NPFC

North Pacific Fisheries Commission

6th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems
REPORT

8–10 December 2025

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8-10 December 2025
Nagoya, Japan

REPORT

Agenda Item 1. Opening of the Meeting

1. The 6th Meeting of the Small Scientific Committee on Bottom Fish and Marine Ecosystems (SSC BF-ME06) was held in a hybrid format, with participants attending in-person in Nagoya, Japan, or online via WebEx, on 8–10 December 2025. 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), the International Council for the Exploration of the Sea (ICES) and the Pew Charitable Trusts (Pew) attended as observers. Dr. Maite Pons and Dr. Ricardo Amoroso participated as invited experts.

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

3. Japan thanked the participants for coming to Nagoya and expressed its pleasure to be hosting the meeting. Japan also welcomed participants joining the meeting online. Japan noted the importance of the SSC BF-ME's scheduled work, including developing stock assessments for North Pacific armorhead (NPA), splendid alfonsino (SA), and sablefish, identification of vulnerable marine ecosystems (VMEs), and the updating of impact assessments, for providing strong scientific advice and supporting sustainable management of marine resources.

4. The Science Manager, Dr. Aleksandr Zavolokin, 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 agreed to change agenda item 10.3.4 from "Other Proposals related to CMM 2025-05" to "Other recommendations for CMM."

7. The agenda was adopted as revised (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 BFME05

8. The Chair summarized the discussions and outcomes of the SSC BF-ME05 meeting.

3.2 COM09

9. The Science Manager presented the outcomes from the 9th Commission meeting (COM09) that concern the SSC BF-ME.

3.2.1 CMMs 2025-05 and 2025-06

10. The Science Manager outlined the revisions made to Conservation and Management Measure (CMM) 2025-05 for Bottom Fisheries and Protection of VMEs in the Northwestern (NW) Pacific Ocean and CMM 2025-06 for Bottom Fisheries and Protection of VMEs in the Northeastern (NE) Pacific Ocean.

3.2.2 Requests from COM09

11. The Science Manager informed the SSC BF-ME that the Commission requested the SC to consider the frequency of stock assessments, including the possibility of conducting benchmark assessments less frequently with updates in between, and to explore the potential benefits of a peer review system.

12. The Science Manager reminded the SSC BF-ME that CMM 2023-14 on Sharks requires Members to report all shark catches as part of their Annual Reports and that the deadline for the submission of the next Annual Report is 15 January 2026.

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 2024

13. The Science Manager presented the fishing catch and effort statistics for NPA including the latest available data for 2024. Total catch in 2024 was around 46 MT. 1 Japanese trawl and 1 Japanese gillnet vessel were in operation catching NPA and SA in the Convention Area.

4.2 NPA monitoring survey and Adaptive Management Procedure (AMP)

4.2.1 Review of the results from 2025 monitoring survey

14. The Science Manager presented the results of the monitoring survey for NPA in the Emperor Seamounts in 2025 (NPFC-2025-SSC BFME06-IP01). The fishing vessel Kaiyo Maru No.51 conducted four trawl hauls for at least one hour each in Koko Seamount from March to June 2025. The criteria for high recruitment were not met.

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

4.3.1 Ongoing research activities on NPA

15. No ongoing activities were presented.

4.3.2 Future and planned research activities by Members on NPA in 2026

16. No future or planned activities 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 2024

17. The Science Manager presented the fishing catch and effort statistics for SA including the latest available data for 2024. Total catch in 2024 was around 1,573 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 Ongoing research activities on SA

18. No ongoing activities were presented.

5.2.2 Future and planned research activities by Members on SA in 2026

19. Japan informed the SSC BF-ME that it intends to conduct research on the possibility of sex change occurring in SA in response to a paper observing this characteristic in the Atlantic SA population.

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

6.1 Review of Members fishing statistics for sablefish in 2024

20. 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)

21. 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-2025-SSC BFME06-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), ~3–5-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 Convention Area, there has been no fishery catch or effort since

2020.

22. The SSC BF-ME developed a stock status summary for sablefish, as shown in Annex D, 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

23. The SSC BF-ME reviewed the updated species summary of sablefish (NPFC-2025-SSC BFME06-WP02).

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

25. The SSC BF-ME reviewed the updated species summary of blackspotted and rougheye rockfishes (NPFC-2025-SSC BFME06-WP03).

26. The SSC BF-ME recommended that the SC adopt the updated species summary of blackspotted and rougheye rockfishes (Annex F).

6.2.3 Proposed method for developing harvest control rule for sablefish in CA

27. Canada presented a proposed analysis of potential harvest control rule (HCR) for sablefish in the Convention Area (NPFC-2025-SSC BFME06-IP03). Canada proposed developing a simple effort-limitation decision rule based on the following equation:

$$E_{TARGET} = \frac{F_{TARGET}}{q}$$

where the target (or limit) fishing effort E_{TARGET} would be fixed most years or revised occasionally as new information arises, F_{TARGET} is a target fishing mortality rate that could, at first, be derived based on F_{MSY} estimates for the coastal Alaska and British Columbia stock assessment and perhaps revised based on information specific to each seamount, and q is a trap catchability that could be estimated similarly based on a combination of British Columbia coastal stock assessment and local information. Canada intends to estimate the components of the equation for the Cobb seamount chain to derive a potential HCR for sablefish trap fisheries. The rule can also be tested via simulation to evaluate robustness to variation in coastal abundances and vessel-specific catchability.

28. Pew expressed support for the work being conducted by Canada to potentially develop an HCR for sablefish. Pew suggested that Canada also consider the potential impact of climate change and other ecosystem factors on sablefish, pointing out that preliminary research suggests that the stock is moving westward into the Convention Area.

