North Pacific Fisheries Commission

5th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems
REPORT

9-11 December 2024

February 2025

This paper may be cited in the following manner:

Small Scientific Committee on Bottom Fish and Marine Ecosystems. 2024. 5th Meeting Report. NPFC-2024-SSC BF-ME05-Final Report. 149 pp. (Available at www.npfc.int)

2nd Floor Hakuyo Hall,
Tokyo University of Marine Science and Technology,
4-5-7 Konan, Minato-ku, Tokyo
108-8477, JAPAN

TEL +81-3-5479-8717
FAX +81-3-5479-8718
Email secretariat@npfc.int
Web www.npfc.int

North Pacific Fisheries Commission
5th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems

9–11 December 2024
Tokyo, Japan (Hybrid)

REPORT

Agenda Item 1. Opening of the Meeting

1. The 5th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems (SSC BF-ME05) was held in a hybrid format, with participants attending in-person in Tokyo, Japan, or online via WebEx, on 9–11 December 2024. 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. Maite Pons and Dr. Joel Rice participated as invited experts.

2. The meeting was opened by the SSC BF-ME Chair, Dr. Chris Rooper (Canada).

3. Japan welcomed the participants to Tokyo and thanked the Secretariat for its work to prepare for the meetings. Japan expressed its hope that the SSC BF-ME would continue to make progress in the management of bottom fish and conservation of associated marine environments and that the participants would enjoy their time in Tokyo, especially the night-life.

4. The Science Manager, Dr. Aleksandr Zavolokin, and the Data Coordinator, Mr. Sungkuk Kang, outlined the meeting procedures and logistics.

5. Mr. Alex Meyer was selected as rapporteur.

Agenda Item 2. Adoption of Agenda

6. The SSC BF-ME reviewed the provisional agenda and agreed to add two new sub-agenda items: “10.1.6 Proposal for VME closure – Japan” and “16.3 FAO request for deep-sea fishing effort data.”

7. The revised agenda was adopted (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 BFME04

8. The Chair summarized the discussions and outcomes of the SSC BF-ME04 meeting.

3.2 COM08

9. The Science Manager presented the outcomes from the 8th Commission meeting (COM08) that concern the SSC BF-ME.

3.2.1 CMMs 2024-05 and 2024-06

10. The Science Manager outlined the revisions made by COM08 to Conservation and Management Measure (CMM) 2024-05 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems (VMEs) in the Northwestern (NW) Pacific Ocean and CMM 2024-06 for Bottom Fisheries and Protection of VMEs in the Northeastern (NE) Pacific Ocean.

3.2.2 Requests from COM08

11. The Science Manager reminded the SSC BF-ME that paragraph 10 of CMM 2023-14 on Sharks, adopted at COM07, requires Members to annually report all shark catches. A new section for shark reporting will be added by the Secretariat to the electronic Annual Report on the NPFC website soon.

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

12. The Science Manager presented the fishing catch and effort statistics for NPA including the latest available data for 2023. Total catch in 2023 was around 148 MT. 1 Japanese trawl and 1 Japanese gillnet vessel were in operation catching NPA and splendid alfonsino (SA) in the Convention Area.

4.2 NPA monitoring survey and Adaptive Management Procedure (AMP)

4.2.1 Review of the results from 2024 monitoring survey

13. The Science Manager presented the results of the monitoring survey for NPA in the Emperor Seamounts in 2024 (NPFC-2024-SSC BFME05-IP01). The fishing vessel Kaiyo Maru No.51 conducted four trawl hauls for at least one hour each in the Kammu and Koko Seamounts from March to June 2024. The criteria for high recruitment were not met.

4.3 Review of Members' research and joint research activities on NPA

4.3.1 NPA species summary document update and review

14. The SSC BF-ME reviewed the updated species summary of NPA in the Emperor Seamounts (NPFC-2024-SSC BFME05-WP02).

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

4.3.2 Other research activities on NPA

16. No other research activities were presented.

4.3.3 Future and planned research activities by Members on NPA in 2025

17. No future and planned research activities by Members on NPA in 2025 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

18. The Science Manager presented the fishing catch and effort statistics for SA including the latest available data for 2023. Total catch in 2023 was around 1,701 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

19. The SSC BF-ME reviewed the updated species summary of SA in the Emperor Seamounts (NPFC-2024-SSC BFME05-WP03).

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

5.2.2 Other research activities on SA

21. No other research activities were presented.

5.2.3 Future and planned research activities by Members on SA in 2025

22. No future and planned research activities by Members on SA in 2025 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

23. 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)

24. Canada presented a brief update, jointly prepared with the United States, on sablefish status in the eastern North Pacific, including the NPFC Convention Area (NPFC-2024-SSC BFME05-WP06). Domestic sablefish stock assessments are conducted in three regions: Alaska (age-structured model, annual), Canada (management strategy evaluation (MSE) with age-structured operating model (OM), ~3-year cycle), and US West Coast (age-structured model, ~3–5-year cycle). The most recent assessments all indicate that the sablefish stock is healthy and not subject to overfishing. In all three regions, the stock is well above the upper stock reference point. In the NPFC Convention Area, there has been no fishery catch or effort since 2020.

25. The SSC BF-ME developed a stock status summary for sablefish, as shown in Annex I, and recommended that the SC Chair present the information in the summary to the Commission.

6.2.2 Sablefish species summary document update and review

26. The SSC BF-ME reviewed the updated species summary of sablefish (NPFC-2024-SSC BFME05-WP04).

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

28. The SSC BF-ME reviewed the updated species summary of blackspotted and rougheye rockfishes (NPFC-2024-SSC BFME05-WP05).

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

6.2.3 Other research activities on sablefish

30. Canada explained that the following research activities are ongoing by Canada and the United States:
    (a) Sensitivity analysis of OM to aging effort and age composition among gear types.
    (b) Coastwide analysis of climate and recruitment.
    (c) Coastwide MSE process.
    (d) Spatial assessment that includes age-based movement in Alaska.
    (e) VME MSE process using Bowie-SGaan Kinglas data.

6.2.4 Future and planned research activities by Members on sablefish in 2025

31. Canada explained that the following research activities are planned in 2025:

(a) Integrating climate-linkages to early life history stages towards developing a full life cycle spatial model for sablefish.
(b) Ongoing work to develop electronic tagging database and use in the spatial model.

Agenda Item 7. Skilfish in the NPFC Convention Area

7.1 Updated catch and effort for skilfish in 2023

32. Russia informed the SSC BF-ME that no Russian vessels have fished for skilfish in the Convention Area in 2023 and 2024.

7.2 Skilfish species summary document update and review

33. Russia presented a draft species summary of skilfish (NPFC-2024-SSC BFME05-WP20).

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

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

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

8.1 Update from SWG NPA-SA

36. The SWG NPA-SA Lead, Dr. Kota Sawada (Japan), presented a summary of the intersessional progress made by the SWG NPA-SA on the tasks it was assigned by SSC BF-ME04 (NPFC-2024-SSC BFME05-WP17). 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

37. The SWG NPA-SA Lead explained that the SWG NPA-SA has:
(a) improved the estimation of life-history parameters conducted in 2023, considering the uncertainty of parameters by sensitivity analyses.
(b) conducted life history-based analyses on the stock status of SA.
(c) considered the uncertainty of parameter estimates by running sensitivity analyses.

8.1.2 Review of stock status for SA

38. Dr. Pons presented updated estimates of life history parameters for SA in the North Pacific, specifically examining growth, maturity, and the length-weight relationship (NPFC-2024-SSC BFME05-WP08). Growth estimates align with recent local studies and other studies around the world. However, the differences in growth parameters by gear type underscore the potential impact of gear selectivity (and catchability), with gillnets appearing to sample larger individuals compared to trawls. This sampling bias may influence growth assessments and has implications for accurately modeling SA growth. The sensitivity of maturity estimates to data sources was also evident, with substantial variation observed between Gonadosomatic

Index (GSI)-based and histology-based maturity curves. Additionally, the Member-specific maturity estimates based on histological data reveal possible inconsistencies among protocols or representativeness of the data. However, the GSI model using combined data from all countries appears to balance these differences, potentially providing an average estimate across regional variability. The updated length-weight relationship for SA aligns closely with previous estimates.

39. Dr. Pons presented yield per recruit (YPR) and length-based spawning biomass per recruit (LBSPR) analyses for SA in the North Pacific (NPFC-2024-SSC BFME05-WP09). The YPR analysis suggested that, for the scenarios of both the trawl and gillnet fisheries combined, fish are being harvested before they reach the size where YPR is optimized, suggesting growth overfishing. The LBSPR analysis suggested that SA is experiencing recruitment overfishing with low estimated spawning potential ratio (SPR) values and high fishing mortality rates. SA are being fished before they mature, reducing the abundance of mature individuals and therefore future recruitment. The most pessimistic scenario is when using the length data and selectivity from all gears combined. However, these results may be biased towards overfishing due to the dome-shaped selectivity of the trawl gear, which is the main fishery contributing to total SA catch. The analyses were very sensitive to the life history input parameters, in particular growth for the YPR analyses and maturity estimates for the spawning biomass per recruit (SPBR) analysis. Moreover, growth estimates are essential to estimate M from empirical studies. Assessing a multi-gear fishery with data-limited methods is challenging because these methods do not allow for multiple gears and for dome-shaped selectivity. More complex models that could manage different fleets with different selectivity assumptions may be needed. Integrated models that use data from different fleets with different selectivity shapes could be an alternative to data-limited assessment to better understand the status of SA and improve fisheries management.

40. The SSC BF-ME reviewed and revised the science advice on SA from the SWG NPA-SA and summarized it in Annex I.

8.1.3 Review of alternative approaches to NPA assessment

41. The SWG NPA-SA Lead explained that the SWG NPA-SA has:
    (a) agreed to consider integrated modelling (e.g. Stock Synthesis, Methot and Wetzel 2013) with multiple fleets to assess the SA stock next year, and that the SWG NPA-SA recommended assigning higher priority to catch per unit effort (CPUE) standardization work, if integrative modeling of SA becomes a future task for the group.

(b) reviewed the data for depletion analysis of NPA shared by Members (Japan and Korea) and the update on individual-based bioenergetic modeling (IBM) of NPA presented by Canada.

8.1.4 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) developed and agreed upon the Term of References for sharing SA catch size composition data, reviewed the data shared by Members, and reviewed the preliminary analyses by Japan on the impact of trawl's mesh size change on SA catch size composition introduced from 2019.

(b) reviewed preliminary work conducted by Japan to monitor the trend of directed effort for NPA and recommended further analyses.

43. Japan presented a study on the impact of mesh size change on catch size composition of splendid alfonsino (NPFC-2024-SSC BFME05-WP15). Japan explained that previous evaluation of size composition data found no change following the implementation of the new mesh size regulations. The reevaluation in this study was conducted using a more robust size composition dataset spanning from 2013 to 2023, while also comparing the effects of different seamounts, fishing vessels, and seasons. The analysis found no clear relationship between the mesh changes and mean fork-length of SA over time, but there was significant year-to-year variation in length frequencies. While there is some evidence that suggests an increase of catch size in recent years, continued monitoring to determine the validity of the current trend is necessary.

44. Japan presented a study to test the hypothesis that the setting of encouraged catch reduced directed fishing effort and fishing pressure on NPA, even though the recent annual catch is smaller than the encouraged catch limit level (NPFC-2024-SSC BFME05-WP16). Two approaches were taken to test the hypothesis: records of intended target by observers and cumulative catch plots to specify target species in a "directed CPUE" method. The results demonstrated that the targeting NPA has been avoided and suggested that the implementation of encouraged catch limits might be effective in reducing directed fishing pressure on NPA by discouraging fishers against targeting the fish.

45. The SSC BF-ME developed stock status summaries for SA and NPA, as shown in Annex I, and recommended that the SC Chair present the information in the summaries to the Commission.

Agenda Item 9. Discussion of other proposals on bottom fish management

9.1 Proposal from USA on Emperor Seamount bottom fishery closure

46. The United States presented a proposal for additional temporal and spatial closures to ensure that additional scientific work is completed before authorizing continued bottom fishing activities (NPFC-2024-SSC BFME05-WP18). The United States noted that impact assessments of Members' bottom fishing activities on VMEs have not been updated to consider cumulative impacts or more recent scientific information and management considerations, that NPFC lacks stock assessments and scientific advice on sustainable levels of fishing activities for NPA and SA, which are believed to be overfished, and that scientific literature highlights the likely presence of VMEs in areas subject to current or potential fishing effort on the Emperor Seamounts. The United States emphasized that these factors are sufficient to consider additional closures to bottom fishing consistent with the international guidance adopted through the United Nations General Assembly and the precautionary approach in the NPFC Convention (Article 3(c)). The United States called for Members that conduct or seek to conduct bottom fishing in the Convention Area to provide updated assessments on bottom fishing activities' significant adverse impacts (SAIs) on VMEs, and for the SC and its subsidiary bodies to review them and recommend whether additional management measures will be required to prevent SAIs on VMEs. It also called for more precautionary management, as well as temporary closures on bottom trawling or appropriate area closures to limit potential impacts on VMEs and promote stock rebuilding.

47. The SSC BF-ME noted that the United States has previously conducted surveys of NPA in the Emperor Seamounts but discontinued them after 1991. The SSC BF-ME noted the value of these surveys and recommended that the United States share the data from the surveys with the SSC BF-ME and resume conducting the surveys, if possible.

48. The SSC BF-ME recommended that the SC recommend that the Commission request Members that conduct or seek to conduct bottom fishing in the Convention Area to provide updated assessments on bottom fishing activities' SAIs on VMEs (following Annex 2 of CMM 2024-05 and CMM 2024-06) and submit them for review by the SC and its subsidiary bodies at or before SC11. The SSC BF-ME recommended that the SC review the updated impact assessments following Annex 3 of CMM 2024-05 and CMM 2024-06 and recommend whether additional management measures will be required to prevent SAIs on VMEs.

49. The SSC BF-ME requested Members to work through the SWG VME to develop a standardized approach for conducting their updated impact assessments.

50. Some Members discussed the adoption of broader temporary closures in the Emperor Seamounts for the protection of VMEs and prevention of SAIs, in addition to two new

closures proposed by Japan (paragraph 61). Other Members noted the need for more spatially specific proposals, as well as further evidence to support closures, including identification of VMEs following one of the methods endorsed by the NPFC.

51. Some Members suggested that the NPA and SA fisheries, as well as any fisheries that take NPA and SA as bycatch, should be temporarily closed in order to allow time for the recovery of these stocks. Other Members pointed out that no working paper outlining such a proposal had been submitted to SSC BF-ME05 and that there was insufficient information or time to consider such a proposal at this meeting.

52. Pew and DSCC presented a literature review that synthesizes research on the environmental vulnerability of and fishery-related impacts to the northwestern Hawaiian Ridge and Emperor Seamount Chain (NPFC-2024-SSC BFME05-OP01). Bottom fisheries cause significant SAIs to VMEs in this area. There is evidence that recovery of deep-sea coral VME taxa may be possible if protections are put into place. Continued trawling will further damage any remnant populations, reducing recovery rates and overall recovery potential. The Emperor Seamounts and Northwestern Hawaiian Ridge have been designated as an Ecologically or Biologically Significant Area (EBSA). A fisheries closure is a tool that could safeguard the ecosystem and aid in its potential recovery as well as the recovery of depleted fish stocks. The DSCC emphasized that in its view the closure of the NPA and SA fisheries as well as the US proposal for the protection of VMEs were consistent with United Nations General Assembly resolutions and should be required under the provisions of Article 3 of the NPFC Convention.

53. On behalf of the Deep-Ocean Stewardship Initiative (DOSI), an observer with the DSCC delegation presented a summary report of Seamount Science Summit – Ecological Insights Workshop (NPFC-2024-SSC BFME05-OP02). The Workshop was held to assess the current understanding of seamount ecosystems, examine current management frameworks, and develop policy recommendations to preserve seamount biodiversity. The Workshop recommended managing seamounts as VMEs, implementing mandatory public reporting for any bycatch of VME indicator taxa regardless of whether the encounter threshold is exceeded, and integrating cumulative impacts, including historical fishing and present and projected climate change and ocean acidification, into the management of impacts from bottom fisheries on seamounts.

Agenda Item 10. Assessment and scientific advice on the management of Vulnerable Marine Ecosystems (VME)

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

10.1.1 Review of progress towards developing a definition of VMEs

54. Canada presented results from the Joint Canada-USA International Seamount Survey (JCUISS) in 2024 (NPFC-2024-SSC BFME05-IP02). The current study was conducted to validate the existing coral and sponge models, developed during the 2022 study, using an independent data set collected via underwater stereo camera systems and generate new spatially explicit data for constructing improved presence-absence and abundance models. In 2024, only 58 of the 86 stations were occupied on Brown Bear and Cobb Seamounts. Preliminary image analysis showed that gorgonian corals were present at 71% of the transects occupied. Most of the corals occurred at depths below 400 m and corals were present at most transects on all seamounts below this depth. Coral taxa appeared to consist of Primnoidae, Isididae and other Octocorallians and Antipatharians at deeper depths. Hexactinellid sponges had a similar distribution, but occurred in only 46% of the transects. Hydrocorals were common at shallow depths on Cobb and Corn seamount, while sea whips and sea pens were not common, but found at most depths. Reef-building scleractinians were observed at 8 transects across both years. It should be noted that these data are the result of a cursory look at the 2024 transect data and will change following detailed image analysis.

10.1.2 Modeling VME distribution in the NE Convention Area

55. Canada presented preliminary work to develop distribution models for VME indicator taxa in the Cobb-Eickelberg Seamount Chain (NPFC-2024-SSC BFME05-IP03). Models were successfully constructed and tested using the survey data collected in 2022 and 2024 at Cobb-Eickelberg seamount chain. Overall, the models generally fit the data well. Most tested well against the 2024 data. The models reflected the overall high occurrence rate of VME indicator taxa at deeper depths. More work could be done to incorporate additional variables that might explain some of the variability on a smaller scale. Modeling of density data instead of presence/absence should be a next step in order to identify areas of high density of VME indicator taxa. Eventually, Canada hopes to incorporate the models into the risk assessment for its sablefish fishery.

10.1.3 Update on progress on standardizing an approach to defining SAI

56. There were no updates on standardizing an approach to defining SAIs.

10.1.4 Other research activities on VMEs

57. Japan presented the results of drop-camera surveys conducted on Suiko, Yomei and Ojin Seamounts (NPFC-2024-SSC BFME05-IP06). Japan conducted surveys at 19 stations in the 3 seamounts based on the results of a scientific survey conducted in 2023.

10.1.5 Future and planned research activities by Members on VMEs in 2025

58. The United States explained that it plans to work on the development of distribution models for VME indicator taxa in 2025.

59. Japan explained that it will continue to conduct drop camera surveys in the Emperor Seamounts in 2025.

10.1.6 Proposal for VME closure – Japan

60. Japan presented the results of surveys on the Koko and Yuryaku Seamounts that identified two potential VME sites and mapped their spatial ranges (NPFC-2024-SSC BFME05-WP11 (Rev. 1)). Japan explained that, from 2021 to 2024, it has been following up on US field surveys along the Emperor Seamount Chain (NPFC-2020-SSC BFME01-WP08) by working to identify the dense patches of VME indicator taxa proposed in Baco et al. (2020), map their spatial extent, and determine if these areas are VMEs. Based on the VME identification method reported in NPFC-SSC BFME04-WP11, Japan has been conducting multi-year visual surveys on the R/V Kaiyo-maru on multiple seamounts. In its recent surveys on the Koko and Yuryaku Seamounts, Japan identified two potential VME sites on the northwestern and southeastern parts of Yuryaku Seamount, mapped their spatial range, and recommended the adoption of measures to prevent future SAIs on these sites.

61. The SSC BF-ME appreciated Japan's ongoing research for identifying VMEs in the Emperor Seamounts and recommended that the SC advise the Commission to designate the following areas as VMEs and adopt appropriate measures for their protection:
    (a) Northwestern part of Yuryaku Seamount: 32–42.75'N, 172–12.90'E; 32–42.75'N, 172–13.65'E; 32–43.50'N, 172–13.65'E; 32–43.50'N, 172–12.90'E.
    (b) Southeastern part of Yuryaku Seamount: 32–37.80'N, 172–18.00'E; 32–37.80'N, 172–18.60'E; 32–38.40'N, 172–18.60'E; 32–38.40'N, 172–18.00'E.

62. The DSCC presented additional research from remote-operated vehicle (ROV) surveys and habitat suitability modeling concerning Yuryaku Seamount (NPFC-2024-SSC BFME05-OP03). The DSCC suggested that this research, as well as historical fishing of precious corals on Yuryaku, indicate there are widespread VMEs of coralliids and reef-forming scleractinians. The DSCC welcomed Japan's proposal for the closure of two areas of Yuryaku Seamount but suggested that these areas do not capture the full extent of VMEs on Yuryaku and called for a full closure of the seamount.

