scientific paper on the deepwater chondrichthyans ERAs for intended publication in a scientific journal. The paper will be co-authored by all contributing scientists to the ERA WG/SIOFA SC. Intended publication date will be late 2018.

SIOFA Scientific Committee Operational Work Plan 2016-2019

The SIOFA Scientific Committee (SC) Operational Work Plan 2016-2019 contains immediate research priorities that are currently in progress or are proposed for the next 1-3 years. Noting that the operational work plan is influenced by the SC Work Plan which is agreed by the Meeting of the Parties, each 'year' refers to the intersessional period between the Meetings of the Parties (notionally occurring annually in June/July). Regarding timeframe for completion, the expected delivery of each task identified in this plan will be to the next SC meeting. Where there is no timeframe identified, it is assumed that this work has not been prioritised for the first year of this work plan (2016-2017) but should be undertaken within the three years to which this plan applies. The Operational Work Plan will be reviewed annually by the SC.

The SC may wish to consider the extent to which the Operational Work Plan will be connected to a SIOFA SC budget.

- Year 1: July 2016-July 2017
- Year 2: 2017-2018
- Year 3: 2018-2019

Operational Work Plan for SIOFA research				
Theme	**Research activities**	**Timeframe for Completion***	**Progress SC 2017**	**For completion by SC-03**
1. Scientific data standards for the collection, reporting, verification and exchange of data	• Review of current data holdings and other relevant research	Year 1 – for SC 02	• Catch and effort data from Australia and FOT; Aggregated catch and effort data for Korea, Japan, CI, EU	
	• Identify data gap		• Scientific observer data, including actual locations of VME indicator catches; Consolidation of historical data; Data from non-members	• Consolidation of historical data, including that from non-members (Secretariat) (SC-03)
	• List Agencies and States working on data related to SIOFA		• This relates to mapping process – see below	

	• Guidelines for evaluating and approving e-monitoring programs for scientific data collection	Year 1 – for SC 02	• Paper by AU; • Adopted guidelines (Annex XX)	
	• Development of database for compilation of relevant data		• Database is built and can accept data; Some data inputted; some refinements are required e.g. field constraints	• Completion of database refinements, database populated with data submissions and standard data summaries developed (asap)
	• Development of identifications guides for sponges and corals to enable better collection of data		• SIOFA members using Australian, NZ, CCAMLR and SEAFO reference documents at present	• No further work required
	• Development of identifications guides for deepsea sharks to enable better collection of data		• FAO ABNJ shark guide prepared for SIOF available and being used by some Parties	• No further work required
	• Periodic review of scientific data standards as and when required			• Review of Annex B of CMM 2016-02 'Voluntary observer data' in line with CMM 2016-02 (SC-03)
	• Trialing of 'smart forms'		• CI is working with FAO on trial • AU uses 'smart forms'	• Progress report on trial (SC-03)
2. Advice on vulnerable marine ecosystems	• Contribute information to FAO VME database	Ongoing	• Process of information exchange has been initiated	Ongoing
	• Mapping of bottom fishing effort and VME occurrence	Year 1 – for SC 02	• Some data available via submissions	• Maps of VME encounter/indicator data, (Secretariat in collaboration with ABNJ Deep Seas project)
	• Develop standard protocols for future		• Protocol with draft criteria prepared for recommendation to the MoP (Annex XX)	• Review of draft criteria after first application