6.2.4 Other research activities on sablefish

29. Canada shared examples of ongoing research activities on sablefish including work on a spatially explicit research-based assessment model, exploration of time-varying and density-dependent growth, analysis of potential North Pacific Fishery Management Council actions to allow small sablefish release, estimation of transboundary movement rates and abundance exchange, development of bottom-contacting estimates for sablefish longline trap and hook fishing gear on seafloor habitats in British Columbia, and a VME MSE process using S'Gaan Kinghlas-Bowie data.

6.2.5 Future and planned research activities by Members on sablefish in 2026

30. Canada shared examples of future and planned research activities, including integrating climate-linkages to early life history stages, investigation into the prevalence and determinants of skipped spawning, development of an electronic tagging database and use in spatial modeling, evaluation of management procedures with mortality caps on sub-legal sablefish, and updated investigation into potential environmental drivers of sablefish recruitment and growth in British Columbia.

Agenda Item 7. Skilfish in the NPFC Convention Area

7.1 Updated catch and effort for skilfish in 2024

31. The SSC BF-ME noted that no Members have targeted skilfish in the Convention Area after 2021 and that all reported catches of skilfish were bycatch in fisheries targeting other species.

7.2 Skilfish species summary document update and review

32. The SSC BF-ME reviewed the updated species summary of skilfish (NPFC-2025-SSC BFME06-WP20).

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

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

8.1 Update from SWG NPA-SA

34. 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-ME05 (NPFC-2025-SSC BFME06-WP12). Further details are described in Agenda Items 8.1.1–8.1.6 below.

35. The SWG NPA-SA Lead explained that, besides the SWG's assigned tasks, two of its members, Dr. Kota Sawada and Mr. Satoi Arai (Japan), participated in the 14th Workshop on the Development of Quantitative Assessment Methodologies based on Life-history traits,

exploitation characteristics, and other relevant parameters for data-limited stocks (ICES WKLIFE XIV) in Horta, Portugal. Dr. Sawada and Mr. Arai received travel support from the United Nations Food and Agriculture Organization (FAO) Deep-Sea Fisheries Project and they gave presentations on NPA and SA assessments in the NPFC. Dr. Sawada and Mr. Arai gave a report to the SWG on their participation in the workshop and shared the suggestions they received from the workshop participants. The SWG noted these suggestions, including a fatness-based model as opposed to length- or age-based models for NPA, application of surplus production models in continuous-time (SPiCT) and the possibility of protandrous hermaphroditism (i.e. male-to-female sex change) for SA.

8.1.1 Depletion analysis of NPA catch and update on IBM approach

36. The SWG NPA-SA Lead explained that in 2024, the SWG NPA-SA completed data sharing for depletion analysis. In 2025, in response to the request from the invited experts, the SWG shared additional data. Using the shared data, the invited experts conducted a depletion analysis for NPA.

37. Dr. Pons presented a depletion analysis for NPA in the Southern Emperor-Northern Hawaiian Ridge seamounts using data from 2010 to 2024 (NPFC-2025-SSC BFME06-WP18). Average CPUE declined with increasing cumulative catch, reflecting localized depletion of NPA aggregations as fishing progressed. Simple and mixed-effects regression models produced consistent results. The depletion models indicate that NPA is currently subject to high exploitation rates. The low biomass estimated in recent years aligns with the low catches observed over the past decade, suggesting that the stock may be in poor condition, or that a regime shift leading to low recruitment has occurred. Changing targeting could be a limitation for the analysis. Based on the Japanese data, which have information of intended target species, NPA has not been a target of the fishery since 2020. If catchability changed through time, CPUE may no longer be a proportional index of local abundance and estimates could be biased.

38. The SWG NPA-SA Lead explained that based on the depletion analysis, the SWG NPA-SA concluded that:
    (a) No strong recruitment was detected in the recent years (since 2013), consistent with the result of monitoring surveys.
    (b) Stock status remains low.
    (c) Harvest rate is likely to be high.
    (d) The current analysis has some caveats including:
        i. the possible effect of target shift from NPA to SA,
        ii. uncertainty in the estimation of the timing (seasonality) of recruitment,
        iii. estimates of harvest rates >1 in some years and seamounts, and
        iv. potential bias caused by the removal of zero-catch operations from the data.

39. The SWG NPA-SA Lead explained that based on the depletion analysis, the SWG NPA-SA provided the following advice:
   (a) Keep monitoring possible recruitment events, and try to avoid high harvest rate for recruited fish, as specified in the current CMM 2025-05, paragraphs 4.M and L.
   (b) Reduce the harvest rate as much as possible when the recruitment is weak, while recognizing the voluntary avoidance of targeting NPA by Japanese fishers.

40. The SWG NPA-SA Lead explained that as a future task, the SWG NPA-SA agreed to continue improving the analysis by expanding the model to incorporate entire time series ("seamount integrated depletion method"), using fatness information to estimate recruitment, and finding ways to incorporate zero-catch operations and targeting.

41. The SWG NPA-SA Lead explained that the SWG made no progress on individual-based modeling (IBM) in 2025 as it agreed to focus on depletion analysis and put lower priority on the IBM approach.

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

8.1.2 Standardized CPUE for SA

43. The SWG NPA-SA Lead explained that the SWG NPA-SA reviewed work conducted by Japan to standardize the CPUE of SA. Japan's first analysis was conducted using the R package glmmTMB. Japan then conducted an analysis using the R package sdmTMB following the SWG NPA-SA's advice.