63. The Chair encouraged the DSCC to share data from its surveys in the SWG VME.

64. The United States proposed that, based on the information presented by Japan in NPFC-2024-SSC BFME05-WP11 (Rev. 1) and by the DSCC in NPFC-2024-SSC BFME05-OP03, there is credible scientific basis for closure of the entirety of Yuryaku Seamount. The United States also noted that as Yuryaku is a lightly fished seamount, closure would not have a significant impact on fishing. Some Members disagreed with the United States' proposal, pointing out that VMEs should be designated based on one of the NPFC's endorsed methods, as was done for the closures proposed by Japan, and that the Japanese survey found a number of sites on Yuryaku Seamount that had no VME indicator taxa.

65. The SSC BF-ME noted that the Commission has not provided guidance on how it interprets the precautionary principle in relation to defining VMEs.

10.2 Review of intersessional activities of the SWG VME

66. The SWG VME Lead, Dr. Janelle Curtis (Canada), presented summaries of the 1st and 2nd intersessional meetings of the SWG VME (NPFC-2024-SSC BFME05-IP05) in the 2024 operational year and related email correspondence. Further details are described in Agenda Items 10.2.1–10.2.5 below.

67. The SWG VME Lead also informed the SSC BF-ME of her intention to step down as the Lead due to other responsibilities. Chris Rooper (Canada) volunteered to lead the SWG VME in the coming year until SSC BF-ME06.

10.2.1 Review of the development and implementation of gear specific and taxon specific encounter thresholds for VME indicator taxa in the NPFC Convention Area

68. The SWG VME Lead explained that the SWG VME:
    (a) reviewed the use of data-based methods applied to Japan's indicator taxa bycatch to further refine encounter thresholds that are taxon and gear specific.
    (b) reviewed the availability of Korean bycatch data on VME indicator taxa and noted the potential limitations in refining encounter thresholds using this dataset alone.

69. Japan presented its study to explore a new potential quantitative evaluation method ("data-based method") for the sake of refining encounter bycatch thresholds of VME indicator taxa in the Northwestern Pacific Ocean (NPFC-2024-SSC BFME05-WP13). Japan applied the method to the Japanese bycatch data and evaluated its fit. The recalculated bycatch values were largely overestimated among taxa and fishing gears. Differences in data distribution between fishery and survey data may be the major problem behind the lower model performance. Based on the study, Japan would not recommend refining the current encounter

bycatch thresholds in the Northwestern Pacific Ocean using the current data-based method, and believed that further considerations/developments may be required for this task.

10.2.2 Review of progress on data analysis of shared VME indicator data and directions on future joint data analyses

70. The SWG VME Lead explained that the SWG VME shared data and reviewed work done by Canada to use the data for the following objectives:
    (a) learn where VME indicator taxa are known to be present and absent.
    (b) determine where there are elevated densities (hotspots) of VME indicator taxa.
    (c) validate VME predictive models against Members' VME observations.

10.2.3 Proposals for revisions to VME indicator species list or nomenclature

71. The SWG VME Lead explained that:
    (a) Canada and Japan drafted a translation table of VME indicator corals between common and scientific names of cold-water corals among the VME indicator taxa.
    (b) The SWG VME considered adding hydrocorals to the list of VME indicator taxa but ultimately did not recommend doing so, although some participants expressed concern because of life-history traits that make hydrocorals vulnerable.

72. Japan presented a translation table of VME indicator corals between common and scientific names of cold-water corals among the VME indicator taxa, including both common and taxonomic names in accordance with the latest taxonomy, for the sake of their usage in discussion and research within the NPFC in the future (NPFC-2024-SSC BFME05-WP10). The table was jointly developed by Canada and Japan. All taxa found by the NPFC Members during their surveys and/or recorded in fishing-bycatch data in the Convention Area to date (as of October 2024) are listed in the table. Japan recommended adding the translation table as one of the Annexes of CMM 2024-05 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean and CMM 2024-06 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northeastern Pacific Ocean.

73. The SSC BF-ME recommended that the SC endorse the translation table of VME indicator corals between common and scientific names of cold-water corals among the VME indicator taxa and recommend that the table be added to the digital NPFC VME Taxa Identification Guide online and either added as an annex to CMMs 2024-05 and 2024-06 or that a reference to the table in the online identification guide be added to CMMs 2024-05 and 2024-06.

74. The SSC BF-ME noted that the NPFC has been updating its list of VME indicator taxa and that there is a need to update the NPFC VME Taxa Identification Guide. The SSC BF-ME

suggested that the publication of an updated online version of the NPFC VME Taxa Identification Guide should occur regularly, while the publication of an updated print version could occur less frequently, for example every ten years.

10.2.4 Review of potential refinements to quantitative definitions of VME

75. The SWG VME Lead explained that the SWG VME discussed each of the United Nations Food and Agriculture Organization (FAO) criteria for defining VME and agreed to continue to discuss them at SSC BF-ME05.

76. Japan presented a preliminary evaluation of density levels of VME indicator taxa to define VMEs (NPFC-2024-SSC BFME05-WP12). Of the two methods for defining VMEs officially approved by the NPFC, the Japanese-proposed method evaluates the density of VME indicator taxa into three levels (Low, Medium, and High). As the lack of scientific evidence regarding these levels was pointed out by some NPFC Members, Japan examined the adequacy of each density level using the segmented regression method of cumulative distributions for the density of each VME indicator taxa. Japan found that the current density levels are adequate, or even more precautionary, than the calculated results for most taxa.

77. The SSC BF-ME recommended the application of the current density levels used in the Japanese-proposed method from a precautionary point of view.

10.2.5 Other topics on measuring cumulative impacts and SAI

78. The SWG VME Lead explained that Canada and Japan communicated intersessionally by email about data requirements and spatial/temporal resolution for SAI assessment. They agreed that the spatial resolution for SAI assessment should match the spatial extent of VMEs and that evaluation of SAI should be done with the best available temporal scale data that can ensure the spatial resolution required for SAI evaluation. They also noted that ideally, there would be data on the entire historical distribution of fishing so as to be able to see where SAI have likely occurred.

Agenda Item 11. Ecosystem considerations

11.1. Summaries of historical discarded bycatch by Members (Canada, Japan, Korea, Russia)

79. Canada presented a summary of bycatch in its sablefish fishery (NPFC-2024-SSC BFME05-WP07). Bycatch was low in the pot and longline fisheries since 1996. Rockfishes (including targeted rockfishes) were the dominant bycatch. Crabs dominated the invertebrate bycatch (king crabs and tanner crabs). Only two instances of VME indicator taxa were observed in the bycatch data. Canada should continue to monitor impacts of its fisheries on species belonging to the same ecosystem as sablefish.

80. Japan presented a summary and visualization of discarded bycatch recorded by scientific observers on Japanese bottom fishing vessels in the Convention Area (NPFC-2024-SSC BFME05-WP14). Japan generated time series of weight of bycatch for 56 species that are frequently caught and CPUE per year and from 2011 to 2023. The study revealed a number of issues in quantitatively analyzing discard data, specifically differences in taxonomic resolutions in discard records and observer knowledge.

81. Korea presented bycatch information for its bottom fisheries in the Emperor Seamounts (NPFC-2024-SSC BFME05-WP21). During the survey period, discarded bycatch species were recorded in the logbooks of observers onboard bottom trawl vessels in 2014, 2015, 2017, and 2018. The discarded bycatch accounted for less than 5% of the total catch, excluding VME, in all years except 2015. A comparison of CPUE showed that *Epigonus denticulatus* had the highest value, followed by *Xenolepidichthys dalgleishi* and *Hyperoglyphe japonica*. Annual CPUE trends revealed that *Epigonus denticulatus* was dominant in 2014 and 2015, whereas *Xenolepidichthys dalgleishi* had the highest CPUE in 2017 and 2018. However, these results rely solely on observer logbooks rather than expert species identification, making precise annual quantitative comparisons challenging.

82. Russia presented information on its longline fisheries bycatch in the NPFC Convention Area. The weight of bycatch of both fish and invertebrate species was generally low in the Russian fishery. Since the fishery occurs sporadically, data was only available for a few years.

Agenda Item 12. Data collection and reporting

83. The SSC BF-ME agreed to share data for use by the NPFC to support the provision of scientific advice in accordance with the data sharing protocols specified by the SWG NPA-SA and the SWG VME.

84. The SSC BF-ME reaffirmed the importance of ensuring that the use of shared data in the SSC BF-ME and its SWGs complies with the relevant Terms of References (TORs) and the Regulations for Management of Scientific Data and Information.

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

85. The SSC BF-ME considered the current observer program to be adequate.

86. The SC Chair reminded the SSC BF-ME that the Technical and Compliance Committee (TCC) Chair has asked the SC and its subsidiary bodies to answer the following questions: 1.

Are there different needs for the different fisheries regarding data collection? 2. What new data would the SC prioritize/need from a regional observer program (ROP)? 3. What new data would be nice to have (i.e. not needed/priority)? 4. Whether this data could be collected through electronic monitoring (EM)? 5. Whether the observer needs to be a scientist, or can data be collected by a non-scientist?

87. The SSC BF-ME explained that there were different data needs from the different fisheries. However, the SSC BF-ME did not identify any new data that it would prioritize/need from a ROP. The SSC BF-ME agreed that the data needs for the different fisheries are currently being met. The SSC BF-ME did not identify any clear opportunities for data collection by EM and noted that preliminary studies by Japan suggest that there are difficulties in biological sampling by EM in Japan's bottom fishery but EM may be applicable to other aspects of the observer program. The SSC BF-ME noted that data could be collected by observers without backgrounds as professional scientists, provided the observers are highly trained.

88. Korea requested that Japan consider the possibility of having a Korean scientific observer onboard a Japanese trawl vessel in the Emperor Seamounts as this would provide valuable training opportunities for more accurate scientific data collection, VME taxa and bycatch identification for Korean observers in preparation for any future resumption of the Korean bottom fisheries there. Japan needed more time to consider the request. The SSC BF-ME encouraged Japan and Korea to continue their discussions intersessionally.

12.2 Review of the template for collection of scientific observer data

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

Agenda Item 13. 5-Year (2024-2028) Rolling Work Plan and NPFC Performance Review recommendations

13.1 North Pacific armorhead

13.2 Splendid alfonsino

13.3 Sablefish

13.4 Vulnerable marine ecosystems

13.5 Other ecosystem components

90. The SSC BF-ME reviewed, revised and endorsed the 2024-2028 SSC BF-ME 5-Year Rolling Work Plan (NPFC-2024-SSC BFME05-WP01 (Rev. 1)).

13.6 NPFC Performance Review recommendations

91. The SSC BF-ME reviewed the NPFC Performance Review recommendations that concern bottom fish and marine ecosystems, and reviewed and revised the updated status of responses drafted by the SC Chair and Secretariat (NPFC-2024-SC09-WP01 (Rev. 5)).

Agenda Item 14. Review of CMMs 2024-05 and 2024-06 for bottom fisheries and protection of vulnerable marine ecosystems and CMM 2019-10 for sablefish

92. The SSC BF-ME proposed revisions to CMM 2024-05 as described in Annex J.

93. The SSC BF-ME proposed revisions to CMM 2024-06 as described in Annex K.

Agenda Item 15. Climate change impacts on bottom fisheries and VME

15.1 Discussion of potential impacts of climate change and potential research and advice that the BFME should address

94. Dr. Rice presented a report on pathways for the incorporation of climate change into the work of the NPFC (NPFC-2024-SC09-OP01). The report provided an overview of the literature and data available to evaluate and address climate change related impacts on managed stocks, the Intergovernmental Panel on Climate Change (IPCC) ocean climate change predictions, and potential strategies for the NPFC to integrate climate change into its fisheries management. Addressing the effects of climate change on a basin wide scale should include collaboration among the NPFC, other regional organizations, and NPFC Members' management agencies; enhanced monitoring of fish stocks and bycatch species through an increase in fisheries independent surveys; development of a regional observer program; expansion of fisheries-independent surveys to older individuals for the NPFC priority species surveyed only in the pre-recruit to juvenile stage; and adoption of an iterative program of work that begins with a literature review, prioritization of research, and the creation of a workplan.

Agenda Item 16. Other matters

16.1 Inter-sessional work and priority issues for next meeting

95. The SSC BF-ME discussed intersessional work and agreed priority issues for the next meeting as described under Agenda Item 17.

16.2 Update on PICES WG47 Seamount Ecology

96. The Co-Chair of the North Pacific Marine Science Organization (PICES) Working Group 47 (WG-47) on Ecology of Seamounts, Dr. Janelle Curtis, provided an update on WG-47's (NPFC-2024-SSC BFME05-IP04). In 2024, WG-47 held its annual business meetings in the form of a virtual meeting on 23 September and an in-person meeting in Honolulu, USA, on

31 October, during which it reviewed members' expertise and research interests, reviewed its TOR and anticipated contributions, and planned the WG-47 final report. In 2025, WG-47 plans to write its final report and publish members' primary papers, prepare a fact sheet for WG-47, consider proposing a new Working Group to focus on seamount biodiversity, ecology or conservation, and submit its final report by PICES 2025.

97. The WG-47 Co-Chair suggested that the new Working Group to focus on seamount biodiversity, ecology or conservation could be a joint Working Group with the NPFC. The WG-47 Co-Chairs will invite NPFC Members to provide their input on the proposal prior to submission to PICES.

16.3 FAO request for deep-sea fishing effort data

98. The Science Manager informed the SSC BF-ME that the FAO has submitted a request for deep-sea fishing effort data by position and gear for fisheries using bottom contact gears, at 1^{o} latitude by 1^{o} longitude resolution, to develop a global map of spatial bottom fishing effort (NPFC-2024-SC09-OP08). He explained that the request will be discussed at SC09.

16.4 Other issues

99. The SSC BF-ME requested that the Secretariat create a GitHub repository for the SSC BF-ME with two folders for the SWG NPA-SA and the SWG VME.

100. Noting that the vice-Chair position has become vacant, the SSC BF-ME agreed to elect Dr. Kota Sawada (Japan) and Dr. Donald Kobayashi (USA) as the SSC BF-ME vice-Chairs.

Agenda Item 17. Recommendations to the Scientific Committee

101. The SSC BF-ME agreed to:
    (a) Task the SWG NPA-SA with the following:
        i Alternative approaches to NPA assessment
            a) NPA depletion analysis
            b) NPA IBM approach
        ii Integrated model for SA
            a) Standardize CPUE using directed effort data for SA
            b) Improve and standardize biological data collection
        iii Update species summaries (SA and NPA)
        iv Conduct a literature review on the effects of climate change on SA and NPA
    (b) Task the SWG VME to:
        i Continue working on visual data objectives (Objective 2b and Objective 3)
            a) Identify high density VME areas on each fished seamount

b) Develop new species distribution (presence/absence and abundance) models for VME taxa on all seamounts

ii Prepare to update fishing impacts assessment

iii 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

iv Develop or research alternative methods to apply to Japan and Korea's indicator taxa bycatch to further refine encounter thresholds that are taxon and gear specific

v Consider and explore other methods for identifying VME

vi Discuss value of using fisheries VME indicator taxa bycatch data for managing VME and develop TOR if sharing is necessary

vii Conduct a literature review of connectivity, recruitment and recovery of VME indicator taxa among seamounts

(c) Update species summaries for sablefish, blackspotted and rougheye rockfishes, and skilfish

(d) Elect Dr. Kota Sawada (Japan) and Dr. Donald Kobayashi (USA) as vice-Chairs of the SSC BF-ME and elect Dr. Chris Rooper as Lead of the SWG VME

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

(a) Adopt the updated species summaries of NPA (Annex D), SA (Annex E), sablefish (Annex F), blackspotted and rougheye rockfishes (Annex G), and skilfish (Annex H).

(b) Continue to hire external experts to support the work of the SWG NPA-SA.

(c) Task the SC Chair to present the information in the stock status summaries for sablefish, NPA, and SA (Annex I) to the Commission.

(d) Request Members that conduct or seek to conduct bottom fishing in the Convention Area to provide updated assessments on bottom fishing activities' SAIs on VMEs (following CMM 2024-05 and CMM 2024-06 Annex 2) and submit them for review by the SC and its subsidiary bodies at or before SC11.

(e) Endorse the revised CMM 2024-05 (Annex J), including the following updates:

i. Translation table of VME indicator corals between common and scientific names of cold-water corals among the VME indicator taxa

ii. Two new area closures: (1) Northwestern part of Yuryaku Seamount: 32–42.75'N, 172–12.90'E; 32–42.75'N, 172–13.65'E; 32–43.50'N, 172–13.65'E; 32–43.50'N, 172–12.90'E, and (2) Southeastern part of Yuryaku Seamount: 32–37.80'N, 172–18.00'E; 32–37.80'N, 172–18.60'E; 32–38.40'N, 172–18.60'E; 32–38.40'N, 172–18.00'E.

(f) Endorse the revised CMM 2024-06 (Annex K), including the following update:

i. Translation table of VME indicator corals between common and scientific names of cold-water corals among the VME indicator taxa

(g) Endorse the updated 2024-2028 SSC BF-ME 5-Year Rolling Work Plan (NPFC-2024-SSC BFME05-WP01 (Rev. 1)).

(h) Consider the SSC BF-ME's comments on the NPFC Performance Review recommendations that concern bottom fishing and marine ecosystems (NPFC-2024-SC09-WP01 (Rev. 5)).

Agenda Item 18. Next meeting

103. The SSC BF-ME recommended holding a 3-day meeting of the SSC BF-ME in 2025 and requested the guidance of the SC and Commission for determining the date, format and location of the meeting.

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

Agenda Item 19. Adoption of the Report

105. The report was adopted by consensus.

Agenda Item 20. Close of the Meeting

106. The Chair thanked the participants for their participation and constructive and in-depth discussions.

107. The meeting closed at 11:45 on 11 December 2024, Tokyo time.

Annexes:

Annex A – Agenda
Annex B – List of Documents
Annex C – List of Participants
Annex D – Species summary for North Pacific armorhead
Annex E – Species summary for splendid alfonsino
Annex F – Species summary for sablefish
Annex G – Species summary for blackspotted and rougheye rockfishes
Annex H – Species summary for skilfish
Annex I – Stock status summary for North Pacific armorhead, splendid alfonsino and sablefish
Annex J – Revised CMM 2024-05 Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean
Annex K – Revised CMM 2024-06 Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northeastern Pacific Ocean

Annex A

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 BFME04
- 3.2 COM08
  - 3.2.1 CMMs 2024-05 and 2024-06
  - 3.2.2 Requests from COM08

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 2024 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 2025

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 2025

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 2025

Agenda Item 7. Skilfish in the NPFC Convention Area

7.1 Updated catch and effort for skilfish in 2023

7.2 Skilfish species summary document update and review

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 Review of stock status for SA

8.1.3 Review of alternative approaches to NPA assessment

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

Agenda Item 9. Discussion of other proposals on bottom fish management

9.1 Proposal from USA on Emperor Seamount bottom fishery closure

Agenda Item 10. Assessment and scientific advice on the management of Vulnerable Marine Ecosystems (VME)

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

10.1.1 Review of progress towards developing a definition of VMEs

10.1.2 Modeling VME distribution in the NE Convention Area

10.1.3 Update on progress on standardizing an approach to defining SAI

10.1.4 Other research activities on VMEs

10.1.5 Future and planned research activities by Members on VMEs in 2025

10.1.6 Proposal for VME closure - Japan

10.2 Review of intersessional activities of the SWG VME

10.2.1 Review of the development of gear and taxon specific encounter thresholds for VME indicator taxa in the NPFC Convention Area

10.2.2 Review of progress on data analysis of shared VME indicator data and directions on future joint data analyses

10.2.3 Proposals for revisions to VME indicator species list or nomenclature

10.2.4 Review of potential refinements to quantitative definitions of VME

10.2.5 Other topics on measuring cumulative impacts and SAI

Agenda Item 11. Ecosystem considerations

11.1. Summaries of historical discarded bycatch by Members (Canada, Japan, Korea)

Agenda Item 12. Data collection and reporting

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

12.2 Review of the template for collection of scientific observer data

Agenda Item 13. 5-Year (2024-2028) Rolling Work Plan and NPFC Performance Review recommendations

13.1 North Pacific armorhead

13.2 Splendid alfonsino

13.3 Sablefish

13.4 Vulnerable marine ecosystems

13.5 Other ecosystem components

13.6 NPFC Performance Review recommendations

Agenda Item 14. Review of CMMs 2024-05 and 2024-06 for bottom fisheries and protection of vulnerable marine ecosystems and CMM 2019-10 for sablefish

Agenda Item 15. Climate change impacts on bottom fisheries and VME

15.1 Discussion of potential impacts of climate change and potential research and advice that the BFME should address

Agenda Item 16. Other matters

16.1 Inter-sessional work and priority issues for next meeting

16.2 Update on PICES WG47 Seamount Ecology

16.3 FAO request for deep-sea fishing effort data

16.4 Other issues

Agenda Item 17. Recommendations to the Scientific Committee

Agenda Item 18. Next meeting

Agenda Item 19. Adoption of the Report

Agenda Item 20. Close of the Meeting

Annex B

List of Documents

MEETING INFORMATION PAPERS

Number	Title
NPFC-2024-SC09-MIP01 (Rev. 5)	Meeting Information
NPFC-2024-SSC BFME05-MIP02	Provisional Agenda
NPFC-2024-SSC BFME05-MIP03 (Rev. 1)	Annotated Indicative Schedule

