NPFC
North Pacific Fisheries Commission

**4th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems
REPORT**

7–9 December 2023

February 2024

North Pacific Fisheries Commission
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7–9 December 2023
Nanaimo, British Columbia, Canada (Hybrid)

FINAL REPORT

Agenda Item 1. Opening of the Meeting

1. The 4th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems (SSC BF-ME04) was held in a hybrid format, with participants attending in-person in Nanaimo, British Columbia, Canada, or online via WebEx, on 7–9 December 2023. The meeting was attended by Members from Canada, China, Japan, the Republic of Korea, the Russian Federation, and the United States of America (USA). The Deep Sea Conservation Coalition (DSCC) and the Pew Charitable Trusts (Pew) attended as observers. Dr. Keith Reid participated as a consultant.

2. The meeting was opened by the SSC BF-ME Chair, Dr. Chris Rooper (Canada), who welcomed the participants and introduced the history and characteristics of Nanaimo.

3. The Science Manager, Dr. Aleksandr Zavolokin, outlined the procedures for the meeting.

4. Mr. Alex Meyer was selected as rapporteur.

Agenda Item 2. Adoption of Agenda

5. The agenda was adopted without revision (Annex A). The List of Documents and List of Participants are attached (Annexes B, C).

Agenda Item 3. Overview of the outcomes of previous NPFC meetings
3.1 SSC BFME03
6. The Chair summarized the discussions and outcomes of the SSC BF-ME03 meeting.

3.2 COM07
3.2.1 CMMs 2023-05 and 2023-06

7. The Science Manager presented the outcomes from the 7th Commission meeting. In particular, he outlined Conservation and Management Measure (CMM) 2023-05 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems (VMEs) in the Northwestern (NW) Pacific Ocean and CMM 2023-06 for Bottom Fisheries and Protection of VMEs in the Northeastern (NE) Pacific Ocean. He also explained a related task from the Commission to the Scientific Committee (SC) to report on the appropriateness of the 500 kg encounter threshold for sponges and that the Commission had not made any clarifications in response to the recommendations from the SSC BF-ME and SC about the referenced effort limits of February 2007 in Paragraph 4A of CMM 2023-05.

3.2.2 NPFC Performance Review

8.   The Science Manager presented an overview of the NPFC Performance Review and outlined some general findings related to the SC. Recommendations from the Performance Review report that concern bottom fish and marine ecosystems were reviewed under agenda item 11.6.

3.2.3 Resolution on Climate Change

9. The Science Manager presented an overview of the Resolution on Climate Change.

Agenda Item 4. Stock assessment and scientific advice on the management of North Pacific armorhead (NPA)

4.1 Review of Members fishing statistics for NPA in 2023

10. The Science Manager presented the fishing catch and effort statistics for NPA including the latest available data for 2022. Total catch in 2022 was around 34.1 MT. 1 Japanese trawl and 1 Japanese gillnet vessel were in operation catching NPA and splendid alfonsino (SA) in the Convention Area.

11. The Lead of the Small Working Group on North Pacific Armorhead and Splendid Alfonsino (SWG NPA-SA), Dr. Kota Sawada (Japan), explained that Japanese vessels have voluntarily avoided targeting NPA since 2019 when the encouraged catch limits were put in place. Therefore, the catch level may not directly reflect stock levels. In light of this, the SWG NPA-SA intends to conduct analysis of directed NPA effort and present the results at a future SSC BF-ME meeting (paragraph 109).

4.2 NPA monitoring survey and Adaptive Management Procedure (AMP)

4.2.1 Review of the results from 2023 monitoring survey

12. The Science Manager presented the results of the monitoring survey for NPA in the Emperor Seamounts in 2023 (NPFC-2023-SSC BFME04-IP03). The fishing vessel Kaiyo Maru No. 51

conducted four trawl hauls for at least one hour each in the Koko and Kammu Seamounts from March to June 2023. The criteria for high recruitment were not met.

13. The SSC BF-ME noted that, although NPA catch was slightly higher in 2022 than 2021, the catch remains at low levels relative to historical values. There are some indications that Japanese fishers have been avoiding catching NPA since the voluntary catch limit was introduced in 2019. There has been no indication of high recruitment of NPA detected in the monitoring survey.

14. The SSC BF-ME noted that there is still no current or accepted assessment for NPA in the Convention Area.

4.3 Review of Members' research and joint research activities on NPA
4.3.1 NPA species summary document update and review
15. The SWG NPA-SA Lead presented an updated species summary of NPA in the Emperor Seamounts (NPFC-2023-SSC BFME04-WP07).

16. The SSC BF-ME reviewed and further updated the species summary.

17. The SSC BF-ME recommended that the SC adopt the updated species summary (Annex D).

4.3.2 Other research activities on NPA
18. No other research activities were presented.

4.3.3 Future and planned research activities by Members on NPA in 2024
19. No future and planned research activities by Members on NPA in 2024 were presented.

Agenda Item 5. Stock assessment and scientific advice on the management of splendid alfonsino (SA)
5.1 Review of Members fishing statistics for SA in 2023
20. The Science Manager presented the fishing catch and effort statistics for SA including the latest available data for 2022. Total catch in 2022 was around 1096.8 MT. 1 Japanese trawl and 1 Japanese gillnet vessel were in operation catching NPA and SA in the Convention Area.

5.2 Review of Members' research and joint research activities on SA
5.2.1 SA species summary document update and review
21. The SWG NPA-SA Lead presented the updated species summary of SA in the Emperor

Seamounts (NPFC-2023-SSC BFME04-WP08).

22. The SSC BF-ME reviewed and further updated the species summary.

23. The SSC BF-ME recommended that the SC adopt the updated species summary (Annex E).

24. The SSC BF-ME noted that SA catch has been about 1/2 of the mean for the last 10 years, but nominal CPUE is only slightly lower than the 10 year average.

5.2.2 Other research activities on SA

25. Japan presented an analysis of SA data collected by NPFC Members for the purpose of determining spawning season, maturity stages, and size at maturity for stock fish around the Emperor seamounts (NPFC-2023-SSC BFME04-WP10). To mitigate sampling bias and maturity stage inconsistencies in the existing data set, Japan calculated maturity using the gonadosomatic index (GSI) of female alfonsino using the gonometric method described in Flores et al (2019). Japan found a $GSI_{cut-off}$ score of 0.51 and *k* coefficient of 0.67 for Japanese data. Japan had intended to explore the gonometric method as a method that could be applied to all Members' data. However, Korean and Russian data were not applicable for this analysis due to lack of gonad weight data for mature fish. Based on the gonometric results, FL_{50} was 282 mm among fish sampled by fishery trawl and 266 mm for fish sampled by fishery gillnet. Further analyses on size and maturity revealed that the difference between gears is likely to be a result of different gear selectivity, and that different seamounts host alfonsino with different size and size at maturity. Japan believed that the gonometric method could potentially function as an accurate yet inexpensive way to determine stock maturity, but did not yet recommend it for use in stock management as it is currently in the preliminary phase of testing.

5.2.3 Future and planned research activities by Members on SA in 2024

26. No future and planned research activities by Members on SA in 2024 were presented.

Agenda Item 6. Stock assessment and scientific advice on the management of sablefish

6.1 Review of Members fishing statistics for sablefish in 2023

27. Canada informed the SSC BF-ME that no Canadian vessels have fished for sablefish in the Convention Area since 2020.

6.2 Review of Members' research and joint research activities on sablefish

6.2.1 Updated stock status for sablefish (Canada and USA)

28. Canada explained that, although genetic and other evidence indicates there is a single stock of

sablefish in the eastern North Pacific Ocean, including the NPFC Convention Area, three stock assessments are carried out in the three domestic jurisdictions (Alaska (USA), British Columbia (Canada) and the U.S. West Coast (USA)) where sablefish are harvested. No stock assessment is conducted for the portion of the sablefish population found in the NPFC Convention Area. The most recent stock assessments from the USA and Canada indicate the spawning stock biomass has been increasing since about 2018, supported by a large coastwide recruitment in around 2016.

6.2.2 Sablefish species summary document update and review

29. The Chair presented the updated species summary of sablefish (NPFC-2023-SSC BFME04-WP02).

30. The SSC BF-ME recommended that the SC adopt the updated species summary (Annex F).

31. The Chair presented the updated species summary of blackspotted and rougheye rockfishes (NPFC-2023-SSC BFME04-WP03).

32. The SSC BF-ME recommended that the SC adopt the updated species summary (Annex G).

6.2.3 Other research activities on sablefish

33. Canada shared some of its other research activities on sablefish including updates to its stock assessment results, a coastwide management strategy evaluation (MSE) process for sablefish, a VME MSE process using Bowie SGaan Kinghlas data, development of sablefish assessment good practices, recruitment forecasting, and ongoing work to develop an electronic tagging database.

6.2.4 Future and planned research activities by Members on sablefish in 2024

34. Canada explained that it plans to work with the USA and any other interested Members to design a harvest control rule specific to NPFC sablefish.

Agenda Item 7. Skilfish in the NPFC Convention Area

7.1 Summary of skilfish distribution, biology and life history

35. Russia presented a summary of skilfish distribution, biology and life history (NPFC-2023-SSC BFME04-IP04). Skilfish is distributed in the North Pacific Ocean, from the Hawaiian Ridge in the south to the Aleutian Islands in the north. Most commonly, it inhabits deep rocky bottoms. It is believed that early juveniles are found in the surface water layer among floating algae, and are distributed in the open ocean, where they live 4–6 years, reaching a length of about 50 cm,

after which they switch to a bottom lifestyle. It is a predator of large numbers of bony fish, cephalopod mollusks, and small crabs. It may also feed on jellyfish. Russian surveys found skilfish on all seamounts in the southern Emperor Seamount Chain (south of 42º N). Most catches were obtained on seamounts T365+A and Koko, where most of the Russian longline deployments were made. The bathymetric range was between 340 and 1300 meters. Across the study period, the size composition of skilfish ranged from 55 to 201 cm, with an average of 103.5 cm. The body weight ranged from 4 to 102 kg, with an average of 20.8 kg. Sexual maturity of most of the analyzed fish were at stages II and II-III of gonad development. Most had empty stomachs, but considering the depth of habitat, stomachs could have been emptied during the stasis period and during sampling.

7.2 Summary of skilfish longline fishery characteristics in the NPFC Convention Area

36. Russia presented a summary of the Russian skilfish longline fishery characteristics in the NPFC Convention Area (NPFC-2023-SSC BFME04-IP04), including descriptions of the Russian longline vessels, description of fishing operations, sites where skilfish have been observed by its longline vessels, the accumulated local effect of year/depth/latitude, and catches between 2014 and 2021.

37. The SSC BF-ME requested Russia, in cooperation with Japan and any other interested Members, to create a species summary document for skilfish and present it at SSC BF-ME05.

Agenda Item 8. Progress on data-limited approaches to assessment of NPA and SA
8.1 Update from SWG NPA-SA

38. The SWG NPA-SA Lead presented a summary of the intersessional progress made by the SWG NPA-SA on the tasks it was assigned by SSC BF-ME03 (NPFC-2023-SSC BFME04-WP09). Further details are described in Agenda Items 8.1.1–8.1.4 below.

8.1.1 Review of joint work on life history based approach to stock assessment

39. The SWG NPA-SA Lead explained that the SWG NPA-SA has:
   (a) conducted analysis (NPFC-2023-SSC BFME04-WP09, Appendix 1) on the growth curve for SA and concluded that the growth curve estimate was improved by incorporating seamount locations as a random factor.
   (b) agreed to use growth parameters as estimates of SA growth.
   (c) conducted analysis to improve statistical modeling of maturity, particularly by the use of the gonometric method (Flores et al. 2019).

40. The SSC BF-ME recommended that the SC adopt the Terms of Reference for Data Sharing of

Catch and Effort Data for Depletion Analysis of North Pacific Armorhead (Annex H) and template for data sharing (Annex I).

8.1.2 Other possible approaches to stock assessment, especially for NPA

41. The SWG NPA-SA Lead explained that the SWG NPA-SA has:

    (a) agreed to conduct individual-based bioenergetic modeling (Gibson et al. 2019) to estimate recruitment success, and depletion analysis (Kiyota et al. 2014) to estimate past recruitment, harvest rate and spawning stock biomass, as possible approaches for NPA.

    (b) reviewed data requirements for bioenergetic modeling on NPA and agreed to begin with a literature survey.

    (c) agreed to share catch and effort data on NPA for depletion analysis, and endorsed the Terms of Reference (NPFC-2023-SSC BFME04-WP09, Appendix 2) and template (NPFC-2023-SSC BFME04-WP09, Appendix 3) for data sharing.

8.1.3 Review of the effectiveness of current CMMs for NPA and SA

42. The SWG NPA-SA Lead explained that the SWG NPA-SA has:

    (a) reviewed the current CMMs for NPA and SA and agreed to evaluate the effectiveness of encouraged catch for NPA (CMM 2023-05 Paragraphs 4M and 4N) and of mesh size regulation of the trawl nets for SA (CMM 2023-05 Paragraph 4Q).

    (b) agreed to evaluate encouraged catch by testing the hypothesis that the setting of encouraged catch reduced directed fishing effort and fishing pressure on NPA, even though recent annual catch is smaller than the encouraged level, and noted that depletion analysis, which is planned to be conducted under task 2, will also contribute to this evaluation by estimating harvest rate.

    (c) agreed to monitor the trend of directed effort through observer data on intended target species and catch species composition (Sawada et al. 2017), noting that it would be useful to know the socio-economic background of recent effort reduction.

    (d) agreed to evaluate mesh size regulation by the comparison of catch size composition of SA before and after the implementation of regulation, while also noting that the conclusion from a previous analysis by Japan (Sawada and Ichii 2020) was ambiguous and further analysis is required, and that a previous analysis by Korea (Park et al. 2021) found an increase of size for NPA, but SA was not analyzed.

8.1.4 Update on CPUE standardization work

43. The SWG NPA-SA Lead explained that the SWG NPA-SA has:

    (a) made no progress on this task and agreed to keep it in lower priority.

    (b) encouraged Members to continue discussion on methodology and framework for CPUE

standardization.

8.1.4 Final review and approval of Fish ID guide

44. The SWG NPA-SA Lead explained that the SWG NPA-SA has:
    (a) agreed on specifications for the design and content of the Field Guide for Identifications of Fishes of the Emperor Seamount Chain Captured by Bottom Fisheries (fish ID guide).
    (b) assisted the Secretariat to edit the fish ID guide.

45. The Science Manager presented the final version of the fish ID guide (NPFC-2023-SSC BFME04-WP14).

46. The SSC BF-ME provisionally approved the fish ID guide, while noting that it may be appropriate to update it further with information provided by Russia on skilfish and that it is necessary to consult the author of the fish ID Guide regarding such potential changes. The SSC BF-ME was unable to receive a reply from the author of the fish ID guide during the meeting and requested the SC to revisit this issue at SC08 and revise the fish ID guide if necessary based on the author's reply. The guide will be made available on the NPFC website in pdf format. Hard copies of the fish ID guide will be distributed to Members.

Agenda Item 9. Assessment and scientific advice on the management of Vulnerable Marine Ecosystems (VME)

9.1 Review of Members' research and joint research activities on VME

9.1.1 Review of progress towards developing a definition of VMEs

47. Japan presented a recommendation that the Japanese method of identifying VMEs in the Emperor Seamount region be adopted as an NPFC standard (NPFC-SSC BFME04-WP11). Japan explained that it has applied its proposed approach for identifying VMEs and assessing the potential impacts of bottom fisheries on VMEs using data from Japanese surveys and fisheries in the Emperor Seamounts region, as reported in NPFC-2017-SSC VME02-WP03 (Rev. 1) and NPFC-2019-SSC VME04-WP02. This approach provided a scientific basis for the prohibition of bottom contact by trawl nets in two potential VME sites stipulated in CMM 2023-05 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the NW Pacific Ocean. Japan recommended that the SSC BFME and the SC endorse the process described in NPFC-2019-SSC VME04-WP02 as one of the NPFC's processes for identifying VMEs.

48. The SSC BF-ME recommended that the SC endorse the method as one framework for identifying VMEs, noting that the density thresholds should be further explored.

49. The SSC BF-ME encouraged Japan and Canada to collaborate and compare methods for estimating density thresholds.

50. The DSCC welcomed the Japanese methodology, while emphasizing that it should be one in a broader set of methodologies to ensure consistency with United Nations General Assembly Resolutions and the United Nations Food and Agriculture Organization (FAO) criteria for the identification of VME.

51. Canada presented the results of a study to identify VMEs on Cobb Seamount using visual data (NPFC-2023-SSC BFME04-WP13). Canada applied a quantitative approach to assessing the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas' criterion of structural complexity for identifying VMEs (FAO 2009) developed by Rowden et al. (2020). Canada identified VMEs using visual data, as outlined in the NPFC framework for identifying data to identify VMEs (CMM 2023-05 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the NW Pacific Ocean, CMM 2023-06 For Bottom Fisheries and Protection of VMEs in the NE Pacific Ocean, and NPFC-2022-SSC BFME03-WP03). Using Rowden et al.'s (2020) approach, Canada calculated a VME density threshold of 0.6 VME indicator taxa colonies m^{-2}. Applying this threshold to visual data from autonomous underwater vehicle (AUV) transects on Cobb Seamount, Canada identified five areas as VMEs ranging in size from 50 – 200 m^2. Using the NPFC's move-on distance of 1 nautical mile following a VME encounter, Canada proposed a fisheries closure area of 1 nautical mile around the identified VMEs to protect them from potential significant adverse impacts (SAIs). Canada proposed two areas as VME protection sites on Cobb Seamount: one in the northwest corner and one in the northeast corner with areas of 24.7 km^2 and 13.7 km^2, respectively. The closure of these areas is estimated to affect less than 4% of the historical sablefish fishing grounds in the Cobb-Eickelberg Seamounts.

52. The SSC BF-ME endorsed the proposed closures and considered potential amendments to CMM 2023-06 to reflect this under Agenda Item 12.

53. The SWG VME Lead, Dr. Janelle Curtis (Canada), provided an overview of a paper on a community consensus on designating VMEs from imagery which is a collaborative work of VME experts from 15 countries (NPFC-2023-SSC BFME04-IP01). The SWG VME Lead explained that the SWG VME had reviewed the paper, and had agreed to scrutinize it further and discuss the inclusion of the methodology as one means of identifying VMEs in the NPFC Convention Area. The SWG VME considered the criteria listed in the FAO Deep Sea Fisheries

Guidelines for the identification of a VME and agreed that meeting one or more criterion can indicate a VME, but a comprehensive analysis is needed to understand the spatial extent of the potential VME and analyze other criteria. The SWG VME also agreed that a site does not need to meet all criteria to be a VME.

54. The SSC BF-ME considered the methodology and tasked the SWG VME to discuss methods for defining VMEs using other FAO criteria (in addition to density-based criteria). These approaches could include the method described in NPFC-2023-SSC BFME04-IP01, so this will be discussed further in considering how to adapt it for use for the identification of VMEs in the NPFC Convention Area.

9.1.2 Modeling VME distribution in the NE Convention Area

55. Canada presented the results of a study to identify potential VMEs on the Cobb-Eickelberg seamount chain using predictive modeling (NPFC-2023-SSC BFME04-WP12). Canada applied the regional VME indicator taxa density threshold of 0.6 VME indicator taxa colonies m^{-2} (see NPFC-2023-SSC BFME04-WP13) to model predictions of VME indicator taxa densities. Based on the results, Canada predicted that potential VMEs are present on all seamounts in the Cobb-Eickelberg seamount chain. Canada said it intends to further refine the method based on feedback and use it to identify where VMEs are likely to occur in the eastern part of the Convention Area.

56. The SSC BF-ME welcomed the research presented by Canada and encouraged Canada to proceed with its intended plan.

9.1.3 Update on progress on standardizing an approach to defining SAI

57. The SWG VME Lead explained that the SWG VME had drafted a five-step flow chart for assessing and managing the risk of SAI in the eastern and western parts of the NPFC Convention Area and presented it to the SSC BF-ME. The five steps are as follows: 1. Characterize benthic communities and identify VME areas and potential VME areas, 2. Analyze the geographical overlap of the distributions of bottom fishing activities and VMEs and potential VMEs, 3. If data are available, determine if one or more SAI have occurred, 4. Calculate the relative risk of SAIs on VMEs and potential VMEs, 5. Use information on the distribution of (1) VMEs and potential VMEs, (2) fishing activities, and (3) relative risk of SAIs to formulate advice on protection of VME areas from SAIs.

58. The SSC BF-ME agreed to task the SWG VME to continue to work to develop a synchronized approach for assessing and managing the risk of SAI.

9.1.4 Other research activities on VMEs

59. Japan presented the results of its 2023 visual survey to collect information on the distribution of cold-water corals in the Emperor Seamounts (NPFC-2023-SSC BFME04-IP06). Japan observed a number of communities and explained that it plans to conduct surveys in 2024 to confirm the extent of these observed communities and determine whether or not they are VMEs using the VME identification method proposed by Japan.

60. Canada presented updated information (NPFC-2023-SSC BFME04-IP02) from the Joint Canada-USA International Seamount Survey (JCUISS), which it introduced at SSC BF-ME03 (NPFC-2022-SSC BFME03-WP12). The objectives of the survey were to survey five seamounts in the NE Pacific Ocean; estimate abundance/size structure of deep-sea coral and seamount species; produce models of presence, density, and size; identify fish and habitat associations; and assess risk of fishery impacts to corals and sponges. Coral and sponge occurrence was found to be widespread. Given the amount of hard substrates, the VME densities were fairly low. The observed sizes were large. There was a relatively high risk of fishing impact, particularly on Cobb Seamount, where a high proportion of transects had discarded gear and there was extensive overlap between fishing activity and predicted coral and sponge presence. Canada informed the SSC BF-ME that additional surveys would be conducted in 2024 if vessel time is available.

9.1.5 Future and planned research activities by Members on VMEs in 2024

61. No additional future and planned research activities by Members on VMEs in 2024 were presented.

9.2 Review of intersessional activities of the SWG VME
9.2.1 Review of the development and implementation of gear specific and taxon specific encounter thresholds in other RFMOs

62. The consultant, Dr. Keith Reid, presented a summary of VME encounter thresholds from other RFMOs (Northwest Atlantic Fisheries Organization (NAFO), North East Atlantic Fisheries Commission (NEAFC), South East Atlantic Fisheries Organisation (SEAFO), Southern Indian Ocean Fisheries Agreement (SIOFA), South Pacific Regional Fisheries Management Organisation (SPRFMO)) and Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and how they were determined by taxa and gear-type (NPFC-2023-SSC BFME04-WP06). There is a need to determine objectives for management actions when setting encounter thresholds. They may be set (i) to determine when a VME might have been encountered in order to implement a temporary closure until the existence of a VME can be

established, or (ii) to indicate a level of catch of VMEs that is greater than expected based on the spatial modelling of VME distribution and may cause SAI at the overall scale of the distribution of VMEs. The data requirements and the management actions arising from (i) and (ii) are very different. Encounter thresholds are part of an overall management approach to VMEs, including closed areas and gear restrictions, so it is essential that the context and objectives of individual thresholds are clearly articulated and that the thresholds are considered as part of the overall management framework. Furthermore, data availability leads to different approaches. There are two approaches taken by other RFMOs: survey led (data rich, NAFO) and modelling led (data limited, SPRFMO). Thresholds for bottom trawl, agreed in NAFO, and for demersal longline, agreed by CCAMLR, have been widely incorporated by other regional fisheries management organizations and arrangements (RFMO/As). When considering threshold values adopted by other RFMO/As, it may be more appropriate to leverage the science on determining the distribution and abundance of VMEs rather than inherit the negotiated outcomes that are reflected in the prevailing regulations.

9.2.2 Recommendations on gear and taxon specific encounter thresholds for VME indicator taxa in the NPFC Convention Area

63. Canada presented the results of a collaborative study by Canada and the USA aimed at using available data to develop a method for determining quantitative gear-specific and taxon-specific thresholds for bycatch of VME indicator taxa (NPFC-2023-SSC BFME04-WP04). Three cumulative catch distribution methods and a percentile regression method with catch and observations were explored. The percentile regression thresholding method indicated that within a region the density of VME indicator taxa was linearly related to bycatch in that same region. Threshold VME bycatch values developed using this method could be easily converted to densities of VME indicator species. In contrast, encounter thresholds based on cumulative catch from bycatch data only were able to distinguish break points, but with no biological basis for these breakpoints being meaningful. In light of this, Canada presented recommendations for gear-specific and taxon-specific thresholds, based on mean percentile regression, for bottom trawl, longline, and pot for Antipatharians, Gorgonians, and Porifera. Canada noted that the thresholds it had recommended were based on data from areas outside the Convention Area and suggested that these thresholds could be further refined using observed bycatch data and visual surveys from inside the Convention Area.

64. The SSC BF-ME recommended adopting the encounter thresholds in NPFC-2023-SSC BFME04-WP04 for pot gear in the NE Pacific Ocean and discussed relevant amendments to CMM 2023-06 under Agenda Item 12.

65. The SSC BF-ME considered the task from the Commission to report on the appropriateness of the 500 kg encounter threshold for sponges, and recommended that a new interim threshold of 350 kg be set based on the study in NPFC-2023-SSC BFME04-WP04 and that this threshold be reviewed based on further analyses, such as the application of the method in the abovementioned study on data from the NPFC Convention Area.

66. The SSC BF-ME recommended that the encounter thresholds be periodically reviewed as new data and scientific analyses become available.

67. The SSC BF-ME noted that the studies presented by Canada (NPFC-2023-SSC BFME04-WP04, WP12, WP13) are based on a theoretical relationship between the amount of structurally complex habitat and associated species richness in Rowden et al. (2020). The SSC BF-ME and Observers discussed the applicability of the theoretical relationship. The SSC BF-ME suggested that alternative thresholds be considered and the relationship be reviewed on a periodic basis as new data become available.

9.2.3 Objectives for data analysis of shared VME indicator data and directions on future joint data analyses

68. The SWG VME Lead presented summaries of the 1st and 2nd intersessional meetings of the SWG VME (NPFC-2023-SSC BFME04-WP15 & WP16) in the 2023 operational year as well as subsequent email correspondence. Further details are described in Agenda Items 9.2.3- 9.2.6 below.

69. The SWG VME Lead explained that the SWG VME reviewed the available VME data from visual surveys and uploaded the visual data on the NPFC Collaboration website. The SWG VME agreed to establish a correspondence group that agreed on objectives for analyzing the observation data (Chris Rooper (Canada), Mai Miyamoto, Moto-omi Yamaguchi and Satoi Arai (Japan), Hyejin Song (Korea), Vladimir Kulik (Russia) and Amy Baco-Taylor (observer)). Members of the SWG VME will work intersessionally toward completing the objectives and report back to the SWG VME at its next meeting.

9.2.4 Proposals for revisions to VME indicator species list or nomenclature

70. The SWG VME Lead explained that the SWG VME reviewed VME indicator taxa from corals relative to taxonomy for Octocorallia and that it recommended keeping Antipatharia (black corals) and Scleractinia (stony corals) as two orders in the list of VME indicator taxa, while changing Alcyonacea to soft corals and Gorgonacea to gorgonians.

71. The SSC BF-ME endorsed the recommended changes and considered related revisions to CMMs 2023-05 and 2023-06 under Agenda Item 12.