44. Japan presented initial estimates of standardized CPUE for SA in the Emperor Seamounts, with records from 2010 to 2024 by the bottom trawl and bottom gillnet fisheries (NPFC-2025-BFME06-WP13). Japan analyzed trawl and gillnet data separately due to differences in effort methodology and fishing history. For statistical analysis, it employed a delta-gamma model utilizing the sdmTMB package to compare CPUE over time. Although the sdmTMB delta-gamma model seemed to fit the data well according to quantile-quantile plot, due to ongoing issues with coding, Japan was unable to calculate the index values and associated uncertainty necessary for integrated modeling. Additionally, the gillnet standard error for the binomial component for several years was unusually large; this is likely the result of low sample size and few instances of zero-catch hauls in those years and will need to be addressed going forward. More work is necessary to further optimize the model and produce index values, so the current results are strictly preliminary.

45. The SSC BF-ME encouraged Japan to continue to develop this work, including exploring the use of additional covariates or the use of month as a proxy for some of the covariates, and exploring other possible model distributions.

8.1.3 Review of biological data collection

46. The SWG NPA-SA Lead explained that the SWG NPA-SA reviewed preliminary annual age-length keys for SA presented by Japan as a potential input for integrated modeling.

8.1.4 Review of results of integrated model for SA

47. The SWG NPA-SA Lead explained that the SWG NPA-SA reviewed the invited experts' initial run of the integrated model for SA with Stock Synthesis (SS3) using length composition data and nominal CPUE data provided by Japan, previously estimated life history parameters, and annual catch information of SA in the Convention Area. The initial run was aimed at testing feasibility, not at providing reliable estimate or advice. The SWG NPA-SA confirmed that the results should not be considered to reflect stock status until further analyses are conducted. The SWG NPA-SA reviewed the results and recommended continuing development of the integrated model using SS3, while noting that the assumption on selectivity could be improved.

48. Dr. Amoroso presented preliminary SS3 results for SA (NPFC-2025-SSC BFME06-WP16). The work was conducted as a diagnostic phase needed to prepare a defensible, fully tuned SS3 model. The model framework itself is functioning correctly and capable of accommodating the available data streams. However, several key elements are still missing before a defensible assessment can be completed. First, the standardized abundance indices are essential for informing absolute and relative trends in stock size. Second, the exploratory runs demonstrate high sensitivity to biological parameters, including natural mortality, growth, maturity, and selectivity formulations. Finally, even a very crude abundance index that spans for a longer period of time would substantially improve historical reconstruction and reduce reliance on strong assumptions. To allow subsequent SS3 runs to move from diagnostic exploration toward a robust, defensible stock assessment, the following critical steps are required: 1. integrating the standardized CPUE indices, 2. exploring sensitivities to biological parameters, and 3. improving historical reconstruction through any additional information that can be brought into the model.

49. The SSC BF-ME encouraged the invited experts to continue developing the model and Members to identify potential sources of historical data that could help inform the model.

8.1.5 Review of stock status for SA

50. The SSC BF-ME developed a stock status summary for SA under agenda item 9.

8.1.6 Literature review of results on the effects of climate change on SA and NPA

51. The SWG NPA-SA Lead explained that:
    (a) The SWG NPA-SA reviewed the overview presented by Dr. Joel Rice entitled "Incorporating Climate Change into the North Pacific Fisheries Commission Framework – A summary for the SWG NPA-SA Meeting," which was supported by the FAO Deep-sea Fisheries project.
    (b) The SWG NPA-SA recognized the importance of research on climate change impacts on bottom fish but agreed to focus on the ongoing works for NPA and SA assessments at this stage.
    (c) The SWG NPA-SA agreed to continue monitoring key population parameters and collecting data on age, growth and maturity for future analyses, including climate change effects.
    (d) Canada informed participants that it plans to draft a list of climate-change indicators for the SSC BF-ME06.
    (e) The USA introduced a relevant preprint article (Champagnat et al. 2025).

8.1.7 NPA species summary document update and review

52. The SWG NPA-SA Lead explained that the SWG had prepared an updated species summary of NPA (NPFC-2025-SSC BFME06-WP04).

53. The SSC BF-ME reviewed the updated species summary of NPA and recommended that the SC adopt the updated species summary (Annex H).

8.1.8 SA species summary document update and review

54. The SWG NPA-SA Lead explained that the SWG had prepared an updated species summary of SA (NPFC-2025-SSC BFME06-WP05).

55. The SSC BF-ME reviewed the updated species summary of SA and recommended that the SC adopt the updated species summary (Annex I).

Agenda Item 9. Summary slides for Sablefish, NPA, SA and Skilfish

9.1 Draft, review and discuss draft slides on priority bottom fish species for presentation to Commission

56. The SSC BF-ME developed stock status summary slides for sablefish, NPA and SA, as shown in Annex D, and recommended that the SC Chair present the information in the summary to the Commission.

57. Canada and the United States called for more precautionary management of NPA, including

a potential closure of the trawl fishery, to reverse the apparent trends in biomass, CPUE, and harvest rate.

58. Japan did not think there was sufficient scientific evidence to justify stronger new measures at this stage.

59. The DSCC and Pew expressed their support for the NPFC's ongoing research on NPA and SA. However, on the basis of the obligations in the NPFC Convention, the United Nations Fish Stocks Agreement (UNFSA), and the United Nations General Assembly (UNGA) Resolutions, they urged the SSC BF-ME to recommend the closure of the NPA and SA fisheries until the scientific uncertainties in the stock assessment process can be overcome and the stocks are firmly on the path to being rebuilt.