WORKING PAPERS

Number	Title
NPFC-2024-SSC BFME05-WP01 (Rev. 1)	Five-Year Work Plan of the SSC BF-ME
NPFC-2024-SSC BFME05-WP02	North Pacific armorhead species summary
NPFC-2024-SSC BFME05-WP03	Splendid alfonsino species summary
NPFC-2024-SSC BFME05-WP04	Sablefish Species Summary
NPFC-2024-SSC BFME05-WP05	Blackspotted and Rougheye Rockfishes Species Summary
NPFC-2024-SSC BFME05-WP06	A brief update of Sablefish status in the eastern North Pacific including the NPFC Convention Area - 2024
NPFC-2024-SSC BFME05-WP07	Bycatch Summary Sablefish Fishery
NPFC-2024-SSC BFME05-WP08 (Rev. 1)	Life history parameters for Splendid Alfonsino (Beryx splendens) in the North Pacific
NPFC-2024-SSC BFME05-WP09 (Rev. 1)	Yield per recruit and spawning biomass per recruit analyses for Splendid Alfonsino (Beryx splendens) in the North Pacific
NPFC-2024-SSC BFME05-WP10	Translation table of VME indicator corals between common and scientific names
NPFC-2024-SSC BFME05-WP11 (Rev. 1)	Two potential Vulnerable Marine Ecosystem (VME) sites in Yuryaku Seamount, the Emperor Seamounts region, and SAI assessments
NPFC-2024-SSC BFME05-WP12	Preliminary evaluation of density levels of VME indicator taxa to define VMEs
NPFC-2024-SSC BFME05-WP13	Application of a data-based method to Japanese bycatch data
NPFC-2024-SSC BFME05-WP14	Trends of discarded bycatch by Japanese bottom fisheries in the NPFC Convention Area
NPFC-2024-SSC BFME05-WP15	Impact of mesh size change on catch size composition of splendid alfonsino Beryx splendens

	in the Emperor Seamounts
NPFC-2024-SSC BFME05-WP16	Reduced fishing effort directed to North Pacific armorhead by Japanese vessels operating in the Emperor Seamount area
NPFC-2024-SSC BFME05-WP17	Small Working Group on NPA and SA - Summary for 2024
NPFC-2024-SSC BFME05-WP18	U.S. Delegation Paper on Bottom Fishing and Emperor Seamounts
NPFC-2024-SSC BFME05-WP19 (Rev. 1)	Objective 2a: Maps of VME Density Observations
NPFC-2024-SSC BFME05-WP20 (Rev. 4)	Skilfish species summary
NPFC-2024-SSC BFME05-WP21	Bycatch information by Korean bottom fisheries in the Emperor Seamounts
NPFC-2024-SSC BFME05-WP22	Revisions to CMM 2024-05 from SSC BFME05
NPFC-2024-SSC BFME05-WP23	Revisions to CMM 2024-06 from SSC BFME05
NPFC-2024-SC09-WP01(Rev. 4)	Performance Review Recommendations update

INFORMATION PAPERS

Number	Title
NPFC-2024-SSC BFME05-IP01	Results of a monitoring survey for North Pacific armorhead in the Emperor Seamounts in 2024
NPFC-2024-SSC BFME05-IP02	Joint Canada-USA International Seamount Survey - 2024
NPFC-2024-SSC BFME05-IP03	Distribution Models for Vulnerable Marine Ecosystem Indicator Taxa in the Cobb-Eickelberg Seamount Chain
NPFC-2024-SSC BFME05-IP04	PICES WG-47 on Ecology of Seamounts
NPFC-2024-SSC BFME05-IP05	SWG VME 2024 report to SSC BFME05
NPFC-2024-SSC BFME05-IP06	Report of Japanese sea-floor visual survey in the northern Emperor Seamount in 2024

OBSERVER PAPERS

Number	Title
NPFC-2024-SSC BFME05-OP01	Review of Scientific Papers to Understand Threats and Fishery Impacts on the Northwestern Hawaiian Ridge and Emperor Seamount Chain
NPFC-2024-SSC BFME05-OP02	Ecosystem-Based Management of Seamounts in the NPFC Convention Area: Recommendations from the Seamount Science Summit – Ecological Insights Workshop
NPFC-2024-SSC BFME05-OP03	Yuryaku VME Areas

NPFC-2024-SC09-OP01	Pathways for the incorporation of climate change into the work of the NPFC
NPFC-2024-SC09-OP08	Request for deep-sea fishing effort data

REFERENCE DOCUMENTS

Number	Title
NPFC-2024-SSC BFME05-RP01	Summary of the 1st meeting of the Small Working Group on VME (2024)
NPFC-2024-SSC BFME05-RP02	Summary of the 2nd meeting of the Small Working Group on VME (2024)
NPFC-2023-SSC BFME04-Final Report	SSC BFME04 report
CMMs 2024-05 and 2024-06	CMMs 2024-05 and 2024-06
	Template for collection of scientific observer data

Annex C

List of Participants

CHAIR

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

CANADA

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

CHINA

Libin DAI
libin.dai@qq.com

Chuanxiang HUA
cxhua@shou.edu.cn

Siquan TIAN
sqtian@shou.edu.cn

Qiuyun MA
qyma@shou.edu.cn

Zi YANG
yangzi_004763@126.com

JAPAN

Kazuhiro OSHIMA
oshima_kazuhiro28@fra.go.jp

Naohiko AKIMOTO
naohiko@sol.dti.ne.jp

Satoi ARAI
arai_satoi36@fra.go.jp

Takumi FUKUDA
takumi_fukuda720@maff.go.jp

Christopher Gardner AYER
Ayer_Christopher_Gardner80@fra.go.jp

Mai MIYAMOTO
miyamoto-mi@janus.co.jp

Takehiro OKUDA *
okuda_takehiro83@fra.go.jp

Ryo ONODERA
ryo_onodera380@maff.go.jp

Yumiko OSAWA
oosawa_yumiko93@fra.go.jp

Kota SAWADA
sawada_kota27@fra.go.jp

Hyoue SUZUKI
hyoe_suzuki110@maff.go.jp

Wataru TANOUE
wataru_tanoue550@maff.go.jp

Haruo TOMINAGA *
haruo_tominaga170@maff.go.jp

Yukiya UCHIDA
yukiya_uchida230@maff.go.jp

Motoomi YAMAGUCHI
yamaguchi_motoomi65@fra.go.jp

KOREA

Jeongseok PARK
jeongseokpark@korea.kr

Hyejin SONG
hyejinsong@korea.kr

RUSSIA

Oleg KATUGIN
oleg.katugin@tinro.vniro.ru

Igor CHERNIENKO
igor.chernienko@tinro.vniro.ru

Vladimir KULIK
vladimir.kulik@tinro.vniro.ru

UNITED STATES

Erin BOHABOY
erin.bohaboy@noaa.gov

Donald KOBAYASHI
donald.kobayashi@noaa.gov

OBSERVERS

Deep Sea Conservation Coalition

Amy BACO-TAYLOR*
abacotaylor@fsu.edu

Gunther ERRHALT
errhalt.consulting@gmail.com

Matthew GIANNI
matthewgianni@gmail.com

Bronwen GOLDER*
bronwen@deep-sea-conservation.org

Lissette VICTORERO *
lissettevictorero@gmail.com

The Pew Charitable Trusts

Raiana MCKINNEY
rmckinney@pewtrusts.org

Ingrid BANSHCHIKOVA
ibanshchikova@pewtrusts.org

RAPPORTEUR
Alex MEYER
meyer@urbanconnections.jp

INVITED EXPERTS

Maite PONS
pons.maite@gmail.com

Joel RICE *
ricemarineanalytics@gmail.com

NPFC SECRETARIAT

Robert DAY
rday@npfc.int

Alex ZAVOLOKIN
azavolokin@npfc.int

Jumpei HINATA
jhinata@npfc.int

Sungkuk KANG
skang@npfc.int

Shinnosuke KATO
skato@npfc.int

* Online Participants

Annex D

Species summary for North Pacific armorhead

North Pacific armorhead (*Pentaceros wheeleri*)

Common names: Pelagic armorhead, Slender armorhead (English); 五棘鲷 (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.

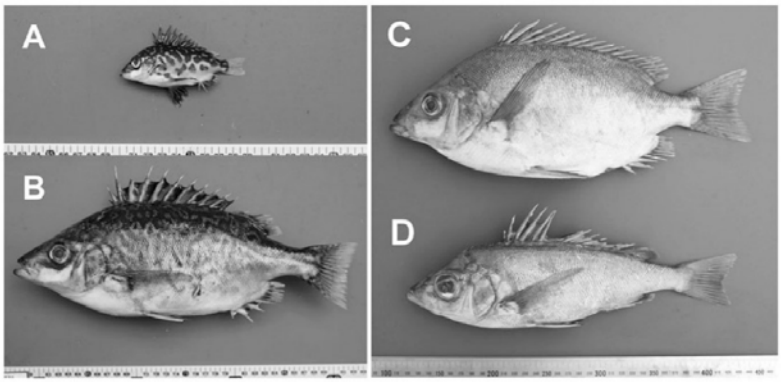


Figure 1: Photographs of Pentaceros wheeleri. *A) Pelagic juvenile, B) pelagic subadult, C) demersal adult (fat type), D) demersal adult (lean type) (from Kiyota et al. 2016)*

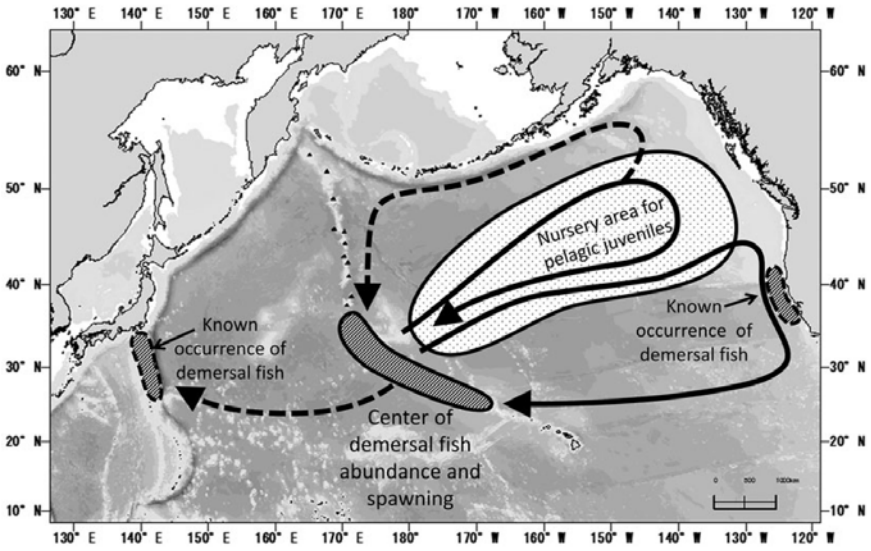


Figure 2: Known demersal habitats and hypothesized pelagic migration routes of Pentaceros wheeleri *(Kiyota et al. 2016 Figure 4, modified from Boehlert and Sasaki 1988).*

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). Currently North Pacific armorhead is caught by Japan and Korea 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.

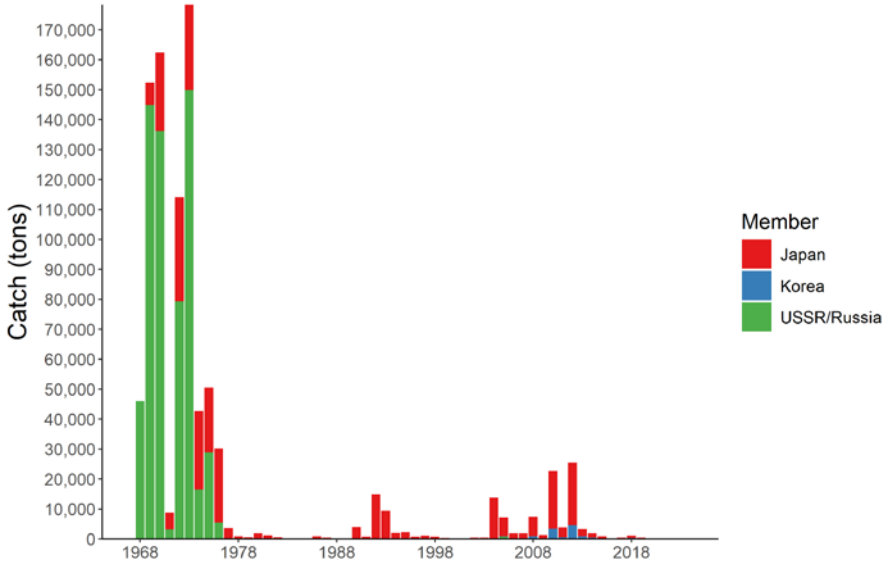


Figure 3: Historical trends of North Pacific armorhead catches in NPFC waters. *The annual amounts of catch by each Member and gear are shown by the bar plot.*

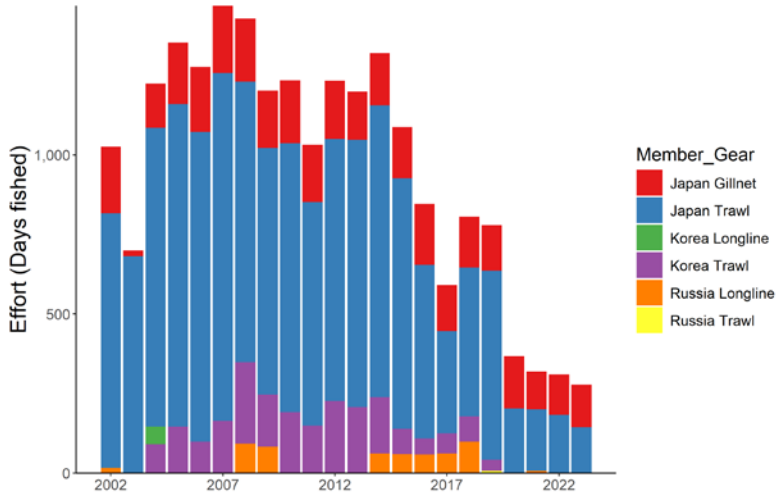


Figure 4. Historical fishing effort for North Pacific armorhead. *The annual fishing efforts by each country are shown by barplot. The efforts are calculated by the total fishing days operated during the year*

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 2024-05 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	Upper limit: 15,000 tons (only for Japan), No operation from

Item	Status	Description
		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 availabe
		Gillnet	2008-present	Logbook data available
	Korea	Trawl	2013-2019	Logbook data available

Data	Member	Fishery	Year	Comments
	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	

References

Boehlert, G. W., and T. Sasaki. 1988. Pelagic biogeography of the armorhead, *Pseudopentaceros wheeleri*, and recruitment to isolated seamounts in the North Pacific Ocean. Fish. Bull. 86:453–465.

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.

Annex E

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).

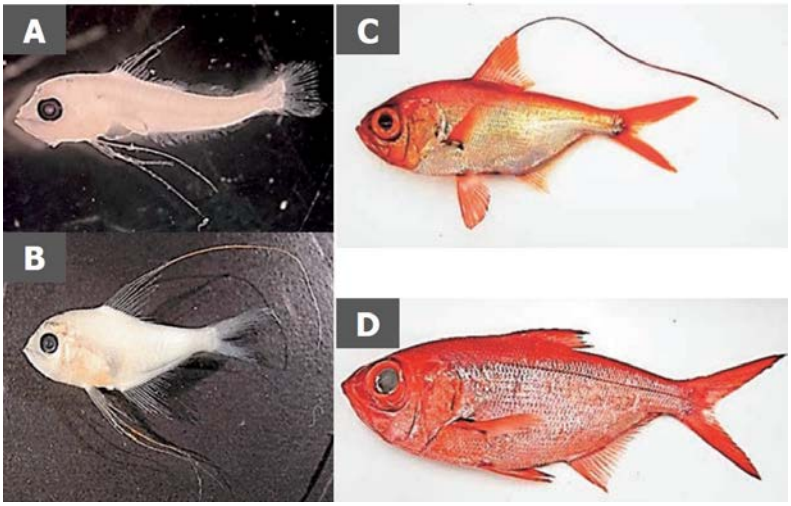


Figure 1: Photographs of Beryx splendens on different developmental stages *A) postlarva, B) juvenile, C) young, D) adult (from Watari et al. 2017)*

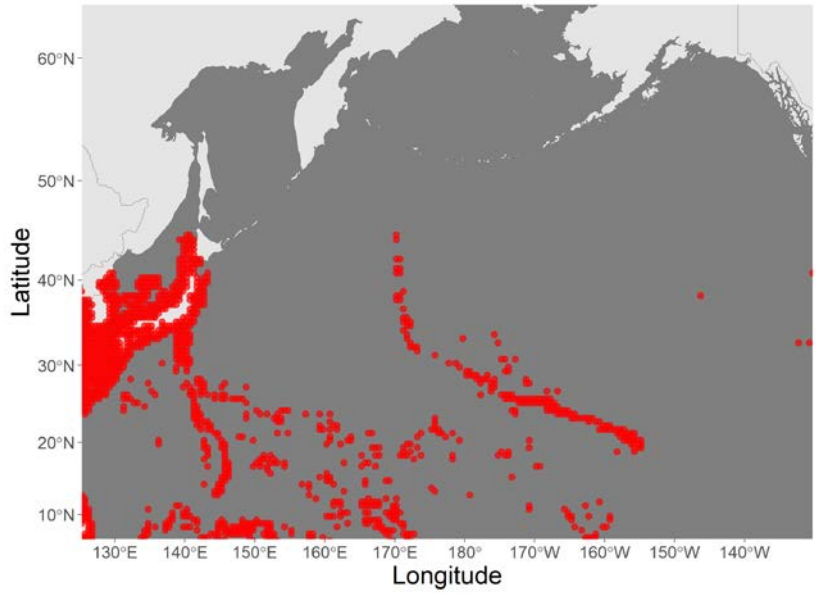


Figure 2: Known distribution of Beryx splendens around NPFC waters. *Points indicate observation data from original sources (AquaMaps 2019, October)*

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).

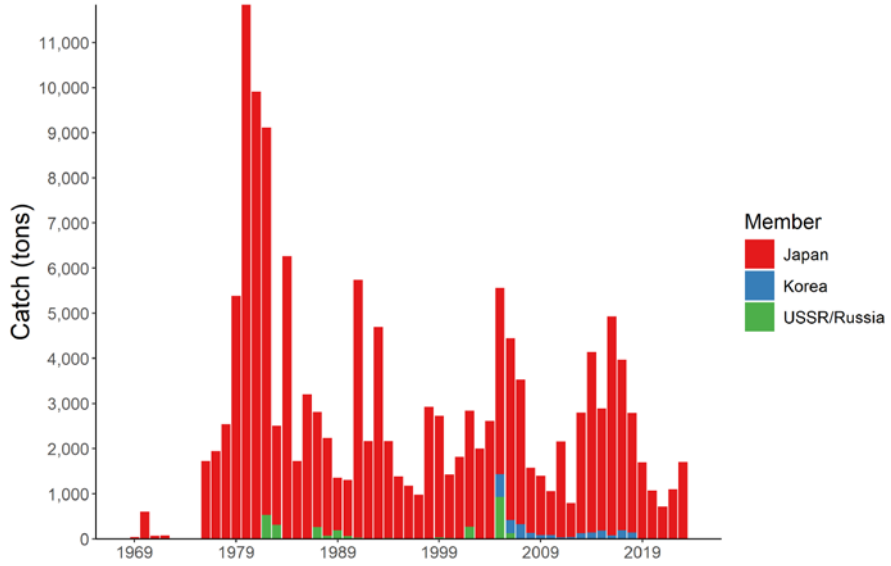


Figure 3: Historical trends of Splendid alfonsino catches in NPFC waters. *The annual amounts of catch by each country are shown by the bar plot.*

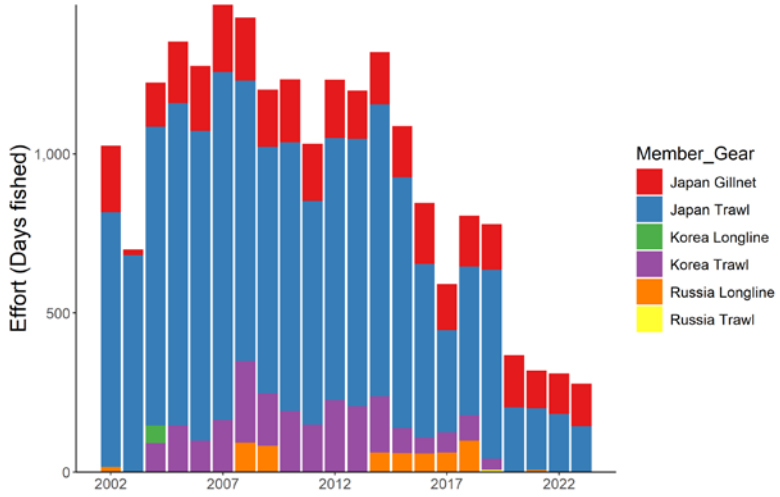


Figure 4. Historical fishing efforts for Splendid alfonsino. *The annual fishing efforts by each country and each gear are shown by the bar plot. The efforts are calculated by the total fishing days operated during the year*

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 2024-05 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. 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	

References

Watari, S., Yonezawa, J., Takeuchi, H., Kato, M., Yamakawa, M., Hagiwara, Y., & Ochi, Y. (2017). Fisheries biology and resource management of Splendid alfonsino *Beryx splendens*. Bulletin of Japan Fisheries Research and Education Agency, 44, 1-46.