72. The SWG VME Lead explained that the SWG VME reviewed the appropriateness of adding pennatulaceans to the list of VME indicator taxa. However, it did not come to a consensus on recommending the inclusion of pennatulaceans as VME indicator taxa and agreed to re-visit this issue at the SSC BF-ME meeting.

73. The SSC BF-ME held further discussions and recommended that pennatulaceans be included as VME indicator taxa in light of its functional role in ecosystems and biological characteristics and that the encounter threshold of 50 kg for corals also include pennatulaceans. The SSC BF-ME considered related revisions to CMMs 2023-05 and 2023-06 under Agenda Item 12.

9.2.5 Review of potential refinements to quantitative definitions of VME
74. The SSC BF-ME considered potential refinements to quantitative definitions of VME and the related discussions of the SWG VME in Agenda Item 9.1.1 above.

9.2.6 Framework for future monitoring for recovering VMEs
75. The SWG VME Lead explained that the SWG VME discussed the development of management objectives for recovering VME sites and that the SSC BF-ME Chair volunteered to draft a proposed framework and present it at SSC BF-ME04 for further discussion.

76. The Chair presented a proposed framework for monitoring VME recovery in the Convention Area (NPFC-2023-SSC BFME04-WP05) consisting of the following: 1. Comparison of impacted VME to un-impacted VME (control sites) in similar depths, on similar substrates and with comparable environmental conditions to gauge the total impact and signs of recovery; 2. Examination and comparison of the functional characteristics of impacted VME to unimpacted VME; 3. Monitoring of ongoing sources of impact, such as continuing fishing effort inside a recovering VME, and monitoring and reporting of the bycatch of VME indicator taxa; 4. Monitoring of potential recruitment and natural mortality throughout recovery; 5. Monitoring of impacted and control sites should ideally be conducted annually, but, given the potentially long timeframe for VME recovery, a 3-5 year revisiting of sites for monitoring would also be acceptable. Canada did not identify a specific standard for moving from "impacted" to "recovered" but suggested that achievement of recovered status could be indicated by sufficient progress towards an un-impacted state across multiple metrics used for comparing impacted and unimpacted VME communities.

77. The SSC BF-ME provided feedback on the Chair's proposal and the Chair agreed to refine it further and present a revised version at SSC BF-ME05.

9.2.7 Other topics on measuring cumulative impacts and SAI
78. No other topics on measuring cumulative impacts and SAI were discussed.

Agenda Item 10. Data collection and reporting
10.1 Review of the adequacy of the current observer program for the BFME
79. The SSC BF-ME considered the current observer program to be adequate.

10.2 Review of the template for collection of scientific observer data
80. The SSC BF-ME reviewed the template for collection of scientific observer data and determined that no revisions are currently required.

Agenda Item 11. 5-Year (2023-2027) Rolling Work Plan and NPFC Performance Review recommendations
11.1 North Pacific armorhead
11.2 Splendid alfonsino
11.3 Sablefish
11.4 Vulnerable marine ecosystems
11.5 Other ecosystem components
11.6 NPFC Performance Review recommendations
81. The SSC BF-ME reviewed, revised and endorsed the 2023-2027 SSC BF-ME 5-Year Rolling Work Plan (NPFC-2023-SSC BFME04-WP01 (Rev. 1)).

82. The SSC BF-ME recommended hiring an external expert to support the work of the SWG NPA-SA and requested the Chair to draft Terms of Reference and present them at SC08.

83. The SSC BF-ME noted that fisheries-independent data and better understanding of the life-history of NPA and SA could contribute greatly to conducting stock assessments of these species and agreed to discuss opportunities for filling these important data gaps, such as new data collection programs or technologies.

84. The SSC BF-ME reviewed the NPFC Performance Review recommendations that concern bottom fishing and marine ecosystems and compiled a table with its comments on each (NPFC-2023-SSC BFME04-WP19).

Agenda Item 12. Review of CMMs 2023-05 and 2023-06 for bottom fisheries and protection of vulnerable marine ecosystems and CMM 2019-10 for sablefish

85. The USA presented draft amendments to CMM 2023-05 to temporarily close the Emperor Seamounts and parts of the Northwestern Hawaiian Ridge to bottom fishing until the NPFC completes a VME impact study and a stock assessment for NPA (NPFC-2023-SSC BFME04-IP07). The USA invited the SSC BF-ME to consider and provide scientific advice on the proposed amendments.

86. Some Members expressed concern regarding the late submission, particularly the scope of the proposed additions to the CMM. They also pointed out that additional information is needed to understand the scientific basis of the proposal and requested the USA provide further explanation, including how the studies/papers it referred to justify the proposal.

87. The USA explained that this was the third iteration of its proposal, that it builds on previous proposals, and that it was based on existing literature. Furthermore, the USA reiterated that it is not seeking endorsement for the proposal. Rather, it is seeking input from the SSC BF-ME on the proposal from a scientific perspective.

88. Responding to the request of the SSC BF-ME, the USA compiled a list of papers it consulted for the scientific basis of its proposal (NPFC-2023-SSC BFME04-IP08). These include papers that document the occurrence of VMEs, papers that indicate VMEs are likely to be widespread, habitat suitability modeling papers that indicate VMEs are likely to be widespread, papers that document the occurrence of SAIs, and papers that indicate recovery is possible. Furthermore, in response to the concerns expressed by Members, the USA gave a more detailed explanation of the scientific basis of some of the changes it is proposing.

89. Members thanked the USA for presenting its proposal as soon as possible at the start of the meeting, for promptly compiling a list of supporting literature when requested to do so, and for providing further explanation of the scientific basis. Several Members stated that, nevertheless, because the USA had not submitted its documents by the submission deadline and because it had not provided the explanations of the scientific basis of each of the proposed changes as a working paper, they had not had time to adequately review the information and were not in a position to provide comprehensive scientific advice on the proposal.

90. While noting the concerns expressed by several Members regarding the late submission of documents and information, the SSC BF-ME agreed to conduct an initial discussion of the USA's proposal.

91. The SSC BF-ME considered the proposal and shared some initial feedback with the USA.

92. Korea expressed the concern that the NPA stock may already be overfished and recognized the potential value of the proposed temporary closures for the next few years for rebuilding this stock.

93. Canada echoed Korea in recognizing the potential value of the proposed temporary closures for rebuilding the NPA stock, as well as the SA stock. Canada further stated that it did not oppose the spirit of the USA's proposal, which is aligned with the precautionary approach in terms of protecting VMEs and preventing SAIs.

94. The DSCC emphasized the importance of ensuring compatibility between the NPFC's CMMs and Members' domestic measures, and ensuring consistency with Articles 5 and 6 of the United Nations Fish Stocks Agreement, particularly in terms of preventing overfishing and protecting biodiversity.

95. The USA thanked Members for their initial comments. The USA expressed its intention to submit a revised proposal to the 8th Commission meeting and requested Members to provide further comments on the current proposal by the end of February 2024. The USA also expressed its intention to prepare a new working paper linking its proposed changes to the supporting scientific evidence and thanked Members for their advice in this regard.

96. Canada presented draft amendments, based on the discussions of the SWG VME and the SSC BF-ME, to CMM 2023-05 (NPFC-2023-SSC BFME04-WP17) and CMM 2023-06 (NPFC-2023-SSC BFME04-WP18) related to VME indicator species list and nomenclature, the interim encounter threshold for sponges, the introduction of encounter thresholds for pot gear in the NE Pacific, and closure of two new areas in the NE Pacific (paragraphs 51–52).

97. The SSC BF-ME considered and further refined the draft amendments presented by Canada.

98. The SSC BF-ME proposed revisions to CMM 2023-05 as described in Annex J.

99. The SSC BF-ME proposed revisions to CMM 2023-06 as described in Annex K.

100. When reviewing CMM 2023-05 and CMM 2023-06, some Members expressed reservations about how the VME indicator taxa are listed (Paragraphs 4F and 4G of CMM 2023-05 and

Paragraphs 3g and 3j of CMM 2023-06). They noted that the nomenclature and wording may be adequate from a management perspective but not coherent from a scientific perspective. The SSC BF-ME agreed to task the SWG VME to hold further discussions and address the discrepancy between common names and scientific names of VME indicator taxa in these CMMs, while recognizing the potential difficulty of doing so in light of ongoing rapid developments in coral taxonomy.

101. The SSC BF-ME reviewed CMM 2019-10 and determined that no changes are currently necessary.

Agenda Item 13. Other matters

13.1 Inter-sessional work and priority issues for next meeting

102. The SSC BF-ME discussed intersessional work and agreed priority issues for the next meeting as described under Agenda Item 14.

13.2 Update on PICES WG47 Seamount Ecology

103. The SC Chair, Dr. Janelle Curtis, provided an update on the activities of PICES Working Group 47 (WG-47) on Ecology of Seamounts (NPFC-2023-SSC BFME04-IP05). WG-47 has common interests in spatial ecology of seamount fishes and invertebrates, environmental variables that influence seamount biodiversity, developing models to predict the distribution of seamount taxa, genetics of seamount taxa, and identification of VMEs. In 2023, WG-47 held its annual business meetings in the form of a virtual meeting on 14 September and an in-person meeting in Seattle, USA, on 25 October, during which it reviewed members' expertise and research interests and reviewed its Terms of Reference (TOR) and anticipated contributions. It also held a 1-day topic session at PICES-2023 in Seattle, USA on "Seamount biodiversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean," which was co-sponsored by the NPFC. In 2024, WG-47 plans to complete work on its TOR and to convene a business meeting during PICES 2024. In 2025, it plans to write its final report and publish members' primary papers and to submit its final report by PICES 2025.

13.3 Selection of Chair and vice-Chair for SSC BFME

104. The SSC BF-ME re-elected Dr. Chris Rooper (Canada) to serve as its Chair.

105. The SSC BF-ME noted that the term of the SSC BF-ME vice-Chair, Dr. Felipe Carvalho (USA), had come to an end and that he would be unable to continue for another term.

106. No nominations for the SSC BF-ME vice-Chair position were received.

13.4 Other issues

107. The Executive Secretary, Dr. Robert Day, informed the SSC BF-ME that the International Seabed Authority will hold a Workshop on the Development of a Regional Environmental Management Plan for the Area of the Northwest Pacific on 19–23 February 2024 in Tokyo, and that a member of the Secretariat will attend the Workshop as a representative of the NPFC.

108. The SSC BF-ME noted that its TOR does not specifically mention the review and proposal of amendments to CMMs and requested that the SC consider amending the SSC BF-ME's TOR to specify this as one of the SSC BF-ME's tasks.

Agenda Item 14. Recommendations to the Scientific Committee

109. The SSC BF-ME agreed to:
  (a) Task the SWG NPA-SA to:
      i.   Deliver science advice on the status of SA to SC09 using the life history based approach:
           1) Maturity estimation and SPR approach
           2) YPR approach
           3) Include assumptions of the approach
      ii. Analyze the impact of mesh size change on SA catch size composition
      iii. Work towards completing approaches using depletion or IBM for NPA
      iv. Evaluate trend in directed effort relative to NPA catch
      v.   Update species summaries (SA and NPA)
      vi. Standardize CPUE (lower priority)
  (b) Task the SWG VME to:
      i.   Continue to work to develop a synchronized approach for assessing and managing the risk of SAI and determine data requirements and spatial/temporal resolution for SAI assessment
      ii. Address the discrepancy between common names and scientific names of VME indicator taxa in the CMMs (e.g., provide a table that translates between common and scientific names that can be updated as taxonomic changes are implemented) (higher priority)
      iii. Work toward completing objectives of VME data sharing (higher priority)
      iv. Use data-based methods applied to Japan and Korea's indicator taxa bycatch to further refine encounter thresholds that are taxon and gear specific (higher priority)
      v.   Revisit other methods for identifying VME using additional criteria

vi. Consider adding Hydrocorals to the VME indicator taxa list and, if necessary, develop science-based encounter thresholds

(c) To request Canada, Japan and Korea to present summaries of historical discarded bycatch for discussion at SSC BF-ME05.

(d) To request Russia to create a species summary document for skilfish, in cooperation with Japan and any other interested Members, and present it at SSC BF-ME05.

110. The SSC BF-ME recommended the following to the SC:

(a) Adopt the updated species summaries of North Pacific armorhead (Annex D), splendid alfonsino (Annex E), sablefish (Annex F), and blackspotted and rougheye rockfishes (Annex G).

(b) Adopt the Terms of Reference for Data Sharing of Catch and Effort Data for Depletion Analysis of North Pacific Armorhead (Annex H) and template for data sharing (Annex I).

(c) Communicate to the Commission that:

i. although NPA catch was slightly higher in 2022 than 2021, the catch remains at low levels relative to historical values.

ii. there are some indications that Japanese fishers have been avoiding catching NPA since the voluntary catch limit was introduced in 2019.

iii. there has been no indication of high recruitment of NPA detected in the monitoring survey.

iv. SA catch has been about 1/2 of the mean for the last 10 years, but nominal CPUE is only slightly lower than the 10 year average.

(d) Endorse the method proposed by Japan (NPFC-2019-SSC VME04-WP02) as one framework for identifying VMEs, noting that the density thresholds should be further explored.

(e) Endorse the updated 2023-2027 SSC BF-ME 5-Year Rolling Work Plan (NPFC-2023-SSC BFME04-WP01 (Rev. 1)).

(f) Consider the SSC BF-ME's comments on the NPFC Performance Review recommendations that concern bottom fishing and marine ecosystems (NPFC-2023-SSC BFME04-WP19).

(g) Hire an external expert to support the work of the SWG NPA-SA.

(h) Recommend that the Commission close two new areas as VME protection sites on Cobb Seamount as described in NPFC-2023-SSC BFME04-WP13.

(i) Endorse a new interim encounter threshold for sponges of 350 kg.

(j) Endorse encounter thresholds for pot gear of 2 kg for corals and 5 kg for Hexactinellida and Demospongiae in the NE Pacific.

(k) Endorse pennatulaceans as a VME indicator taxa and include pennatulaceans in the

encounter threshold of 50 kg for corals.

(l)   Endorse the revised CMM 2023-05 (Annex J).

(m) Endorse the revised CMM 2023-06 (Annex K).

(n)   Consider, in cooperation with TCC and the Commission, amending CMM 2023-05 to address the ambiguity around the referenced effort limits agreed in February 2007 in Paragraph 4A and amending CMM 2023-06 to determine the level of a historical average in Paragraph 3i.

(o)   Look for opportunities for collaboration with other organizations such as the FAO ABNJ Deep-sea Fisheries Project, PICES or NPAFC to collect new data (such as biomass estimates from fishery-independent surveys or biological data collections) that would help with stock assessments for bottom fisheries and outstanding issues on VME such as VME recovery.

Agenda Item 15. Next meeting

111. The SSC BF-ME recommended holding a 3-day meeting of the SSC BF-ME in 2024 and requested the guidance of the SC and Commission for determining the date, format and location of the meeting.

112. The SSC BF-ME agreed to hold intersessional meetings of the SWG NPA-SA and SWG VME.

Agenda Item 16. Adoption of the Report

113. The report was adopted by consensus.

Agenda Item 17. Close of the Meeting

114. The Chair thanked the SSC BF-ME for its cooperation and constructive discussions.

115. The SSC BF-ME thanked the Chair for his great contributions to the meeting and for agreeing to another term.

116. The SSC BF-ME thanked Canada for hosting the meeting and the Secretariat for supporting Canada in making the meeting arrangements.

117. The meeting closed at 16:00 on 9 December 2023, Nanaimo time.

Annexes:

Annex A – Agenda

Annex B – List of documents

Agenda

Agenda Item 1.   Opening of the Meeting

Agenda Item 2.   Adoption of Agenda

Agenda Item 3. Overview of the outcomes of previous NPFC meetings
      3.1 SSC BFME03
      3.2 COM07
            3.2.1 CMMs 2023-05 and 2023-06
            3.2.2 NPFC Performance Review
            3.2.3 Resolution on Climate Change

Agenda Item 4.   Stock assessment and scientific advice on the management of North Pacific
            armorhead (NPA)
      4.1 Review of Members fishing statistics for NPA in 2023
      4.2 NPA monitoring survey and Adaptive Management Procedure (AMP)
            4.2.1 Review of the results from 2023 monitoring survey
      4.3 Review of Members' research and joint research activities on NPA
            4.3.1 NPA species summary document update and review
            4.3.2 Other research activities on NPA
            4.3.3 Future and planned research activities by Members on NPA in 2024

Agenda Item 5.   Stock assessment and scientific advice on the management of splendid
            alfonsino (SA)
      5.1 Review of Members fishing statistics for SA in 2023
      5.2 Review of Members' research and joint research activities on SA
            5.2.1 SA species summary document update and review
            5.2.2 Other research activities on SA
            5.2.3 Future and planned research activities by Members on SA in 2024

Agenda Item 6.   Stock assessment and scientific advice on the management of sablefish
      6.1 Review of Members fishing statistics for sablefish in 2023
      6.2 Review of Members' research and joint research activities on sablefish
            6.2.1 Updated stock status for sablefish (Canada and USA)
            6.2.2 Sablefish species summary document update and review

6.2.3 Other research activities on sablefish

6.2.4 Future and planned research activities by Members on sablefish in 2024

Agenda Item 7. Skilfish in the NPFC Convention Area

7.1 Summary of skilfish distribution, biology and life history

7.2 Summary of skilfish longline fishery characteristics in the NPFC Convention Area

Agenda Item 8. Progress on data-limited approaches to assessment of NPA and SA

8.1 Update from SWG NPA-SA

8.1.1 Review of joint work on life history based approach to stock assessment

8.1.2 Other possible approaches to stock assessment, especially for NPA (IBM and depletion)

8.1.3 Review of the effectiveness of current CMMs for NPA and SA

8.1.4 Update on CPUE standardization work

8.1.5 Final review and approval of Fish ID guide

Agenda Item 9.   Assessment and scientific advice on the management of Vulnerable Marine Ecosystems (VME)

9.1 Review of Members' research and joint research activities on VME

9.1.1 Review of progress towards developing a definition of VMEs

9.1.2 Modeling VME distribution in the NE Convention Area

9.1.3 Update on progress on standardizing an approach to defining SAI

9.1.4 Other research activities on VMEs

9.1.5 Future and planned research activities by Members on VMEs in 2024

9.2 Review of intersessional activities of the SWG VME

9.2.1 Review of the development and implementation of gear specific and taxon specific encounter thresholds in other RFMOs

9.2.2 Recommendations on gear and taxon specific encounter thresholds for VME indicator taxa in the NPFC Convention Area

9.2.3 Objectives for data analysis of shared VME indicator data and directions on future joint data analyses

9.2.4 Proposals for revisions to VME indicator species list or nomenclature

9.2.5 Review of potential refinements to quantitative definitions of VME

9.2.6 Framework for future monitoring for recovering VMEs

9.2.7 Other topics on measuring cumulative impacts and SAI

Agenda Item 10.   Data collection and reporting

10.1 Review of the adequacy of the current observer program for the BFME

10.2 Review of the template for collection of scientific observer data

Agenda Item 11. 5-Year (2023-2027) Rolling Work Plan and NPFC Performance Review
recommendations

11.1 North Pacific armorhead

11.2 Splendid alfonsino

11.3 Sablefish

11.4 Vulnerable marine ecosystems

11.5 Other ecosystem components

11.6 NPFC Performance Review recommendations

Agenda Item 12.   Review of CMMs 2023-05 and 2023-06 for bottom fisheries and protection of
vulnerable marine ecosystems and CMM 2019-10 for sablefish

Agenda Item 13.   Other matters

13.1 Inter-sessional work and priority issues for next meeting

13.2 Update on PICES WG47 Seamount Ecology

13.3 Selection of Chair and vice-Chair for SSC BFME

13.4 Other issues

Agenda Item 14.   Recommendations to the Scientific Committee

Agenda Item 15.   Next meeting

Agenda Item 16.   Adoption of the Report

Agenda Item 17.   Close of the Meeting

List of documents

MEETING INFORMATION PAPERS

Symbol	Title
NPFC-2023-SC08-MIP01 (Rev. 1)	Meeting Information
NPFC-2023-SSC BFME04-MIP02	Provisional Agenda
NPFC-2023-SSC BFME04-MIP03 (Rev. 2)	Annotated Indicative Schedule

WORKING PAPERS

Symbol	Title
NPFC-2023-SSC BFME04-WP01 (Rev. 1)	Five-Year Work Plan of the SSC BF-ME
NPFC-2023-SSC BFME04-WP02	Species Summary for Sablefish
NPFC-2023-SSC BFME04-WP03	Species Summary for Blackspotted and Rougheye Rockfishes
NPFC-2023-SSC BFME04-WP04	Estimating quantitative gear and taxa specific thresholds for bycatch of vulnerable marine ecosystem indicator taxa in the NPFC Convention Area
NPFC-2023-SSC BFME04-WP05	Proposed framework for monitoring VME recovery in NPFC Convention Area
NPFC-2023-SSC BFME04-WP06	A review of the basis by which RFMOs have determined VME encounter thresholds by taxa and gear-types
NPFC-2023-SSC BFME04-WP07 (Rev. 1)	Species Summary for North Pacific Armorhead
NPFC-2023-SSC BFME04-WP08 (Rev. 1)	Species Summary for Splendid Alfonsino
NPFC-2023-SSC BFME04-WP09	Small Working Group on NPA and SA - Summary for 2023
NPFC-2023-BFME04-WP10	Size at maturity of splendid alfonsino (*Beryx splendens*) from the Emperor seamounts
NPFC-2023-BFME04-WP11	Recommendation of Japanese method of identification of Vulnerable Marine Ecosystem (VMEs) in the Emperor Seamount region to NPFC Standard
NPFC-2023-BFME04-WP12	Identifying potential VMEs on the Cobb-Eickelberg seamount chain based on predictive modelling
NPFC-2023-SSC BFME04-WP13	Identifying VMEs on Cobb Seamount using visual data
NPFC-2023-SSC BFME04-WP14 (Rev. 1)	The Field Guide for Identifications of Fishes of the

	Emperor Seamount Chain Captured by Bottom Fisheries
NPFC-2023-SSC BFME04-WP15	Summary of the 1st SWG VME meeting in 2023
NPFC-2023-SSC BFME04-WP16	Summary of the 2nd SWG VME meeting in 2023
NPFC-2023-SSC BFME04-WP17	Revisions to CMM 2023-05 from SSC BFME04
NPFC-2023-SSC BFME04-WP18	Revisions to CMM 2023-06 from SSC BFME04
NPFC-2023-SSC BFME04-WP19	Performance Review Table-SSC BFME04

INFORMATION PAPERS

Symbol	Title
NPFC-2023-SSC BFME04-IP01	Towards a scientific community consensus on designating Vulnerable Marine Ecosystems from imagery
NPFC-2023-SSC BFME04-IP02	Joint Canada-USA International Seamount Survey update for 2023
NPFC-2023-SSC BFME04-IP03	Results of a monitoring survey for North Pacific armorhead in the Emperor Seamounts in 2023
NPFC-2023-SSC BFME04-IP04	Skilfish distribution, biology, life history and longline fishery
NPFC-2023-SSC BFME04-IP05	PICES-WG47 2023 - summary for NPFC
NPFC-2023-SSC BFME04-IP06	Report of Japanese sea-floor visual survey in the northern Emperor Seamount in 2023
NPFC-2023-SSC BFME04-IP07	Draft US proposal for revision of CMM 2023-05
NPFC-2023-SSC BFME04-IP08	Papers Consulted for the Scientific Basis of the US CMM proposal

REFERENCE DOCUMENTS

Symbol	Title
NPFC-2022-SSC BFME03-Final Report	SSC BFME03 report
	Template for collection of scientific observer data
	NPFC Performance Review
	Resolution on Climate Change

List of participants

CHAIR

Chris ROOPER
Chris.rooper@dfo-mpo.gc.ca

CANADA

Janelle CURTIS
Janelle.Curtis@dfo-mpo.gc.ca

Devon WARAWA
devon.warawa@dfo-mpo.gc.ca

Sarah HAWKSHAW*
sarah.hawkshaw@dfo-mpo.gc.ca

John HOLMES*
john.holmes@dfo-mpo.gc.ca

Steven SCHUT*
Steven.schut@dfo-mpo.gc.ca

Susanna FULLER*
Susannafuller@oceansnorth.ca

Jason LADELL
jason.ladell@dfo-mpo.gc.ca

CHINA

Qiuyun MA
qyma@shou.edu.cn

Libin DAI
libin.dai@qq.com

Jintao WANG
jtwang@shou.edu.cn

JAPAN

Kazuhiro OSHIMA
oshima_kazuhiro28@fra.go.jp

Kota SAWADA
sawada_kota27@fra.go.jp

Naohiko AKIMOTO
naohiko@sol.dti.ne.jp

Satoi ARAI
arai_satoi36@fra.go.jp

Christopher Gardner AYER
Ayer_Christopher_Gardner80@fra.go.jp

Hiroshi KUBOTA*
kubota_hiroshi89@fra.go.jp

Mai MIYAMOTO
miyamoto-mi@janus.co.jp

Takehiro OKUDA
okudy@affrc.go.jp

Wataru TANOUE
wataru_tanoue550@maff.go.jp

Motoomi YAMAGUCHI
yamaguchi_motoomi65@fra.go.jp

KOREA

Jeongseok PARK
jeongseokpark@korea.kr

Hyejin SONG
hyejinsong@korea.kr

RUSSIA

Oleg KATUGIN*
okatugin@mail.ru

Dmitrii ANTONENKO*
dmantonenko@yandex.ru

Vladimir KULIK*
vladimir.kulik@tinro.ru

UNITED STATES

Felipe CARVALHO*
felipe.carvalho@noaa.gov

OBSERVERS

Deep Sea Conservation Coalition

Amy BACO-TAYLOR*
abacotaylor@fsu.edu

Matthew GIANNI
matthewgianni@gmail.com

Bronwen GOLDER*
bronwen@savethehighseas.org

Eunhee KIM*
ekim@cies.re.kr

Lance MORGAN*
Lance.Morgan@marine-conservation.org

Lisa SPEER*
lspeer@nrdc.org

The Pew Charitable Trusts

Nichola CLARK*
nclark@pewtrusts.org

Raiana MCKINNEY
rmckinney@pewtrusts.org

Sebastian NICHOLLS
snicholls@pewtrusts.org

Liz KARAN*
lkaran@pewtrusts.org

RAPPORTEUR

Alex MEYER
meyer@urbanconnections.jp

CONSULTANT

Keith REID*
keith.reid@rossanalytics.com.au

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NPFC SECRETARIAT

Robert DAY
rday@npfc.int

Alex ZAVOLOKIN
azavolokin@npfc.int

Judy DWYER*
jdwyer@npfc.int

Yuko YOSHIMURA-TAKAMIYA
ytakamiya@npfc.int

Sungkuk KANG
skang@npfc.int

Natsuki HOSOKAWA*
nhosokawa@npfc.int

Jihwan KIM*
jkim@npfc.int

* Online participants

Species summary for North Pacific armorhead

North Pacific armorhead (*Pentaceros wheeleri*)

Common names: Pelagic armorhead, Slender armorhead (English); 胸五棘鯛 (Chinese);

クサカリツボダイ (Japanese); 북방돗돔 (Korean); кабан-рыба (Russian)

Biological Information

North Pacific armorhead has a unique life history consisting of a pelagic larva phase and a demersal adult stage on the seamounts (Kiyota et al. 2016). Distribution of the larva includes Gulf of Alaska to North Pacific Ocean off central California and south of Japan, with center of abundance at the Emperor Seamounts. Following their settlements in the seamounts, adults make morphological changes from the "fat" type to the "lean" type concurrent with their dietary shifts. Vertical distribution of the adults ranges from 300-500 m. Juveniles at the epipelagic stage mainly feeds on copepods, shifting the targets towards fish and large crustaceans with growth.
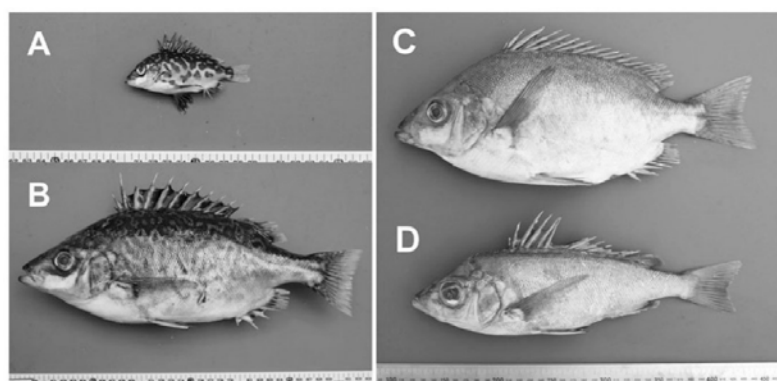

Figure 1: Photographs of Pentaceros wheeleri. A) Pelagic juvenile, B) pelagic subadult, C) demersal adult (fat type), D) demersal adult (lean type) (from Kiyota et al. 2016)
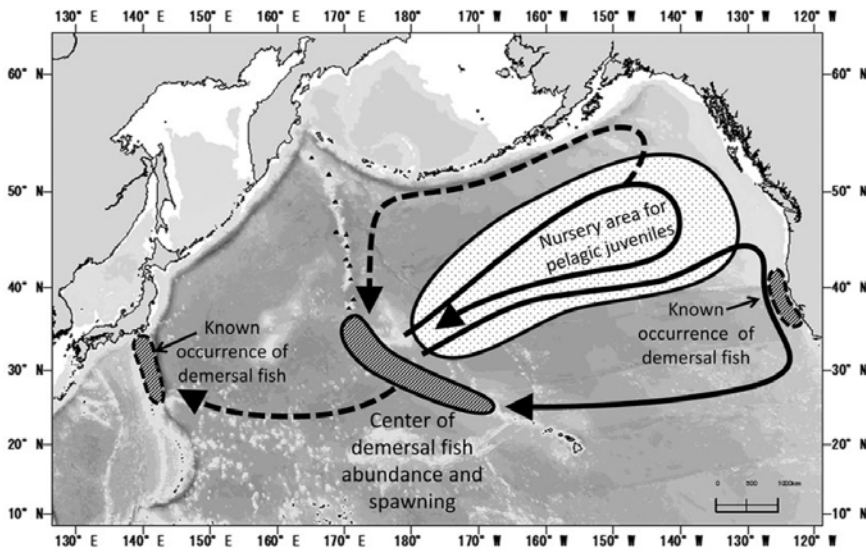
Figure 2: Known demersal habitats and hypothesized pelagic migration routes of Pentaceros wheeleri (Kiyota et al. 2016 Figure 4, modified from Boehlert and Sasaki 1988).