60. The SSC BF-ME expressed its appreciation for the hard work done by the invited experts to advance the stock assessments of NPA and SA, which will support the SC in developing and providing defensible advice for the Commission.

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 Update on surveys and modeling of VME distribution in the NE Pacific

61. Canada presented an updated identification of VMEs on Cobb Seamount in the Northeast Pacific Ocean based on visual data that includes pennatulaceans as VME indicator taxa (NPFC-2025-SSC BFME06-WP14), building on work presented previously in NPFC-2023-SSC BFME04-WP13. Canada re-calculated the VME indicator taxa density threshold by including pennatulaceans, which the Commission added to the list of NPFC VME indicator taxa in 2024. The updated threshold was 0.58 VME indicator taxa colonies m^{-2}. Canada then applied this updated threshold to visual data from autonomous underwater vehicle (AUV) transects on Cobb Seamount and identified three new areas as VMEs, each approximately 50 m^2.

62. Canada presented an updated identification of potential VMEs on the Cobb-Eickelberg seamount chain based on predictive modelling that includes pennatulaceans as VME indicator taxa (NPFC-2025-SSC BFME06-WP09). Canada re-calculated the VME indicator taxa density threshold by including pennatulaceans, which the Commission added to the list of NPFC VME indicator taxa in 2024. The updated threshold was 0.58 VME indicator taxa colonies m^{-2}. The methods predicted that potential VMEs are present on all seamounts in the Cobb-Eickelberg seamount chain. Canada welcomed comments and suggestions from Members and Observers on its proposed methodology to identify areas likely to be VMEs.

63. Canada presented updated information (NPFC-2025-SSC BFME06-IP05) from the Joint Canada-USA International Seamount Survey (JCUISS). In 2022 and 2024 ~two-week surveys using an underwater stereo camera were undertaken at 5 seamounts in the Cobb Seamount Chain. Data were collected at 77 transects in 2022 and 58 transects in 2024. Analyses of these data have shown that deep-sea corals are widespread at relatively low densities across all the seamounts examined and especially at depths below 400 m where the majority of the sampling occurred. Preliminary species distribution models have been developed for coral and sponge taxonomic groups based on these data.

10.1.2 Surveys of VME in the Emperor Seamounts in 2025

64. Japan presented a report of its sea-floor visual survey in the Emperor Seamount area in 2025 (NPFC-2025-SSC BFME06-IP09). The objectives of the survey were to identify the extent of VME indicator taxa communities (Suiko Seamount and Yuryaku Seamount), to collect information on the distribution of cold-water corals and other communities in northern areas that have continued to be fished since 2023 (North Koko Seamount), and to resurvey past survey sites in areas closed to fishing (C-H Seamount). At Suiko Seamount, Japan has clarified the potential VME range. At Yuryaku Seamount, Japan concluded that there is likely no further northern extension of VME indicator taxa communities. At North Koko Seamount, Japan continued collecting distribution information. At C-H Seamount, Japan found increased density of corals and other benthos for some sites and saw no changes at sites previously found to have low or no coral and benthos. Japan plans to resurvey the remaining C-H Seamount sites next summer.

10.1.3 Other research activities on VMEs

65. The DSCC presented a paper (NPFC-2025-SSC BFME06-OP04) suggesting that the NPFC recognize new quantitative scientific evidence for SAIs from visual surveys of Koko Seamount in the NPFC Convention Area based on research conducted by Biede et al. (2025; https://doi.org/10.1016/j.marenvres.2025.107587). The study compared visual evidence of fishing, trawl scars and anthropogenically sourced debris to the abundance, diversity, and ecosystem function of benthic megafauna. It found that that megafaunal abundance, diversity, and metrics of ecosystem function were significantly negatively correlated with increased visual evidence of fishing.

66. The SSC BF-ME noted the potential value of assessing the risk of ongoing SAIs on the Emperor Seamounts by integrating some of the methods presented in NPFC-2025-SSC BFME06-OP04 and information about currently ongoing fisheries in the area. The SSC BF-ME encouraged interested Members to hold intersessional discussions on this matter and to share the outcomes of those discussions at SSC BF-ME07.

10.1.4 Future and planned research activities by Members on VMEs in 2026

67. Japan informed the SSC BF-ME that it plans to conduct similar surveys of VME in the Emperor Seamounts in 2026.

68. Canada informed the SSC BF-ME that it plans to continue to conduct its ongoing data analysis and modeling work.

10.2 Review of intersessional activities of the SWG VME

69. The SWG VME Lead, Dr. Chris Rooper (Canada), presented a report of the SWG VME's activities in the 2025 operational year (NPFC-2025-SSC BFME06-WP15). Summaries of the 1st and 2nd intersessional meetings of the SWG VME are available in NPFC-2025-SSC BFME06-RP01 & RP02. Further details are described in Agenda Items 10.2.1–10.2.6 below.

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

70. The SWG VME Lead explained that Japan and Korea continued to work on alternative methods to define an encounter threshold that is taxon and gear specific using their catch data and that Japan presented an update to the SWG VME.

71. Japan presented a comparison of Japanese and Korean data on bycatch of VME indicator taxa (NPFC-2025-SSC BFME06-WP10). Japan explained that, at SSC BF-ME05, it had applied a data-based method to refine the gear-/taxa-specific bycatch thresholds but could not obtain plausible results. To solve the problem of model uncertainty due to the data limitations, the SSC BF-ME and the SC recommended that Japan incorporate Korean bycatch data. Japan compared the compositions and distributions of Japanese and Korean bycatch data and found that these data may have different distributional patterns, which may make it difficult to treat these data as comparable. Data refinement and/or clarification of the cause of the data discrepancy might be required before putting the data together. However, this work will likely be difficult at this stage. The problem of the spatial mismatch of survey data and bycatch data also remains.