Kaschner, K., Kesner-Reyes, K., Garilao, C., Segschneider, J., Rius-Barile, J. Rees, T., & Froese, R. (2019, October). AquaMaps: Predicted range maps for aquatic species. Retrieved from https://www.aquamaps.org.

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 alfonsin 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).

Annex F

Species summary for sablefish

Sablefish (*Anoplopoma fimbria*)

Common names:

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

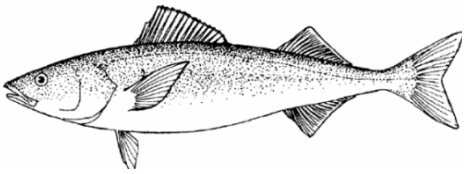


Figure 1. Sablefish (Anaplopoma fimbria).

Management

Active NPFC Management Measures

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

- CMM 2024-06 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.

Current status of management measures

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.

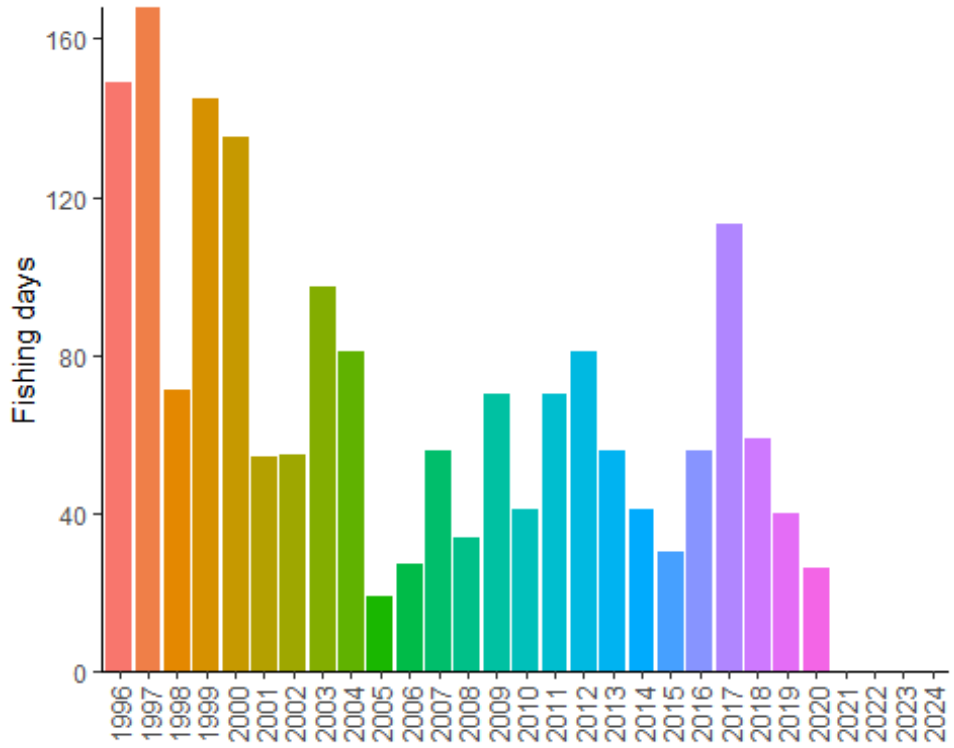


Figure 2. Fishing effort (in number of fishing days) for the Sablefish longline trap fishery conducted in NPFC waters (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

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 2021-2024 resulting in no catch.

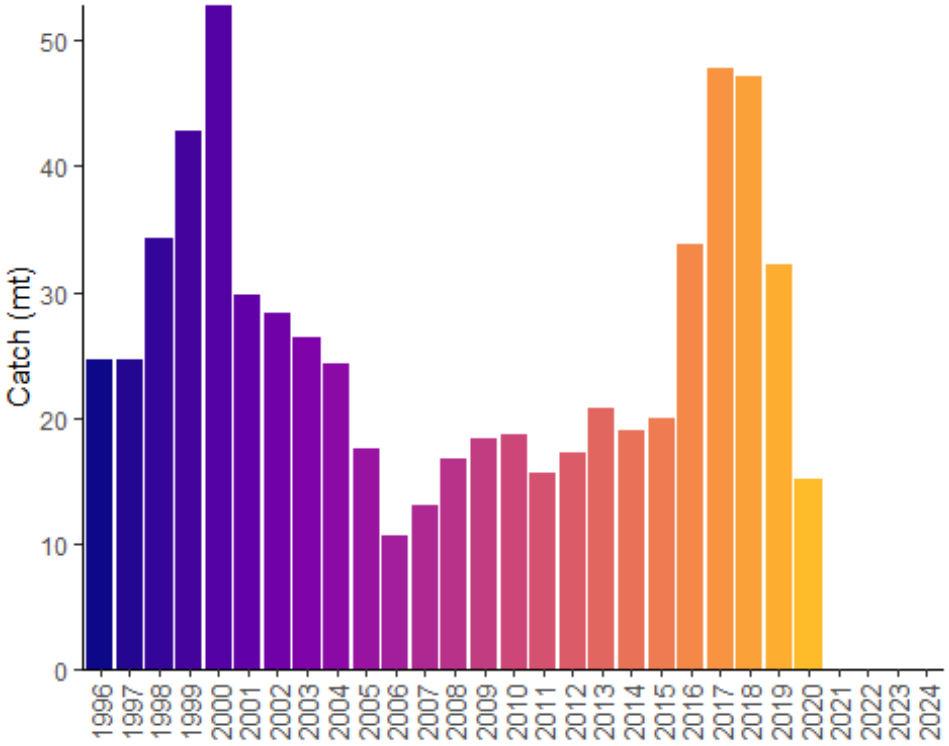


Figure 3. Landings of sablefish in the Canadian Sablefish fishery in NPFC region (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

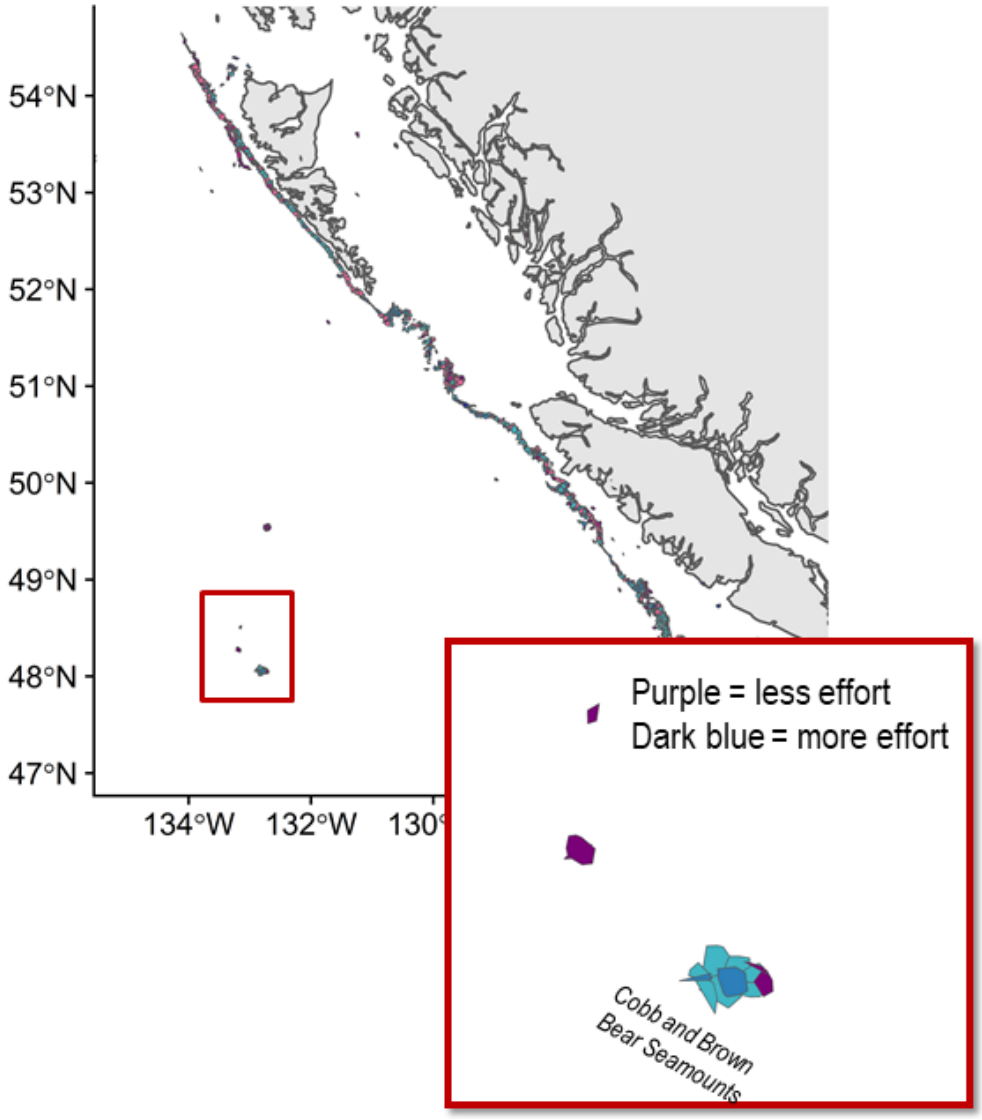


Figure 4. Relative change in spatial distribution of effort for Sablefish trap fishery from 2010-2017 to 2018-2019. Inset shows seamounts in the NPFC Convention Area.

Catch per unit of effort (mt/fishing days) for Sablefish has been increasing over the last 10 years (Figure 5), averaging 0.35 mt/fishing day (CV = 56%). CPUE was not calculated in 2024, but has generally been increasing from 2012 - 2020.

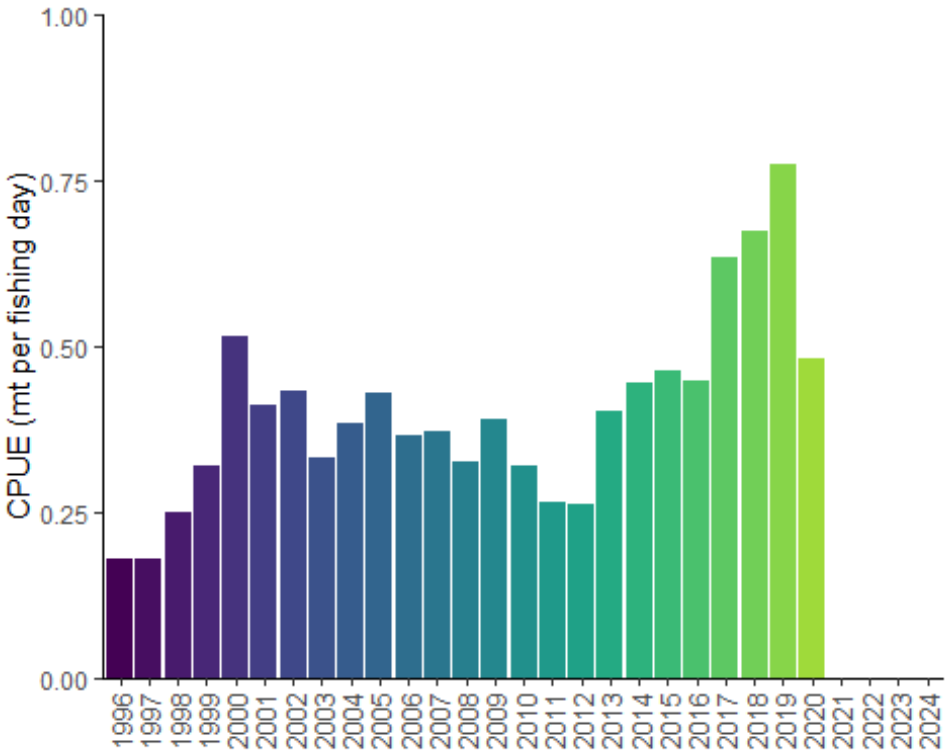


Figure 5. Catch per unit of effort for Canadian Sablefish fishery in NPFC region. Data are averaged across 3 years to comply with data privacy restrictions.

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).

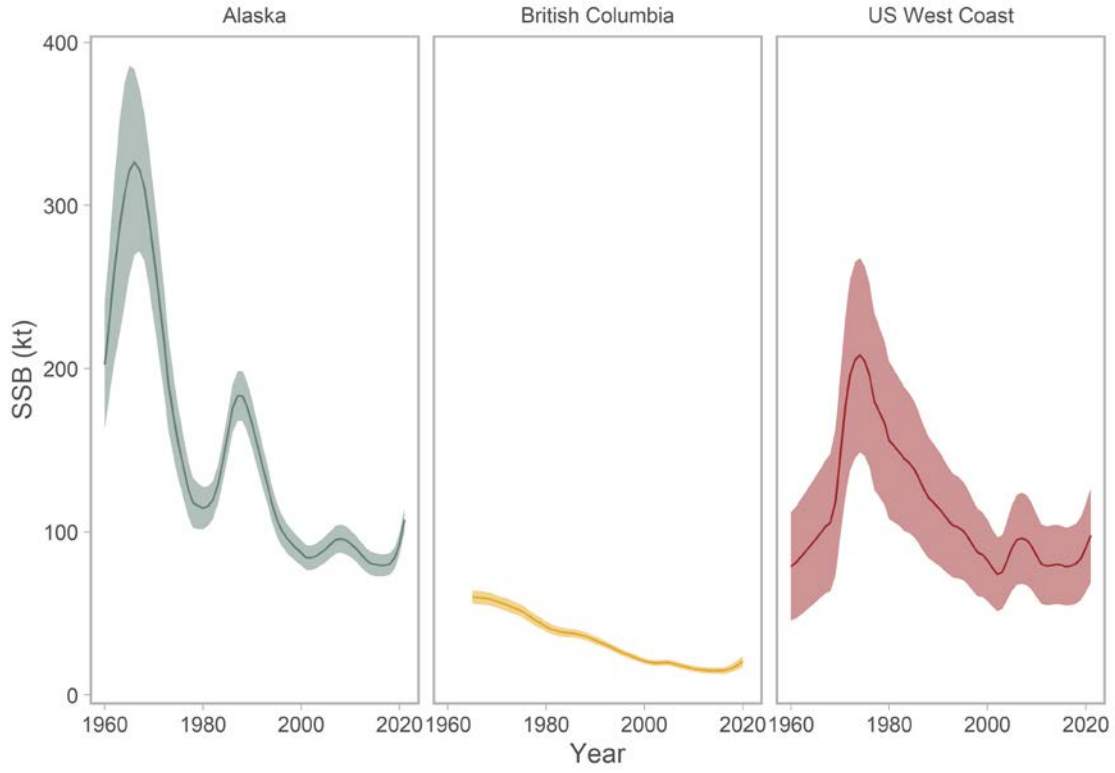


Figure 6. Sablefish (Anaplopoma fimbria) biomass estimated from stock assessments in Alaska, Canada and the US West Coast.

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.

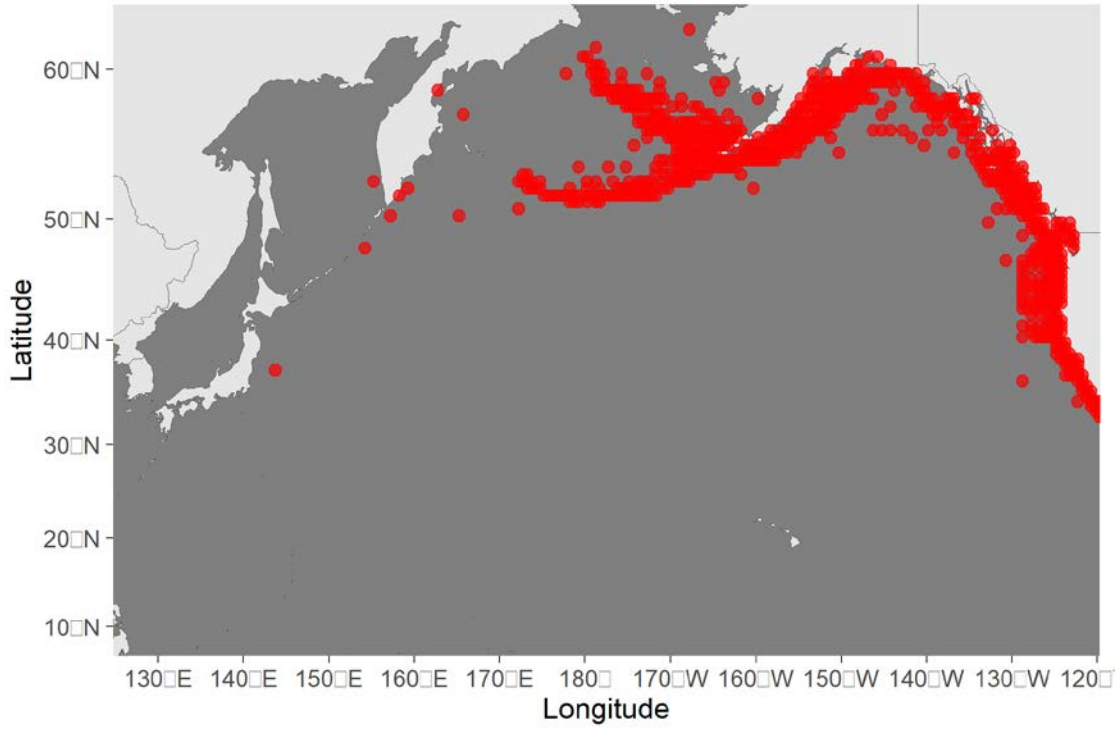


Figure 7. Map of distribution of sablefish in the North Pacific.

Literature cited

DFO. 2016. A revised operating model for Sablefish (Anoplopoma fimbria) in British Columbia, Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2016/015.

DFO. 2020. Evaluating the robustness of candidate management procedures in the BC Sablefish (Anoplopoma fimbria) fpshery for 2019-2020. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/025.
DFO. 2023. A Revised Operating Model for Sablefish in British Columbia in 2022. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2023/010.
DFO. 2023. Application of the British Columbia Sablefish (Anoplopoma fimbria) Management Procedure for the 2023-24 Fishing Year. DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/009.
Goethel, D.R., Rodgveller, C.J., Echave, K.B., Shotwell, S.K., Siwicke, K.A., Hanselman, Malecha, P.W., D.H., Cheng, M., Williams, M., Omori, K.,and Lunsford, C.R. 2022. Assessment 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.
Jasonowicz, A. J., F. W. Goetz, G. W. Goetz, and K. M. Nichols. 2017. Love the one you're with: genomic evidence of panmixia in the sablefish (Anoplopoma fimbria). Can. J. Fish. Aquat. Sci. 74:377-387.
Kapur, M.S., Lee, Q., Correa, G.M., Haltuch,M., Gertseva, V. and Hamel, O.S. 2021. Status of sablefish (Anaplopoma fimbria) along the US West Coast in 2021. Pacific Fisheries Management Council, Portland, Oregon, 196 p.
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.

Annex G

Species summary for blackspotted and rougheye rockfishes

Blackspotted and Rougheye Rockfishes (*Sebastes melanostictus* and *Sebastes aleutianus*)

Common names:

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

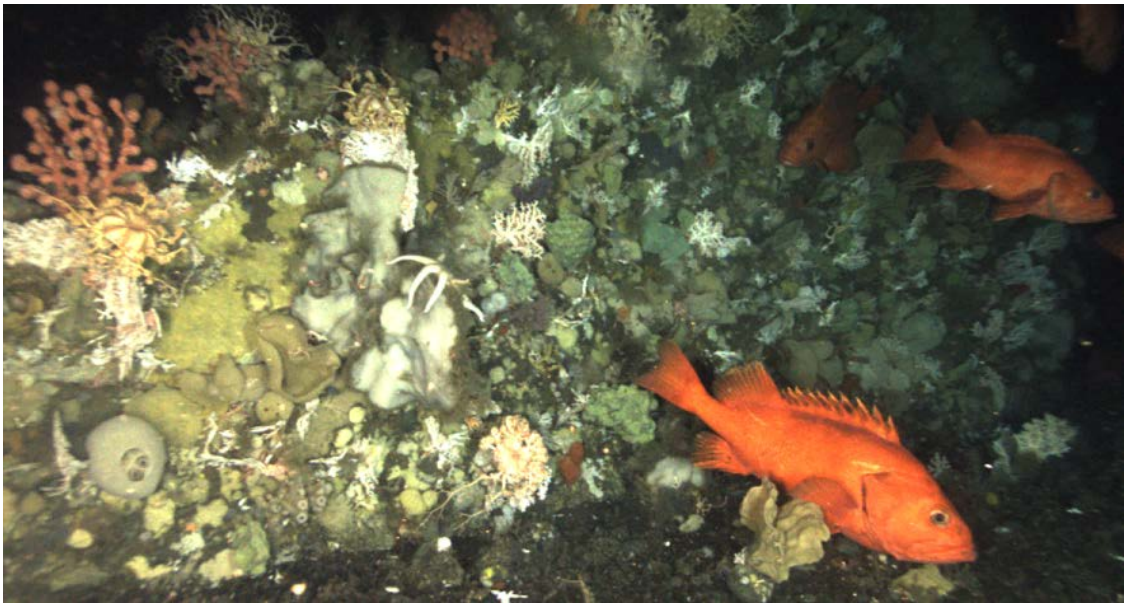


Figure 1. Blackspotted rockfish (Sebastes melanostictus).