Fishery

Historical catches by Russia and Japan from the combined Emperor Seamounts were high and reached 100 thousand tons in 1970s, followed by a crash (Figure 3). One or two Korean bottom trawl vessels operated from 2004 to 2019. Currently North Pacific armorhead is caught by Japan on the Emperor Seamounts using bottom trawls and gillnets. This fishery is a potential source of significant adverse impacts on vulnerable marine ecosystems due to bottom contact gear.
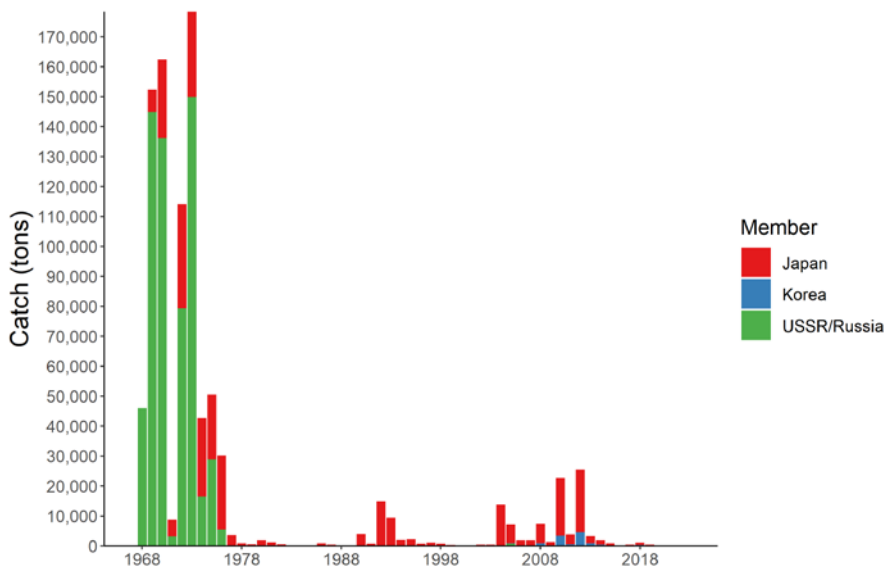

Figure 3: Historical trends of North Pacific armorhead catches in NPFC waters. The annual amounts of catch by each country are shown by the bar plot.
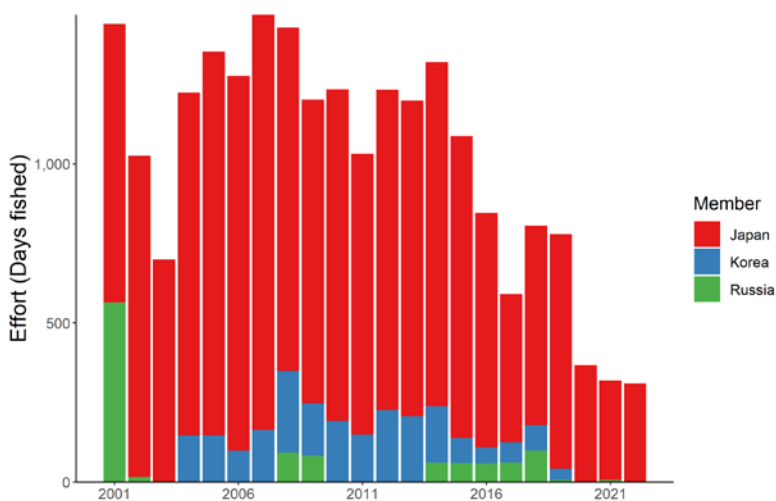
Figure 4. Historical fishing effort for North Pacific armorhead. *The annual fishing efforts by each country are shown by barplot. The efforts are calculated by the total fishing days operated during the year*

Assessment

There is no current or accepted assessment for North Pacific armorhead.

There are no biomass estimates available for this species in NPFC waters. An age- or length-structured stock assessment is unlikely to be feasible given the life history of North Pacific armorhead. Data limited approaches may be examined in the future.

Management

Active Management Measures

The following NPFC conservation and management measures pertain to this species:

•   CMM 2023-05 For Bottom Fisheries and Protection of VMEs in the NW Pacific Ocean

Available from https://www.npfc.int/active-conservation-and-management-measures

Table 1: Current status of management measures

Item	Status	Description
Biological reference point	Not accomplished	Not established
Stock status	Unknown	Status determination criteria not established

Item	Status	Description
Catch limit	Intermediate	Upper limit: 15,000 tons (only for Japan), No operation from November to December, Restriction of trawl mesh size
Harvest control rule	Not accomplished	Catch limit depending on the recruitment strength
Other	Intermediate	No expansion of fishing beyond established areas, No operation in the designated areas, No more increase in the fishing vessels

In 2019, an adaptive management plan was implemented for North Pacific armorhead (NPFC-2019-SSC BF02-WP05, CMM 2019-05). This plan specifies data collection via an annual monitoring survey to be conducted in March-June each year on Koko, Yuryaki, Kammu and/or Colahan Seamounts. If the survey finds evidence of strong recruitment (see CMM 2021-05 and NPFC-2019-SSC BF02-IP01 for details) some areas in the Emperor Seamounts are closed and a 12,000 ton catch limit is encouraged. In low recruitment years, a 700 ton catch limit is encouraged.

Data Availability

Table 2: Catch data

Data	Member	Fishery	Year	Comments
Annual catch	Japan	Trawl	1969-present	
		Gillnet	1990-present	
	Korea	Trawl	2004-2019	
	Russia	Trawl	1970-1987; 1997; 2001-2002; 2005-2006; 2011; 2013	
CPUE	Japan	Trawl	1970-present	Logbook data available
		Gillnet	2008-present	Logbook data available
	Korea	Trawl	2013-2019	Logbook data

Data	Member	Fishery	Year	Comments
				available
	Russia	Trawl	2001-2002; 2005-2006; 2011; 2013	

Table 3: Biological data

Data	Member	Year	Comments
Age	Japan		A preliminary daily ring analysis for ca. 300 fish
	Korea	2013-2019	
	Russia		
Length	Japan	2009-present	Protocol revised (see NPFC-2018-SSC BF01-WP03)
	Korea	2013-2019	
	Russia		
Maturity	Japan	2013-present	
	Korea	2013-2019	
	Russia	1970-1987; 1997; 2011; 2013	

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Kiyota M., Nishida K., Murakami C. and Yonezaki S. 2016. History, biology, and conservation of Pacific endemics 2. The North Pacific armorhead, *Pentaceros wheeleri* (Hardy, 1983) (Perciformes, Pentacerotidae). Pacific Science 70(1): 1-20.

Species summary for splendid alfonsino

Splendid alfonsino (*Beryx splendens*)

Common names: Splendid alfonsino (English); 红金眼鲷 (Chinese); キンメダイ (Japanese); 빛금눈돔 (Korean); Низкотелый берикс (Russian)

Biological Information

Global distribution ranges from tropical to temperate oceans. Historical catch records in the Emperor Seamount suggest the distribution from Nintoku (45 °N) to Hancock (30 °N). Settlement occurs following a certain period of the pelagic life stage. Adults show a vertical distribution from 200 to 800 m with diel vertical migration, feeding on crustaceans, cephalopods, and fish during the night. Limited information is available for recruitment and reproduction processes in the Emperor Seamounts, whereas the population in the Japanese coast shows 4–5 years to sexually mature and spawning occurs during summer (Shotton 2016).
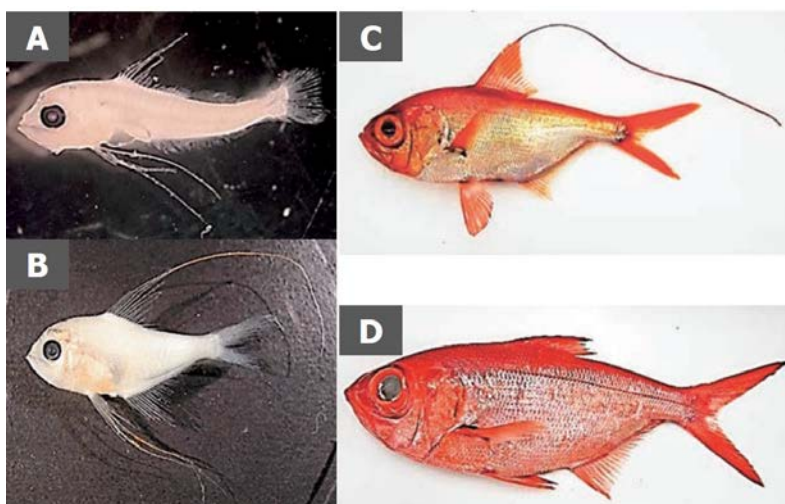

Figure 1: Photographs of Beryx splendens on different developmental stages A) postlarva, B) juvenile, C) young, D) adult (from Watari et al. 2017)
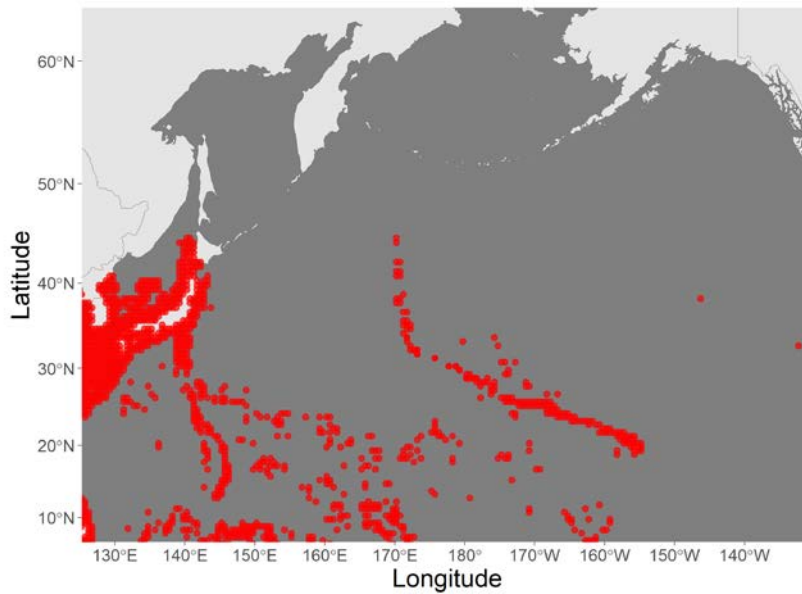
Figure 2: Known distribution of Beryx splendens around NPFC waters. Points indicate observation data from original sources (AquaMaps 2019, October)

Fishery

Since the discovery of large populations of North Pacific armorhead in the Emperor Seamount in the late 1960s, splendid alfonsino has been exploited as an alternative resource to the armorhead due to the large temporal fluctuation of the armorhead population. The main fishing methods are bottom trawls and gillnets.

Historical catch record (Figure 3) shows the highest catch proportion by Japan, followed by Korea and Russia. Russia terminated their fishery nearly a decade ago. Fishing pressure somewhat reflects the recruitment condition of North Pacific armorhead. In 2010 and 2012, when high recruitment of the armorhead occurred, the annual catch decreased below 1,000 tons, whereas it increased up to 4,000 tons ever since then.

Size composition analysis from the catch data by Japanese trawlers suggests the substantial decrease in size of fish in catches over the past decade, raising the concern about growth and recruitment overfishing (Sawada et al. 2018).
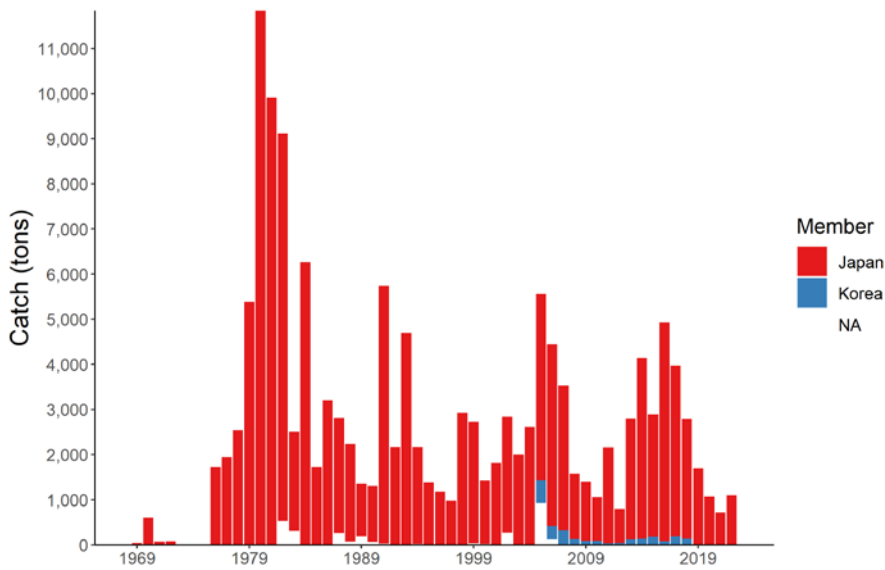
Figure 3: Historical trends of splendid alfonsino catches in NPFC waters. *The annual amounts of catch by each country are shown by the bar plot.*
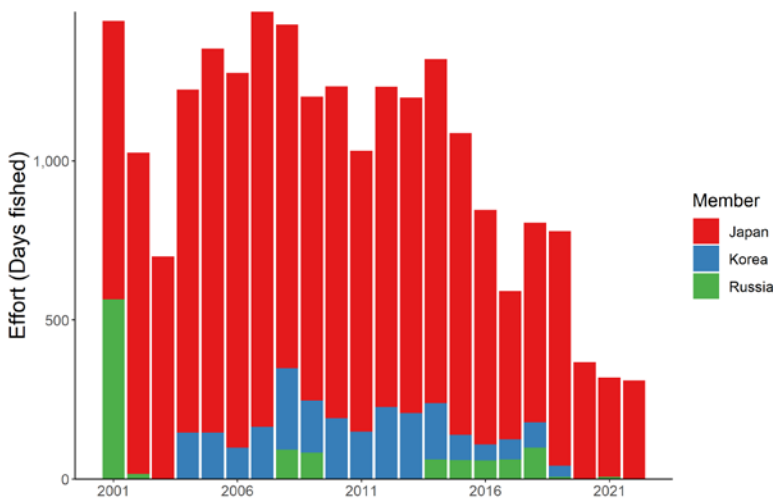

Figure 4. Historical fishing efforts for splendid alfonsino. *The annual fishing efforts by each country are shown by barplot. The efforts are calculated by the total fishing days operated during the year*

Assessment

There are no biomass estimates available for splendid alfonsino in NPFC waters.

An age- or length-structured stock assessment may be feasible given the life history of this species. Surplus production models developed by Japan in 2008 showed that the average fishing mortality is 20–28 % higher than the MSY level (Nishimura and Yatsu 2008). This analysis,

however, remains unreliable as the estimated CPUE is biased due to target shifts between North Pacific armorhead and splendid alfonsino and the estimated intrinsic population growth rate parameter was too high for long-lived deep-sea fish.

Data limited approaches, such as YPR or SPR analysis that do not require detailed resource parameters or fishing data, should be explored in the future.

Management

Active Management Measures

The following NPFC conservation and management measures pertain to this species:

- CMM 2023-05 For Bottom Fisheries and Protection of VMEs in the NW Pacific Ocean

Available from https://www.npfc.int/active-conservation-and-management-measures

Table 1: Current status of management measures

Item	Status	Description
Biological reference point	Not accomplished	Not established
Stock status	Unknown	Status determination criteria not established
Catch limit	Intermediate	No operation from November to December, Restriction of trawl mesh size
Harvest control rule	Not accomplished	Not established
Other	Intermediate	No expansion of fishing beyond established areas, No operation in the designated areas, No more increase in the fishing vessels

Currently, there is no accepted harvest control rule for this species.

In 2016, the management measures were implemented, which includes limiting the fishing effort to the 2007's level, prohibiting fisheries from November to December (which corresponds to the spawning season for North Pacific armorhead) and not allowing fisheries in C-H Seamount and the southeastern part of Koko Seamount (for the protection of VMEs)

In 2019, an additional measure was adopted, which includes the regulation of the mesh size (trawl: > 13 cm) to protect juvenile fish of this species. The effectiveness of this measure yet to be clearly demonstrated (Sawada and Ichii 2020).

Data Availability

Table 2: Catch data

Data	Member	Fishery	Year	Comments
Annual catch	Japan	Trawl	1969-present	
		Gillnet	1990-present	
	Korea	Trawl	2004-2019	
	Russia	Trawl	1969-1988; 2002; 2005; 2006; 2010; 2011; 2013; 2019	
CPUE	Japan	Trawl	1970-present	Logbook data availabe
		Gillnet	2008-present	Logbook data available
	Korea	Trawl	2013-2019	Logbook data available
	Russia	Trawl	1969-1988; 2010; 2019	

Table 3: Biological data

Data	Member	Year	Comments
Age	Japan	2013-present	annual ring analysis
	Korea	2013-2017, 2019	
	Russia		
Length	Japan	2009-present	Protocol revised (see NPFC-2018-SSC BF01-WP03)
	Korea	2013-2019	
	Russia		
Maturity	Japan	2013-present	
	Korea	2013-2017, 2019	
	Russia	1969-1988; 2010; 2011; 2013; 2019	

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Shotton, R. (2016). Global review of alfonsino (*Beryx* spp.), their fisheries, biology and management. FAO Fisheries and Aquaculture Circular, (C1084), I.

Sawada, K., Nishida, K., Yonezaki, S. and Kiyota, M. (2018). Review of biology and fisheries of splendid alfonsino *Beryx splendens*, especially in the Emperor seamounts area. NPFC-2018-SSC-BF01-WP03. 26 pp.

Sawada, K., and Ichii, T. (2020) Catch size composition of splendid alfonsino in the Emperor Seamounts area before and after the implementation of the mesh size regulation. NPFC-2020-SSC BFME01-WP05 (Rev. 1). 3 pp.

Nishimura, A., & Yatsu, A. (2008, October). Application of surplus-production models to splendid alfonsino stock in the Southern Emperor and Northern Hawaiian Ridge (SE-NHR). In Fifth Intergovernmental Meeting on Establishment of New Mechanism for Management of High Seas Bottom Trawl Fisheries in the North Western Pacific Ocean (NWPBT/SWG-05), Tokyo, 17-18 October 2008 (pp. 1-11).

Species summary for sablefish

Sablefish (*Anoplopoma fimbria*)

Common names:

Black cod (USA & Canada)
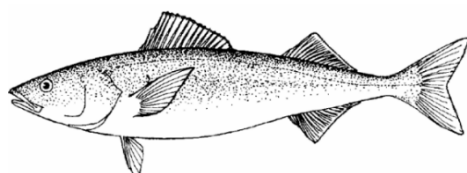ギンダラ, Gindara (Japan)
은대구, Eun-Daegu (Korea)

Figure 1. Sablefish (Anaplopoma fimbria).

Management

Active NPFC Management Measures

The following NPFC conservation and management measures (CMM) pertain to this species:

- CMM 2023-06 For Bottom Fisheries and Protection of VMEs in the NE Pacific Ocean
- CMM 2019-10 For Sablefish in the Northeastern Pacific Ocean

Available from https://www.npfc.int/active-conservation-and-management-measures

Management Summary

The current management measure for sablefish specifies both catch and effort limits. The allowable catch of sablefish in the eastern portion of the Convention Area is based on a long-term mean of historical catches from seamounts by Canada. It allows for 34 mt to be landed each month for the 6 months of the fishing season (April to September). The fishery is also managed through input controls by only allowing a single vessel to fish in each month. The 1-3 Canadian vessels licensed to fish in the NPFC Convention Area are submitted to the NPFC Secretariat annually.

Convention.or.Management.Principle	Status	Comment.or.Consideration
Biological reference point(s)	Unknown	Established for USA and Canada assessments
Stock status	Known	Healthy (in USA and Canada assessments)
Catch limit	Known	Allowable catch of 34 mt per month (6 month season)
Harvest control rule	Undefined	Established for USA and Canada assessments
Other	Known	Effort control (single vessel per month)

Assessment

Although genetic and other evidence indicates there is a single stock of sablefish in the eastern North Pacific Ocean (including the NPFC Convention Area), three stock assessments are carried out in the three domestic jurisdictions Alaska (U.S.A.), British Columbia (Canada) and the U.S. West Coast (U.S.A.) where sablefish are harvested.

Canada uses a management strategy evaluation (MSE) process to generate recommended harvest each year. Underlying the MSE is a statistical catch-at-age structured operating model (stock assessment model) that gets updated on a 3 – 5 year cycle (DFO 2016, DFO 2020). A new revision of the operating model by Canada was completed in 2022 (DFO 2023). The USA conducts two stock assessments (one for Alaska and one for the US West Coast). Both are conducted using age-structured models and are routinely updated. The current Alaska assessment (Goethel et al. 2022) and most recent USA West Coast assessment (Kapur et al. 2021) are available online.

No stock assessment is conducted for the portion of the sablefish population found in the NPFC Convention area.

Data
Surveys

Canada has conducted two longline trap surveys in British Columbia waters. From 1990-2009 a standardized trap survey was conducted at set stations annually. From 2003 to the present DFO conducts a stratified random trap survey along the outer shelf and slope of the BC coast. Both of these surveys generate a fishery independent CPUE as well as biological data that is used in the assessment. In Alaska, three survey indices are available for use in assessing the status of the

sablefish population. There is a longline survey conducted at standard survey stations that provides a relative index of abundance. It has been conducted at depths from 200-1000 m annually since 1978 (cooperatively with Japan from 1978-1994). Bottom trawl surveys are conducted annually or biennially in the three main ecosystems in Alaska since 1982. The U.S. West Coast primarily uses fishery independent survey data from the west coast groundfish bottom trawl survey conducted from 2003-present over depths of 55 to ~1300 m as an index of sablefish abundance. The bottom trawl survey follows a random-stratified survey design with four vessels (in most years) conducting the survey annually. The trawl survey data is analyzed with the VAST model (Thorson 2019) to produce the index of abundance for sablefish.

There is currently no survey conducted in the eastern NPFC Convention Area that captures or monitors sablefish populations.

Fishery

The Canadian high seas Sablefish fishery typically operates at 1-4 seamounts in the commission area (Cobb, Eickleberg, Warwick and Brown Bear seamounts). Historically other seamounts have been fished for sablefish both inside and outside Canada's EEZ.

Fishing is conducted with longlined traps. Since 2014 a maximum of 3 vessels per year have been allowed to fish in NPFC waters. Historically the number of fishing vessels has averaged <3 per year (since 2008). The number of fishing days is the number of unique calendar days during which gear was set. The number of fishing days has averaged from about 25 to greater than 100, but in most years has averaged between 50 and 75 (Figure 2).

No Canadian vessels have chosen to fish for Sablefish in the Convention Area since 2020. This is likely due to a combination of economics (high fuel prices and the large distance to the seamounts), the availability of quota in the domestic fishery which is easier to access and hesitancy about the requirements under the implementation of the new NPFC AIS policy.