72. The SSC BF-ME encouraged Japan, Korea, and any other interested Members to continue to work on this issue.

10.2.2 Update on progress on data analysis of shared VME indicator data and directions on future joint data analyses (Objectives 2b, 2c and 3)

73. The SWG VME Lead explained that:
    (a) All the observation data from Members was compiled for mapping in 2024.

(b) The presence and absence mapping of VME indicator taxa (Objective 1) was updated to include new data from a 2024 research survey in the Cobb Seamount Chain.
(c) Densities of VME indicator taxa were mapped throughout the Emperor and Cobb Seamount chains.
(d) A new analysis shows the kernel density maps indicating observed "hotspots" for each VME indicator taxa and seamount where sufficient data was available to make the estimate (Objective 2c).
(e) The VME model validation exercise (Objective 2b) was updated with new data from 2022 and 2024 and a new model for gorgonians in the Emperor Seamount Chain.
(f) Although the SWG VME did not undertake work to develop new species distribution models for VME indicator taxa using the data and to highlight areas where surveys should be conducted (Objective 3) in 2025 as a group exercise, Canada has developed new models that utilize the shared data from the Cobb Seamount Chain and for the past few years Japan has been using the shared data (particularly the data shared by the USA) to help prioritize areas for underwater camera surveys.

74. The SWG VME Lead presented the SWG VME's work to map VME presence and absence observations in the Convention Area (NPFC-2025-SSC BFME06-WP07). There were 14,220 observations including both transect and point data from Members. The SWG VME mapped the distribution of the presence of VME indicator taxa for each of the seamounts in the Emperor Seamount Chain and the Cobb Seamount Chain. It also produced a series of figures depicting each of the 17 seamounts with observations.

75. The SWG VME Lead presented updated maps of VME density observations and kernel density estimation in the Convention Area (NPFC-2025-SSC BFME06-WP08). There were 4,090 observations including both transect and point data from Members. The SWG VME mapped the distribution of density of VME indicator taxa for each of the 17 seamounts in the Emperor Seamount Chain and the Cobb Seamount Chain with observations. The SWG VME also estimated kernel density based on these densities. For some taxa-Member combinations there were no data available. For example, Japan did not have any records for sea whips and pens in its submitted data. Therefore, the figures for some seamounts, such as for C-H Seamount, where only Japanese data were available, have no presence or absence records for these VME indicator taxa.

10.2.3 Proposals for revisions to VME indicator species list or nomenclature

76. There were no proposals for revisions to the VME indicator species list or nomenclature.

10.2.4 Proposals for updates to definitions of VME

77. The SWG VME Lead explained that no new methods for identifying VME were proposed by

Members for discussion during the two meetings of the SWG VME. However, the Observers suggested that Members try the method for identifying VME from imagery presented in NPFC-2023-SSC BFME04-IP01.

78. The DSCC presented a paper suggesting that the NPFC endorse two additional approaches to identifying VMEs in the Convention Area (NPFC-2025-SSC BFME06-OP02). One approach is a consensus method for using imagery data to identify VMEs, as described in Baco et al., (2023; https://doi.org/10.7717/peerj.16024) and as previously presented in NPFC-2023-SSC BFME04-IP01. The other approach is the use of species distribution models to identify locations of VMEs likely to occur for reef-forming scleractinian corals, as described in Tong et al., (2023; https://doi.org/10.3389/fmars.2023.1217851).

79. The SSC BF-ME encouraged Members who are planning VME surveys to consider the potential VME locations predicted by species distribution models as one of the factors for prioritizing survey sites.

80. The SSC BF-ME noted the usefulness of the method in Baco et al. (2023) as a tool for identifying areas likely to be VMEs and prioritizing areas for further investigation.

10.2.5 Update on progress on standardizing an approach to defining SAI

81. Canada presented an update on the SWG VME's progress on standardizing an approach to defining SAI (NPFC-2025-SSC BFME06-IP04). Japan and Canada have independently developed similar approaches to assessing the risk of SAIs to VMEs. Both approaches assess the relative risk of SAIs by evaluating the overlap between the distribution of fishing activity and VMEs. The SWG VME has identified some data requirements for several of the steps in the NPFC's flow chart for assessing and managing the risk of an SAI in the Convention Area.

10.2.6 Literature review of connectivity, recruitment and recovery of VME taxa

82. The SWG VME Lead explained that the SWG VME made no progress on conducting a draft literature review on connectivity and suggested that this work might be conducted in 2026. The SWG VME noted that this activity could potentially be conducted in cooperation with a new North Pacific Marine Science Organization (PICES) Working Group on Seamount Connectivity.

10.3 Management of VME and SAI

83. The SWG VME Lead explained that the SWG VME suggested that the SSC BF-ME discuss the holding of a workshop on VME and SAI that would follow up on the 2018 VME workshop.

84. The SSC BF-ME recognized the value of holding a follow-up workshop related to VME and

SAI, while noting the need to set a focused scope for the workshop and avoid overlap with ongoing discussions at the SWG VME. The SSC BF-ME also noted that the workshop may be organized in cooperation with the Deep-sea Fisheries project and PICES.