Management

Active NPFC Management Measures

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

- CMM 2024-06 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.

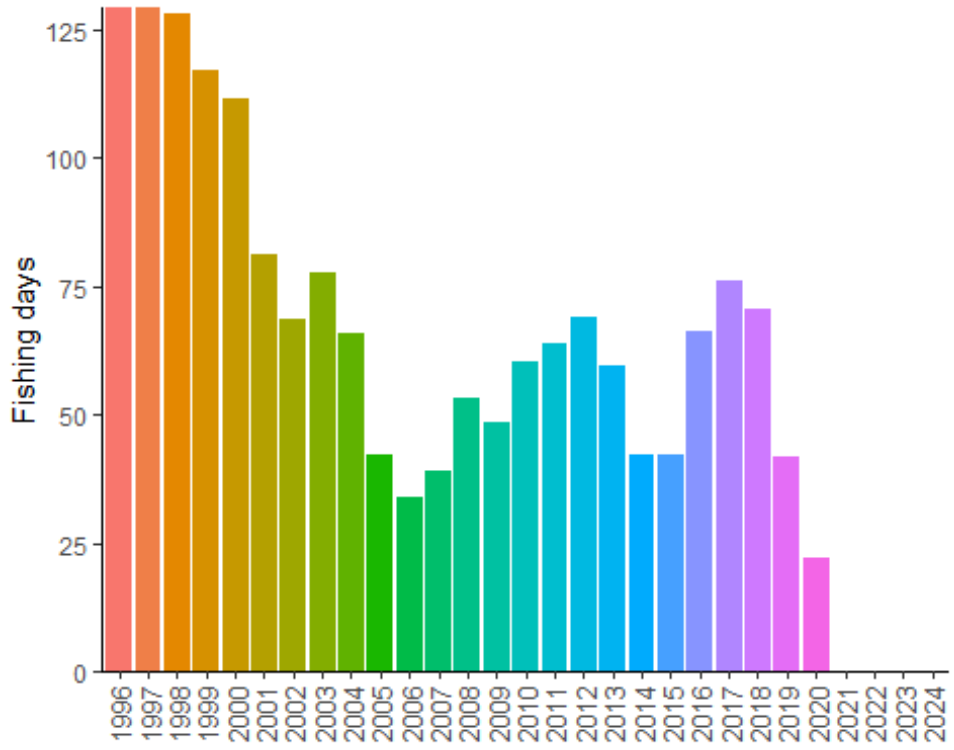


Figure 2. Fishing effort (in number of fishing days) for the Sablefish longline trap fishery conducted in NPFC waters (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

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 2021-2024 resulting in no catch.

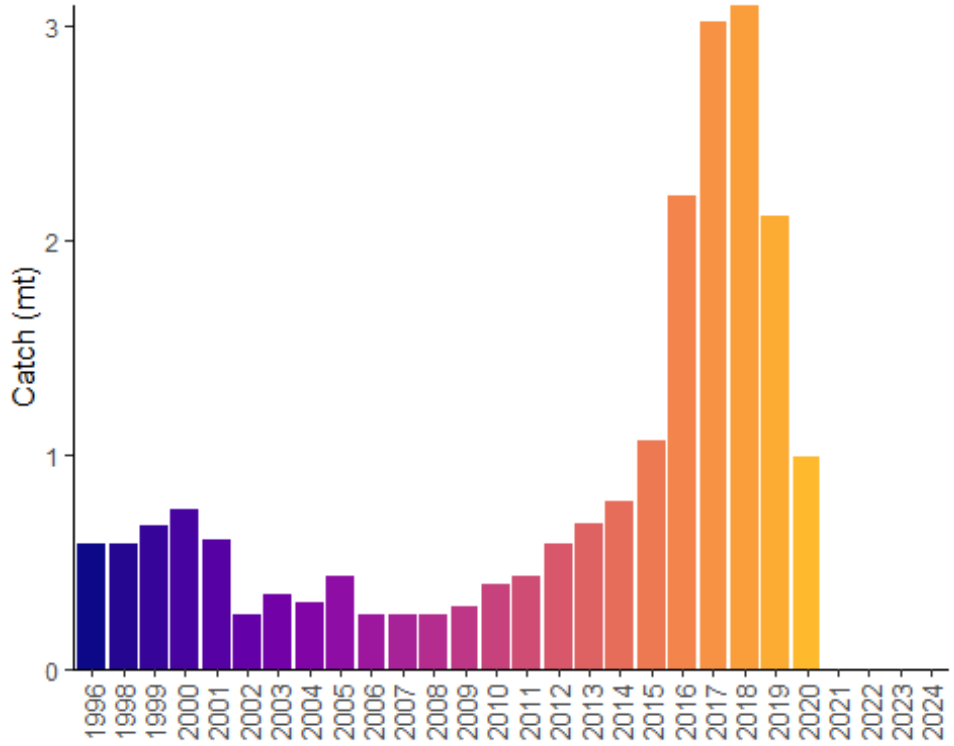


Figure 3. Landings of blackspotted and rougheye rockfishes in the Canadian Sablefish fishery in NPFC region (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

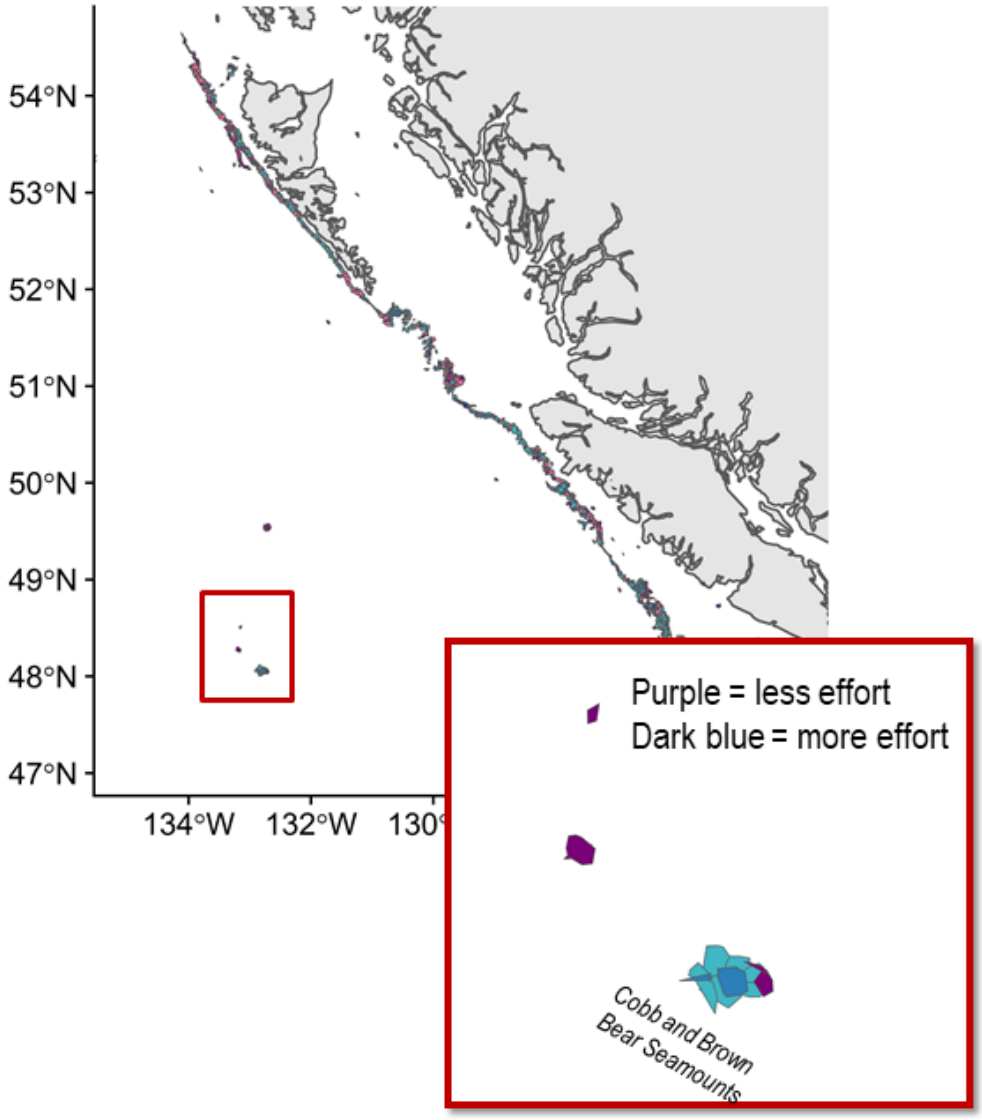


Figure 4. Relative change in spatial distribution of effort for Sablefish trap fishery from 2010-2017 to 2018-2019. Inset shows seamounts in the NPFC Convention Area.

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 = 114%). CPUE was not calculated in 2024 due to the absence of fishing in the Convention Area, but has generally been increasing since 2012.

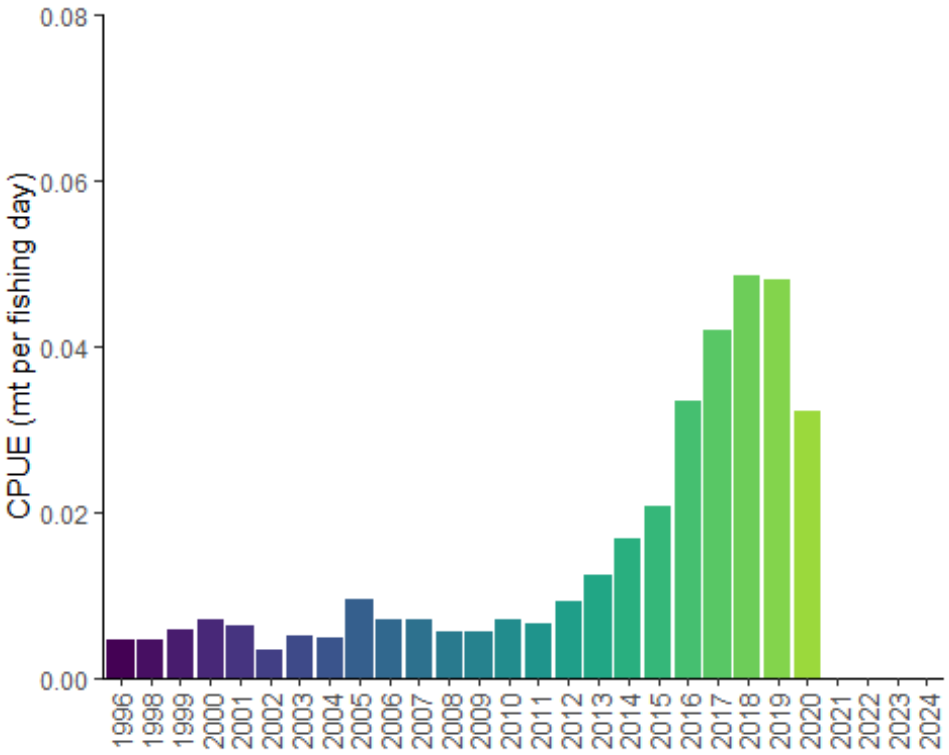


Figure 5. Catch per unit of effort for blackspotted and rougheye rockfishes in the Canadian Sablefish fishery in NPFC region. Data are averaged across 3 years to comply with data privacy restrictions.

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).

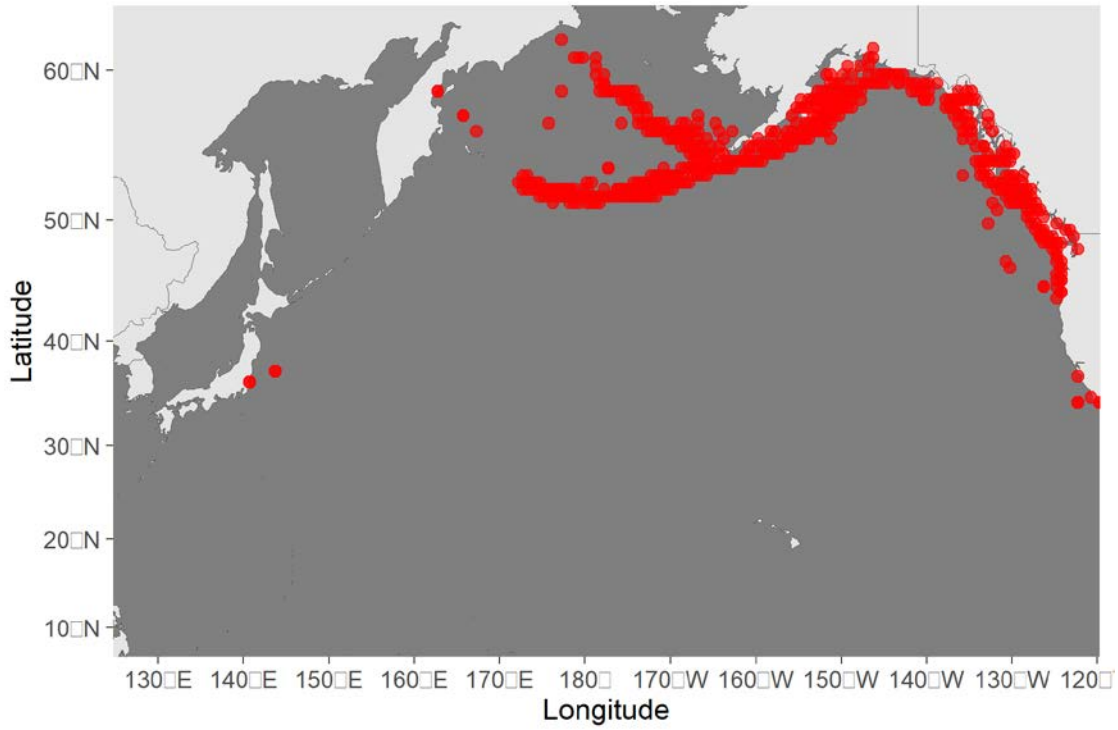


Figure 6. Map of distribution of blackspotted and rougheye rockfishes in the North Pacific.

Literature cited

DFO. 2020. Rougheye/Blackspotted Rockfish (Sebastes aleutianus/melanostictus) Stock Assessment for British Columbia in 2020. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/047.

Gharrett, A.J., A.P. Matala, E.L. Peterson, A.K. Gray, Z. Li, and J. Heifetz. 2007. Distribution and population genetic structure of sibling rougheye rockfish species. Pages 121-140 In J. Heifetz, J. DiCosimo, A.J. Gharrett, M.S. Love, V.M. O'Connell, and R.D. Stanley (eds.) 2007. Biology, assessment, and management of North Pacific rockfishes. Alaska Sea Grant College Publication AK-SG-07-01, University of Alaska Fairbanks.

Love, M.S., M. Yoklavich, and L. Thorsteinson. 2002.The Rockfishes of the North Pacific. University of California Press, Berkeley, California. 405 p.

Orr, J.W. and S. Hawkins. 2008. Species of the rougheye rockfish complex: resurrection of Sebastes melanostictus (Matsubara, 1934) and a redescription of Sebastes aleutianus (Jordan and Evermann, 1898) (Teleostei: Scorpaeniformes). Fish. Bull. 106(2):111-134

Shotwell, S.K., D.H Hanselman, P.J.F. Hulson, and J. Heifetz. 2014. Assessment of rougheye and blackspotted rockfish stock in the Gulf of Alaska. In Stock assessment and fishery evaluation report for the groundfish fisheries of the Gulf of Alaska. p.655-750. North Pacific Fishery Management Council, 605 W. 4th. Avenue, Suite 306, Anchorage, AK 9950-2252.

Sullivan J. 2022. Assessment of rougheye and blackspotted rockfish stock complex in the Gulf of

Alaska. In Stock assessment and fishery evaluation report for the groundfish fisheries of the Gulf of Alaska. North Pacific Fishery Management Council, 605 W. 4th. Avenue, Suite 306, Anchorage, AK 9950-2252.
Spencer, P.D., J.N. Ianelli, and N. Laman. 2022. Assessment of the blackspotted and rougheye rockfish complex in the eastern Bering Sea/Aleutian Islands. In Stock assessment and fishery evaluation report BSAI. North Pacific Fishery Management Council, 605 W. 4th Ave, suite 306. Anchorage, AK 99501
Yang, M.S. and M.W. Nelson. 2000. Food habits of the commercially important groundfishes in the Gulf of Alaska in 1990, 1993, and 1996. NOAA Tech. Memo. NMFS-AFSC-112. 174 p.

Annex H

Species summary for skilfish

Skilfish (*Erilepis zonifer*)

Common names: Skilfish (English); 白斑裸盖鱼(Chinese); アブラボウズ (Japanese);

큰은대구 (Korean); эрилепис или морской монах (Russian)

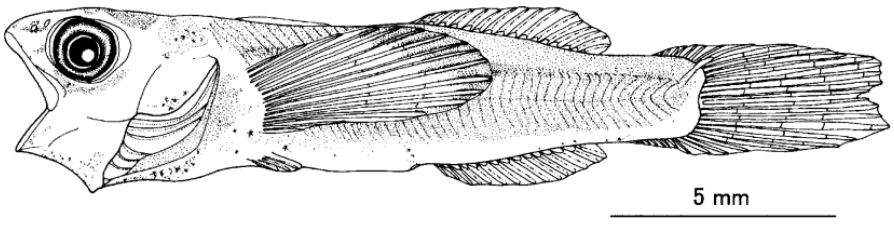
Biological Information

Skilfish *Erilepis zonifer* (Lockington, 1880) is one of the two species belonging to the family Anoplopomatidae, and the only species of the genus *Erilepis*. Published data suggest that juvenile fish are found in the surface water layer, among floating algae, and are distributed in the open ocean, where they live 4 - 6 years, reaching the length of about 50 cm, after which they switch to the bottom lifestyle. Adult fish inhabit deep rocky bottoms. Young fish have bright white spots on their bodies, but with age their color changes to dark gray, and bright markings become duller and less visible as the fish grows. Skilfish has a dark body, nearly black fins, and large blue eyes above a prominent, cavernous mouth like that of a rockfish (fig. 1). It also has a strong tail fin that is equal to or higher than the fish's head. The fish is a predator, and consumes different species of bony fish, cephalopod mollusks and crustaceans, and may also feed on jellyfish.

Global distribution ranges from the central Japan north to the Commander and Aleutian Islands; Gulf of Alaska south to Monterey Bay (California, U.S.A.). Skilfish were registered on all south Emperor Seamounts (south of 42° E). Skilfish were captured mainly on the seamounts T365+A and Koko using bottom longlines (fig. 2). Skilfish are also captured occasionally on longlines and in pots on seamounts in the Cobb Seamount chain in the eastern North Pacific.

This species lives at depth range from 340 to 1150 meters, according to research surveys, and were captured even at 1438 m depth during commercial fishing. The analysis of changes in the fish body length with depth (fig. 3) shows positive correlation in the research area^ larger fish tend to live deeper [Zolotov et al., 2014].

Skilfish size (body length) in commercial catches ranged from 55 to 201 cm, with an average length of 103.5 cm as recorded by Russian scientific observers in 2014-2018 (fig. 4). The body weight ranged from 4.0 kg to 102 kg, with an average weight of 20.8 kg. Published size composition differed on different seamounts (fig. 5).