Both Canada and the U.S.A. have large domestic fisheries that target sablefish inside their EEZ's. Sablefish is also captured as bycatch in domestic trawl fisheries in Canada and the U.S.A.
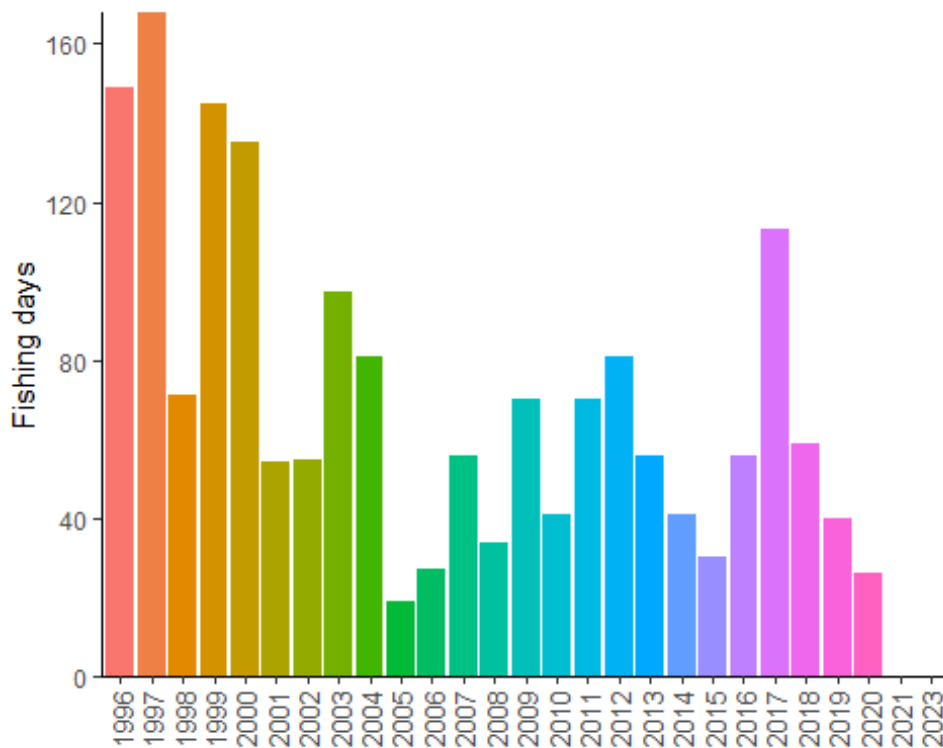
Figure 2. Fishing effort (in number of fishing days) for the Sablefish longline trap fishery conducted in NPFC waters (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

Output controls limit the amount of fish that can be landed during a trip. Authorized vessels are subject to monthly vessel limits of 34 mt of Sablefish, 2.3 mt of combined Rougheye and Blackspotted rockfish and 0.45 mt of other rockfish, sole and flounder (all in round weight). These measures have been in place since 2011.

Catches of Sablefish from NPFC region seamounts has ranged from an average of about 10 mt per year in 2005-2008 to about 67 mt in 2017 (Figure 3). Average annual catches were relatively low from 2002 to 2016 at NPFC seamounts and then increased in 2017-2018, with a decline to low levels in the last years. This increase in part probably reflects shifting effort due to closures of seamounts within Canada's EEZ. An examination of coastwide shifts in the spatial pattern of fishing effort showed that fishing effort has become concentrated on Cobb Seamount, with increasing effort in shallower waters relative to the past (Figure 4).

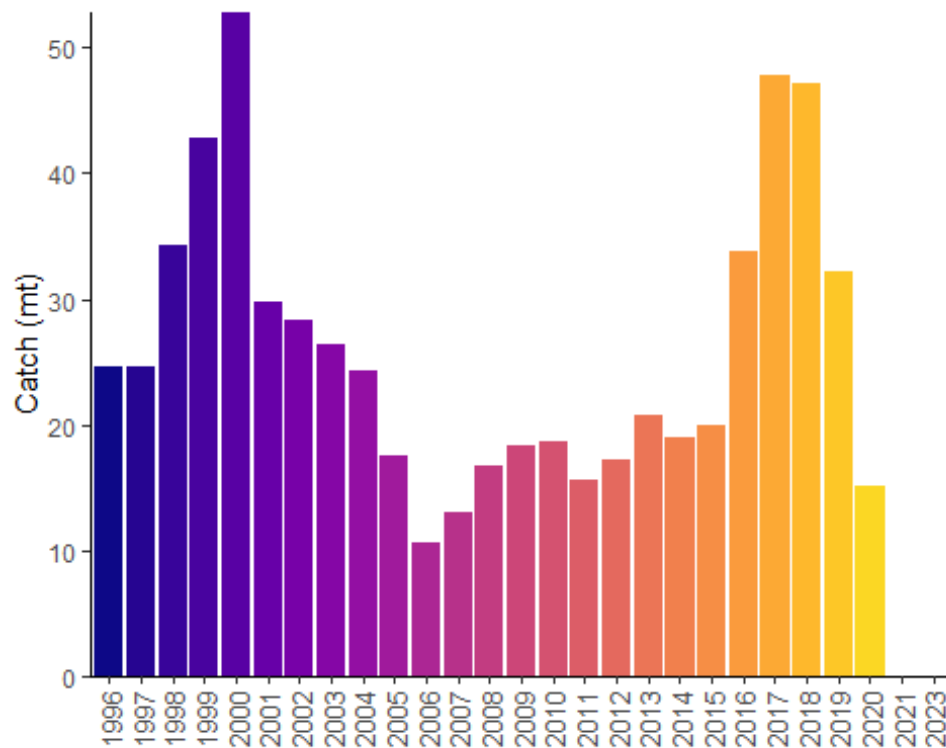There has been no fishing effort at seamounts from 2021-2023 resulting in no catch.

Figure 3. Landings of sablefish in the Canadian Sablefish fishery in NPFC region (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.
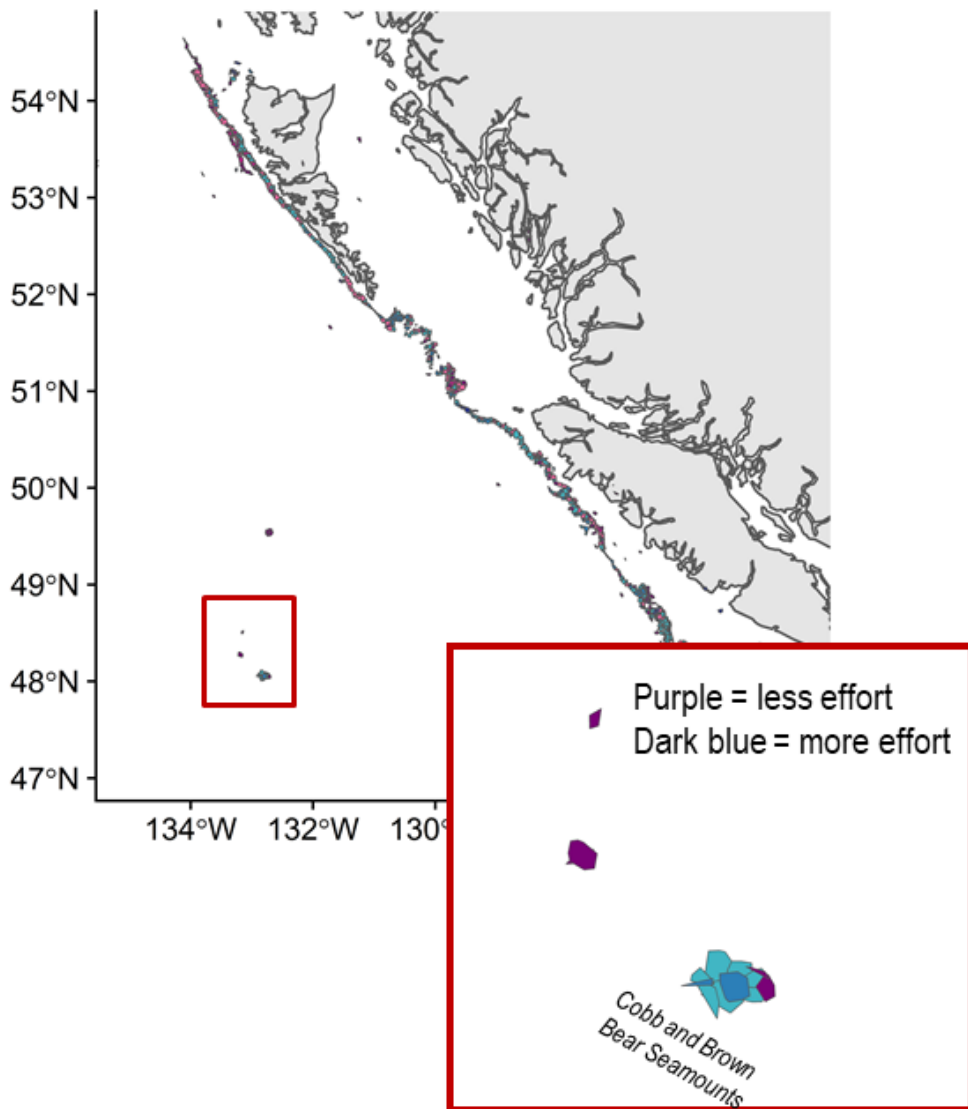
Figure 4. Relative change in spatial distribution of effort for Sablefish trap fishery from 2010-2017 to 2018-2019. Inset shows seamounts in the NPFC Convention Area.

Catch per unit of effort (mt/fishing days) for Sablefish has been increasing over the last 10 years (Figure 5), averaging 0.37 mt/fishing day (CV = 47%). CPUE was not calculated in 2023, but has generally been increasing since 2012.
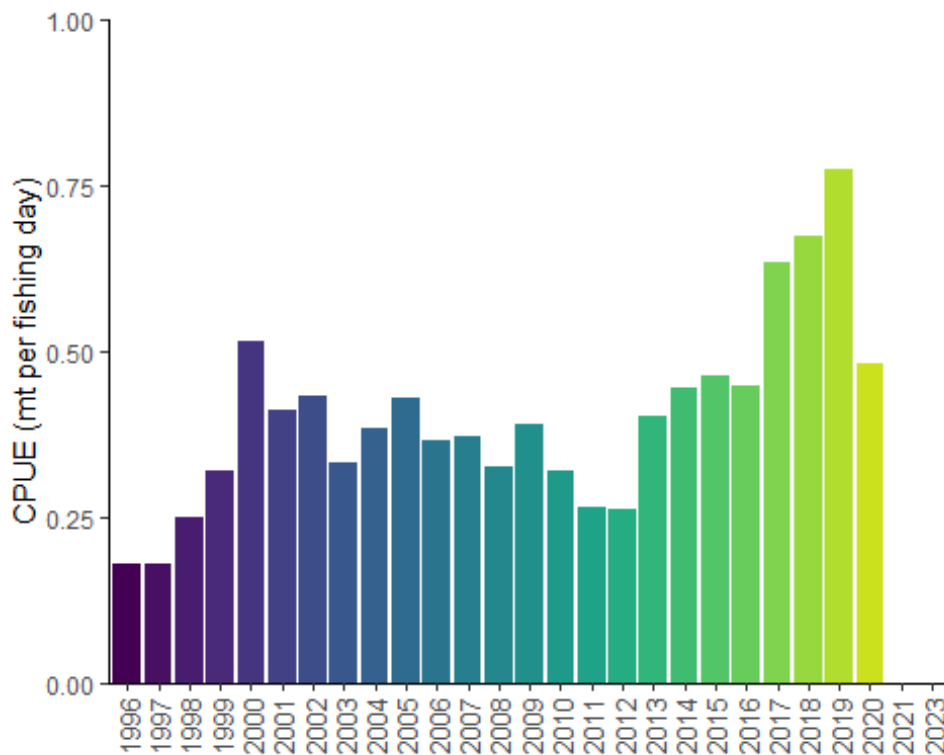
Figure 5. Catch per unit of effort for Canadian Sablefish fishery in NPFC region. Data are averaged across 3 years to comply with data privacy restrictions.

Biological collections

Under the seamount fishing protocol, 5 randomly selected fish per trip are saved by the vessel for sampling when it returns to port. These sablefish are sampled for length, weight and sex. Otoliths are collected for age estimation.

In 2020 due to COVID 19 restrictions, there were no biological samples collected from Sablefish captured in the Convention Area. Historical data will be provided to the NPFC Science Committee, when and as required, in conjunction with the NPFC's Interim Guidance for Management of Scientific Data Used in Stock Assessments.

Domestic fisheries in the U.S.A. and Canada also collect biological data. Data including length, weight and sex are collected from the scientific survey and by observers and dockside samplers from the commercial fisheries. Otoliths for estimating fish ages are also collected from both the surveys and the fisheries.

Data availability from Members regarding blackspotted and rougheye rockfishes

Data	Source	Years	Comment
Catch	Canada	1965-present	Catches from national waters and convention area
	USA	~1960-present	Catches in national waters
CPUE	Canada	~1988-present	
	USA	~1988-present	
Survey	Canada	1990-2009	Longline trap standard survey
	Canada	2003-present	Longline trap random survey
	USA	1978-present	Alaska longline survey
	USA	1982-present	Alaska bottom trawl surveys
	USA	2003-present	West Coast bottom trawl survey
Age data	Canada	variable	Commercial and survey catches, including NPFC Convention Area
	USA	variable	Commercial and survey catches
Length data	Canada	variable	Commercial and survey catches, including NPFC Convention Area
	USA	variable	Commercial and survey catches
Maturity/fecundity	Canada	variable	Commercial and survey catches in national waters
	USA	variable	Research cruises in national waters

Special Comments

The most recent stock assessments from the USA and Canada indicate the spawning stock biomass has been increasing since about 2018, supported by a large coastwide recruitment in ~2016 (data from Gothel et al. 2022, DFO 2023, Kapur et al 2021).
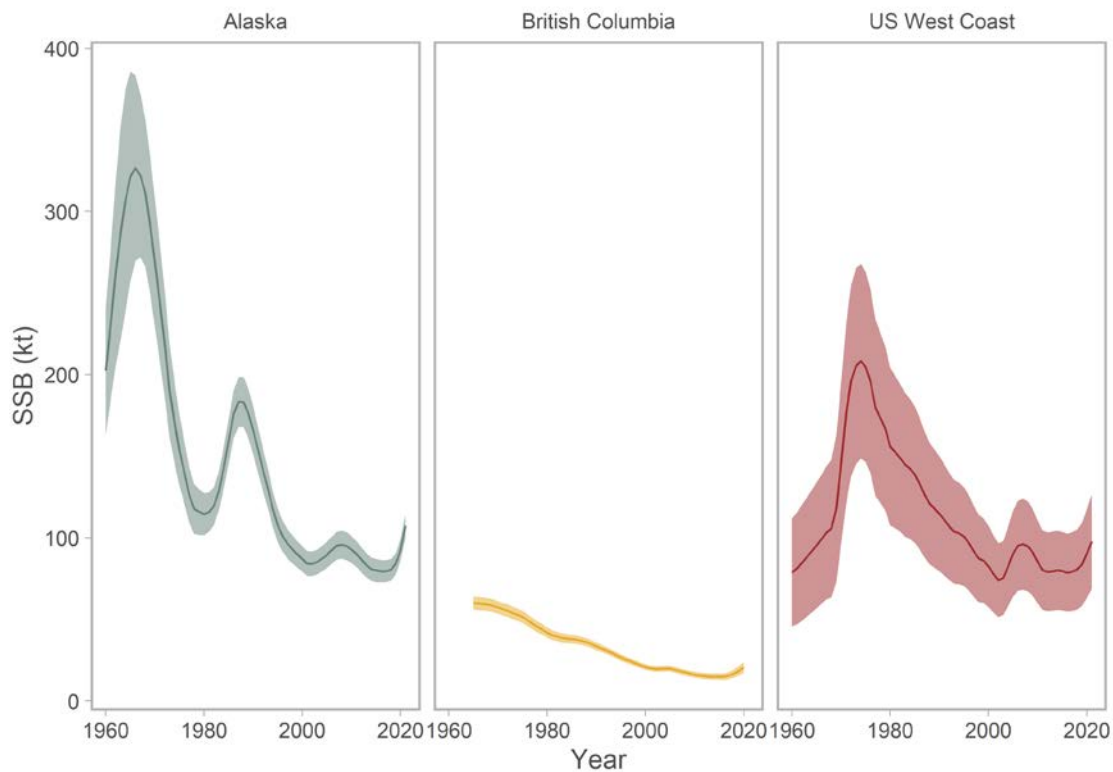

Figure 6. Sablefish (Anaplopoma fimbria) biomass estimated from stock assessments in Alaska, Canada and the US West Coast.

Biological Information

Distribution

Sablefish are widely distributed throughout the Pacific Ocean from northern Mexico to the Gulf of Alaska, westward to the Aleutian, and northward into the Bering Sea (Figure 7; Wolotira et al. 1993). They are also found along the western margin of the Pacific Ocean from southern Japan through the Kamchatka Peninsula and northward into the Bering Sea. Adult sablefish occur along the continental slope, shelf gullies, and in deep fjords, generally at depths greater than 200 m. Juvenile sablefish spend their first two to three years on the continental shelf at shallower depths. Spawning is generally in the winter and spring (October-April) and occurs near the shelf break. Spawning timing generally occurs earlier in the south (October-February in California) and later

in the north (January – April in Alaska). Eggs are found at depth and larvae are found in surface waters (Shotwell et al. 2020).

Life history

Larval sablefish feed on zooplankton prey. Juveniles shift from pelagic to benthic prey including fishes and invertebrates. Adults consume mostly benthic fishes and invertebrates. Sablefish mature at 4 to 5 years. In the eastern Pacific, Sablefish have traditionally been thought to form two populations based on differences in growth rate, size at maturity, and tagging studies. The northern population inhabits Alaska and northern British Columbia waters and the southern population inhabits southern British Columbia, Washington, Oregon, and California waters, with mixing of the two populations occurring off southwest Vancouver Island and northwest Washington. However, recent genetic work by Jasonowicz et al. (2017) found no population sub-structure throughout their range along the US West Coast to Alaska, and suggested that observed differences in growth and maturation rates may be due to phenotypic plasticity or are environmentally driven. Tagging evidence suggests that the sablefish inhabiting seamounts in the NPFC Convention Area are not distinct from the coast wide sablefish population.
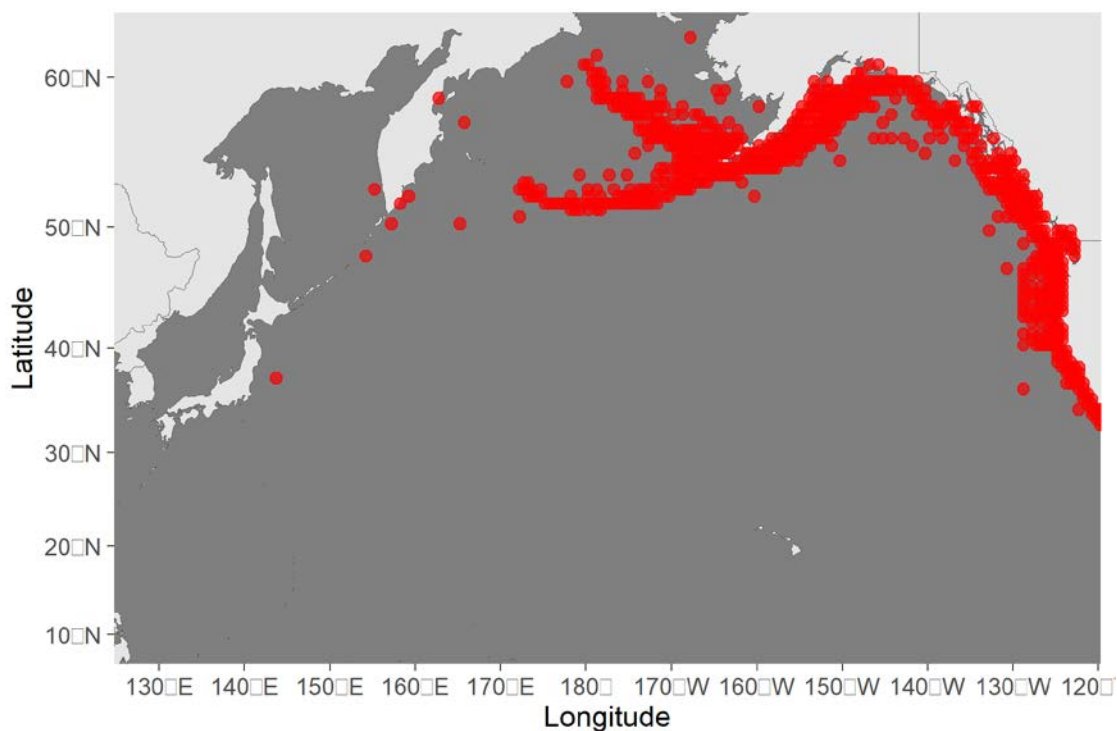

Figure 7. Map of distribution of sablefish in the North Pacific.

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Shotwell, K., Goethel, D.R., Deary, A., Echave, K., Fenske, K., Fissel, B., Hanselman, D., Lunsford, C., Siwicke, K., and Sullivan, J. 2020. Ecosystem and socioeconomic profile of the sablefish stock in Alaska. In "Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the GOA and BS/AI." Anchorage, AK: North Pacific Fishery Management Council.

Thorson, J. 2019. Guidance for decisions using the Vector Autoregressive Spatio-Temporal (VAST) package in stock, ecosystem, habitat and climate assessments. Fisheries Research 210: 143–161. doi:10.1016/j.fishres.2018.10.013.

Wolotira, R. J. J., T. M. Sample, S. F. Noel, and C. R. Iten. 1993. Geographic and bathymetric distributions for many commercially important fishes and shellfishes off the west coast of North America, based on research survey and commercial catch data, 1912-1984. NOAA Tech. Memo. NMFS-AFSC-6. 184 pp.

Blackspotted and Rougheye Rockfishes

(*Sebastes melanostictus* and *Sebastes aleutianus*)

Common names:

アラメヌケ, Aramenuke (Japan)
한볼락, Han Bollak (Korea)

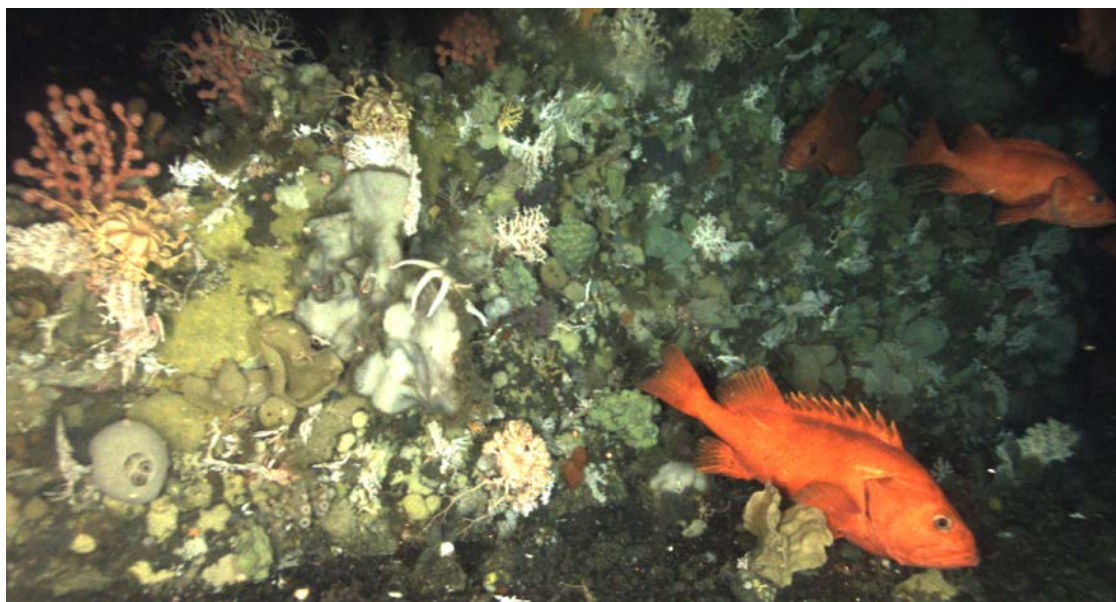*Figure 1. Blackspotted rockfish (Sebastes melanostictus).*

Management

Active NPFC Management Measures

The following NPFC conservation and management measures (CMM) pertain to this species:

- CMM 2023-06 For Bottom Fisheries and Protection of VMEs in the NE Pacific Ocean
- CMM 2019-10 For Sablefish in the Northeastern Pacific Ocean

Available from https://www.npfc.int/active-conservation-and-management-measures

Management Summary

Blackspotted and rougheye rockfishes are captured in the longline trap fishery that targets sablefish (*Anaplopoma fimbria*) at seamounts in the eastern part of the NPFC Convention Area. The current management measure for blackspotted and rougheye rockfishes specifies both catch and effort limits. The allowable catch of blackspotted and rougheye rockfishes in the eastern portion of the Convention Area is based on a long-term mean of historical catches from seamounts by Canada. It allows for 2.3 mt to be landed each month for the 6 months of the fishing season (April to September). The fishery is also managed through input controls by only allowing a single vessel to fish in each month. The 1-3 Canadian vessels licensed to fish in the NPFC Convention Area are submitted to the NPFC Secretariat annually.

Current status of management measures

Convention.or.Management.Principle	Status	Comment.or.Consideration
Biological reference point(s)	Not accomplished	Not established
Stock status	Unknown	Status determination criteria not established
Catch limit	Known	Allowable catch of 2.3 mt per month (6 month season)
Harvest control rule	Not accomplished	Not established
Other	Known	Effort control (single vessel per month)

Assessment

No stock assessment is conducted for blackspotted and rougheye rockfishes in the NPFC Convention area.

It is unclear if the blackspotted and rougheye rockfish population on seamounts in the NPFC Convention Area is distinct from the population on the continental shelf of Canada. There is evidence of population structure in other regions, such as Alaska, where population trends and genetics indicate some structure on the order of ~1000 km (Shotwell and Hanselman 2019, Gharrett et al. 2007, Shotwell et al. 2014). This is about twice the distance from the continental shelf to the fished seamounts in the NPFC Convention Area, however there is potentially a large barrier to dispersal of deepwater between the shelf and the seamounts. There is no available

tagging data to indicate whether the blackspotted and rougheye rockfishes at seamounts are connected to populations in domestic waters on the continental shelf. It is likely that the seamount populations are distinct stocks with distinct population trajectories.

Domestic stock assessments for blackspotted and rougheye rockfishes conducted in Canada assume there are two populations in domestic waters. These are assessed using a statistical catch at age model (DFO 2020). Assessments are also carried out in Alaska (Sullivan 2022, Spencer et al. 2022).

Data

Surveys

There is currently no survey conducted in the eastern NPFC Convention Area that captures or monitors blackspotted and rougheye rockfish populations.

Fishery

The Canadian high seas sablefish fishery typically operates at 1-4 seamounts in the commission area (Cobb, Eickleberg, Warwick and Brown Bear seamounts). Historically other seamounts have been fished for blackspotted and rougheye rockfishes both inside and outside Canada's EEZ.

Fishing is conducted with longlined traps. Since 2014 a maximum of 3 vessels per year have been allowed to fish in NPFC waters. Historically the number of fishing vessels has averaged <3 per year (since 2008). The number of fishing days is the number of unique calendar days during which gear was set. The number of fishing days has averaged from about 25 to greater than 100, but in most years has averaged between 50 and 75 (Figure 2).

No Canadian vessels have chosen to fish for Sablefish in the Convention Area since 2020. This is likely due to a combination of economics (high fuel prices and the large distance to the seamounts), the availability of quota in the domestic fishery which is easier to access and hesitancy about the requirements under the implementation of the new NPFC AIS policy.