10.3.1 Updated impact assessment for Japan bottom fish fisheries

85. Japan presented an updated assessment of the potential impacts of Japanese bottom fisheries on VMEs within fished seamounts of the Emperor Seamounts region (NPFC-2025-SSC BFME06-WP11), as well as an updated report on the identification of VMEs and the assessment of impacts caused by individual fishing activities on VMEs or marine species (NPFC-2025-SSC BFME06-WP17). In total, 942 locations were precisely assessed for the risk of SAI by overlapping the fine-scale spatial distribution of trawl/gillnet fishing operations. The majority of these locations were classified as low-risk as the VME indicator taxa are of low abundance or not comprising an ecosystem, and/or fishing intensity was low. This implies that the distribution of the main fishing grounds and the dense patches of VME indicator taxa were spatially segregated within the fished seamounts. Although the spatial overlap of VME indicator taxa and fishing operations was generally limited, some locations were identified as likely to be potential VMEs. Japan's assessments indicate the difficulty of identifying VMEs without visual images, underpinning the fundamental importance of ground truth confirmations to identify true VMEs. Japan newly identified the following potential VMEs: (1) Keratoisidid gorgonian patches with small dendrophylliid scleractinians in the southeastern part of Koko Seamount, (2) Keratoisidid and primnoid gorgonian patches in the center of Suiko Seamount, and (3) diverse gorgonian reefs in the southeastern part of Yuryaku Seamount. Apart from these newly identified potential VME sites, Japan's updated assessments indicated that the distribution of the main fishing grounds and the dense patches of VME indicator taxa were generally spatially segregated within the fished seamounts, thus the recent fishing activities are unlikely to cause significant impacts on VMEs or surrounding organisms in most of the fishing ground.

86. The SSC BF-ME offered some technical suggestions on the work presented by Japan and encouraged Japan to present updated papers to SSC BF-ME07 and SC11.

10.3.2 Updated impact assessment for Canada bottom fish fisheries

87. Canada presented a preliminary updated impact assessment for its sablefish fishery (NPFC-2025-SSC BFME06-WP19). The current Canadian seamount fishery does not appear to pose a conservation concern. Based on domestic stock assessments, the sablefish population is sustainable at current harvest rates. There is minimal bycatch of other species in the fishery. The impact on VME at current (2017–2020) levels appears to be sustainable given the relative benthic status results. Canada explained that it plans to continue to update and improve the assessment and present the updated assessment at SSC BF-ME07 and SC11.

10.3.3 Other updated impact assessments

88. The DSCC presented a paper with suggestions for improvements to the draft template and updated procedures for conducting impact assessments of bottom fisheries in the NPFC Convention Area (NPFC-2025-SSC BFME06-OP03). The suggestions are based on relevant commitments in UNGA Resolutions, and related legal obligations contained in the UNFSA, the United Nations Convention on the Law of the Sea, the NPFC Convention and CMMs 2025-05 and 2025-06.

89. Canada agreed with a subset of the recommendations and suggested that Members consider updating the template accordingly before the next round of assessments.

90. The SSC BF-ME noted that Members are currently in the process of finalizing their updated impact assessments and suggested that as part of this process, Members could discuss potential future modifications to the impact assessments template through the SWG VME.

10.3.4 Other recommendations for CMM

91. Pew and the DSCC presented a joint scientists' letter to NPFC Members regarding the Emperor Seamount Chain (NPFC-2025-SSC BFME06-OP01). In the letter, the 105 undersigned scientists from 22 countries, including experts from NPFC Members, reiterated their call for the NPFC to take steps towards greater protection of the Emperor Seamount Chain and NW Hawaiian Ridge, and recommend a precautionary, bottom fishing moratorium based on the best available science and understanding of the long-term impacts in the region.

92. Canada expressed support for the spirit of the letter and the call for stronger measures to ensure that bottom fishing does not cause further SAIs on VMEs.

93. Korea expressed its intention that it won't resume bottom fishing in the Emperor Seamounts until the NPA monitoring survey finds clear evidence of strong recruitment. Korea also recognized the need to take strong concrete actions to ensure greater protection of the NPA stock and VMEs, and stated that, to that end, it is planning a research expedition to the Emperor Seamounts in 2027, the details of which it would present under agenda item 16.4.

Agenda Item 11. Ecosystem considerations

11.1 Summary of FAO Ecosystem Based Fisheries Management Symposium in March 2025

94. The Chair reported on his attendance of the FAO Symposium on Applying the Ecosystem Approach to Fisheries Management (EAFM) in Areas Beyond National Jurisdiction (ABNJ) and shared the key messages from the symposium (NPFC-2025-SSC BFME06-IP06). Collecting data on all catch and other impacts is a weak spot for most regional fisheries

management organizations (RFMOs) and prevents advancement of EAFM in some cases. It is important to make a start. Taking the initial steps toward EAFM, even if minor, can help to build capacity and interest in implementation of more developed steps. Such symposia offer great opportunities for meeting and sharing ideas with scientists from other RFMOs.

95. Pew suggested that the NPFC conduct an updated review of its CMMs, utilizing the Secretariat's previous UN ICSP15 Submission, against the FAO EAFM implementation monitoring tool.

96. Canada noted that the Convention calls on Members to understand the effects of fishing activities not only on target species but also on species belonging to the same ecosystem or dependent upon or associated with the target stocks. Canada noted that Members are already collecting related information and encouraged the Commission to task Members with sharing this information with the Commission to facilitate the relevant analyses.

97. The SSC BF-ME noted that Members generally did not object to sharing such information but that they could not agree to sharing the information without a clearer understanding of the purpose of the data-sharing and the scope of the data to be shared. The SSC BF-ME tasked the Chair to draft terms of reference (ToR) outlining the purpose for sharing such data. The SSC BF-ME agreed to review the ToR and discuss this matter further in the intersessional period.