A)

B)

Figure 1: Erilepis zonifer at different developmental stages: *A) larva [Okamoto et al., 2010], B) adult (picture made by Igor Maltsev)*

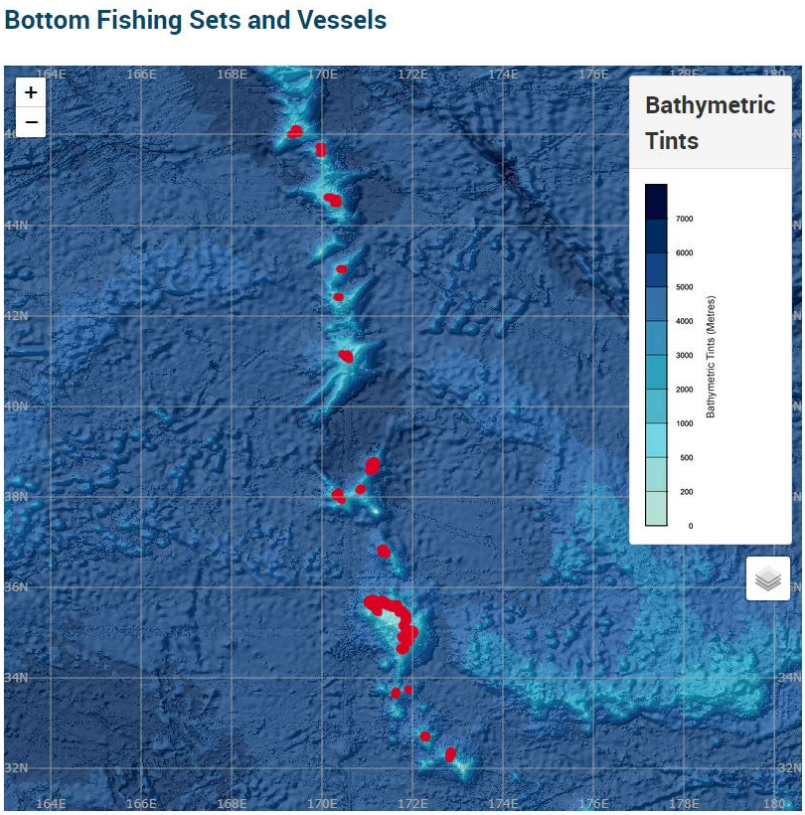


Figure 2: Surveyed area by Russian Long-Liners [https://www.npfc.int/science/gis/bottom_fishing]

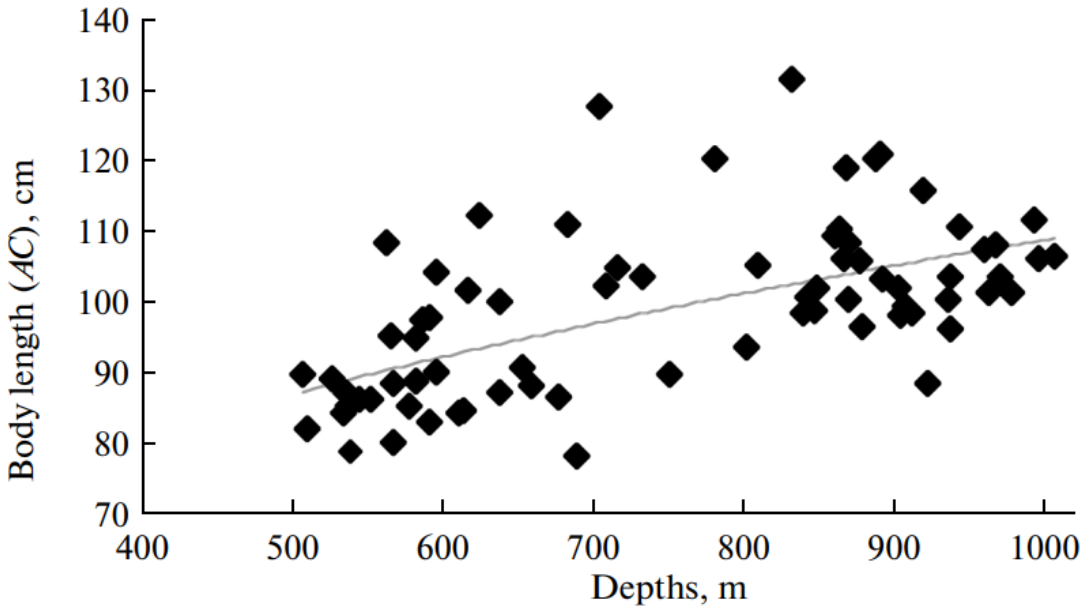


Figure 3: Skilfish body length versus habitat depth at the Emperor Seamounts, June–July 2009: $y = 11.632x^{0.3239}$, $R^2 = 0.3692$ [Zolotov et al., 2014]

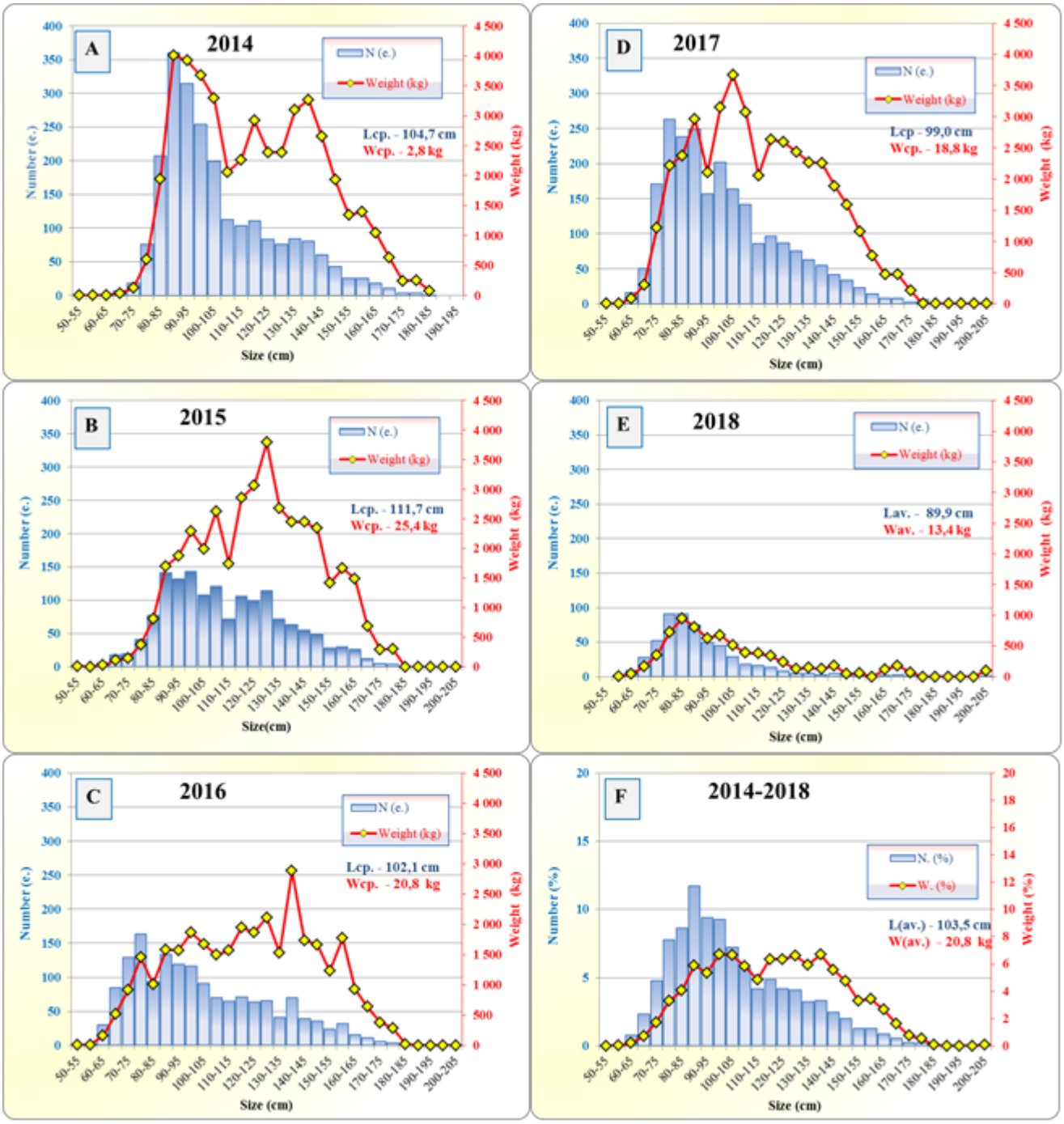


Figure 4: Skilfish body length and weight at the Emperor Seamounts based on longline catches during 2014-2017 (fishing vessel "Palmer") and in 2018 (fishing vessel "Vostok-7"); F – average long-term data, %

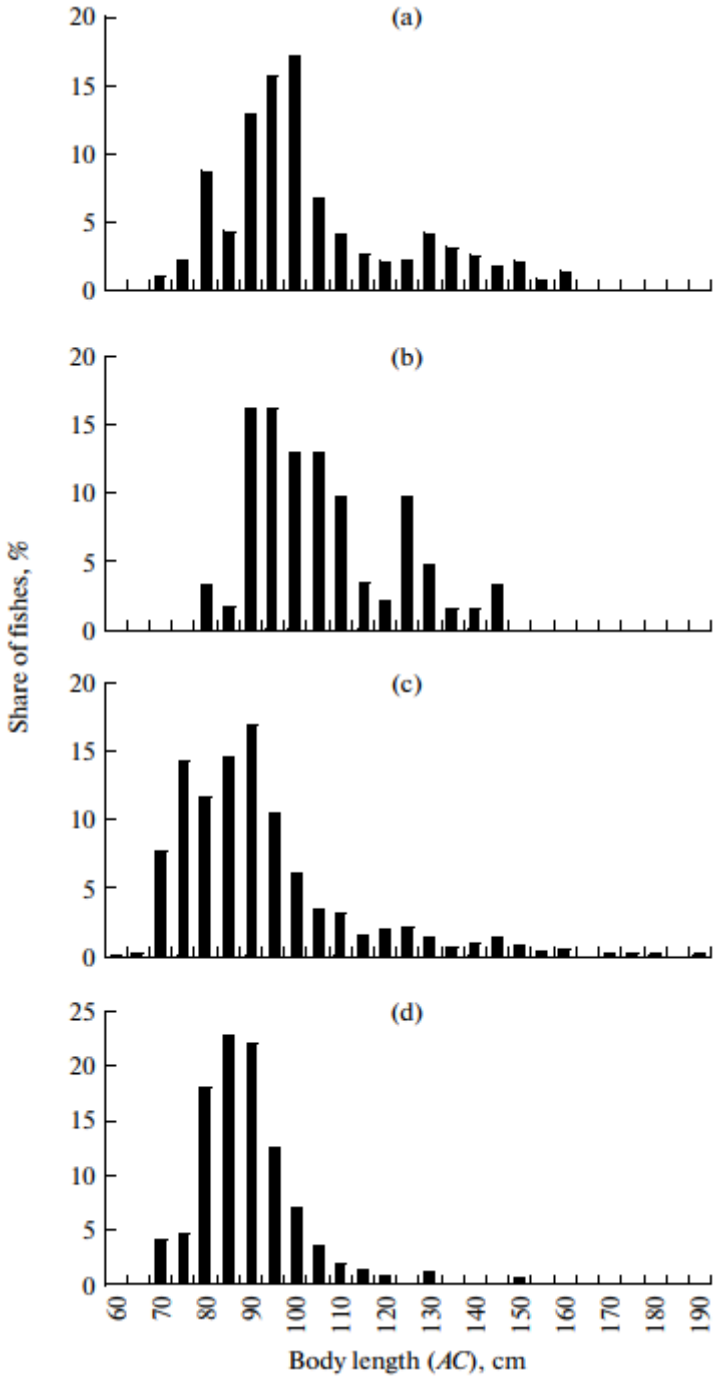


Figure 5: Skilfish body length at the Emperor Seamounts, June–July of 2009: (a) Jingu (M = 103.28 cm, n = 762); (b) Ojin (M = 105.74 cm, n = 61); (c) Northern Koko (M = 92.40 cm, n = 573); (d) Koko (M = 89.07 cm, n = 199)

Fishery

Skilfish was one of the priority species in the Japanese [Belyaev and Darnitskiy, 2005] long-line catches. The fish aggregations of commercial importance were found at several guyots [Baytalyuk

et al., 2010; Monakhtina, 2010]. It is also caught by Japanese trawl and gillnet fisheries primarily as bycatch. For several years (2001–2007) this fish was commercially fished by bottom long-lines on a number of Emperor Seamounts. On some markets, this fish was sold under the name “grouper”. In 2009, data on skilfish biology and distribution at the Emperor Seamounts were collected and analyzed by Kamchatka Research Institute of Fisheries and Oceanography (KamchatNIRO) observers on two long-liners [Zolotov et al., 2014]. Later, in 2014-2018, observations were conducted by observers from TINRO, now the Pacific branch of Russian Federal Institute of Fisheries and Oceanography (VNIRO). Catch data for skilfish in Korea is available for the period 2013–2019.

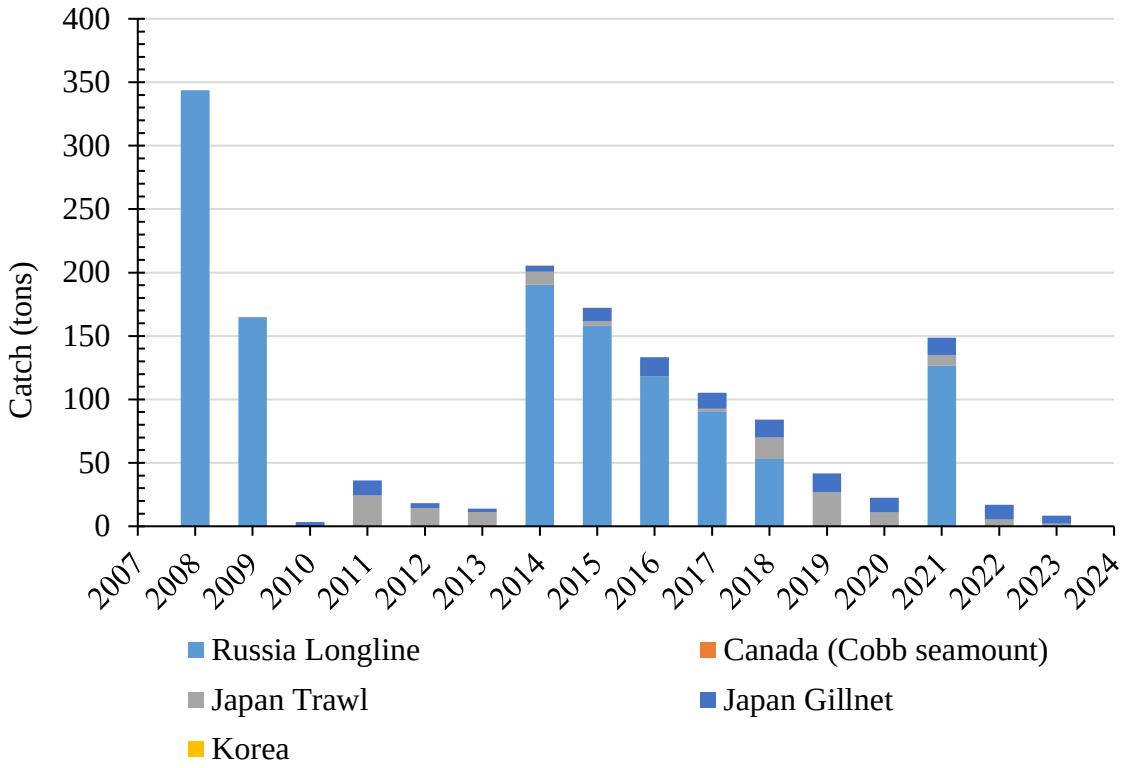


Figure 6: Historical catches of Skilfish in NPFC waters (metric tons)

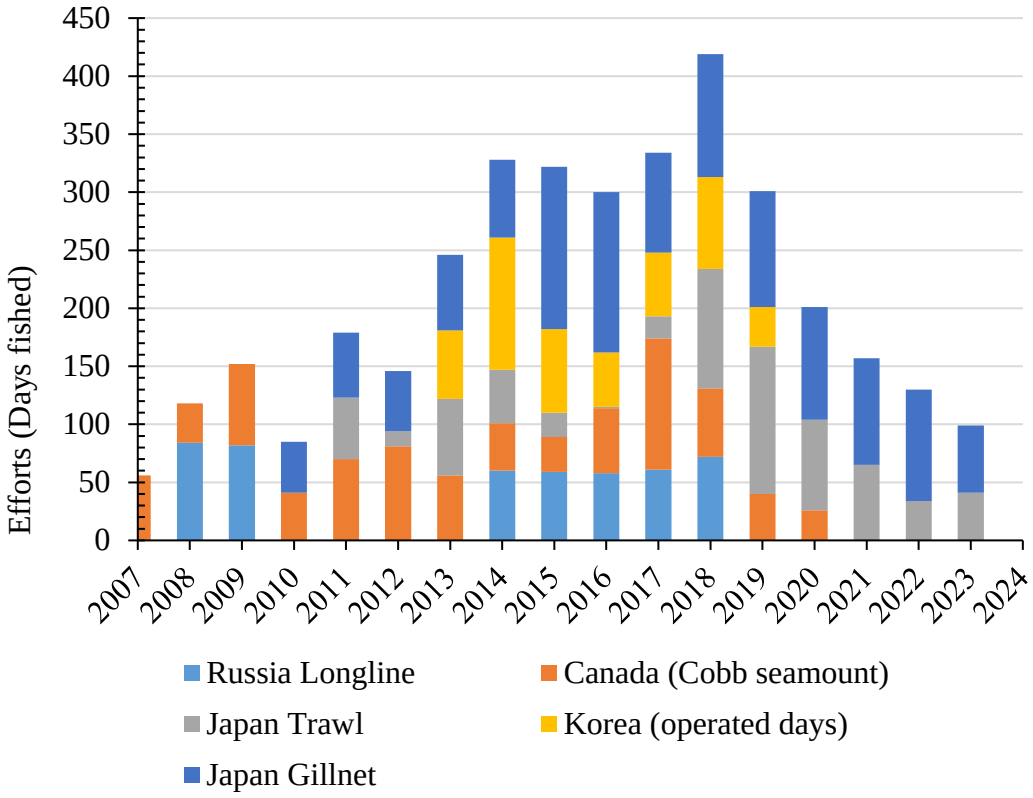


Figure 7: Historical fishing efforts for Skilfish (days with catches)

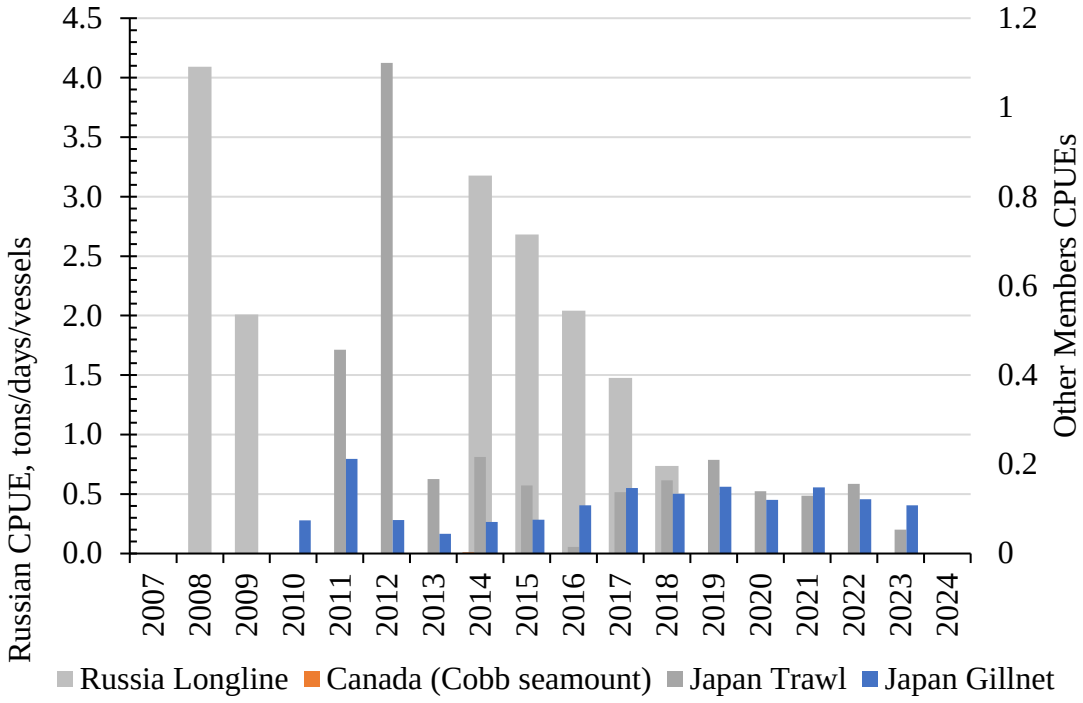


Figure 8: Historical CPUE for Skilfish (Cath per day per vessel)

Assessment

The initial biomass of skilfish at Nintoku, Jingu, Ojin, Koko, and Northern Koko seamounts calculated by the Leslie method was assessed at approximately 203.5 tons in 2009 [Zolotov et al., 2014].

An age- or length-structured stock assessment for Skilfish may be feasible considering life history of this species when more data on age-size structure are available (see fig. 4, 5 & 6). At present, given small amount of data, it is impossible to suggest reliable size-age keys for Skilfish. Available data yielded the following traditional von Bertalanffy equation: $L_t = 183.0\ [1 - e^{-0.0411(t + 4.1172)}]$, where L is the fish body length (AC), cm, and t is fish age, years. According to this equation, skilfish at the age of 10, 20, and 30 years reach body length of 105, 115, and 138 cm, respectively [Zolotov et al., 2014].