Both Canada and the U.S.A. have domestic fisheries that target blackspotted and rougheye rockfishes inside their EEZ's. Blackspotted and rougheye rockfishes is also targeted in domestic trawl fisheries in Canada and the U.S.A.
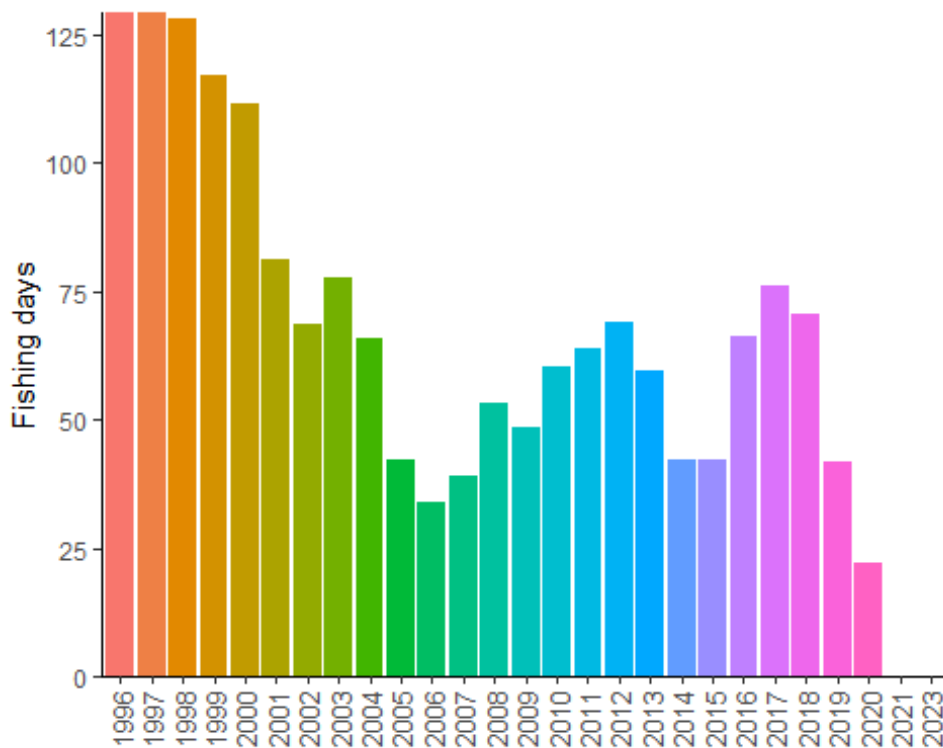
Figure 2. Fishing effort (in number of fishing days) for the Sablefish longline trap fishery conducted in NPFC waters (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

Output controls limit the landings of combined rougheye and blackspotted rockfish to 2.3 mt (in round weight). These measures have been in place since 2011.

Catches of blackspotted and rougheye rockfishes from NPFC region seamounts has ranged from an average of about 0.5 mt per year in 1996-2014 to about 4 mt in 2017 (Figure 3). Average annual catches were relatively low from 1996 to 2016 at NPFC seamounts and then increased in 2017-2018, with a decline to low levels in the last years. This increase in part probably reflects shifting sablefish effort due to closures of seamounts within Canada's EEZ. An examination of coastwide shifts in the spatial pattern of fishing effort showed that fishing effort has become concentrated on Cobb Seamount, with increasing effort in shallower waters perhaps reflecting increased targeting of blackspotted and rougheye rockfishes relative to the past (Figure 4).

There has been no fishing effort at seamounts from 2021-2023 resulting in no catch.

Figure 3. Landings of blackspotted and rougheye rockfishes in the Canadian Sablefish fishery in NPFC region (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.
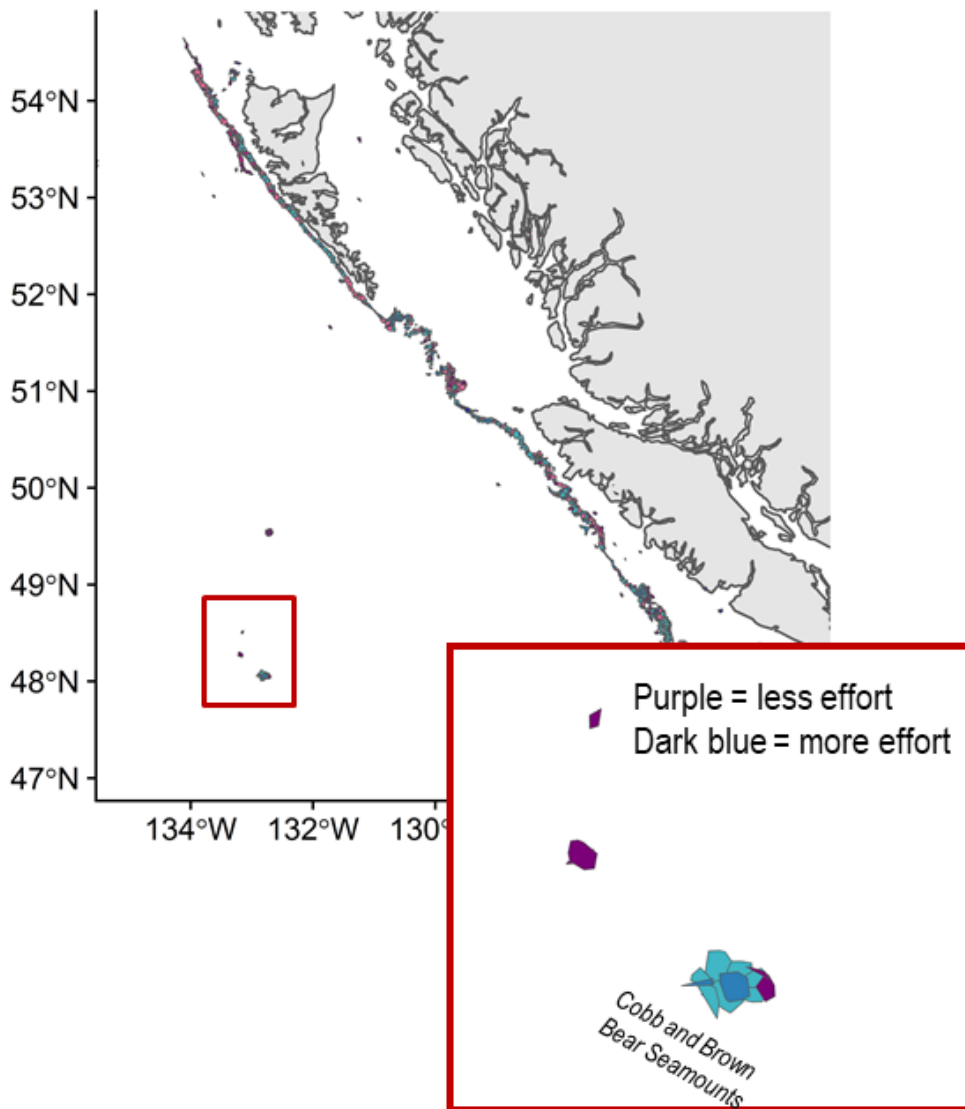
Figure 4. Relative change in spatial distribution of effort for Sablefish trap fishery from 2010-2017 to 2018-2019. Inset shows seamounts in the NPFC Convention Area.

Catch per unit of effort (mt/fishing days) for blackspotted and rougheye rockfishes has been increasing over the last 10 years (Figure 5), averaging 0.01 mt/fishing day (CV = 107%). CPUE was not calculated in 2023 due to the absence of fishing in the Convention Area, but has generally been increasing since 2012.
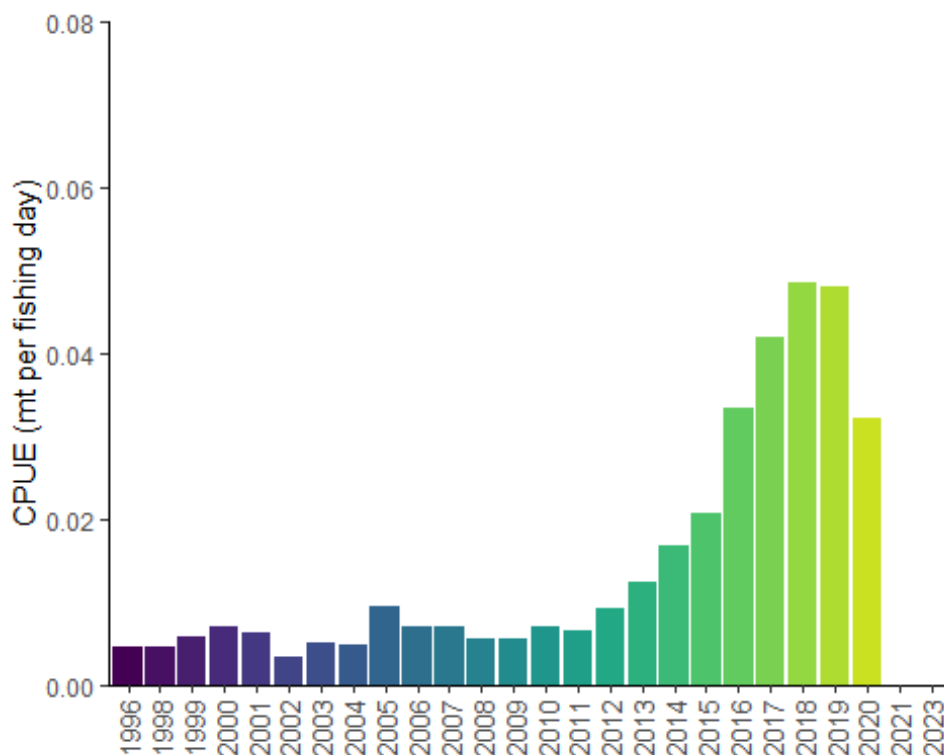
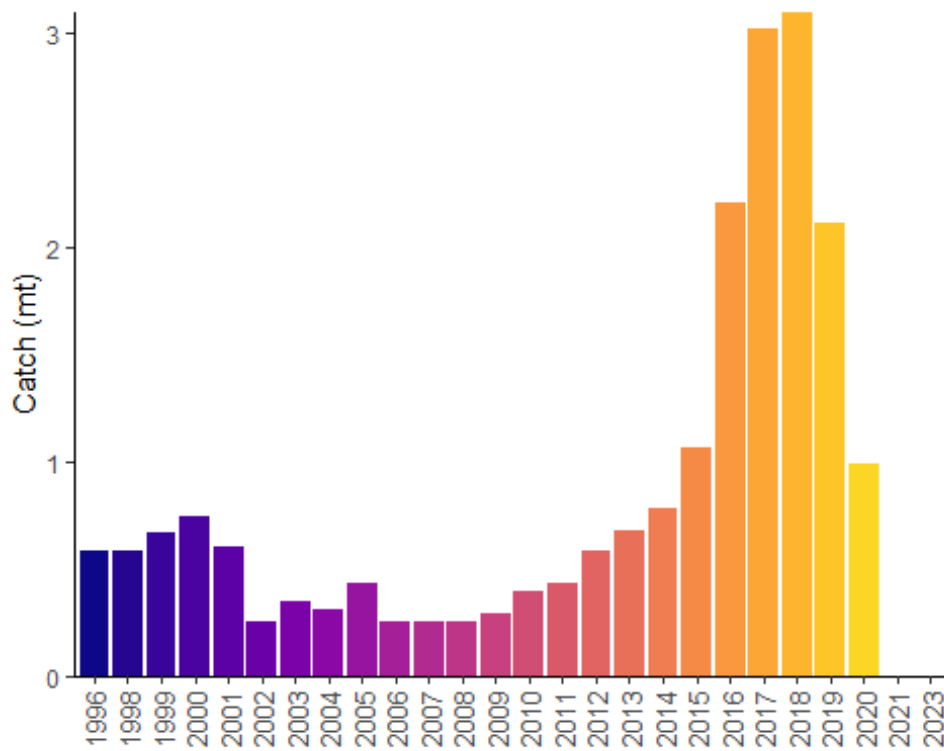*Figure 5. Catch per unit of effort for blackspotted and rougheye rockfishes in the Canadian Sablefish fishery in NPFC region. Data are averaged across 3 years to comply with data privacy restrictions.*

Biological collections

No biological collections are taken from blackspotted and rougheye rockfishes captured in the NPFC Convention Area. Biological data are available from domestic fisheries and surveys in Canada.

Data availability from Members regarding blackspotted and rougheye rockfishes

Data	Source	Years	Comment
Catch	Canada	1996-present	Catches from national waters and convention area
CPUE	Canada	1996-present	
Survey	None		Survey data are available from Canada and U.S.A. national waters

Data	Source	Years	Comment
Age data	None		Data available from Canada and U.S.A. domestic fisheries and surveys
Length data	None		Data available from Canada and U.S.A. domestic fisheries and surveys
Maturity/fecundity	None		Data available from Canada and U.S.A. domestic fisheries and surveys

Special Comments

None

Biological Information

Distribution

Blackspotted and rougheye rockfishes are widely distributed throughout the Pacific Ocean from California to the Gulf of Alaska, westward to the Aleutian, and northward into the Bering Sea (Figure 6; Love et al. 2002). They are also found along the western margin of the Pacific Ocean from the Kuril Islands through the Kamchatka Peninsula and northward into the Bering Sea. Adult blackspotted and rougheye rockfishes occur in rocky habitat along the continental slope, shelf gullies, and in deep fjords, generally at depths from 150 to 450 m (Love et al. 2002). Juvenile blackspotted and rougheye rockfishes are found at shallower depths (250-300 m) at the continental shelf break. Until recently, these species were considered a single species (rougheye rockfish; Orr and Hawkins 2008).

Life history

Blackspotted and rougheye rockfishes are extremely long-lived, with maximum ages > 200 years. They mature late at about 20 years of age. These characteristics make them vulnerable to overfishing. The species are live-bearing, extruding larvae generally in the spring (February-June). Blackspotted and rougheye rockfishes are benthic feeders, consuming mostly shrimps, crabs and fishes (Yang and Nelson 2000).
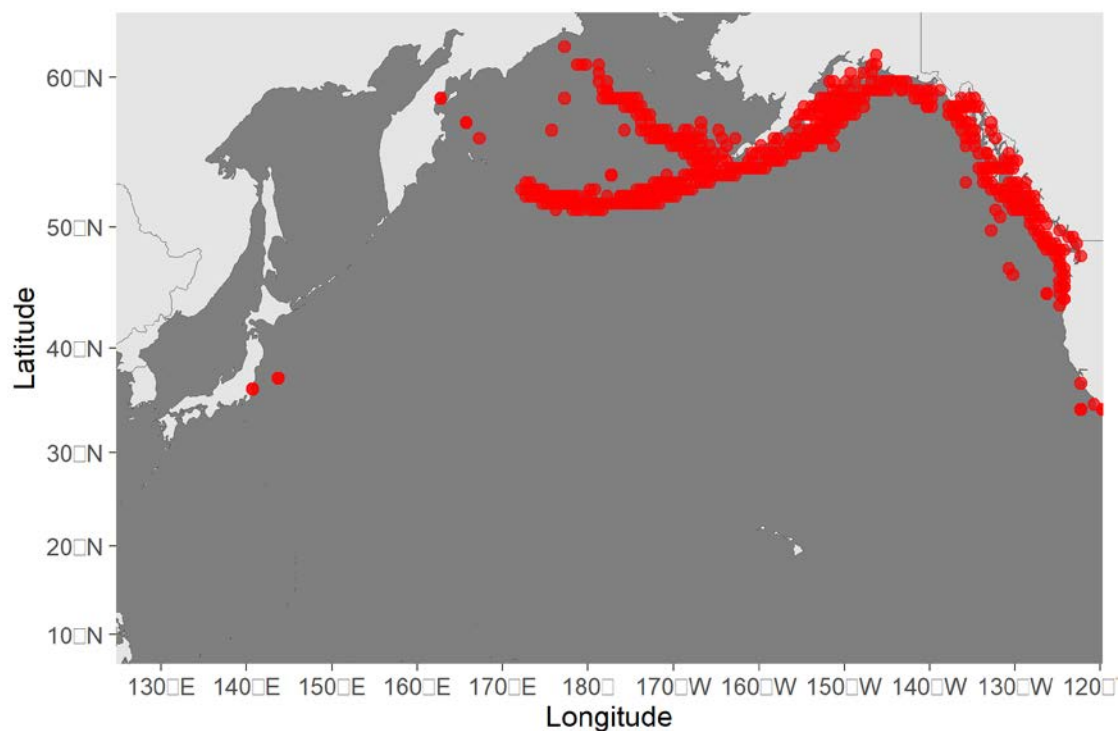
Figure 6. Map of distribution of blackspotted and rougheye rockfishes in the North Pacific.

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Terms of Reference for data sharing of catch and effort data for depletion analysis of North Pacific armorhead

1. The SSC BF-ME03 tasked the SWG NPA-SA to explore alternative approaches to assess the status of North Pacific armorhead (NPA) stock, given the difficulty of applying life history based approaches to NPA.

2. The SWG NPA-SA agreed to conduct depletion analysis, which was applied to NPA during the Scientific Working Group in the Preparatory Conference of NPFC, to estimate past recruitment, harvest rate and spawning stock biomass.

3. All Members with fishing activities that catch NPA since 2013 will contribute available data on NPA catch and effort. Shared data should also include date, seamount, fishing gear and target (if available).

4. The SWG NPA-SA participants will collaborate on any analyses of these data.

5. The provided data will be used for the purposes of the above-mentioned analysis and will not be shared, distributed, or used for other purposes without the consent of the data provider.

Template for data sharing of catch and effort data for depletion analysis of North Pacific armorhead

ID	Member	Date start	Date end	Gear	Source	Seamount	Catch live weight kg	Effort	Effort unit
shot1	Japan	1/1/2030	1/1/2030	trawl	fishery	Colahan	180	100	minutes
shot2	Russia	1/1/2030	1/1/2030	trawl	survey	Milwaukee	100	115	minutes
daily	Korea	2/1/2030	2/1/2030	gillnet	fishery	Suiko	200	280	panels
weekly	Japan	3/1/2030	3/7/2030	longline	fishery	Koko	50	5000	hooks

Effort description	Intended target species	Intended target species FAO code
Duration of the estimated period of seabed contact	North Pacific armorhead	EDJ
Duration of the estimated period of seabed contact	NA	NA
Number of net panels retrieved	Splendid alfonsino	BYX
Number of hooks retrieved	Skilfish	ESZ

Revised CMM 2023-05 - Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean

CMM 2023-05

(Entered into force 26 July 2023)

CONSERVATION AND MANAGEMENT MEASURE
FOR BOTTOM FISHERIES AND PROTECTION OF VULNERABLE MARINE
ECOSYSTEMS IN THE NORTHWESTERN PACIFIC OCEAN

The North Pacific Fisheries Commission (NPFC),

Strongly supporting protection of vulnerable marine ecosystems (VMEs) and sustainable management of fish stocks based on the best scientific information available;

Recalling the United Nations General Assembly Resolutions (UNGA) on Sustainable Fisheries, particularly paragraphs 66 to 71 of the UNGA59/25 in 2004, paragraphs 69 to 74 of UNGA60/31 in 2005, and paragraphs 69 and 80 to 91 of UNGA61/105 in 2006;

Noting, in particular, paragraphs 66 and 69 of UNGA59/25 that call upon States to take action urgently to address the issue of bottom trawl fisheries on VMEs and to cooperate in the establishment of new regional fisheries management organizations or arrangements;

Recognizing further that fishing activities, including bottom fisheries, are an important contributor to the global food supply and that this must be taken into account when seeking to achieve sustainable fisheries and to protect VMEs;

Recognizing the importance of collecting scientific data to assess the impacts of these fisheries on marine species and VMEs;

Concerned about possible adverse impacts of unregulated expansion of bottom fisheries on marine

species and VMEs in the western part of the Convention Area.

Adopts the following Conservation and Management Measure:

1. Scope

   A. Coverage

   These Measures are to be applied to all bottom fishing activities throughout the high seas areas of the Northwestern Pacific Ocean, defined, for the purposes of this document, as those occurring in the Convention Area as set out in Article 4 of the Convention text to the west of the line of 175 degrees W longitude (here in after called "the western part of the Convention Area") including all such areas and marine species other than those species already covered by existing international fisheries management instruments, including bilateral agreements and Regional Fisheries Management Organizations or Arrangements.

   B. Management target

   Bottom fisheries conducted by vessels operating in the western part of the Convention Area.

2. General purpose

   Sustainable management of fish stocks and protection of VMEs in the western part of the Convention Area.

   The objective of these Measures is to ensure the long-term conservation and sustainable use of the fisheries resources in the Convention Area while protecting the marine ecosystems of the North Pacific Ocean in which these resources occur.

   These measures shall set out to prevent significant adverse impacts on VMEs in the Convention Area of the North Pacific Ocean, acknowledging the complex dependency of fishing resources and species belonging to the same ecosystem within VMEs.

   The Commission shall re-evaluate, and as appropriate, revise, the definition based on further consideration of the work done through FAO and by NPFC.

3. Principles

The implementation of this CMM shall:

(a) be based on the best scientific information available,

(b) be in accordance with existing international laws and agreements including UNCLOS and other relevant international instruments,

(c) establish appropriate and effective conservation and management measures,

(d) be in accordance with the precautionary approach, and

(e) incorporate an ecosystem approach to fisheries management.

4. Measures

Members of the Commission shall take the following measures in order to achieve sustainable management of fish stocks and protection of VMEs in the western part of the Convention Area:

A. Limit fishing effort in bottom fisheries on the western part of the Convention Area to the level agreed in February 2007 in terms of the number of fishing vessels and other parameters which reflect the level of fishing effort, fishing capacity or potential impacts on marine ecosystems.

B. Not allow bottom fisheries to expand into the western part of the Convention Area where no such fishing is currently occurring, in particular, by limiting such bottom fisheries to seamounts located south of 45 degrees North Latitude and refrain from bottom fisheries in other areas of the western part of the Convention Area covered by these measures and also not allow bottom fisheries to conduct fishing operation in areas deeper than 1,500m.

C. Notwithstanding subparagraphs A and B above, exceptions to these restrictions may be provided in cases where it can be shown that any fishing activity beyond such limits or in any new areas would not have significant adverse impacts (SAIs) on marine species or any VME.   Such fishing activity is subject to an exploratory fishery protocol (Annex 1).

D. Any determinations pursuant to subparagraph C that any proposed fishing activity will not have SAIs on marine species or any VME are to be in accordance with the Science-based

Standards and Criteria (Annex 2), which are consistent with the FAO International Guidelines for the Management of Deepsea Fisheries in the High Seas.

E. Any determinations, by any flag State or pursuant to any subsequent arrangement for the management of the bottom fisheries in the areas covered by these measures, that fishing activity would not have SAIs on marine species or any VMEs, shall be made publicly available through agreed means.

F. Prohibit its vessels from engaging in directed fishing on the following taxa: ~~Alcyonacea,~~ black corals (Antipatharia), ~~Gorgonacea~~gorgonians,~~ and~~ pennatulaceans, stony corals (Scleractinia), soft corals, the classes of Demospongiae and Hexactinellida in the phylum Porifera as well as any other indicator species for VMEs as may be identified from time to time by the SC and approved by the Commission.

G. Further, considering accumulated information regarding fishing activities in the western part of the Convention Area, in areas where, in the course of fishing operations, cold water corals more than 50Kg or sponges more than 350~~500~~Kg are encountered in one gear retrieval, Members of the Commission shall require vessels flying their flag to cease bottom fishing activities in that location. In such cases, the vessel shall not resume fishing activities until it has relocated a sufficient distance, which shall be no less than 1 nautical mile, so that additional encounters with VMEs are unlikely. All such encounters, including the location, gear type, date, time and name and weight of the VME indicator species, shall be reported to the Secretariat, through the Member, within one business day. The Executive Secretary shall, within one business day, notify the other Members of the Commission and at the same time implement a temporary closure in the area to prohibit bottom fishing vessels from contacting the sea floor with their trawl nets. Members shall inform their fleets and enforcement operations within one business day of the receipt of the notification from the Executive Secretary. It is agreed that the VME indicator taxa include four groups of cold water corals, specifically ~~Alcyonacea,~~ black corals (Antipatharia), ~~Gorgonacea~~gorgonians, pennatulaceans, ~~and~~ stony corals (Scleractinia), and soft corals.~~,~~ The VME indicator taxa also include ~~and~~ the classes of Demospongiae and Hexactinellida in the phylum Porifera.

H. Based on all the available data, including data on the VME encounter and distribution received from the fishing vessel(s), research survey data, visual survey data, and/or model results, the Scientific Committee (SC) shall assess and conclude if the area has a VME. If so, the SC shall recommend to the Commission that the temporary closure be made permanent, although the boundary of the closure may be adjusted, or suggest other appropriate measures. Otherwise, the Executive Secretary shall inform the Members that they may reopen the area to their vessels.

I. C-H seamount and Southeastern part of Koko seamount, specifically for the latter seamount, the area South of 34 degrees 57 minutes North, East of the 400m isobaths, East of 171 degrees 54 minutes East, North of 34 degrees 50 minutes North, are closed precautionary for potential VME conservation. Fishing in these areas requires exploratory fishery protocol (Annex 1).

J. Ensure that the distance between the footrope of the gill net and sea floor is greater than 70 cm.

K. Apply a bottom fisheries closure from November to December.

L. Limit annual catch of North Pacific armorhead to 15,000 tons for Japan. In years when strong recruitment of North Pacific armorhead is not detected by the monitoring survey (Annex 6), the Commission encourages Japan to limit their catch of North Pacific armorhead by vessels flying its flag to 500 tons, and encourages Korea to limit their catch of North Pacific armorhead by vessels flying its flag to 200 tons. When a strong recruitment of North Pacific armorhead is detected by the monitoring survey (Annex 6), the Commission encourages that Japan limit the annual catch of North Pacific armorhead by vessels flying its flag to 10,000 tons, and that Korea limit the annual catch of North Pacific armorhead by vessels flying its flag to 2,000 tons. The Commission encourages that catch overages for any given year be subtracted from the applicable annual catch limit in the following year, and that catch underages during any given year not be added to the applicable annual catch limit during the following year.

M. During a year when high recruitment is detected, bottom fishing with trawl gear shall be prohibited in specific areas in the Emperor seamounts where half of the catch occurred in 2010 and 2012 (Annex 6).   Determination of a strong recruitment year and of the specific areas where bottom fishing with trawl gear is prohibited shall be communicated to all Members and Cooperating Non-Contracting Parties following the procedure specified in Annex 6.

N. Catch in the monitoring surveys shall not be included in the catch limits specified in paragraphs L but shall be reported to the Secretariat.

O. Development of new fishing activity for the North Pacific armorhead and splendid alfonsino in the Convention Area by Members without documented historical catch for North Pacific armorhead and splendid alfonsino in the Convention Area shall be determined in accordance with relevant provisions, including but not limited to Article 3, paragraph (h) and Article 7, subparagraphs 1(g) and (h) of the Convention.

P. Fishing activity for the North Pacific armorhead and splendid alfonsino in the Convention Area by Members with documented historical catch for North Pacific armorhead and splendid alfonsino in the Convention Area is not precluded.

Q. Members shall require vessels flying their flags to use trawl nets with mesh size greater than or equal to 130mm of stretched mesh with 5kg tension in the codend when conducting fishing activities for North Pacific armorhead or splendid alfonsino.

R. Task the Scientific Committee with reviewing the appropriate methods for establishing catch limits, and the adequacy and practicability of the adaptive management plan described in subparagraphs K, L, M, N, O, P, Q and Annex 6 from time to time and recommending revisions and actions, if necessary.

S. Prohibit its bottom fishing vessels from contacting the sea floor with their trawl nets in the following two sites with VME indicator species.   A Member of the Commission whose

fishing vessels entered these areas shall report to the TCC as to how it ensured the compliance of this measure.