11.2 Preliminary ecosystem indicators and framework for communication to SC

98. Canada presented an overview of potential approaches to include ecosystem indicators in the advice process for the NPFC as a first step moving towards an ecosystem approach to fisheries management (NPFC-2025-SSC BFME06-IP07). Canada shared two examples, one from Pacific Herring in British Columbia, Canada and one for Sablefish in Alaska. Both examples highlight different ways to visualize ecosystem indicators and also present these indicators to managers and other scientists so that they are considered when applying or recommending management actions for fisheries. Canada suggested that the SSC BF-ME conduct analysis and work towards reporting of environmental indicators in a similar fashion to the two examples and that these indicators could be presented to the SC as auxiliary information and ecosystem context to inform management decisions.

Agenda Item 12. Data collection and reporting

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

99. Canada encouraged Members to compile and analyze data to understand the impact of bottom fishing activities on wider ecosystem and associated species.

100. The DSCC supported Canada's suggestion.

12.2 Review of the template for collection of scientific observer data

101. The SSC BF-ME did not suggest any amendments to the template for the collection of scientific observer data.

12.3 Update on the work of SWG Data as it pertains to BFME

102. On behalf of the SWG Data Lead, the Data Coordinator, Mr. Sungkuk Kang, provided an update on the work of SWG Data. SWG Data has completed the finalization of the harmonized scientific data framework, including standardized terminology and templates for the seven core scientific data types: Biological Estimates – Raw; Biological Estimates – Age Composition; Biological Estimates – Length Composition; Biological Estimates – Maturity Ogive; Catch and Effort – Processed; Catch and Effort – CPUE; and Catch by Species – Ratio. SWG Data also reviewed the confidentiality rules, validation requirements, and the submission workflow to ensure that the system aligns with the operational needs of the SSC BF-ME and other subsidiary bodies. At this stage, the NPFC Scientific Data Repository supports the seven core fisheries data types. Other BFME datasets, such as VME information, benthic survey data, annual footprint summaries, and model outputs, may continue to be managed through existing channels until additional data types are defined and implemented in future development phases. The prototype structure of the Scientific Data Management System has been completed, and internal testing will begin shortly. This provides the SSC BF-ME with a consistent and transparent foundation for biological and catch-related data used in stock assessments and ecosystem analyses.

Agenda Item 13. 5-Year (2025-2029) Rolling Work Plan

13.1 North Pacific armorhead

13.2 Splendid alfonsino

13.3 Sablefish

13.4 Vulnerable marine ecosystems

13.5 Other ecosystem components

103. The SSC BF-ME reviewed, revised and endorsed the 2025–2029 SSC BF-ME 5-Year Rolling Work Plan (NPFC-2025-SSC BFME05-WP01 (Rev. 1)).

Agenda Item 14. Review of CMMs 2025-05 and 2025-06 for bottom fisheries and protection of vulnerable marine ecosystems and CMM 2019-10 for sablefish

104. There were no proposals for revisions to CMMs.

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 SSC BFME should address

105. The SSC BF-ME noted that the SWG NPA-SA reviewed the work presented by the FAO Consultant, Dr. Joel Rice, on incorporating climate change into the NPFC framework and recognized the importance of research on climate change impacts on bottom fish but agreed to focus on the ongoing works for NPA and SA assessments at this stage. The SWG NPA-SA also agreed to continue monitoring key population parameters and collecting data on age, growth and maturity for future analyses, including climate change effects.

Agenda Item 16. Other matters

16.1 Inter-sessional work and priority issues for next meeting

106. The SSC BF-ME agreed to:

(a) Task the SWG NPA-SA to:

i. Improve depletion model for NPA
   a) Expansion of the model to incorporate entire time series of catch and CPUE

ii. Keep developing integrated model using Stock Synthesis for SA
   a) Finalize CPUE standardization
   b) Look at options for extending the time series using logbooks and other sources
   c) Work to improve biological information for SA
   d) Conduct sensitivity analyses on important processes and parameters

iii. Update species summaries for SA and NPA

iv. Conduct a literature review on climate change for SA and NPA (lower priority)

(b) Task the SWG VME to:

i. Continue working on visual data objectives on agreed ToR from SSC BF-ME04 (Objective 3)
   a) Develop new species distribution (presence/absence and abundance) models for VME taxa on all seamounts
   b) Consolidate other potential data sources and clarify gaps and deficiencies in VME data

ii. Finalize fishing impacts assessments
   a) Consider and discuss potential revisions to the template, particularly reflecting on the suggested additions presented at SSC BF-ME06, and present recommendations for future template changes at SSC BF-ME07 if possible

iii. Consider ToR and objectives for a workshop on VME and SAI that would follow up on the 2018 VME workshop

iv. Continue working on encounter protocol thresholds using Japanese and Korean data (lower priority)

v. Consider and explore other methods for identifying VME

a) Discuss development of criteria for each of the branch points on the VME identification with visual imagery flow chart
b) Explore ideas about using species distribution models to predict likely VME

16.2 Update on PICES WG47 Seamount Ecology and newly proposed PICES WG

107. The Co-Chair of the PICES Working Group 47 (WG-47) on Ecology of Seamounts, Dr. Janelle Curtis, informed the SSC BF-ME that WG-47 prepared and submitted its final report and the report was endorsed by the PICES Governing Council. One of the endorsed recommendations in the final report was to establish a new working group focused on seamount deepwater connectivity.

108. The Chair of the new PICES Working Group 56 (WG-56) on Seamount Connectivity, Dr. Don Kobayashi, provided an update on WG-56's planned activities. The goal of WG-56 is 1) assembling existing information pertaining to reproductive biology of deep ecosystem species, and 2) prior modeling efforts and flow fields on and around seamounts, and to use this knowledge to apply deep sea connectivity modeling with initial focus on Emperor Seamount ecosystems. WG-56 will leverage information and expertise from the recently completed WG-47 on Ecology of Seamounts and will address data gaps identified by WG-47, the NPFC, and other entities involved in managing and conserving seamount ecosystems.