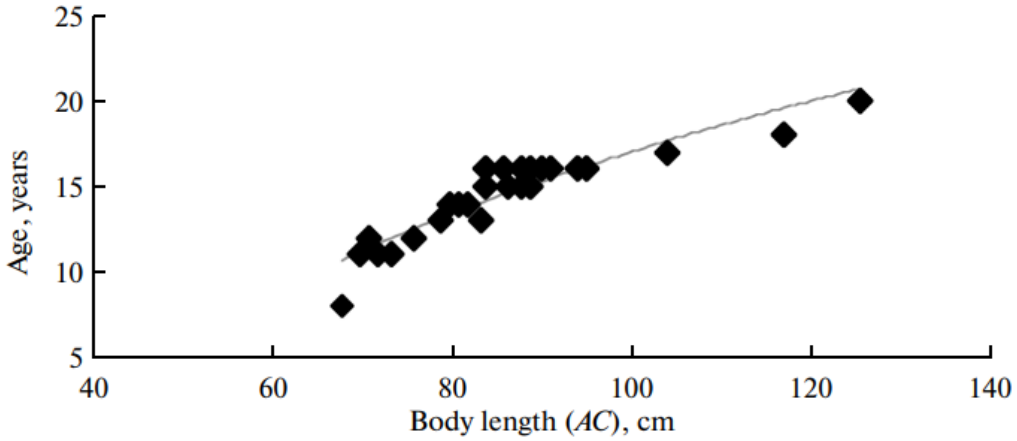


Figure 9: Growth curve of skilfish Erilepis zonifer at the Emperor Seamounts: y = 16.337ln(x) – 58.222, R^2 = 0.8592 [Zolotov et al., 2014]

Management

Active Management Measures

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

- CMM 2024-05 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	Not accomplished	Not established
Harvest control rule	Not accomplished	Not established
Other	Intermediate	No expansion of fishing beyond 1500 m, No more increase in the fishing vessels

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

Data Availability

Table 2: Catch data

Data	Member	Fishery	Year	Comments
Annual catch	Japan	Trawl	2010-present	
		Gillnet	2010-present	
	Korea	Trawl	2013-2019	Bycatch less than 1% of total catch
	Russia	Long-Line	2000	
CPUE	Japan	Trawl	2010-present	
		Gillnet	2010-present	
	Korea	Trawl	2013-2019	Logbook data available
	Russia	Long-Line	2014-2018	

Table 3: Biological data

Data	Member	Year	Comments
Age	Japan		
	Korea		
	Russia	2009	annual ring analysis
Length	Japan		
	Korea		
	Russia	2014-2018	
Maturity	Japan		
	Korea		
	Russia	2014-2018	

References

Baitalyuk, A.A., Karyakin, K.A., and Orlov, A.M., Resources of thalassobathyal Emperor Ridge: exploration, stock condition, and feasibility of commercial expeditions, *Vopr. Rybolov.*, 2010, vol. 11, no. 4 (44), pp. 801–816.

Belyaev, V.A. and Darnitskiy, V.B., Features of oceanography and ichthyofauna composition on the Emperor Ridge, in *Deep Sea 2003: Conference Governance and Management of Deep-Sea Fisheries*, Shotton, R., Ed., Queenstown, New Zealand: FAO Fish. Proc., 2005, nos. 3/1, part 1, pp. 107–124. http://www.fao.org/docrep/009/a0210e/a0210e09.htm

Monakhtina, S., Skilfish (*Erilepis zonifer*): traits of biology from a fishery near the Emperor Seamounts in the north-west Pacific Ocean, in *14th PICES Annual Meeting, Abstracts of Papers*, Portland, OR, 2010, p. 22.

Okamoto, M., Watanabe, Y., and Asahida, T., A larva of the skilfish, *Erilepis zonifer* (Actinopterygii: Scorpaeniformes: Anoplopomatidae), from off Northeastern Japan, Spec. Diversity, 2010, vol. 15, pp. 125–130.

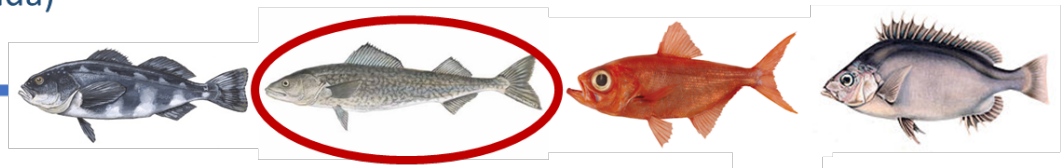
Zolotov, O.G., Spirin, I.Y. & Zudina, S.M. New data on the range, biology, and abundance of skilfish Erilepis zonifer (Anoplopomatidae). J. Ichthyol. 54, 251–265 (2014). https://doi.org/10.1134/S0032945214020131

Stock status summary for North Pacific armorhead, splendid alfonsino and sablefish

NPFC

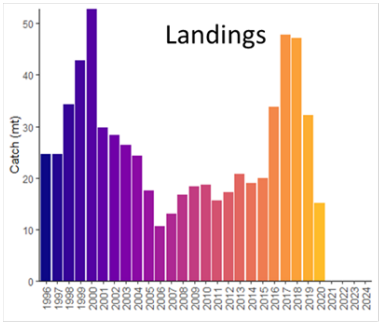
Small Scientific Committee on Bottom Fish & Marine Ecosystems (SSC BF-ME)

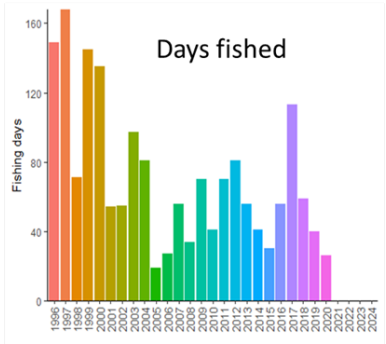
Chair: Dr. Chris Rooper (Canada)



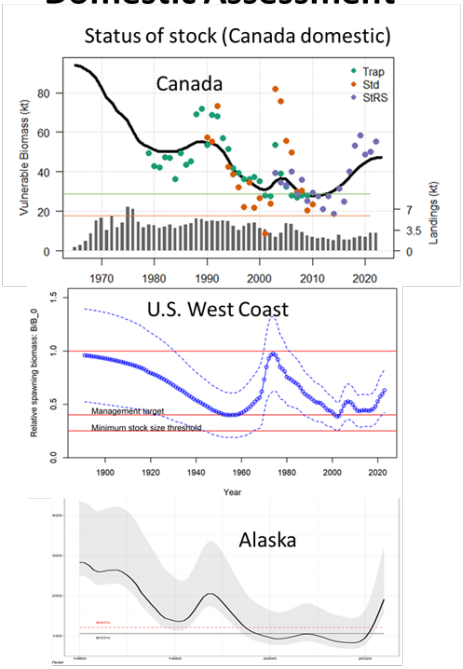
Sablefish

Convention Area





Domestic Assessment



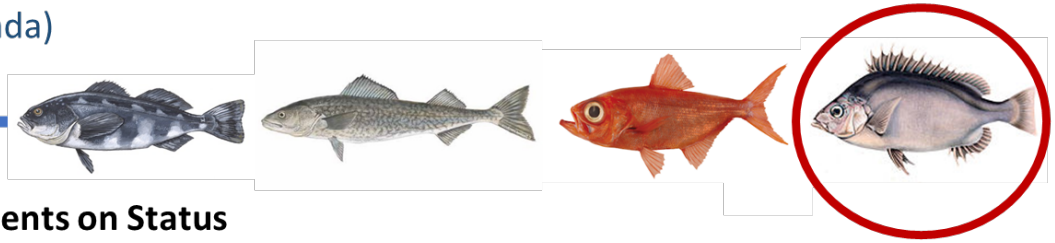
Comments on Status

- Fish stock **healthy**

- No CA fishing since 2020
- Economically not profitable
- Likely no fishing in 2025

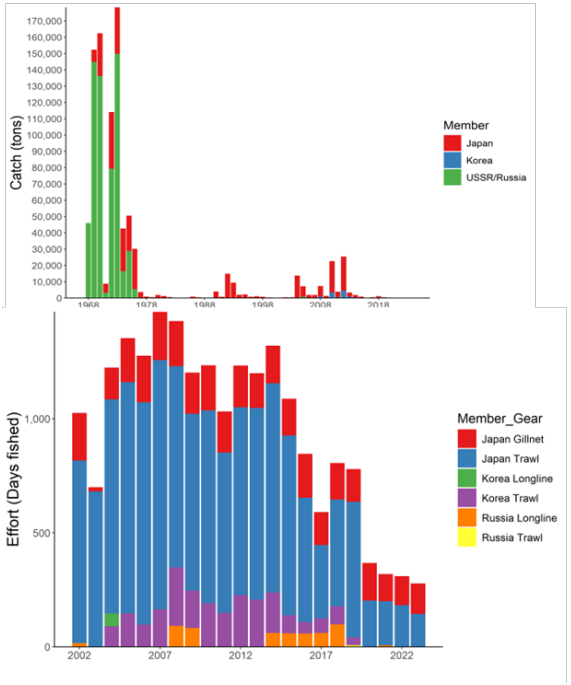
Small Scientific Committee on Bottom Fish & Marine Ecosystems (SSC BF-ME)

Chair: Dr. Chris Rooper (Canada)



North Pacific Armorhead

Convention Area

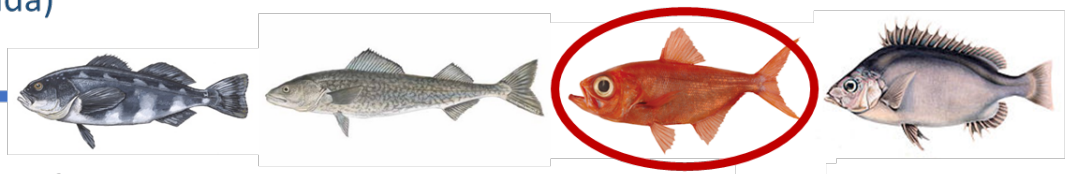


Comments on Status

- Catch slightly higher in 2023 v. 2022
- No indication of strong recruitment
- Effort remained low (1 gillnet, 1 trawl)
- Fishers avoiding NPA since 2019 so the catch may not reflect stock status

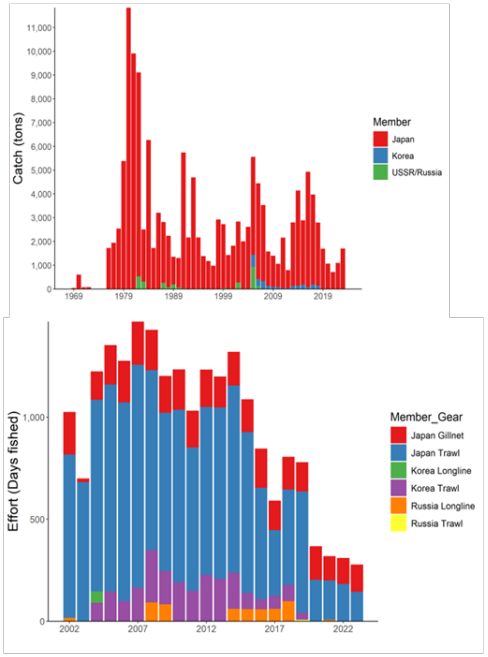
Small Scientific Committee on Bottom Fish & Marine Ecosystems (SSC BF-ME)

Chair: Dr. Chris Rooper (Canada)

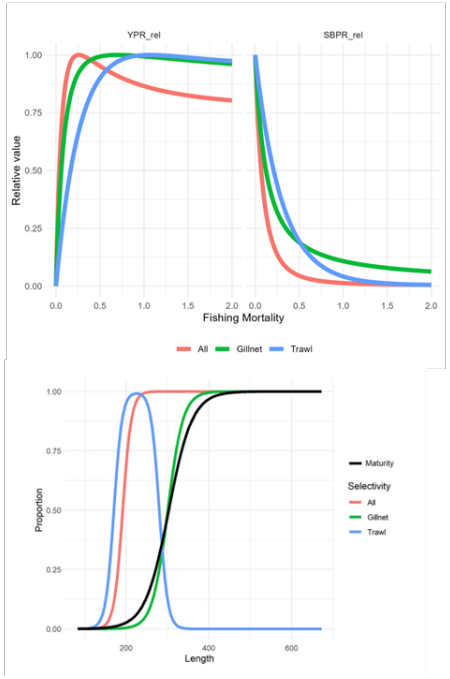


Splendid Alfonsino

Convention Area



Per recruit analyses



Comments on Status

- High likelihood that growth overfishing is occurring (harvest before the size that maximizes YPR)
- Splendid Alfonsino are being captured before they are mature, likely reducing the spawning potential
- Caveat - Trawl fishery has dome shaped selectivity which may make the analyses pessimistic about the status of the stock

Annex J

Revised CMM 2024-05 – Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean

CMM 2024-05

(Entered into force 1 January 2025)

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; paragraphs 113, 117 and 119 to 124 of resolution 64/72 in 2009, paragraphs 121, 126, 129, 130 and 132 to 134 of resolution 66/68 in 2011, paragraphs 156, 171, 175, 177 to 188 and 219 of resolution 71/123 in 2016 and paragraphs 181 and 203-219 of resolution 77/118 in 2022;

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 UNGA's calls to identify and overcome barriers to the implementation of the relevant paragraphs of General Assembly resolutions such as data availability, especially with regard to baseline data and the spatial distribution and connectivity of vulnerable marine ecosystems, including their associated and dependent species; periodically review and revise impact assessments whenever a substantial change in the fishery has occurred or there is relevant new information; and ensure that the precautionary approach is applied, including in the utilization of impact assessments

to inform management decisions and consideration of significant adverse impacts on vulnerable marine ecosystems, including their associated and dependent species;

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 bottom fisheries on marine species and VMEs;

Recognizing that scientific literature indicates the likely occurrence of VMEs on most seamounts in the area and has documented significant adverse impacts to VMEs resulting from bottom fishing in the area, which reinforces the importance of regularly updating impact assessments and considering the adequacy of the existing management framework through the SC and the Commission*;*

Concerned about potential significant adverse impacts of bottom fisheries on marine species and VMEs in the western part of the Convention Area.

Recognizing Article 2 of the Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean (the Convention), which provides that the objective of the Convention 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;

Recognizing further Articles 3 (c) and (e) of the Convention, which call on the Commission to adopt and implement measures in accordance with the precautionary approach and ecosystem approach to fisheries and protect biodiversity in the marine environment, including by preventing significant adverse impacts on vulnerable marine ecosystems;

Re-affirming NPFC's commitment to the precautionary approach and to implementing an ecosystem approach to fisheries management;

Noting the ongoing work of the Scientific Committee to address the FAO International Guidelines

for the Management of Deep-Sea Fisheries in the High Seas, including the identification of VMEs;

Underscoring the ecological importance of the Emperor Seamounts to the fisheries resources and biodiversity of the NPFC convention area;

Adopts the following Conservation and Management Measure:

Scope

1. This CMM applies to all bottom fishing activities for fisheries resources 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 (hereinafter called “the western part of the Convention Area”).

General purpose

2. The objective of this CMM 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. The measures in this CMM aim 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 regularly review, and as appropriate, revise this CMM considering the best available science and the recommendations of the NPFC Scientific Committee, and with reference to relevant guidance adopted by UNGA and FAO.

Principles

3. 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.

Measures

4. Members of the Commission shall implement 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 not allow 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: black coral (Antipatharia), gorgonians, pennatulaceans, stony corals (Scleractinia), soft corals, the classes of Hexactinellida and Demospongiae 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. The translation table of VME indicator corals between common and scientific names is attached to the VME taxa identification guide (link) [to this CMM (Annex 7)].

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 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, 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 fishing vessels from contacting the sea floor with their fishing gear. 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 five groups of cold water corals, specifically black corals (Antipatharia), gorgonians, pennatulaceans, stony coral (Scleractinia), and soft corals. The VME indicator taxa also include the classes of Hexactinellida and Demospongiae 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, the Southeastern part of Koko seamount (specifically, 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 to prevent potential significant adverse impacts on VMEs consistent with the precautionary approach. 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 January.

L. Limit annual catch of North Pacific armorhead consistent with the precautionary approach. In years when strong recruitment of North Pacific armorhead is not detected by the monitoring survey (Annex 6), Japan shall limit the catch of North Pacific armorhead by vessels flying its flag to 500 tons, and Korea shall limit its 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), Japan shall limit its annual catch of North Pacific armorhead by vessels flying its flag to 10,000 tons, and Korea shall limit its annual catch of North Pacific armorhead by vessels flying its flag to 2,000 tons. The catch overages for any given year shall be subtracted from the applicable annual catch limit in the following year, and catch underages during any given year shall 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 fishing gear in the following ~~two~~ four 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
Northwestern part of Yuryaku Seamount	32-42.75 N 172-12.90 E	32-42.75 N 172-13.65 E
	32-43.50 N 172-13.65 E	32-43.50 N 172-12.90 E
Southeastern part of Yuryaku Seamount	32-37.80 N 172-18.00 E	32-37.80 N 172-18.60 E
	32-38.40 N 172-18.60 E	32-38.40 N 172-18.00 E

Contingent Action

5. 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).

Scientific Information

6. 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

   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) Members shall ensure each bottom fishing vessel operating in the western part of the Convention Area collects the following scientific information. Members shall provide the scientific information to the Secretariat.

(a) Catch and effort data

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

(ii) As appropriate, Members should encourage the collection of information from research vessels operating in the western part of the Convention Area and provide updates to the Commission to the extent possible.

(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.

Vessel Monitoring System

7. 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.

Observers

8. Members shall ensure that all vessels authorized to bottom fish in the western part of the Convention Area shall carry an observer on board. Members shall ensure that observers are independent, impartial, and qualified to fulfill the requirements of this measure and to

enhance data collection. An observer is deemed to be independent, impartial, and qualified if the observer:

(a) is deployed from a Commission Member's, or Cooperating non-Contracting Party's, national observer program, and familiar with NPFC fisheries resources, fishing activities, and CMMs;
(b) is neither part of the crew, nor has any employment or family relationship to the ownership or operator of the fishing vessel; and
(c) does not have any shared business interests with the owner or operator of the fishing vessel.

An observer shall be provisioned, accommodated, and provided safe working conditions and access to independent communications in accordance with the Commission requirements and the Member's domestic laws and regulations.

Final Clauses

9. This CMM shall enter into force on January 1st, 2025, replacing CMM 2023-05.

Annex 1

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)

Appendix 1.2

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

Annex 2

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

[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.

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 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. 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), gorgonians, 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

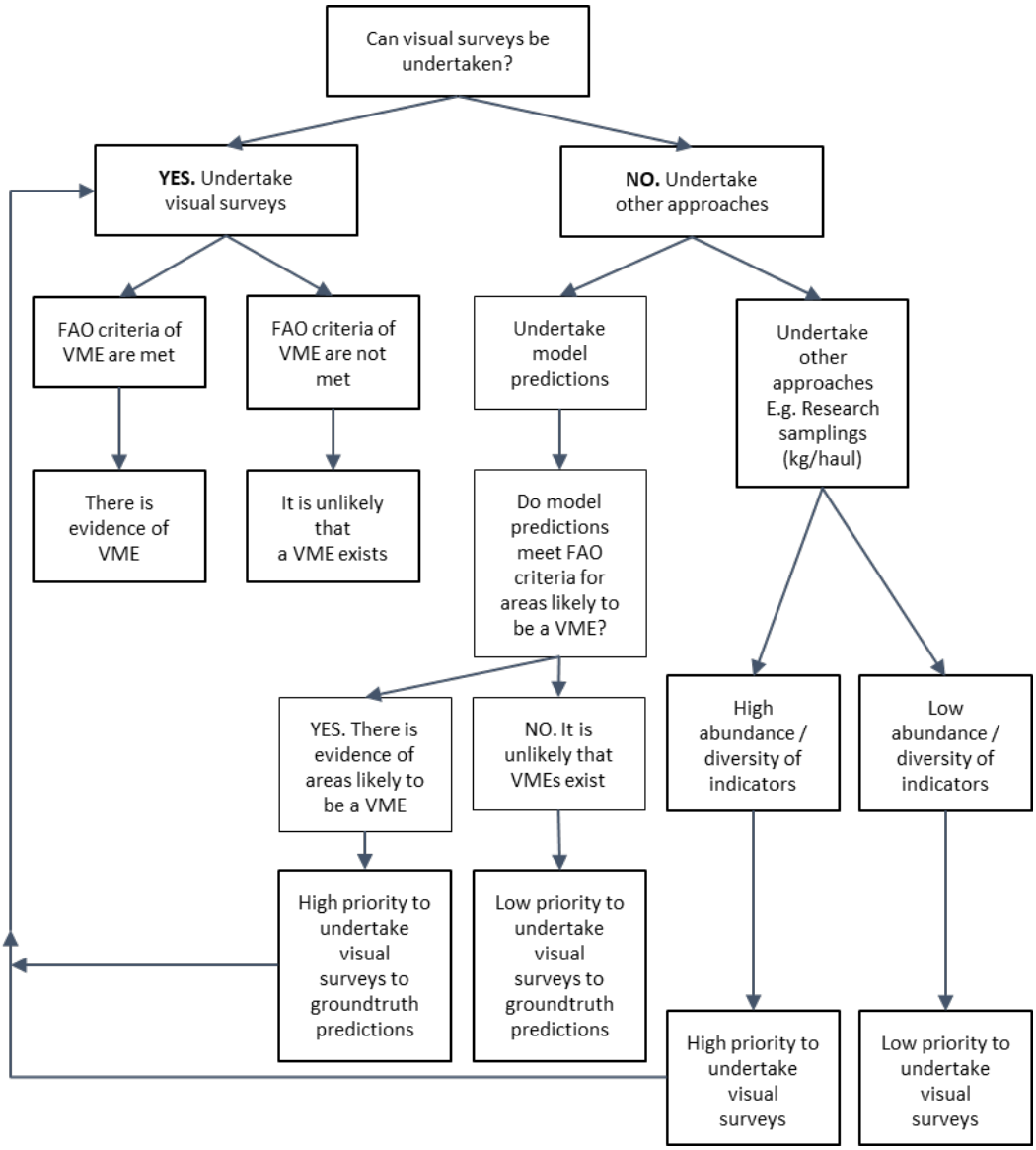
Template for reports on identification of VMEs and assessment of impacts caused by individual fishing activities on VMEs or marine species

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).