	protected area designation			
	• Development of a bottom fishing impact assessment standard		• BFIAS prepared for recommendation to the MoP (Annex XX)	• Review of submitted BFIAS in line with CMM 2016-01 (SC-03)
	• Assessment of likely impact of specific gear types - including review of existing information (see also theme 5 below)	Year 1 – for SC 02	*Nil	• Progress report from ABNJ Deep Seas Project global analysis (SC-03)
	• List Agencies and States working on data related to mapping in SIOFA			• List of agencies and states working on data related to mapping (Parties to provide information to Secretariat who will compile list)
3. Current and historical status of fishing activities	• Scientific impact assessments on demersal gillnet operations		JP reported that they had no data to undertake assessment	• Scientific impact assessments on demersal gillnet operations
	• Scientific impact assessment on other gillnets and developing gillnet fisheries	Year 1 – for SC 02	• No	• Scientific impact assessment on other gillnets and developing gillnet fisheries
	Develop advice on reference periods for effort, footprints and spatial control			• Recommendations to the MoP on appropriate SIOFA bottom fishing footprint (by 2020) • Recommendations to the MoP on the most appropriate response to the VME encounter (by 2019)
	• Characterisation of historical and current deepsea shark fisheries (see also theme 5 below)		• AU paper; ToR agreed for WG for recommendation to the MoP (Annex XX); EU work on characterisation of target fisheries (EU Report)	• Research workplan for implementation of ERAs and related processes as required by WG (Annex XX) (SC-03)

4. Stock assessments for key targeted species[1] **- Orange roughy** **- Alfonsinos** **- Pelagic armourhead?** **- Toothfish[2]**	• Collection, analysis and reporting of essential biological and fisheries information, including: • Age composition data • Length and age • Growth • Reproductive biology • Maturity ogives • Natural mortality	Commence in Year 1 (ongoing)	• ToR agreed for WG for recommendation to the MoP (Annex XX)	• Research work plan for implementation of stock assessments and related processes for alfonsino and orange roughy (Annex XX) (SC-03) • Recommendations to the MoP on the status of principal deep-sea resources targeted in line with CMM 2016-01 (2019)
	• Spatial structure for management purposes	Year 1 – for SC 02	• ToR for Stock Assessment WG to be recommended to the MoP (Annex XX)	See above
	• Determination of biological reference points and associated development of harvest strategies			See above
	• Survey indices/abundance estimates as inputs to assessment model			See above
	• Analysis of data from existing acoustic surveys	Year 1 – for SC 02	• ABNJ workshop • ToR for intersessional analysis of orange roughy acoustic data building towards stock assessments as part of Stock Assessment (Annex XX)	• Analysis completed
	• Evaluation of alternative indices	Year 1 – for SC 02		

[1] Note there are agreed assessment approaches for orange roughy, but not for alfonsino. This will affect speed at which some of this work can be addressed

[2] Noting that the SC agreed that the Chairperson would write to the Chair of the CCAMLR SC to discuss collaborating on toothfish stock assessments

	• Conduct a stock assessment for orange roughy in the SIOFA Area	Year 1 – for SC 02	• Will follow on from analysis of data from existing acoustic survey of OR	See Above (Annex XX)
	• Engage with the CCAMLR Secretariat to discuss collaboration on toothfish assessment	Year 1 – for SC 02	• Initiated discussions, on stock assessment and tagging	• Progress collaboration with CCAMLR on stock assessment and tagging (France and SC Chair)
5. Advice on the impacts of fishing on associated and dependent species	• Risk assessment of effects of fishing on non-target, associated and dependent species (see also theme 2 above)	Year 1 – for SC 02	• AU paper on ERA for deepwater sharks; • ToR for WG to be recommended to the MoP (Annex XX)	• Research workplan for implementation of ERAs and related processes as required by WG (Annex XX) (SC-03)
	• Seek advice from expert groups, such as Birdlife International and the Agreement for the Conservation of Albatross and Petrels, in relation to risk assessments completed for species in the SIOFA Area	Year 1 – for SC 02	• SC Chair requested and provided information	• Recommendations to the MoP on the status of stocks taken as bycatch and caught incidentally (to the extent possible) in line with ERA WG ToR (Annex XX) (by 2019) • Request input prior to SC (Secretariat)
6. Any other advice that the Meeting of the Parties (MoP) requests	*This may be updated following the fourth Meeting of the Parties to SIOFA (26-30 June 2017)*			