Sites with VME indicator species (Areas surrounded by the straight lines linking the 4 geographical points below)

Northwestern part of Koko Seamount	35-44.75 N 171-07.60 E	35-44.75 N 171-07.80 E
	35-43.80 N 171-07.80 E	35-43.80 N 171-08.00 E
Northern Ridge of Colahan Seamount	31-03.85 N 175-53.40 E	31-03.85 N 175-53.65 E
	31-03.5 N 175-53.50 E	31-03.05 N 175-53.85 E

5. Contingent Action

Members of the Commission shall submit to the SC their assessments of the impacts of fishing activity on marine species or any VMEs, including the proposed management measures to prevent such impact. Such submissions shall include all relevant data and information in support of any such assessment. Procedures for such reviews including procedures for the provision of advice and recommendations from the SC to the submitting Member are attached (Annex 3). Members will only authorize bottom fishing activity pursuant to paragraph 4 (C).

6. Scientific Information

To facilitate the scientific work associated with the implementation of these measures, each Member of the Commission shall undertake:

A. Reporting of information for purposes of defining the footprint

In implementing paragraphs 4A and 4B, the Members of the Commission shall provide for each year, the number of vessels by gear type, size of vessels (tons), number of fishing days or days on the fishing grounds, total catch by species, and areas fished (names of seamounts) to the Secretariat. The Secretariat shall circulate the information received to the other Members consistent with the approved Regulations for Management of Scientific Data and Information. To support assessments of the fisheries and refinement of conservation and management measures, Members of the Commission are to provide updated information on an annual basis.

B. Collection of information

   (i) Collection of scientific information from each bottom fishing vessel operating in the western part of the Convention Area.

      (a) Catch and effort data

      (b) Related information such as time, location, depth, temperature, etc.

   (ii) As appropriate, the collection of information from research vessels operating in the western part of the Convention Area.

      (a) Physical, chemical, biological, oceanographic, meteorological, etc.

      (b) Ecosystem surveys.

      (c) Seabed mapping (e.g. multibeam or other echosounder); seafloor images by drop camera, remotely operated underwater vehicle (ROV) and/or autonomous underwater vehicle (AUV).

   (iii) Collection of observer data

      Duly designated observers from the flag member shall collect information from bottom fishing vessels operating in the western part of the Convention Area. Observers shall collect data in accordance with Annex 5. Each Member of the Commission shall submit the reports to the Secretariat in accordance with Annex 4. The Secretariat shall compile this information on an annual basis and make it available to the Members of the Commission.

7. Control of bottom fishing vessels

To strengthen its control over bottom fishing vessels flying its flag, each Member of the Commission shall ensure that all such vessels operating in the western part of the Convention Area be equipped with an operational vessel monitoring system.

8. Observers

All vessels authorized to bottom fishing in the western part of the Convention Area shall carry an observer on board.

EXPLORATORY FISHERY PROTOCOL IN THE NORTH PACIFIC OCEAN

1. From 1 January 2009, all bottom fishing activities in new fishing areas and areas where fishing is prohibited in a precautionary manner or with bottom gear not previously used in the existing fishing areas, are to be considered as "exploratory fisheries" and to be conducted in accordance with this protocol.

2. Precautionary conservation and management measures, including catch and effort controls, are essential during the exploratory phase of deep sea fisheries.   Implementation of a precautionary approach to sustainable exploitation of deep sea fisheries shall 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.

3. When a member of the Commission would like to conduct exploratory fisheries, it is to follow the following procedure:

    (i)   Prior to the commencement of fishing, the member of the Commission is to circulate the information and assessment in Appendix 1.1 to the members of the Scientific Committee (SC) for review and to all members of the Commission for information, together with the impact assessment. Such information is to be provided to the other members at least 30 days in advance of the meeting at which the information shall be reviewed.

    (ii) The assessment in (i) above is to be conducted in accordance with the procedure set forth in "Science-based Standards and Criteria for Identification of VMEs and Assessment of Significant Adverse Impacts on VMEs and Marine Species (Annex 2)", with the

understanding that particular care shall be taken in the evaluation of risks of the significant adverse impact on vulnerable marine ecosystems (VMEs), in line with the precautionary approach.

(iii) The SC is to review the information and the assessment submitted in (i) above in accordance with "SC Assessment Review Procedures for Bottom Fishing Activities (Annex 3)."

(iv) The exploratory fisheries are to be permitted only where the assessment concludes that they would not have significant adverse impacts (SAIs) on marine species or any VMEs and on the basis of comments and recommendations of SC.　Any determinations, by any Member of the Commission or the SC, that the exploratory fishing activities would not have SAIs on marine species or any VMEs, shall be made publicly available through the NPFC website.

4. The member of the Commission is to ensure that all vessels flying its flag conducting exploratory fisheries are equipped with a satellite monitoring device and have an observer on board at all times.

5. Within 3 months of the end of the exploratory fishing activities or within 12 months of the commencement of fishing, whichever occurs first, the member of the Commission is to provide a report of the results of such activities to the members of the SC and all members of the Commission. If the SC meets prior to the end of this 12-month period, the member of the Commission is to provide an interim report 30 days in advance of the SC meeting. The information to be included in the report is specified in Appendix 1.2.

6. The SC is to review the report in 5 above and decide whether the exploratory fishing activities had SAIs on marine species or any VME.　The SC then is to send its recommendations to the Commission on whether the exploratory fisheries can continue and whether additional management measures shall be required if they are to continue. The Commission is to strive to adopt conservation and management measures to prevent SAIs on marine species or any VMEs. If the Commission is not able to reach consensus on any such measures, each fishing member of the Commission is to adopt measures to avoid any SAIs on VMEs.

7. Members of the Commission shall only authorize continuation of exploratory fishing activity, or commencement of commercial fishing activity, under this protocol on the basis of comments and recommendations of the SC.

8. The same encounter protocol should be applied in both fished and unfished areas specified in Annex 2, paragraph 4(1)(a).

Appendix 1.1

Information to be provided before exploratory fisheries start

1. A harvesting plan
    - Name of vessel
    - Flag member of vessel
    - Description of area to be fished (location and depth)
    - Fishing dates
    - Anticipated effort
    - Target species
    - Bottom fishing gear-type used
    - Area and effort restrictions to ensure that fisheries occur on a gradual basis in a limited geographical area.

2. A mitigation plan
    - Measures to prevent SAIs to VMEs that may be encountered during the fishery

3. A catch monitoring plan
    - Recording/reporting of all species brought onboard to the lowest possible taxonomic level
    - 100% satellite monitoring
    - 100% observer coverage

4. A data collection plan

- Data is to be collected in accordance with "Type and Format of Scientific Observer Data to be Collected" (Annex 5)

<div align="right">**Appendix 1.2**</div>

Information to be included in the report

- Name of vessel
- Flag member of vessel
- Description of area fished (location and depth)
- Fishing dates
- Total effort
- Bottom fishing gear-type used
- List of VME encountered (the amount of VME indicator species for each encounter specifying the location: longitude and latitude)
- Mitigation measures taken in response to the encounter of VME
- List of all organisms brought onboard
- List of VMEs indicator species brought onboard by location: longitude and latitude

SCIENCE-BASED STANDARDS AND CRITERIA FOR IDENTIFICATION OF VMES AND ASSESSMENT OF SIGNIFICANT ADVERSE IMPACTS ON VMES AND MARINE SPECIES

1. Introduction

   Members of the Commission have hereby established science-based standards and criteria to guide their implementation of United Nations General Assembly (UNGA) Resolution 61/105 and the measures adopted by the Members in respect of bottom fishing activities in the North Pacific Ocean (NPO). In this regard, these science-based standards and criteria are to be applied to identify vulnerable marine ecosystems (VMEs) and assess significant adverse impacts (SAIs) of bottom fishing activities on such VMEs or marine species and to promote the long-term sustainability of deep sea fisheries in the Convention Area. The science-based standards and criteria are consistent with the FAO International Guidelines for the Management of Deep-Sea Fisheries in the High Seas, taking into account the work of other RFMOs implementing management of deep-sea bottom fisheries in accordance with UNGA Resolution 61/105. The standards and criteria are to be modified from time to time as more data are collected through research activities and monitoring of fishing operations.

2. Purpose

   (1) The purpose of the standards and criteria is to provide guidelines for each member of the Commission in identifying VMEs and assessing SAIs of individual bottom fishing activities [1] on VMEs or marine species in the Convention Area. Each member of the Commission, using the best information available, is to decide which species or areas are to be categorized as VMEs, identify areas where VMEs are known or likely to occur, and assess whether individual bottom fishing activities would have SAIs on such VMEs or marine species. The results of these tasks are to be submitted to and reviewed by the Scientific

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[1] "individual bottom fishing activities" means fishing activities by each fishing gear. For example, if ten fishing vessels operate bottom trawl fishing in a certain area, the impacts of the fishing activities of these vessels on the ecosystem are to be assessed as a whole rather than on a vessel-by-vessel basis. It should be noted that if the total number or capacity of the vessels using the same fishing gear has increased, the impacts of the fishing activities are to be assessed again.

Committee with a view to reaching a common understanding among the members of the Commission.

(2) For the purpose of applying the standards and criteria, the bottom fisheries are defined as follows:

    (a) The fisheries are conducted in the Convention Area;

    (b) The total catch (everything brought up by the fishing gear) includes species that can only sustain low exploitation rates; and

    (c) The fishing gear is likely to contact the seafloor during the normal course of fishing operations.

3. Definition of VMEs

(1) Although Paragraph 83 of UNGA Resolution 61/105 refers to seamounts, hydrothermal vents and cold-water corals as examples of VMEs, there is no definitive list of specific species or areas that are to be regarded as VMEs.

(2) Vulnerability is related to the likelihood that a population, community or habitat will experience substantial alteration by fishing activities and how much time will be required nfor its recovery from such alteration. The most vulnerable ecosystems are those that are both easily disturbed and are very slow to recover or may never recover. The vulnerabilities of populations, communities and habitats are to be assessed relative to specific threats. Some features, particularly ones that are physically fragile or inherently rare may be vulnerable to most forms of disturbance, but the vulnerability of some populations, communities and habitats may vary greatly depending on the type of fishing gear used or the kind of disturbance experienced. The risks to a marine ecosystem are determined by its vulnerability, the probability of a threat occurring and the mitigation means applied to the threat. Accordingly, the FAO Guidelines only provide examples of potential vulnerable species groups, communities and habitats as well as features that potentially support them (Annex 2.1).

(3) A marine ecosystem is to be classified as vulnerable based on its characteristics. The following list of characteristics is used as criteria in the identification of VMEs.

    (a) Uniqueness or rarity - an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by other similar areas. These include:

        (i) Habitats that contain endemic species;

(ii) Habitats of rare, threatened or endangered species that occur in discrete areas;

(iii)Nurseries or discrete feeding, breeding, or spawning areas.

(b) 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.

(c) Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities

(d) 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:

(i) Slow growth rates

(ii) Late age of maturity

(iii)Low or unpredictable recruitment

(iv)Long-lived

(e) 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.

(4) Management response may vary, depending on the size of the ecological unit in the Convention Area. Therefore, the spatial extent of the ecological unit is to be decided first. That is, whether the ecological unit is the entire Area, or the current fishing ground, namely, the Emperor Seamount and Northern Hawaiian Ridge area (hereinafter called "the ES-NHR area"), or a group of the seamounts within the ESNHR area, or each seamount in the ES-NHR area, is to be decided using the above criteria.

4. Identification of potential VMEs

(1) Fished seamounts

(a) Identification of fished seamounts

It is reported that four types of fishing gear are currently used by the members of the

Commission in the ES-NHR area, namely, bottom trawl, bottom gillnet, bottom longline and pot.   A fifth type of fishing gear (coral drag) was used in the ES-NHR area from the mid-1960s to the late 1980s and is possibly still used by non-members of the Commission.   These types of fishing gear are usually used on the top or slope of seamounts, which could be considered VMEs.   It is therefore necessary to identify the footprint of the bottom fisheries (fished seamounts) based on the available fishing record. The following seamounts have been identified as fished seamounts: Suiko, Showa, Youmei, Nintoku, Jingu, Ojin, Northern Koko, Koko, Kinmei, Yuryaku, Kammu, Colahan, and CH.   Since the use of most of these gears in the ES-NHR area dates back to the late 1960s and 1970s, it is important to establish, to the extent practicable, a time series of where and when these gears have been used in order to assess potential long-term effects on any existing VMEs.

Fishing effort may not be evenly distributed on each seamount since fish aggregation may occur only at certain points of the seamount and some parts of the seamount may be physically unsuitable for certain fishing gears.   Thus, it is important to know actual fished areas within the same seamount so as to know the gravity of the impact of fishing activities on the entire seamount.

Due consideration is to be given to the protection of commercial confidentiality when identifying actual fishing grounds.

(b) Assessment on whether a specific seamount that has been fished is a VME

After identifying the fished seamounts or fished areas of seamounts, it is necessary to assess whether each fished seamount is a VME or contains VMEs in accordance with the criteria in 3 above, individually or in combination using the best available scientific and technical information as well as Annex 2.1.   A variety of data would be required to conduct such assessment, including pictures of seamounts taken by an ROV camera or drop camera, biological samples collected through research activities and observer programs, and detailed bathymetry map. Where site-specific information is lacking, other information that is relevant to inferring the likely presence of VMEs is to be used. The flow chart to identify data that can be used to identify VMEs is attached in Annex 2.3.

(2) New fishing areas

Any place other than the fished seamounts above is to be regarded as a new fishing area. If a member of the Commission is considering fishing in a new fishing area, such a fishing area is to be subject to, in addition to these standards and criteria, an exploratory fishery protocol (Annex 1).

5. Assessment of SAIs on VMEs or marine species

(1) 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 are to be evaluated individually, in combination and cumulatively.

(2) When determining the scale and significance of an impact, the following six factors are to be considered:

(a) The intensity or severity of the impact at the specific site being affected;

(b) The spatial extent of the impact relative to the availability of the habitat type affected;

(c) The sensitivity/vulnerability of the ecosystem to the impact;

(d) The ability of an ecosystem to recover from harm, and the rate of such recovery;

(e) The extent to which ecosystem functions may be altered by the impact; and

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

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

(4) In determining whether an impact is temporary, both the duration and the frequency with which an impact is repeated is to be considered.   If the interval between the expected disturbances of a habitat is shorter than the recovery time, the impact is to be considered more than temporary.

(5) Each member of the Commission is to conduct assessments to establish if bottom fishing activities are likely to produce SAIs in a given seamount or other VMEs.   Such an impact

assessment is to address, *inter alia*:

(a) Type of fishing conducted or contemplated, including vessel and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing;

(b) Best available scientific and technical information on the current state of fishery resources, and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;

(c) Identification, description and mapping of VMEs known or likely to occur in the fishing area;

(d) The data and methods used to identify, describe and assess the impacts of the activity, identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;

(e) 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;

(f) Risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be SAIs, particularly impacts on VMEs and low-productivity fishery resources (Risk assessments are to take into account, as appropriate, differing conditions prevailing in areas where fisheries are well established and in areas where fisheries have not taken place or only occur occasionally);

(g) The proposed mitigation and management measures to be used to prevent SAIs 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.

(6) Impact assessments are to consider, as appropriate, the information referred to in these Standards and Criteria, as well as relevant information from similar or related fisheries, species and ecosystems.

(7) Where an assessment concludes that the area does not contain VMEs or that significant adverse impacts on VMEs or marine species are not likely, such assessments are to be repeated when there have been significant changes to the fishery or other activities in the area, or when natural processes are thought to have undergone significant changes.

6. Proposed conservation and management measures to prevent SAIs

As a result of the assessment in 5 above, if it is considered that individual fishing activities are

causing or likely to cause SAIs on VMEs or marine species, the member of the Commission is to adopt appropriate conservation and management measures to prevent such SAIs. The member of the Commission is to clearly indicate how such impacts are expected to be prevented or mitigated by the measures.

7. Precautionary approach

If after assessing all available scientific and technical information, the presence of VMEs or the likelihood that individual bottom fishing activities would cause SAIs on VMEs or marine species cannot be adequately determined, members of the Commission are only to authorize individual bottom fishing activities to proceed in accordance with:

(a) Precautionary, conservation and management measures to prevent SAIs;

(b) Measures to address unexpected encounters with VMEs in the course of fishing operations;

(c) Measures, including ongoing scientific research, monitoring and data collection, to reduce the uncertainty; and

(d) Measures to ensure long-term sustainability of deep sea fisheries.

8. Template for assessment report

Annex 2.2 is a template for individual member of the Commission to formulate reports on identification of VMEs and impact assessment.

Annex 2.1

Examples of potential 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 is to be made on a case-by-case basis through application of relevant provisions of the Standards and Criteria, particularly Sections 3, 4 and 5.

> Examples of species groups, communities and habitat forming species that are documented or considered sensitive and potentially vulnerable to deep-sea fisheries

	in the high-seas, and which may contribute to forming VMEs:
a.	certain cold-water corals, e.g., reef builders and coral forest including: stony corals (scleractinia), alcyonaceans and gorgonians (octocorallia), black corals (antipatharia), and hydrocorals (stylasteridae),
b.	Some types of sponge dominated communities,
c.	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
d.	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:

a. submerged edges and slopes (e.g., corals and sponges)
b. summits and flanks of seamounts, guyots, banks, knolls, and hills (e.g., corals, sponges and xenophyphores)
c. canyons and trenches (e.g., burrowed clay outcrops, corals),
d. hydrothermal vents (e.g., microbial communities and endemic invertebrates), and
e. cold seeps (e.g., mud volcanoes, microbes, hard substrates for sessile invertebrates).

Annex 2.2

Template for reports on identification of VMEs and assessment of impacts caused by individual fishing activities on VMEs or marine species

1. Name of the member of the Commission
2. Name of the fishery (e.g., bottom trawl, bottom gillnet, bottom longline, pot)
3. Status of the fishery (existing fishery or exploratory fishery)
4. Target species
5. Bycatch species
6. Recent level of fishing effort (every year at least since 2002)

    (1) Number of fishing vessels

    (2) Tonnage of each fishing vessel

    (3) Number of fishing days or days on the fishing ground

    (4) Fishing effort (total operating hours for trawl, # of hooks per day for long-line, # of pots per day for pot, total length of net per day for gillnet)

    (5) Total catch by species

    (6) Names of seamounts fished or to be fished

7. Fishing period

8. Analysis of status of fishery resources

    (1) Data and methods used for analysis

    (2) Results of analysis

    (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties

9. Analysis of status of bycatch species resources

    (1) Data and methods used for analysis

    (2) Results of analysis

    (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties

10. Analysis of existence of VMEs in the fishing ground

    (1) Data and methods used for analysis

    (2) Results of analysis

    (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties

11. Impact assessment of fishing activities on VMEs or marine species including cumulative impacts, and identification of SAIs on VMEs or marine species, as detailed in Section 5 above, Assessment of SAIs on VMEs or marine species

12. Other points to be addressed

13. Conclusion (whether to continue or start fishing with what measures, or stop fishing).

Flow chart to identify data that can be used to identify VMEs in the NPFC Convention Area

SCIENTIFIC COMMITTEE ASSESSMENT REVIEW PROCEDURES FOR BOTTOM FISHING ACTIVITIES

1. The Scientific Committee (SC) is to review identifications of vulnerable marine ecosystems (VMEs) and assessments of significant adverse impact on VMEs, including proposed management measures intended to prevent such impacts submitted by individual Members.

2. Members of the Commission shall submit their identifications and assessments to members of the SC at least 21 days prior to the SC meeting at which the review is to take place. Such submissions shall include all relevant data and information in support of such determinations.

3. The SC will review the data and information in each assessment in accordance with the Science-based Standards and Criteria for Identification of VMEs and Assessment of Significant Adverse Impacts on VMEs and Marine Species (Annex 2), previous decisions of the Commission, and the FAO Technical Guidelines for the Management of Deep Sea Fisheries in the High Seas, paying special attention to the assessment process and criteria specified in paragraphs 47-49 of the Guidelines.

4. In conducting the review above, the SC will give particular attention to whether the deep-sea bottom fishing activity would have a significant adverse impact on VMEs and marine species and, if so, whether the proposed management measures would prevent such impacts.

5. Based on the above review, the SC will provide advice and recommendations to the submitting Members on the extent to which the assessments and related determinations are consistent with the procedures and criteria established in the documents identified above; and whether additional management measures will be required to prevent SAIs on VMEs.

6. Such recommendations will be reflected in the report of the SC meeting at which the assessments are considered.

FORMAT OF NATIONAL REPORT SECTIONS ON DEVELOPMENT AND IMPLEMENTATION OF SCIENTIFIC OBSERVER PROGRAMMES

Report Components

Annual Observer Programme implementation reports should form a component of annual National Reports submitted by members to the Scientific Committee. These reports should provide a brief overview of observer programmes conducted in the NPFC Convention Area. Observer programme reports should include the following sections:

A. Observer Training

An overview of observer training conducted, including:
- Overview of training programme provided to scientific observers.
- Number of observers trained.

B. Scientific Observer Programme Design and Coverage

Details of the design of the observer programme, including:
- Which fleets, fleet components or fishery components were covered by the programme.
- How vessels were selected to carry observers within the above fleets or components.
- How was observer coverage stratified: by fleets, fisheries components, vessel types, vessel sizes, vessel ages, fishing areas and seasons.

Details of observer coverage of the above fleets, including:
- Components, areas, seasons and proportion of total catches of target species, specifying units used to determine coverage.
- Total number of observer employment days, and number of actual days deployed on observation work.

C. Observer Data Collected

List of observer data collected against the agreed range of data set out in Annex 5, including:

- Effort Data: Amount of effort observed (vessel days, net panels, hooks, etc), by area and season and % observed out of total by area and seasons

- Catch Data: Amount of catch observed of target and by-catch species, by area and season, and % observed out of total estimated catch by species, area and seasons

- Length Frequency Data: Number of fish measured per species, by area and season.

- Biological Data: Type and quantity of other biological data or samples (otoliths, sex, maturity, etc.) collected per species.

- The size of length-frequency and biological sub-samples relative to unobserved quantities.

D. Detection of Fishing in Association with Vulnerable Marine Ecosystems

- Information about VME encounters (species and quantity in accordance with Annex 5, H, 2).

E. Tag Return Monitoring

- Number of tags returns observed, by fish size class and area.

F. Problems Experienced

- Summary of problems encountered by observers and observer managers that could affect the NPFC Observer Programme Standards and/or each member's national observer programme developed under the NPFC standards.

NPFC BOTTOM FISHERIES OBSERVER PROGRAMME STANDARDS: SCIENTIFIC COMPONENT

TYPE AND FORMAT OF SCIENTIFIC OBSERVER DATA TO BE COLLECTED

A. Vessel & Observer Data to be collected for Each Trip

1. Vessel and observer details are to be recorded only once for each observed trip.
2. The following observer data are to be collected for each observed trip:
   (a) NPFC vessel ID.
   (b) Observer's name.
   (c) Observer's organisation.
   (d) Date observer embarked (UTC date).
   (e) Port of embarkation.
   (f) Date observer disembarked (UTC date).
   (g) Port of disembarkation.

B. Catch & Effort Data to be collected for Trawl Fishing Activity

1. Data are to be collected on an un-aggregated (tow by tow) basis for all observed trawls.
2. The following data are to be collected for each observed trawl tow:
   (a) Tow start date (UTC).
   (b) Tow start time (UTC).
   (c) Tow end date (UTC).
   (d) Tow end time (UTC).
   (e) Tow start position (Lat/Lon, 1 minute resolution).
   (f) Tow end position (Lat/Lon, 1 minute resolution).
   (g) Type of trawl, bottom or mid-water.
   (h) Type of trawl, single, double or triple.
   (i) Height of net opening (m).

(j) Width of net opening (m).

(k) Mesh size of the cod-end net (stretched mesh, mm) and mesh type (diamond, square, etc).

(l) Gear depth (of footrope) at start of fishing (m).

(m)Bottom (seabed) depth at start of fishing (m).

(n) Gear depth (of footrope) at end of fishing (m).

(o) Bottom (seabed) depth at end of fishing (m).

(p) Status of the trawl operation (no damage, lightly damaged*, heavily damaged*, other (specify)).

    *Degree may be evaluated by time for repairing (<=1hr or >1hr).

(q) Duration of estimated period of seabed contact (minute)

(r) Intended target species.

(s) Catch of all species retained on board, split by species, in weight (to the nearest kg).

(t) Estimate of the amount (weight or volume) of all living marine resources discarded, split by species.

(u) Record of the numbers by species of all marine mammals, seabirds or reptiles caught.

C. Catch & Effort Data to be collected for Bottom Gillnet Fishing Activity

1. Data are to be collected on an un-aggregated (set by set) basis for all observed bottom gillnet sets.

2. The following data are to be collected for each observed bottom gillnet set:

(a) Set start date (UTC).

(b) Set start time (UTC).

(c) Set end date (UTC).

(d) Set end time (UTC).

(e) Set start position (Lat/Lon, 1 minute resolution).

(f) Set end position (Lat/Lon, 1 minute resolution).

(g) Net panel ("tan") length (m).

(h) Net panel ("tan") height (m).

(i) Net mesh size (stretched mesh, mm) and mesh type (diamond, square, etc)

(j) Bottom depth at start of setting (m).

(k) Bottom depth at end of setting (m).

(l) Number of net panels for the set.

(m) Number of net panels retrieved.

(n) Number of net panels actually observed during the haul.

(o) Actually observed catch of all species retained on board, split by species, in weight (to the nearest kg).

(p) An estimation of the amount (numbers or weight) of marine resources discarded, split by species, during the actual observation.

(q) Record of the actually observed numbers by species of all marine mammals, seabirds or reptiles caught.

(r) Intended target species.

(s) Catch of all species retained on board, split by species, in weight (to the nearest kg).

(t) Estimate of the amount (weight or volume) of all marine resources discarded* and dropped off, split by species. * Including those retained for scientific samples.

(u) Record of the numbers by species of all marine mammals, seabirds or reptiles caught (including those discarded and dropped-off).

D. Catch & Effort Data to be collected for Bottom Long Line Fishing Activity

1. Data are to be collected on an un-aggregated (set by set) basis for all observed longline sets.

2. The following fields of data are to be collected for each set:

(a) Set start date (UTC).

(b) Set start time (UTC).

(c) Set end date (UTC).

(d) Set end time (UTC).

(e) Set start position (Lat/Lon, 1 minute resolution).

(f) Set end position (Lat/Lon, 1 minute resolution).

(g) Total length of longline set (m).

(h) Number of hooks or traps for the set.

(i) Bottom (seabed) depth at start of set.

(j) Bottom (seabed) depth at end of set.

(k) Number of hooks or traps actually observed during the haul.

(l) Intended target species.

(m) Actually observed catch of all species retained on board, split by species, in weight (to the nearest kg).

(n) An estimation of the amount (numbers or weight) of marine resources discarded* or dropped-off, split by species, during the actual observation. * Including those retained for scientific samples.

(o) Record of the actually observed numbers by species of all marine mammals, seabirds or reptiles caught (including those discarded and dropped-off).

E. Length-Frequency Data to Be Collected

1. Representative and randomly distributed length-frequency data (to the nearest mm, with record of the type of length measurement taken) are to be collected for representative samples of the target species and other main by-catch species. Total weight of length-frequency samples should be recorded, and observers may be required to also determine sex of measured fish to generate length-frequency data stratified by sex. The length-frequency data may be used as potential indicators of ecosystem changes (for example, see: Gislason, H. et al. (2000. ICES J Mar Sci 57: 468-475), Yamane et al. (2005. ICES J Mar Sci, 62: 374-379), and Shin, Y-J. et al. (2005. ICES J Mar Sci, 62: 384-396)).