Annex 2.3

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



Annex 3

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.

Annex 4

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.

Annex 5

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.

Annex 6

Implementation of the Adaptive Management for North Pacific armorhead

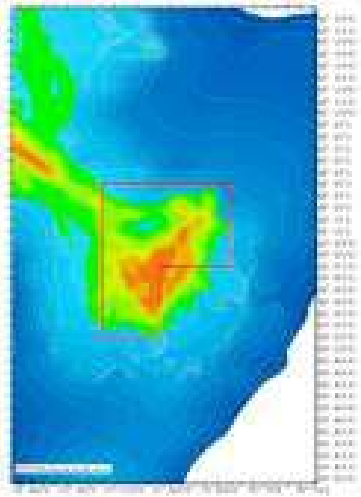
1. Monitoring survey for the detection of strong recruitment of North Pacific armorhead

(1) Location of monitoring surveys

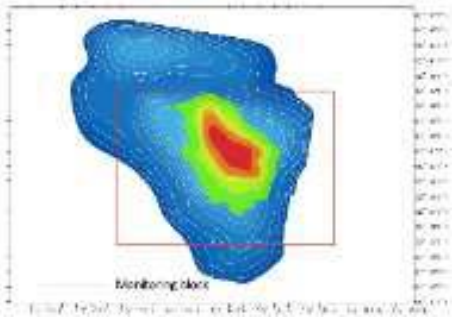
Monitoring surveys for the detection of strong recruitment of North Pacific armorhead will be conducted by trawl fishing vessels in the pre-determined four (24) monitoring blocks of Koko (South eastern), Yuryaku, Kammu (North western) and/or Colahan seamounts.

Monitoring blocks

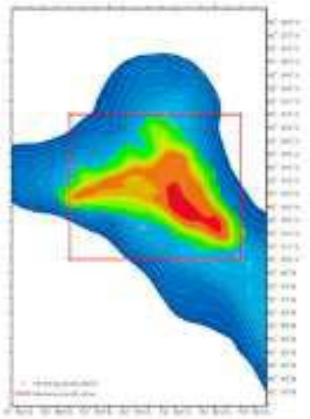
(1) Koko seamount (34°51’ –35°04’N, 171°49’ –172°00’ E)



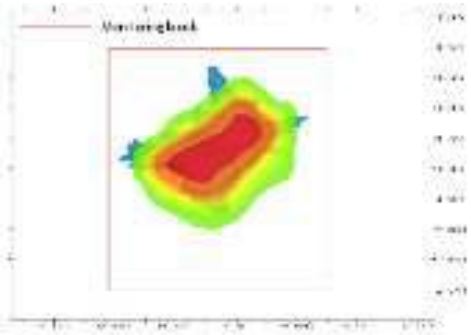
(2) Yuryaku seamount (32°35’ –32°45’N, 172°10’ –172°24’E)



(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.

Annex 7

Translation table of VME indicator corals between common and scientific names

VME Indicator Corals from Emperor Seamounts: Present Classification *1, Taxa, and Common (nominal) Names in NPFC

Sub phylum	Class	Order	Superfamily	Family	Genus/Subgenus	NPFC_～2023	NPFC_2024～ *2	Guide Cat. *3
Anthozoa	Hexacorallia	Antipatharia		Antipathidae	——	Black Corals (Antipatharia)		Black Corals
				Aphanipathidae	——	Black Corals (Antipatharia)		Black Corals
				Cladopathidae	——	Black Corals (Antipatharia)		Black Corals
				Leiopathidae	——	Black Corals (Antipatharia)		Black Corals
				Schizopathidae	——	Black Corals (Antipatharia)		Black Corals
		Scleractinia		Caryophylliidae	——	Stony Corals (Scleractinia)		Hard Corals
				Deltocyathidae	——	Stony Corals (Scleractinia)		Hard Corals
				Dendrophylliidae	——	Stony Corals (Scleractinia)		Hard Corals
				Flabellidae	——	Stony Corals (Scleractinia)		Hard Corals
				Fungiacyathidae	——	Stony Corals (Scleractinia)		Hard Corals
				Micrabaciidae	——	Stony Corals (Scleractinia)		Hard Corals
				Oculinidae	——	Stony Corals (Scleractinia)		Hard Corals
				Turbinoliidae	——	Stony Corals (Scleractinia)		Hard Corals
				Madreporidae	——	Stony Corals (Scleractinia)		Hard Corals
	Octocorallia *4	Scleralcyonacea ≒Calcaxonia-Pennatulacea	Pennatuloidea *5	Anthoptilidae	——	NA	Pennatulaceans *5	NA
				Balticinidae	——	NA	Pennatulaceans *5	NA
				Funiculinidae	——	NA	Pennatulaceans *5	NA
				Kophobelemnidae	——	NA	Pennatulaceans *5	NA
				Pennatulidae	——	NA	Pennatulaceans *5	NA
				Protoptilidae	——	NA	Pennatulaceans *5	NA
				Scleroptilidae	——	NA	Pennatulaceans *5	NA
				Stachyptilidae	——	NA	Pennatulaceans *5	NA
				Umbellulidae	——	NA	Pennatulaceans *5	NA
				Veretillidae	——	NA	Pennatulaceans *5	NA
				Virgulariidae	——	NA	Pennatulaceans *5	NA
				Chrysogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Keratoisididae	——	Gorgonacea	Gorgonians	Gorgonians
				Primnoidae	——	Gorgonacea	Gorgonians	Gorgonians
				Briareidae	——	Gorgonacea	Gorgonians	Gorgonians
				Clavulariidae>> **Briareidae**	*Pachyclavularia*>>***Briareum***	Alcyonacea	Soft Corals	Soft Corals
				Alcyoniidae>> **Coralliidae** *6	*Anthomastus*	Alcyonacea	Soft Corals	Soft Corals
					Paraminabea	Alcyonacea	Soft Corals	Soft Corals
				Paragorgiidae>> **Coralliidae** *6	——	Gorgonacea	Gorgonians	Gorgonians
				Coralliidae *6	——	Gorgonacea	Gorgonians	Gorgonians
		Malacalcyonacea ≒Holaxonia-Alcyoniina		Clavulariidae	——	Alcyonacea	Soft Corals	Soft Corals
				——	*Pseudocladochonus* *7	Alcyonacea	Soft Corals	Soft Corals
				Tubiporidae	——	Alcyonacea	Soft Corals	Soft Corals
				Nidaliidae	——	Alcyonacea	Soft Corals	Soft Corals
				Siphonogorgiidae	——	Alcyonacea	Soft Corals	Soft Corals
				Anthothelidae>> **Alcyoniidae** *8	*Anthothela*	Gorgonacea	Gorgonians	Gorgonians
				Nephtheidae>> **Alcyoniidae** *8	*Gersemia*	Alcyonacea	Soft Corals	Soft Corals
				Alcyoniidae *8	——	Alcyonacea	Soft Corals	Soft Corals
				Nephtheidae	——	Alcyonacea	Soft Corals	Soft Corals
				Paralcyoniidae	——	Alcyonacea	Soft Corals	Soft Corals
				Gorgoniidae	——	Gorgonacea	Gorgonians	Gorgonians
				Isididae	——	Gorgonacea	Gorgonians	Gorgonians
				Keroeididae	——	Gorgonacea	Gorgonians	Gorgonians
				Astrogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Euplexauridae	——	Gorgonacea	Gorgonians	Gorgonians
				Anthogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Acanthogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Victorgorgiidae	——	Gorgonacea	Gorgonians	NA
				Plexauridae	——	Gorgonacea	Gorgonians	NA
				——	*Calcigorgia* *9	Gorgonacea	Gorgonians	NA

*1 Classification is based on WoRMS (in July 2024)

*2 Nominal names of VME indicator corals agreed by NPFC for adoption after 2025 (NPFC-2024-COM08-Final Report-ANNEX O-G)

*3 Coral Morphology Categories of "NPFC VME Taxa Identification Guide (Western North Pacific Ocean)"

*4 See WoRMS based on McFadden *et al*. (2022) for the present octocorallian classificaton, and McFadden *in* Daly *et al*. (2007) for the former one
The current families of octocorals and their correspondence to former suborders/systems are well summarized *in* Table 2 of McFadden *et al*. (2022)

*5 2024_9th_COM has agreed to add pennatulaceans (sea pens) to the VME indicator taxa (entered into force 1 January 2025)

*6 The family Coralliidae is originally gorgonians (Gorgonacea), but the current classification includes some soft corals (formerly Alcyonacea)
(e.g. Anthomastus)

*7 *Pseudocladochonus* is the genus Octocorallia *incertae sedis* in McFadden *et al*. (2022) and in also WoRMS. (See Table 3 *in* McFadden *et al*., 2022)

*8 The family Alcyoniidae is originally soft corals (former Alcyonacea), but the current classification includes some gorgonians (Gorgonacea)
(e.g. Anthothela)

*9 *Calcigorgia* is a gorgonian genus in Octocorallia *incertae sedis* in McFadden *et al*. (2022) and in also WoRMS. (See Table 3 *in* McFadden *et al*., 2022)

>> pink= former Gorgonacea (Gorgonians); yellow= former Alcyonecea (Soft Corals)

WoRMS (World Register of Marine Species) https://www.marinespecies.org/index.php

Daly *et al*. (2007) The phylum Cnidaria: A review of phylogenetic patterns and diversity 300 years after Linnaeus. *Zootaxa*, 1668: 127-182.

McFadden *et al*. (2022) Revisionary systematics of Octocorallia (Cnidaria: Anthozoa) guided by phylogenomics. *Bull. Soc. Syst. Biol.*, 1: 1-79.

Annex K

Revised CMM 2024-06 - Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northeastern Pacific Ocean

CMM 2024-06

(Entered into force 24 July 2024)

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: black corals (Antipatharia), gorgonians, 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. The translation table of VME indicator corals between common and scientific names is attached to the VME taxa identification guide (link) [to this CMM (Annex 6)].

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 2Kg or sponges (Demospongiae and Hexactinellida) that exceed 5Kg 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 black corals (Antipatharia), gorgonians, pennatulaceans, stony corals (Scleractinia), and soft corals. The VME indicator taxa also include 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.

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.

9. 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.

Annex 1

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)

Appendix 1.2

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

Annex 2

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.

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

[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.

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.

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 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).

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

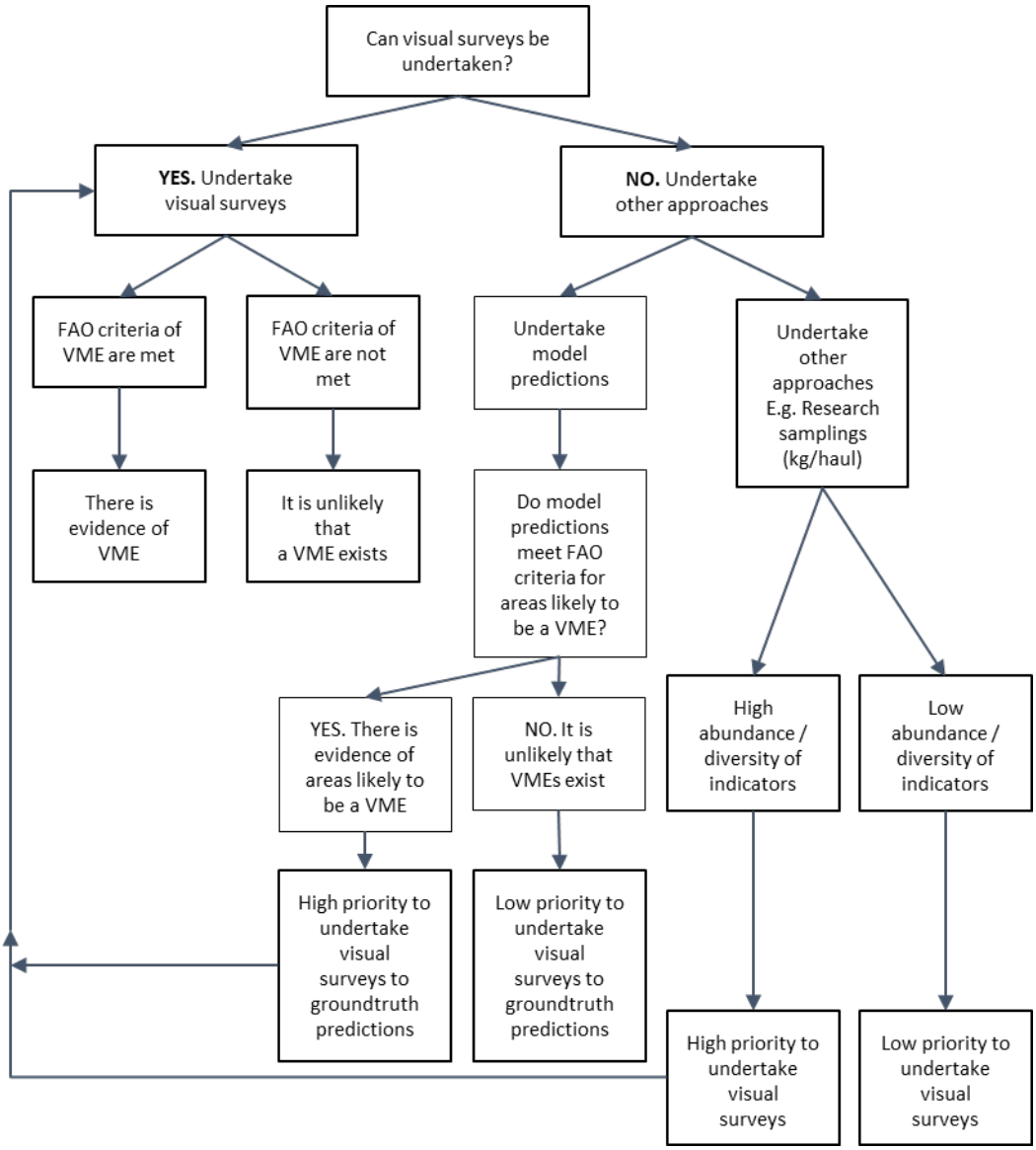
(2) Results of analysis

(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).

Annex 2.3

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



Annex 3

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.

Annex 4

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.

Annex 5

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.

Annex 6

Translation table of VME indicator corals between common and scientific names

VME Indicator Corals from Emperor Seamounts: Present Classification *1, Taxa, and Common (nominal) Names in NPFC

Sub phylum	Class	Order	Superfamily	Family	Genus/Subgenus	NPFC_～2023	NPFC_2024~ *2	Guide Cat. *3
Anthozoa	Hexacorallia	Antipatharia		Antipathidae	——	Black Corals (Antipatharia)		Black Corals
				Aphanipathidae	——	Black Corals (Antipatharia)		Black Corals
				Cladopathidae	——	Black Corals (Antipatharia)		Black Corals
				Leiopathidae	——	Black Corals (Antipatharia)		Black Corals
				Schizopathidae	——	Black Corals (Antipatharia)		Black Corals
		Scleractinia		Caryophylliidae	——	Stony Corals (Scleractinia)		Hard Corals
				Deltocyathidae	——	Stony Corals (Scleractinia)		Hard Corals
				Dendrophylliidae	——	Stony Corals (Scleractinia)		Hard Corals
				Flabellidae	——	Stony Corals (Scleractinia)		Hard Corals
				Fungiacyathidae	——	Stony Corals (Scleractinia)		Hard Corals
				Micrabaciidae	——	Stony Corals (Scleractinia)		Hard Corals
				Oculinidae	——	Stony Corals (Scleractinia)		Hard Corals
				Turbinoliidae	——	Stony Corals (Scleractinia)		Hard Corals
				Madreporidae	——	Stony Corals (Scleractinia)		Hard Corals
	Octocorallia *4	Scleralcyonacea ≒Calcaxonia-Pennatulacea	Pennatuloidea *5	Anthoptilidae	——	NA	Pennatulaceans *5	NA
				Balticinidae	——	NA	Pennatulaceans *5	NA
				Funiculinidae	——	NA	Pennatulaceans *5	NA
				Kophobelemnidae	——	NA	Pennatulaceans *5	NA
				Pennatulidae	——	NA	Pennatulaceans *5	NA
				Protoptilidae	——	NA	Pennatulaceans *5	NA
				Scleroptilidae	——	NA	Pennatulaceans *5	NA
				Stachyptilidae	——	NA	Pennatulaceans *5	NA
				Umbellulidae	——	NA	Pennatulaceans *5	NA
				Veretillidae	——	NA	Pennatulaceans *5	NA
				Virgulariidae	——	NA	Pennatulaceans *5	NA
				Chrysogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Keratoisididae	——	Gorgonacea	Gorgonians	Gorgonians
				Primnoidae	——	Gorgonacea	Gorgonians	Gorgonians
				Briareidae	——	Gorgonacea	Gorgonians	Gorgonians
				Clavulariidae>> **Briareidae**	*Pachyclavularia*>>***Briareum***	Alcyonacea	Soft Corals	Soft Corals
				Alcyoniidae>> **Coralliidae** *6	*Anthomastus*	Alcyonacea	Soft Corals	Soft Corals
					Paraminabea	Alcyonacea	Soft Corals	Soft Corals
				Paragorgiidae>> **Coralliidae** *6	——	Gorgonacea	Gorgonians	Gorgonians
				Coralliidae *6	——	Gorgonacea	Gorgonians	Gorgonians
		Malacalcyonacea ≒Holaxonia-Alcyoniina		Clavulariidae	——	Alcyonacea	Soft Corals	Soft Corals
				——	*Pseudocladochonus* *7	Alcyonacea	Soft Corals	Soft Corals
				Tubiporidae	——	Alcyonacea	Soft Corals	Soft Corals
				Nidaliidae	——	Alcyonacea	Soft Corals	Soft Corals
				Siphonogorgiidae	——	Alcyonacea	Soft Corals	Soft Corals
				Anthothelidae>> **Alcyoniidae** *8	*Anthothela*	Gorgonacea	Gorgonians	Gorgonians
				Nephtheidae>> **Alcyoniidae** *8	*Gersemia*	Alcyonacea	Soft Corals	Soft Corals
				Alcyoniidae *8	——	Alcyonacea	Soft Corals	Soft Corals
				Nephtheidae	——	Alcyonacea	Soft Corals	Soft Corals
				Paralcyoniidae	——	Alcyonacea	Soft Corals	Soft Corals
				Gorgoniidae	——	Gorgonacea	Gorgonians	Gorgonians
				Isididae	——	Gorgonacea	Gorgonians	Gorgonians
				Keroeididae	——	Gorgonacea	Gorgonians	Gorgonians
				Astrogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Euplexauridae	——	Gorgonacea	Gorgonians	Gorgonians
				Anthogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Acanthogorgiidae	——	Gorgonacea	Gorgonians	Gorgonians
				Victorgorgiidae	——	Gorgonacea	Gorgonians	NA
				Plexauridae	——	Gorgonacea	Gorgonians	NA
				——	*Calcigorgia* *9	Gorgonacea	Gorgonians	NA

*1 Classification is based on WoRMS (in July 2024)

*2 Nominal names of VME indicator corals agreed by NPFC for adoption after 2025 (NPFC-2024-COM08-Final Report-ANNEX O-G)

*3 Coral Morphology Categories of "NPFC VME Taxa Identification Guide (Western North Pacific Ocean)"

*4 See WoRMS based on McFadden *et al*. (2022) for the present octocorallian classificaton, and McFadden *in* Daly *et al*. (2007) for the former one
The current families of octocorals and their correspondence to former suborders/systems are well summarized *in* Table 2 of McFadden *et al*. (2022)

*5 2024_9th_COM has agreed to add pennatulaceans (sea pens) to the VME indicator taxa (entered into force 1 January 2025)

*6 The family Coralliidae is originally gorgonians (Gorgonacea), but the current classification includes some soft corals (formerly Alcyonacea) (e.g. Anthomastus)

*7 *Pseudocladochonus* is the genus Octocorallia *incertae sedis* in McFadden *et al*. (2022) and in also WoRMS. (See Table 3 *in* McFadden *et al*., 2022)

*8 The family Alcyoniidae is originally soft corals (former Alcyonacea), but the current classification includes some gorgonians (Gorgonacea) (e.g. Anthothela)

*9 *Calcigorgia* is a gorgonian genus in Octocorallia *incertae sedis* in McFadden *et al*. (2022) and in also WoRMS. (See Table 3 *in* McFadden *et al*., 2022)

>> pink= former Gorgonacea (Gorgonians); yellow= former Alcyonecea (Soft Corals)

WoRMS (World Register of Marine Species) https://www.marinespecies.org/index.php

Daly *et al*. (2007) The phylum Cnidaria: A review of phylogenetic patterns and diversity 300 years after Linnaeus. *Zootaxa*, 1668: 127-182.

McFadden *et al*. (2022) Revisionary systematics of Octocorallia (Cnidaria: Anthozoa) guided by phylogenomics. *Bull. Soc. Syst. Biol.*, 1: 1-79.