2. The numbers of fish to be measured for each species and distribution of samples across area and month strata should be determined, to ensure that samples are properly representative of species distributions and size ranges.

F. Biological sampling to be conducted (optional for gillnet and long line fisheries)

1. The following biological data are to be collected for representative samples of the main target species and, time permitting, for other main by-catch species contributing to the catch:

(a) Species

(b) Length (to the nearest mm), with record of the type of length measurement used.

(c) Length and depth in case of North Pacific armorhead.

(d) Sex (male, female, indeterminate, not examined)

(e) Maturity stage (immature, mature, ripe, ripe-running, spent)

2. Representative stratified samples of otoliths are to be collected from the main target species and, time permitting, from other main by-catch species regularly occurring in catches. All otoliths to be collected are to be labelled with the information listed in 1 above, as well as the date, vessel name, observer name and catch position.

3. Where specific trophic relationship projects are being conducted, observers may be requested to also collect stomach samples from certain species. Any such samples collected are also to be labelled with the information listed in 1 above, as well as the date, vessel name, observer name and catch position.

4. Observers may also be required to collect tissue samples as part of specific genetic research programmes implemented by the SC.

5. Observers are to be briefed and provided with written length-frequency and biological sampling protocols and priorities for the above sampling specific to each observer trip.

G. Data to be collected on Incidental Captures of Protected Species

1. Flag members operating observer programs are to develop, in cooperation with the SC, lists and identification guides of protected species or species of concern (seabirds, marine mammals or marine reptiles) to be monitored by observers.

2. The following data are to be collected for all protected species caught in fishing operations:
   (a) Species (identified as far as possible, or accompanied by photographs if identification is difficult).
   (b) Count of the number caught per tow or set.
   (c) Life status (vigorous, alive, lethargic, dead) upon release.
   (d) Whole specimens (where possible) for onshore identification. Where this is not possible, observers may be required to collect sub-samples of identifying parts, as specified in biological sampling protocols.

H. Detection of Fishing in Association with Vulnerable Marine Ecosystems

1. The SC is to develop a guideline, species list and identification guide for benthic species (e.g. sponges, sea fans, corals) whose presence in a catch will indicate that fishing occurred in

association with a vulnerable marine ecosystem (VME).   All observers on vessels are to be provided with copies of this guideline, species list and ID guide.

2. For each observed fishing operation, the following data are to be collected for all species caught, which appear on the list of vulnerable benthic species:

   (a) Species (identified as far as possible or accompanied by a photograph where identification is difficult).

   (b) An estimate of the quantity (weight (kg) or volume (m^3)) of each listed benthic species caught in the fishing operation.

   (c) An overall estimate of the total quantity (weight (kg) or volume (m^3)) of all invertebrate benthic species caught in the fishing operation.

   (d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitable preserved for identification on shore.

I. Data to be collected for all Tag Recoveries

1. The following data are to be collected for all recovered fish, seabird, mammal or reptile tags:

   (a) Observer name.

   (b) Vessel name.

   (c) Vessel call sign.

   (d) Vessel flag.

   (e) Collect, label (with all details below) and store the actual tags for later return to the tagging agency.

   (f) Species from which tag recovered.

   (g) Tag colour and type (spaghetti, archival).

   (h) Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)

   (i) Date and time of capture (UTC).

   (j) Location of capture (Lat/Lon, to the nearest 1 minute)

   (k) Animal length / size (to the nearest cm) with description of what measurement was taken (such as total length, fork length, etc).

(l) Sex (F=female, M=male, I=indeterminate, D=not examined)

(m) Whether the tags were found during a period of fishing that was being observed (Y/N)

(n) Reward information (e.g. name and address where to send reward)

(It is recognised that some of the data recorded here duplicates data that already exists in the previous categories of information. This is necessary because tag recovery information may be sent separately to other observer data.)

J. Hierarchies for Observer Data Collection

1. Trip-specific or programme-specific observer task priorities may be developed in response to specific research programme requirements, in which case such priorities should be followed by observers.

2. In the absence of trip- or programme-specific priorities, the following generalised priorities should be followed by observers:

   (a) Fishing Operation Information
   - All vessel and tow / set / effort information.

   (b) Monitoring of Catches
   - Record time, proportion of catch (e.g. proportion of trawl landing) or effort (e.g. number of hooks), and total numbers of each species caught.
   - Record numbers or proportions of each species retained or discarded.

   (c) Biological Sampling
   - Length-frequency data for target species.
   - Length-frequency data for main by-catch species.
   - Identification and counts of protected species.
   - Basic biological data (sex, maturity) for target species.
   - Check for presence of tags.
   - Otoliths (and stomach samples, if being collected) for target species.
   - Basic biological data for by-catch species.
   - Biological samples of by-catch species (if being collected)
   - Photos

3. The monitoring of catches and biological sampling procedures should be prioritised among species groups as follows:

Species	Priority (1 highest)
Primary target species (such as North Pacific armorhead and splendid alfonsino)	1
Other species typically within top 10 in the fishery (such as mirror dory, and oreos)	2
Protected species	3
All other species	4

The allocation of observer effort among these activities will depend on the type of operation and setting. The size of sub-samples relative to unobserved quantities (e.g. number of hooks/panels examined for species composition relative to the number of hooks/panels retrieved) should be explicitly recorded under the guidance of member country observer programmes.

K. Coding Specifications to be used for Recording Observer Data

1. Unless otherwise specified for specific data types, observer data are to be collected in accordance with the same coding specifications as specified in this Annex.
2. Coordinated Universal Time (UTC) is to be used to describe times.
3. Degrees and minutes are to be used to describe locations.
4. The following coding schemes are to be used:
   (a) Species are to be described using the FAO 3 letter species codes or, if species do not have a FAO code, using scientific names.
   (b) Fishing methods are to be described using the International Standard Classification of Fishing Gear (ISSCFG - 29 July 1980) codes.
   (c) Types of fishing vessel are to be described using the International Standard Classification of Fishery Vessels (ISSCFV) codes.
5. Metric units of measure are to be used, specifically:
   (a) Kilograms are to be used to describe catch weight.
   (b) Metres are to be used to describe height, width, depth, beam or length.
   (c) Cubic metres are to be used to describe volume.
   (d) Kilowatts are to be used to describe engine power.

**Implementation of the Adaptive Management for North Pacific armorhead**

1. Monitoring survey for the detection of strong recruitment of North Pacific armorhead

(1) Location of monitoring surveys

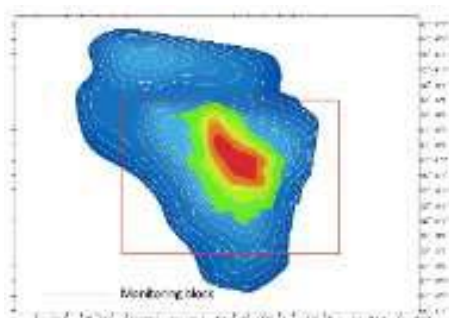Monitoring surveys for the detection of strong recruitment of North Pacific armorhead will be conducted by trawl fishing vessels in the pre-determined four (24) monitoring blocks of Koko (South eastern), Yuryaku, Kammu (North western) and/or Colahan seamounts.
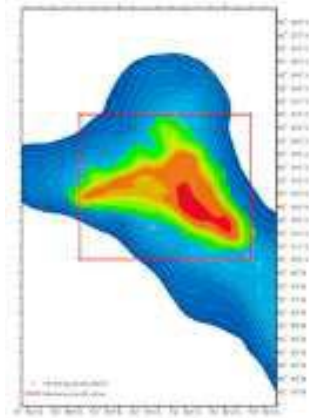
Monitoring blocks

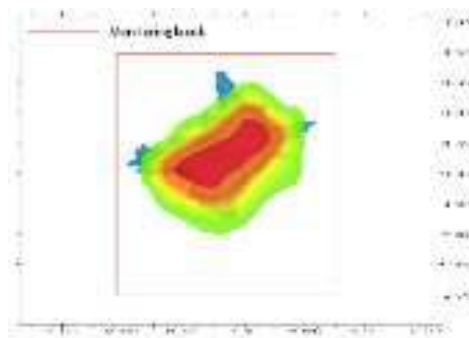(1) Koko seamount (34°51' –35°04'N, 171°49' –172°00' E)
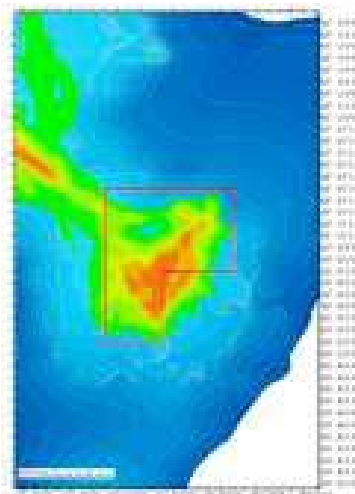
(2) Yuryaku seamount (32°35' –32°45'N, 172°10' –172°24'E)

(3) Kammu seamount (32°10'–32°21'N, 172°44'–172°57'E)

(4) Colahan seamount (30°57'–31°05'N, 175°50'–175°57'E)

(2) Schedule for monitoring surveys

Monitoring surveys will be conducted from March 1st to June 30th each year, with at least a one week interval between monitoring surveys. For each survey, a trawl fishing vessel will conduct a monitoring survey in one of the four monitoring blocks that is the nearest from the location of the trawl fishing vessel at the time of prior notification in (4) below.   The base schedule for monitoring surveys will be notified to the Executive Secretary by the end of February of each year.   The base schedule may be revised during the year subject to prior notification to the Executive Secretary.

(3) Data to be collected during monitoring surveys

For each monitoring survey, a trawl net will be towed for one hour. A scientific observer onboard

the trawl fishing vessel will calculate nominal-CPUE (kg/hour) of North Pacific armorhead. The scientific observer will also calculate fat index* (FI) of randomly sampled 100 individuals of North Pacific armorhead by measuring fork length (FL) and body height (BH) of each individual.

(*fat index (FI) = body height (BH) / fork length (FL))

(4) Prior notifications and survey results

At least three (3) days before each survey, a prior notification with monitoring date/time, location and trawl fishing vessel name will be provided by the flag state of the trawl fishing vessel to the Executive Secretary.

No later than three (3) days after each survey, the survey result including date/time, location, catch, nominal-CPUE (kg/hour) and percentage of fish with fat index (FI)>0.3 will be provided by the flag state to the Executive Secretary.

The Executive Secretary will circulate these prior notifications and survey results to all Members of the Commission without delay.

2. Areas where bottom fishing with trawl gear is prohibited when high recruitment is detected

(1) Criteria for a high recruitment

It is considered that high recruitment has occurred if the following criteria are met in four (4) consecutive monitoring surveys.

  - Nominal CPUE > 10t/h
  - Individuals of fat index (FI)> 0.3 account for 80% or more

(2) Areas where bottom fishing with trawl gear is prohibited

Bottom fishing with trawl gear shall be prohibited in the following two (2) seamount areas (*)

during the year when high recruitment is detected. In such a case, all monitoring surveys scheduled during the year will be cancelled.

- Northern part of Kammu seamount (north of 32°10.0′ N)
- Yuryaku seamount

(*) The catch of North Pacific armorhead in the above two seamounts accounts for a half of the total catch in the entire Emperor Seamounts area based on the catch records in 2010 and 2012.

(3) Notification by the Secretariat

When the criteria for high recruitment are met as defined in 2(1) above, the Executive Secretary will notify all Members of the Commission of the fact with a defined date/time from which bottom fishing with trawl gear is prohibited in the areas as defined in 2(2) above until the end of the year.

Revised CMM 2023-06 - Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northeastern Pacific Ocean

CMM 2023-06

(Entered into force 26 July 2023)

CONSERVATION AND MANAGEMENT MEASURE
FOR BOTTOM FISHERIES AND PROTECTION OF VULNERABLE MARINE
ECOSYSTEMS IN THE NORTHEASTERN PACIFIC OCEAN

The North Pacific Fisheries Commission (NPFC):

Seeking to ensure the long term conservation and sustainable use of the fishery resources of the Northeastern Pacific Ocean and, in so doing, protect the vulnerable marine ecosystems that occur there, in accordance with the Sustainable Fisheries Resolutions adopted by the United Nations General Assembly (UNGA) including, in particular, paragraphs 66 to 71 of the UNGA59/25 in 2004, paragraphs 69 to 74 of UNGA60/31 in 2005, paragraphs 69 and 80 to 91 of UNGA61/105 in 2006, and paragraphs 113 to 124 of UNGA64/72 in 2009;

Recalling that paragraph 85 of UNGA 61/105 calls upon participants in negotiations to establish regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries to adopt permanent measures in respect of the area of application of the instruments under negotiation;

Noting that North Pacific Fisheries Commission has previously adopted interim measures for the Northeastern Pacific Ocean;

Conscious of the need to adopt permanent measures for the Northeastern Pacific Ocean to ensure that this area is not left as the only major area of the Pacific Ocean where no such measures are in place;

Hereby adopt the following Conservation and Management Measure (CMM) for bottom fisheries

of the Northeastern Pacific Ocean while working to develop and implement other permanent management arrangements to govern these and other fisheries in the North Pacific Ocean.

Scope

1. These Measures are to be applied to all bottom fishing activities throughout the high seas areas of the Northeastern Pacific Ocean, defined, for the purposes of this document, as those occurring in the Convention Area as set out in Article 4 of the Convention text to the east of the line of 175 degrees W longitude (here in after called "the eastern part of the Convention Area") including all such areas and marine species other than those species already covered by existing international fisheries management instruments, including bilateral agreements and Regional Fisheries Management Organizations or Arrangements.

   For the purpose of these Measures, the term vulnerable marine ecosystems is to be interpreted and applied in a manner consistent with the International Guidelines on the Management of Deep Sea Fisheries on the High Seas adopted by the FAO on 29 August 2008 (see Annex 2 for further details).

2. The implementation of these Measures shall:
   a. be based on the best scientific information available in accordance with existing international laws and agreements including UNCLOS and other relevant international instruments,
   b. establish appropriate and effective conservation and management measures,
   c. be in accordance with the precautionary approach, and
   d. incorporate an ecosystem approach to fisheries management.

3. Actions by Members of the Commission
   Members of the Commission will take the following actions in respect of vessels operating under its Flag or authority in the area covered by these Measures:
   a. Conduct the assessments called for in paragraph 83(a) of UNGA Resolution 61/105, in a manner consistent with the FAO Guidelines and the Standards and Criteria included in Annex 2;
   b. Submit to the SC their assessments conducted pursuant to subparagraph (a) of this paragraph, including all relevant data and information in support of any such assessment,

and receive advice and recommendations from the SC, in accordance with the procedures in Annex 3;

c. Taking into account all advice and recommendations received from the SC, determine whether the fishing activity or operations of the vessel in question are likely to have a significant adverse impact on any vulnerable marine ecosystem;

d. If it is determined that the fishing activity or operations of the vessel or vessels in question would have a significant adverse impact on vulnerable marine ecosystems, adopt conservation and management measures to prevent such impacts on the basis of advice and recommendations of the SC, which are subject to adoption by the Commission;

e. Ensure that if any vessels are already engaged in bottom fishing, that such assessments have been carried out in accordance with paragraph 119(a)/UNGA RES 2009, the determination called for in subparagraph (c) of this paragraph has been rendered and, where appropriate, managements measures have been implemented in accordance with the advice and recommendations of the SC, which are subject to adoption by the Commission;

f. Further ensure that they will only authorize fishing activities on the basis of such assessments and any comments and recommendations from the SC;

g. Prohibit its vessels from engaging in directed fishing on the following taxa: ~~Alcyonacea,~~ black corals (Antipatharia), ~~Gorgonacea~~gorgonians, ~~and~~ pennatulaceans, stony corals (Scleractinia), soft corals, the classes of Demospongiae and Hexactinellida in the phylum Porifera as well as any other indicator species for vulnerable marine ecosystems as may be identified from time to time by the SC and approved by the Commission;

h. In respect of areas where vulnerable marine ecosystems are known to occur or are likely to occur, based on the best available scientific information, ensure that bottom fishing activities do not proceed unless conservation and management measures have been established to prevent significant adverse impacts on vulnerable marine ecosystems;

i. Limit fishing effort in bottom fisheries on the Eastern part of the Convention Area to the level of a historical average (baseline to be determined through consensus in the SC based on information to be provided by Members) in terms of the number of fishing vessels and other parameters which reflect the level of fishing effort, fishing capacity or potential impacts on marine ecosystems dependent on new SC advice;

j. Further, considering accumulated information regarding fishing activities in the Eastern part of the Convention Area, in areas where, in the course of fishing operations with pot gear,

cold water corals that exceed 2~~50~~Kg or sponges (Demospongiae and Hexactinellida) that exceed ~~500~~5Kg ~~of *Hexactinellida* and *Demospongiae*~~ are encountered in one gear retrieval, Members of the Commission shall require vessels flying their flag to cease bottom fishing activities in that location. In the course of fishing operations with all other gears, cold water corals that exceed 50Kg or sponges (Demospongiae and Hexactinellida) that exceed 350Kg are encountered in one gear retrieval, Members of the Commission shall require vessels flying their flag to cease bottom fishing activities in that location. In such cases, the vessel shall not resume fishing activities until it has relocated a sufficient distance, which shall be no less than 1 nautical mile, so that additional encounters with VMEs are unlikely. All such encounters, including the location, gear type, date, time and name and weight of the VME indicator species, shall be reported to the Secretariat, through the Member, within one business day. The Executive Secretary shall notify the other Members of the Commission and at the same time implement a temporary closure in the area to prohibit its bottom fishing vessels from contacting the sea floor with their trawl nets. Members shall inform their fleets and enforcement operations within one business day of the receipt of the notification from the Executive Secretary. It is agreed that the VME indicator taxa include cold water corals *Alcyonacea,* black corals (Antipatharia), ~~Gorgonacea~~gorgonians, pennatulaceans, ~~and~~ stony corals (Scleractinia), and soft corals. The VME indicator taxa also include ~~and~~ the classes of Demospongiae and Hexactinellida in the phylum Porifera.

k. Based on all the available data, including data on the VME encounter and distribution received from the fishing vessel(s), research survey data, visual survey data, and/or model results, the Scientific Committee (SC) shall assess and conclude if the area has a VME. If so, the SC shall recommend to the Commission that the temporary closure be made permanent, although the boundary of the closure may be adjusted, or suggest other appropriate measures. Otherwise, the Executive Secretary shall inform the Members that they may reopen the area to their vessels.

~~k.~~l. Prohibit bottom fishing vessels from fishing in the following areas in order to achieve sustainable protection of VMEs in the eastern part of the Convention Area:

Area	Latitude	Longitude
Northwestern Cobb Seamount	46.8178 N	130.872 W
	46.7703 N	130.861 W
	46.8277 N	130.825 W
	46.7802 N	130.814W
Northeastern Cobb Seamount	46.7759 N	130.735 W
	46.7675 N	130.694 W
	46.7482 N	130.756 W
	46.7399 N	130.716 W

4. All assessments and determinations by any Member as to whether fishing activity would have significant adverse impacts on vulnerable marine ecosystems, as well as measures adopted in order to prevent such impacts, will be made publicly available through agreed means.

Control of Bottom Fishing Vessels

5. Members will exercise full and effective control over each of their bottom fishing vessels operating in the high seas of the Northeastern Pacific Ocean, including by means of fishing licenses, authorizations or permits, and maintenance of a record of these vessels as outlined in the Convention and applicable CMM.

6. New and exploratory fishing will be subject to the exploratory fishery protocol included as Annex 1.

Scientific Committee (SC)

7. Scientific Committee will provide scientific support for the implementation of these CMMs.

Scientific Information

8. The Members shall provide all available information as required by the Commission for any current or historical fishing activity by their flag vessels, including the number of vessels by gear type, size of vessels (tons), number of fishing days or days on the fishing grounds, total catch by species, areas fished (names or coordinates of seamounts), and information from scientific observer programmes (see Annexes 4 and 5) to the NPFC Secretariat as soon as possible and no

later than one month prior to SC meeting.   The Secretariat will make such information available to SC.

Scientific research activities for stock assessment purposes are to be conducted in accordance with a research plan that has been provided to SC prior to the commencement of such activities.

EXPLORATORY FISHERY PROTOCOL IN THE NORTH PACIFIC OCEAN

1. From 1 January 2009, all bottom fishing activities in new fishing areas and areas where fishing is prohibited in a precautionary manner or with bottom gear not previously used in the existing fishing areas, are to be considered as "exploratory fisheries" and to be conducted in accordance with this protocol.

2. Precautionary conservation and management measures, including catch and effort controls, are essential during the exploratory phase of deep sea fisheries.   Implementation of a precautionary approach to sustainable exploitation of deep sea fisheries shall 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.

3. When a member of the Commission would like to conduct exploratory fisheries, it is to follow the following procedure:

(1) Prior to the commencement of fishing, the member of the Commission is to circulate the information and assessment in Appendix 1.1 to the members of the Scientific Committee (SC) for review and to all members of the Commission for information, together with the impact assessment. Such information is to be provided to the other members at least 30 days in advance of the meeting at which the information shall be reviewed.

(2) The assessment in (1) above is to be conducted in accordance with the procedure set forth in "Science-based Standards and Criteria for Identification of VMEs and Assessment of Significant Adverse Impacts on VMEs and Marine Species (Annex 2)", with the understanding that particular care shall be taken in the evaluation of risks of the significant adverse impact on vulnerable marine ecosystems (VMEs), in line with the precautionary approach.

(3) The SC is to review the information and the assessment submitted in (1) above in accordance with "SC Assessment Review Procedures for Bottom Fishing Activities (Annex 3)."

(4) The exploratory fisheries are to be permitted only where the assessment concludes that they would not have significant adverse impacts (SAIs) on marine species or any VMEs and on the basis of comments and recommendations of SC.   Any determinations, by any Member of the Commission or the SC, that the exploratory fishing activities would not have SAIs on marine species or any VMEs, shall be made publicly available through the NPFC website.

4. The member of the Commission is to ensure that all vessels flying its flag conducting exploratory fisheries are equipped with a satellite monitoring device and have an observer on board at all times.

5. Within 3 months of the end of the exploratory fishing activities or within 12 months of the commencement of fishing, whichever occurs first, the member of the Commission is to provide a report of the results of such activities to the members of the SC and all members of the Commission. If the SC meets prior to the end of this 12-month period, the member of the Commission is to provide an interim report 30 days in advance of the SC meeting. The information to be included in the report is specified in Appendix 1.2.

6. The SC is to review the report in 5 above and decide whether the exploratory fishing activities had SAIs on marine species or any VME.   The SC then is to send its recommendations to the Commission on whether the exploratory fisheries can continue and whether additional management measures shall be required if they are to continue. The Commission is to strive to adopt conservation and management measures to prevent SAIs on marine species or any VMEs. If the Commission is not able to reach consensus on any such measures, each fishing member of the Commission is to adopt measures to avoid any SAIs on VMEs.

7. Members of the Commission shall only authorize continuation of exploratory fishing activity, or commencement of commercial fishing activity, under this protocol on the basis of comments and recommendations of the SC.

8. The same encounter protocol should be applied in both fished and unfished areas specified in Annex 2, paragraph 4(1)(a).

Appendix 1.1

Information to be provided before exploratory fisheries start

1. A harvesting plan
   - Name of vessel
   - Flag member of vessel
   - Description of area to be fished (location and depth)
   - Fishing dates
   - Anticipated effort
   - Target species
   - Bottom fishing gear-type used
   - Area and effort restrictions to ensure that fisheries occur on a gradual basis in a limited geographical area.
2. A mitigation plan
   - Measures to prevent SAIs to VMEs that may be encountered during the fishery

3. A catch monitoring plan
   - Recording/reporting of all species brought onboard to the lowest possible taxonomic level
   - 100% satellite monitoring
   - 100% observer coverage

4. A data collection plan
   - Data is to be collected in accordance with "Type and Format of Scientific Observer Data to be

Collected" (Annex 5)

Information to be included in the report

- Name of vessel
- Flag member of vessel
- Description of area fished (location and depth)
- Fishing dates
- Total effort
- Bottom fishing gear-type used
- List of VME encountered (the amount of VME indicator species for each encounter specifying the location: longitude and latitude)
- Mitigation measures taken in response to the encounter of VME
- List of all organisms brought onboard
- List of VMEs indicator species brought onboard by location: longitude and latitude

SCIENCE-BASED STANDARDS AND CRITERIA FOR IDENTIFICATION OF VMES AND ASSESSMENT OF SIGNIFICANT ADVERSE IMPACTS ON VMES AND MARINE SPECIES

1. Introduction

Members of the Commission have hereby established science-based standards and criteria to guide their implementation of United Nations General Assembly (UNGA) Resolution 61/105 and the measures adopted by the Members in respect of bottom fishing activities in the North Pacific Ocean (NPO). In this regard, these science-based standards and criteria are to be applied to identify vulnerable marine ecosystems (VMEs) and assess significant adverse impacts (SAIs) of bottom fishing activities on such VMEs or marine species and to promote the long-term sustainability of deep sea fisheries in the Convention Area. The science-based standards and criteria are consistent with the FAO International Guidelines for the Management of Deep-Sea Fisheries in the High Seas, taking into account the work of other RFMOs implementing management of deep-sea bottom fisheries in accordance with UNGA Resolution 61/105. The standards and criteria are to be modified from time to time as more data are collected through research activities and monitoring of fishing operations.

2. Purpose

(1) The purpose of the standards and criteria is to provide guidelines for each member of the Commission in identifying VMEs and assessing SAIs of individual bottom fishing activities[2] on VMEs or marine species in the Convention Area. Each member of the Commission, using the best information available, is to decide which species or areas are to be categorized as VMEs, identify areas where VMEs are known or likely to occur, and assess whether individual bottom fishing activities would have SAIs on such VMEs or marine species. The results of these tasks are to be submitted to and reviewed by the Scientific Committee with a view to reaching a common understanding among the members of the Commission.

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[2] "individual bottom fishing activities" means fishing activities by each fishing gear. For example, if ten fishing vessels operate bottom trawl fishing in a certain area, the impacts of the fishing activities of these vessels on the ecosystem are to be assessed as a whole rather than on a vessel-by-vessel basis. It should be noted that if the total number or capacity of the vessels using the same fishing gear has increased, the impacts of the fishing activities are to be assessed again.

(2) For the purpose of applying the standards and criteria, the bottom fisheries are defined as follows:

    (a) The fisheries are conducted in the Convention Area;

    (b) The total catch (everything brought up by the fishing gear) includes species that can only sustain low exploitation rates; and

    (c) The fishing gear is likely to contact the seafloor during the normal course of fishing operations

3. Definition of VMEs

(1) Although Paragraph 83 of UNGA Resolution 61/105 refers to seamounts, hydrothermal vents and cold water corals as examples of VMEs, there is no definitive list of specific species or areas that are to be regarded as VMEs.

(2) Vulnerability is related to the likelihood that a population, community or habitat will experience substantial alteration by fishing activities and how much time will be required for its recovery from such alteration. The most vulnerable ecosystems are those that are both easily disturbed and are very slow to recover, or may never recover. The vulnerabilities of populations, communities and habitats are to be assessed relative to specific threats. Some features, particularly ones that are physically fragile or inherently rare may be vulnerable to most forms of disturbance, but the vulnerability of some populations, communities and habitats may vary greatly depending on the type of fishing gear used or the kind of disturbance experienced. The risks to a marine ecosystem are determined by its vulnerability, the probability of a threat occurring and the mitigation means applied to the threat. Accordingly, the FAO Guidelines only provide examples of potential vulnerable species groups, communities and habitats as well as features that potentially support them (Annex 2.1).

(3) A marine ecosystem is to be classified as vulnerable based on its characteristics. The following list of characteristics is used as criteria in the identification of VMEs.

    (a) Uniqueness or rarity - an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by other similar areas. These include:

        (i) Habitats that contain endemic species;

        (ii) Habitats of rare, threatened or endangered species that occur in discrete areas;

(iii) Nurseries or discrete feeding, breeding, or spawning areas

(b) 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.

(c) Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities

(d) 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:

      (i) Slow growth rates

      (ii) Late age of maturity

      (iii) Low or unpredictable recruitment

      (iv) Long-lived

(e) 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.

(4) Management response may vary, depending on the size of the ecological unit in the Convention Area.   Therefore, the spatial extent of the ecological unit is to be decided first. For example, whether the ecological unit is a group of seamounts, or an individual seamount in the Convention Area, is to be decided using the above criteria.

4. Identification of potential VMEs

(1) Fished seamounts
    (a) Identification of fished seamounts
    It is reported that two types of fishing gear are currently used by members of the Commission in the NE area, namely long-line hook and long-line trap.   The footprint of the bottom fisheries (fished seamounts) is identified based on the available fishing record.

The following seamounts have been identified as fished seamounts at some point in the past: Brown Bear, Cobb, Warwick, Eickelberg, Pathfinder, Miller, Murray, Cowie, Surveyor, Pratt, and Durgin. It is important to establish, to the extent practicable, a time series of where and when these gears have been used in order to assess potential long-term effects on any existing VMEs.

Fishing effort may not be evenly distributed on each seamount since fish aggregation may occur only at certain points of the seamount and some parts of the seamount may be physically unsuitable for certain fishing gears. Thus, it is important to know actual fished areas within the same seamount so as to know the gravity of the impact of fishing activities on the entire seamount.

Due consideration is to be given to the protection of commercial confidentiality when identifying actual fishing grounds.

(b) Assessment on whether a specific seamount that has been fished is a VME

After identifying the fished seamounts or fished areas of seamounts, it is necessary to assess whether each fished seamount is a VME or contains VMEs in accordance with the criteria in 3 above, individually or in combination using the best available scientific and technical information as well as Annex 2.1. A variety of data would be required to conduct such assessment, including pictures of seamounts taken by an ROV camera or drop camera, biological samples collected through research activities and observer programs, and detailed bathymetry map. Where site-specific information is lacking, other information that is relevant to inferring the likely presence of VMEs is to be used. The flow chart to identify data that can be used to identify VMEs is attached in Annex 2.3.

(2) New fishing areas

Any place other than the fished seamounts above is to be regarded as a new fishing area. If a member of the Commission is considering fishing in a new fishing area, such a fishing area is to be subject to, in addition to these standards and criteria, an exploratory fishery protocol (Annex 1).

5. Assessment of SAIs on VMEs or marine species

(1) 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 are to be evaluated individually, in combination and cumulatively.

(2) When determining the scale and significance of an impact, the following six factors are to be considered:

   (a) The intensity or severity of the impact at the specific site being affected;

   (b) The spatial extent of the impact relative to the availability of the habitat type affected;

   (c) The sensitivity/vulnerability of the ecosystem to the impact;

   (d) The ability of an ecosystem to recover from harm, and the rate of such recovery;

   (e) The extent to which ecosystem functions may be altered by the impact; and

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

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

(4) In determining whether an impact is temporary, both the duration and the frequency with which an impact is repeated is to be considered. If the interval between the expected disturbances of a habitat is shorter than the recovery time, the impact is to be considered more than temporary.

(5) Each member of the Commission is to conduct assessments to establish if bottom fishing activities are likely to produce SAIs in a given seamount or other VMEs. Such an impact assessment is to address, *inter alia*:

   (a) Type of fishing conducted or contemplated, including vessel and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing;

(b) Best available scientific and technical information on the current state of fishery resources, and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;

(c) Identification, description and mapping of VMEs known or likely to occur in the fishing area;

(d) The data and methods used to identify, describe and assess the impacts of the activity, identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment

(e) 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;

(f) Risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be SAIs, particularly impacts on VMEs and low-productivity fishery resources (Risk assessments are to take into account, as appropriate, differing conditions prevailing in areas where fisheries are well established and in areas where fisheries have not taken place or only occur occasionally);

(g) The proposed mitigation and management measures to be used to prevent SAIs 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.

(6) Impact assessments are to consider, as appropriate, the information referred to in these Standards and Criteria, as well as relevant information from similar or related fisheries, species and ecosystems.

(7) Where an assessment concludes that the area does not contain VMEs or that significant adverse impacts on VMEs or marine species are not likely, such assessments are to be repeated when there have been significant changes to the fishery or other activities in the area, or when natural processes are thought to have undergone significant changes.

6. Proposed conservation and management measures to prevent SAIs

As a result of the assessment in 5 above, if it is considered that individual fishing activities are causing or likely to cause SAIs on VMEs or marine species, the member of the Commission is to

adopt appropriate conservation and management measures to prevent such SAIs. The member of the Commission is to clearly indicate how such impacts are expected to be prevented or mitigated by the measures.

7. Precautionary approach

If after assessing all available scientific and technical information, the presence of VMEs or the likelihood that individual bottom fishing activities would cause SAIs on VMEs or marine species cannot be adequately determined, members of the Commission are only to authorize individual bottom fishing activities to proceed in accordance with:

(a) Precautionary, conservation and management measures to prevent SAIs;

(b) Measures to address unexpected encounters with VMEs in the course of fishing operations;

(c) Measures, including ongoing scientific research, monitoring and data collection, to reduce the uncertainty; and

(d) Measures to ensure long-term sustainability of deep sea fisheries.

8. Template for assessment report

Annex 2.2 is a template for individual member of the Commission to formulate reports on identification of VMEs and impact assessment.

<div align="right">**ANNEX 2.1**</div>

EXAMPLES OF POTENTIAL 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 is to be made on a case-by-case basis through application of relevant provisions of the Standards and Criteria, particularly Sections 3, 4 and 5.

> Examples of species groups, communities and habitat forming species that are documented or considered sensitive and potentially vulnerable to deep-sea fisheries in the high-seas, and which

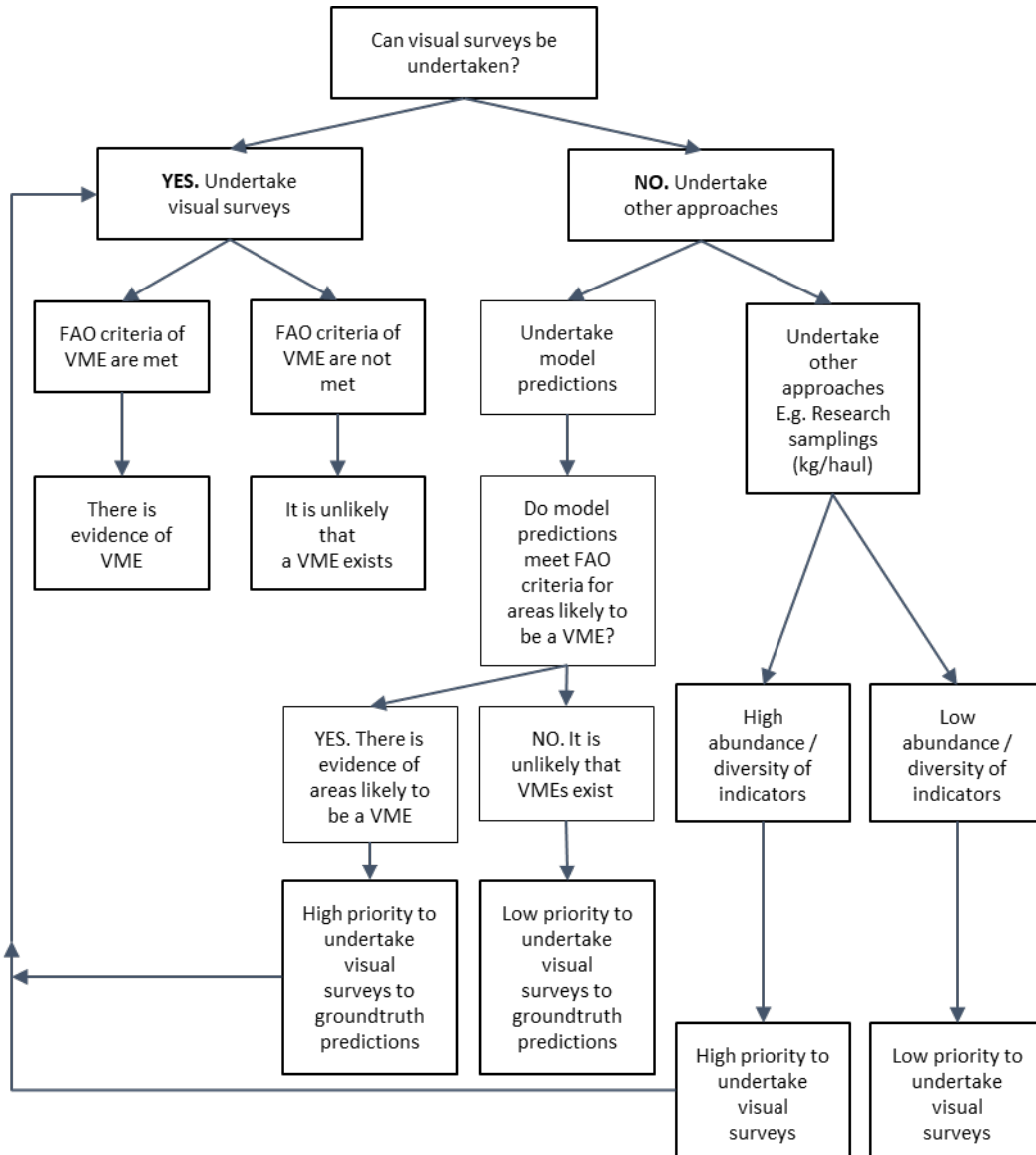|	may contribute to forming VMEs:
a.	certain coldwater corals, e.g., reef builders and coral forest including: stony corals (scleractinia), alcyonaceans and gorgonians (octocorallia), black corals (antipatharia), and hydrocorals (stylasteridae),
b.	Some types of sponge dominated communities,
c.	communities 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
d.	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:
a.	submerged edges and slopes (e.g., corals and sponges),
b.	summits and flanks of seamounts, guyots, banks, knolls, and hills (e.g., corals, sponges, xenophyphores),
c.	canyons and trenches (e.g., burrowed clay outcrops, corals),
d.	hydrothermal vents (e.g., microbial communities and endemic invertebrates), and
e.	cold seeps (e.g., mud volcanoes, microbes, hard substrates for sessile invertebrates).

TEMPLATE FOR REPORTS ON IDENTIFICATION OF VMEs AND ASSESSMENT OF IMPACTS CAUSED BY INDIVIDUAL FISHING ACTIVITIES ON VMEs OR MARINE SPECIES

1. Name of the member of the Commission

2. Name of the fishery (e.g., bottom trawl, bottom gillnet, bottom longline, pot)

3. Status of the fishery (existing fishery or exploratory fishery)

4. Target species

5. Bycatch species

6. Recent level of fishing effort (every year at least since 2002)

   (1) Number of fishing vessels

   (2) Tonnage of each fishing vessel

   (3) Number of fishing days or days on the fishing ground

   (4) Fishing effort (total operating hours for trawl, # of hooks per day for long-line, # of pots per day for pot, total length of net per day for gillnet)

   (5) Total catch by species

   (6) Names of seamounts fished or to be fished

7. Fishing period

8. Analysis of status of fishery resources

   (1) Data and methods used for analysis

   (2) Results of analysis

   (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties

9. Analysis of status of bycatch species resources

   (1) Data and methods used for analysis

   (2) Results of analysis

   (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties

10. Analysis of existence of VMEs in the fishing ground

(1) Data and methods used for analysis

(2) Results of analysis

(3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties

11. Impact assessment of fishing activities on VMEs or marine species including cumulative impacts, and identification of SAIs on VMEs or marine species, as detailed in Section 5 above, Assessment of SAIs on VMEs or marine species

12. Other points to be addressed

13. Conclusion (whether to continue or start fishing with what measures, or stop fishing).

Flow chart to identify data that can be used to identify VMEs in the NPFC Convention Area

SCIENTIFIC COMMITTEE ASSESSMENT REVIEW PROCEDURES FOR BOTTOM FISHING ACTIVITIES

1. The Scientific Committee (SC) is to review identifications of vulnerable marine ecosystems (VMEs) and assessments of significant adverse impact on VMEs, including proposed management measures intended to prevent such impacts submitted by individual Members.

2. Members of the Commission shall submit their identifications and assessments to members of the SC at least 21 days prior to the SC meeting at which the review is to take place.   Such submissions shall include all relevant data and information in support of such determinations.

3. The SC will review the data and information in each assessment in accordance with the Science-based Standards and Criteria for Identification of VMEs and Assessment of Significant Adverse Impacts on VMEs and Marine Species (Annex 2), previous decisions of the Commission, and the FAO Technical Guidelines for the Management of Deep Sea Fisheries in the High Seas, paying special attention to the assessment process and criteria specified in paragraphs 47-49 of the Guidelines.

4. In conducting the review above, the SC will give particular attention to whether the deep-sea bottom fishing activity would have a significant adverse impact on VMEs and marine species and, if so, whether the proposed management measures would prevent such impacts.

5. Based on the above review, the SC will provide advice and recommendations to the submitting Members on the extent to which the assessments and related determinations are consistent with the procedures and criteria established in the documents identified above; and whether additional management measures will be required to prevent SAIs on VMEs.

6.   Such recommendations will be reflected in the report of the SC meeting at which the assessments are considered.

FORMAT OF NATIONAL REPORT SECTIONS ON DEVELOPMENT AND IMPLEMENTATION OF SCIENTIFIC OBSERVER PROGRAMMES

Report Components

Annual Observer Programme implementation reports should form a component of annual National Reports submitted by members to the Scientific Committee.   These reports should provide a brief overview of observer programmes conducted in the NPFC Convention Area.   Observer programme reports should include the following sections:

A.   Observer Training

An overview of observer training conducted, including:
- Overview of training programme provided to scientific observers.
- Number of observers trained.

B.   Scientific Observer Programme Design and Coverage

Details of the design of the observer programme, including:
- Which fleets, fleet components or fishery components were covered by the programme.
- How vessels were selected to carry observers within the above fleets or components.
- How was observer coverage stratified: by fleets, fisheries components, vessel types, vessel sizes, vessel ages, fishing areas and seasons.

Details of observer coverage of the above fleets, including:
- Components, areas, seasons and proportion of total catches of target species, specifying units used to determine coverage.
- Total number of observer employment days, and number of actual days deployed on observation work.

C. Observer Data Collected

List of observer data collected against the agreed range of data set out in Annex 5, including:

- Effort Data: Amount of effort observed (vessel days, net panels, hooks, etc), by area and season and % observed out of total by area and seasons
- Catch Data: Amount of catch observed of target and by-catch species, by area and season, and % observed out of total estimated catch by species, area and seasons
- Length Frequency Data: Number of fish measured per species, by area and season.
- Biological Data: Type and quantity of other biological data or samples (otoliths, sex, maturity, etc) collected per species.
- The size of length-frequency and biological sub-samples relative to unobserved quantities.

D. Detection of Fishing in Association with Vulnerable Marine Ecosystems

- Information about VME encounters (species and quantity in accordance with Annex 5, H, 2).

E. Tag Return Monitoring

- Number of tags returns observed, by fish size class and area.

F. Problems Experienced

- Summary of problems encountered by observers and observer managers that could affect the NPFC Observer Programme Standards and/or each member's national observer programme developed under the NPFC standards.

NPFC BOTTOM FISHERIES
OBSERVER PROGRAMME STANDARDS: SCIENTIFIC COMPONENT

TYPE AND FORMAT OF SCIENTIFIC OBSERVER DATA TO BE COLLECTED

A. Vessel & Observer Data to be collected for Each Trip

1. Vessel and observer details are to be recorded only once for each observed trip.

2. The following observer data are to be collected for each observed trip:
   a) NPFC vessel ID
   b) Observer's name.
   c) Observer's organisation.
   d) Date observer embarked (UTC date).
   e) Port of embarkation.
   f) Date observer disembarked (UTC date).
   g) Port of disembarkation.

B. Catch & Effort Data to be collected for Trawl Fishing Activity

1. Data are to be collected on an un-aggregated (tow by tow) basis for all observed trawls.

2. The following data are to be collected for each observed trawl tow:
   a) Tow start date (UTC).
   b) Tow start time (UTC).
   c) Tow end date (UTC).
   d) Tow end time (UTC).
   e) Tow start position (Lat/Lon, 1 minute resolution).
   f) Tow end position (Lat/Lon, 1 minute resolution).
   g) Type of trawl, bottom or mid-water.
   h) Type of trawl, single, double or triple.
   i) Height of net opening (m).
   j) Width of net opening (m).
   k) Mesh size of the cod-end net (stretched mesh, mm) and mesh type (diamond, square, etc).
   l) Gear depth (of footrope) at start of fishing (m).

m) Bottom (seabed) depth at start of fishing (m).

n) Gear depth (of footrope) at end of fishing (m).

o) Bottom (seabed) depth at end of fishing (m).

p) Status of the trawl operation (no damage, lightly damaged*, heavily damaged*, other (specify)). *Degree may be evaluated by time for repairing (<=1hr or >1hr)

q) Duration of estimated period of seabed contact (minute)

r) Intended target species.

s) Catch of all species retained on board, split by species, in weight (to the nearest kg).

t) Estimate of the amount (weight or volume) of all living marine resources discarded, split by species.

u) Record of the numbers by species of all marine mammals, seabirds or reptiles caught.

C. Catch & Effort Data to be collected for Bottom Gillnet Fishing Activity

1. Data are to be collected on an un-aggregated (set by set) basis for all observed bottom gillnet sets.

2. The following data are to be collected for each observed bottom gillnet set:

   a) Set start date (UTC).

   b) Set start time (UTC).

   c) Set end date (UTC).

   d) Set end time (UTC).

   e) Set start position (Lat/Lon, 1 minute resolution).

   f) Set end position (Lat/Lon, 1 minute resolution).

   g) Net panel ("tan") length (m).

   h) Net panel ("tan") height (m).

   i) Net mesh size (stretched mesh, mm) and mesh type (diamond, square, etc)

   j) Bottom depth at start of setting (m).

   k) Bottom depth at end of setting (m).

   l) Number of net panels for the set.

   m) Number of net panels retrieved.

   n) Number of net panels actually observed during the haul.

   o) Actually observed catch of all species retained on board, split by species, in weight (to the nearest kg).

p) An estimation of the amount (numbers or weight) of marine resources discarded, split by species, during the actual observation.

q) Record of the actually observed numbers by species of all marine mammals, seabirds or reptiles caught.

r) Intended target species.

s) Catch of all species retained on board, split by species, in weight (to the nearest kg).

t) Estimate of the amount (weight or volume) of all marine resources discarded* and dropped-off, split by species. * Including those retained for scientific samples.

u) Record of the numbers by species of all marine mammals, seabirds or reptiles caught (including those discarded and dropped-off).

D. Catch & Effort Data to be collected for Bottom Long Line Fishing Activity

1. Data are to be collected on an un-aggregated (set by set) basis for all observed longline sets.

2. The following fields of data are to be collected for each set:
   a) Set start date (UTC).
   b) Set start time (UTC).
   c) Set end date (UTC).
   d) Set end time (UTC).
   e) Set start position (Lat/Lon, 1 minute resolution).
   f) Set end position (Lat/Lon, 1 minute resolution).
   g) Total length of longline set (m).
   h) Number of hooks or traps for the set.
   i) Bottom (seabed) depth at start of set.
   j) Bottom (seabed) depth at end of set.
   k) Number of hooks or traps actually observed during the haul.
   l) Intended target species.
   m) Actually observed catch of all species retained on board, split by species, in weight (to the nearest kg).

n) An estimation of the amount (numbers or weight) of marine resources discarded* or dropped-off, split by species, during the actual observation. * Including those retained for scientific samples.

o) Record of the actually observed numbers by species of all marine mammals, seabirds or reptiles caught (including those discarded and dropped-off).

E. Length-Frequency Data to Be Collected

1. Representative and randomly distributed length-frequency data (to the nearest mm, with record of the type of length measurement taken) are to be collected for representative samples of the target species and other main by-catch species. Total weight of length-frequency samples should be recorded, and observers may be required to also determine sex of measured fish to generate length-frequency data stratified by sex. The length-frequency data may be used as potential indicators of ecosystem changes (for example, see: Gislason, H. et al. (2000. ICES J Mar Sci 57: 468-475), Yamane et al. (2005. ICES J Mar Sci, 62: 374-379), and Shin, Y-J. et al. (2005. ICES J Mar Sci, 62: 384-396)).

2. The numbers of fish to be measured for each species and distribution of samples across area and month strata should be determined, to ensure that samples are properly representative of species distributions and size ranges.

F. Biological sampling to be conducted (optional for gillnet and long line fisheries)

1. The following biological data are to be collected for representative samples of the main target species and, time permitting, for other main by-catch species contributing to the catch:
   a) Species
   b) Length (to the nearest mm), with record of the type of length measurement used.
   c) Length and depth in case of North Pacific armorhead.
   d) Sex (male, female, indeterminate, not examined)
   e) Maturity stage (immature, mature, ripe, ripe-running, spent)

2. Representative stratified samples of otoliths are to be collected from the main target species and, time permitting, from other main by-catch species regularly occurring in catches.   All otoliths to be collected are to be labelled with the information listed in 1 above, as well as the date, vessel name, observer name and catch position.

3. Where specific trophic relationship projects are being conducted, observers may be requested to also collect stomach samples from certain species.   Any such samples collected are also to be labelled with the information listed in 1 above, as well as the date, vessel name, observer name and catch position.

4. Observers may also be required to collect tissue samples as part of specific genetic research programmes implemented by the SC.

5. Observers are to be briefed and provided with written length-frequency and biological sampling protocols and priorities for the above sampling specific to each observer trip.

G.   Data to be collected on Incidental Captures of Protected Species

1. Flag members operating observer programs are to develop, in cooperation with the SC, lists and identification guides of protected species or species of concern (seabirds, marine mammals or marine reptiles) to be monitored by observers.

2. The following data are to be collected for all protected species caught in fishing operations:
    a) Species (identified as far as possible, or accompanied by photographs if identification is difficult).
    b) Count of the number caught per tow or set.
    c) Life status (vigorous, alive, lethargic, dead) upon release.
    d) Whole specimens (where possible) for onshore identification.   Where this is not possible, observers may be required to collect sub-samples of identifying parts, as specified in biological sampling protocols.

H.   Detection of Fishing in Association with Vulnerable Marine Ecosystems

1. The SC is to develop a guideline, species list and identification guide for benthic species (e.g. sponges, sea fans, corals) whose presence in a catch will indicate that fishing occurred in association with a vulnerable marine ecosystem (VME).   All observers on vessels are to be provided with copies of this guideline, species list and ID guide.

2. For each observed fishing operation, the following data are to be collected for all species caught, which appear on the list of vulnerable benthic species:

   a) Species (identified as far as possible, or accompanied by a photograph where identification is difficult).

   b) An estimate of the quantity (weight (kg) or volume (m^3)) of each listed benthic species caught in the fishing operation.

   c) An overall estimate of the total quantity (weight (kg) or volume (m^3)) of all invertebrate benthic species caught in the fishing operation.

   d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitable preserved for identification on shore.

I. Data to be collected for all Tag Recoveries

1. The following data are to be collected for all recovered fish, seabird, mammal or reptile tags:

   a) Observer name.

   b) Vessel name.

   c) Vessel call sign.

   d) Vessel flag.

   e) Collect, label (with all details below) and store the actual tags for later return to the tagging agency.

   f) Species from which tag recovered.

   g) Tag colour and type (spaghetti, archival).

   h) Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)

i) Date and time of capture (UTC).

j) Location of capture (Lat/Lon, to the nearest 1 minute)

k) Animal length / size (to the nearest cm) with description of what measurement was taken (such as total length, fork length, etc).

l) Sex (F=female, M=male, I=indeterminate, D=not examined)

m) Whether the tags were found during a period of fishing that was being observed (Y/N)

n) Reward information (e.g. name and address where to send reward)

(It is recognised that some of the data recorded here duplicates data that already exists in the previous categories of information. This is necessary because tag recovery information may be sent separately to other observer data.)

J. Hierarchies for Observer Data Collection

2. Trip-specific or programme-specific observer task priorities may be developed in response to specific research programme requirements, in which case such priorities should be followed by observers.

3. In the absence of trip- or programme-specific priorities, the following generalised priorities should be followed by observers:

a) Fishing Operation Information
   - All vessel and tow / set / effort information.

b) Monitoring of Catches
   - Record time, proportion of catch (e.g. proportion of trawl landing) or effort (e.g. number of hooks), and total numbers of each species caught.
   - Record numbers or proportions of each species retained or discarded.

c) Biological Sampling
   - Length-frequency data for target species.
   - Length-frequency data for main by-catch species.

- Identification and counts of protected species.

- Basic biological data (sex, maturity) for target species.

- Check for presence of tags.

- Otoliths (and stomach samples, if being collected) for target species.

- Basic biological data for by-catch species.

- Biological samples of by-catch species (if being collected)

- Photos

4. The monitoring of catches and biological sampling procedures should be prioritised among species groups as follows:

Species	Priority (1 highest)
Primary target species (such as North Pacific armorhead and splendid alfonsino)	1
Other species typically within top 10 in the fishery (such as mirror dory, and oreos)	2
Protected species	3
All other species	4

The allocation of observer effort among these activities will depend on the type of operation and setting. The size of sub-samples relative to unobserved quantities (e.g. number of hooks/panels examined for species composition relative to the number of hooks/panels retrieved) should be explicitly recorded under the guidance of member country observer programmes.

K. Coding Specifications to be used for Recording Observer Data

1. Unless otherwise specified for specific data types, observer data are to be collected in accordance with the same coding specifications as specified in this Annex.

2. Coordinated Universal Time (UTC) is to be used to describe times.

3. Degrees and minutes are to be used to describe locations.

4. The following coding schemes are to be used:
    a. Species are to be described using the FAO 3 letter species codes or, if species do not have a FAO code, using scientific names.
    b. Fishing methods are to be described using the International Standard Classification of Fishing Gear (ISSCFG - 29 July 1980) codes.
    c. Types of fishing vessel are to be described using the International Standard Classification of Fishery Vessels (ISSCFV) codes.

5. Metric units of measure are to be used, specifically:
    a. Kilograms are to be used to describe catch weight.
    b. Metres are to be used to describe height, width, depth, beam or length.
    c. Cubic metres are to be used to describe volume.
    d. Kilowatts are to be used to describe engine power.