16.3 Selection of Chair for SSC BFME

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

110. The SSC BF-ME elected Dr. Yumiko Osawa (Japan) as Lead of the SWG VME.

16.4 Other issues

111. The United States presented its plans for a study on the population and community structure of black, canary, and yellowtail rockfishes at Cobb Seamount (NPFC-2025-SSC BFME06-IP08). The United States explained that at higher ages, females of these species disappear from the catch, and it intends to investigate whether this is because the females are simply not being caught or whether they are in fact dead, and the potential reasons for either scenario. The United States will apply three approaches to conduct this study: a combined visual and acoustic survey, hook and line sampling for age structure and genetics, and satellite tagging to monitor movement.

112. Korea presented its plans for a research expedition to the Emperor Seamount Chain and Northwestern Hawaiian Ridge in 2027 (NPFC-2025-SSC BFME06-IP02). The expedition is intended to study marine biodiversity and help identify potential VMEs, as well as climate change impacts. It also aims to collect oceanographic data, observations of marine litter

(including abandoned, lost, or otherwise discarded fishing gear), eDNA samples, and observations of encounters with vulnerable species. The data collected will support RFMOs in assessing the risks and sustainability of current and future fisheries in the Emperor Seamount region.

Agenda Item 17. Recommendations to the Scientific Committee

113. The SSC BF-ME agreed to:
   (a) Assign the tasks described in paragraph 106 to the SWG NPA-SA and SWG VME
   (b) Update species summaries for sablefish, blackspotted and rougheye rockfishes, and skilfish
   (c) Elect Dr. Chris Rooper as Chair of the SSC BF-ME and elect Dr. Yumiko Osawa as Lead of the SWG VME

114. The SSC BF-ME recommended the following to the SC:
   (a) Adopt the updated species summaries of sablefish (Annex E), blackspotted and rougheye rockfishes (Annex F), skilfish (Annex G), NPA (Annex H), and SA (Annex I).
   (b) Continue to hire an external expert(s) to support the work of the SWG NPA-SA.
   (c) Request the SC Chair to present the information in the stock status summaries for sablefish, NPA, and SA (Annex D) to the Commission.
   (d) Endorse the updated 2025–2029 SSC BF-ME 5-Year Rolling Work Plan (NPFC-2025-SSC BFME06-WP01 (Rev. 1)).

Agenda Item 18. Next meeting

115. The SSC BF-ME recommended holding a 2.5-day meeting of the SSC BF-ME in 2026 and requested the guidance of the SC and Commission for determining the date, format and location of the meeting.

Agenda Item 19. Adoption of Meeting Report

116. The report was adopted by consensus.

Agenda Item 20. Close of the Meeting

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

118. The meeting closed at 12:45 on 10 December 2025, Nagoya time.

LIST OF ANNEXES

Annex C – List of Participants

Annex D – Stock Status Summary Slides for Sablefish, NPA and SA

Annex E – Species Summary for Sablefish

Annex F – Species Summary for Blackspotted and Rougheye Rockfishes

Annex G – Species Summary for Skilfish

Annex H – Species Summary for North Pacific Armorhead

Annex I – Species Summary for Splendid Alfonsino

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 BFME05
- 3.2 COM09
  - 3.2.1 CMMs 2025-05 and 2025-06
  - 3.2.2 Requests from COM09

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 2024
- 4.2 NPA monitoring survey and Adaptive Management Procedure (AMP)
  - 4.2.1 Review of the results from 2025 monitoring survey
- 4.3 Review of Members' research and joint research activities on NPA
  - 4.3.1 Ongoing research activities on NPA
  - 4.3.2 Future and planned research activities by Members on NPA in 2026

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 2024
- 5.2 Review of Members' research and joint research activities on SA
  - 5.2.1 Ongoing research activities on SA
  - 5.2.2 Future and planned research activities by Members on SA in 2026

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

- 6.1 Review of Members fishing statistics for sablefish in 2024
- 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 Proposed method for developing harvest control rule for sablefish in CA
  - 6.2.4 Other research activities on sablefish
  - 6.2.5 Future and planned research activities by Members on sablefish in 2026

Agenda Item 7. Skilfish in the NPFC Convention Area

7.1 Updated catch and effort for skilfish in 2024

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 Depletion analysis of NPA catch and update on IBM approach

8.1.2 Standardized CPUE for SA

8.1.3 Review of biological data collection

8.1.4 Review of results of integrated model for SA

8.1.5 Review of stock status for SA

8.1.6 Literature review of results on the effects of climate change on SA and NPA

8.1.7 NPA species summary document update and review

8.1.8 SA species summary document update and review

Agenda Item 9. Summary slides for Sablefish, NPA, SA and Skilfish

9.1 Draft, review and discuss draft slides on priority bottom fish species for presentation to Commission

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 Update on surveys and modeling of VME distribution in the NE Pacific

10.1.2 Surveys of VME in the Emperor Seamounts in 2025

10.1.3 Other research activities on VMEs

10.1.4 Future and planned research activities by Members on VMEs in 2026

10.2 Review of intersessional activities of the SWG VME

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

10.2.2 Update on progress on data analysis of shared VME indicator data and directions on future joint data analyses (Objectives 2b, 2c and 3)

10.2.3 Proposals for revisions to VME indicator species list or nomenclature

10.2.4 Proposals for updates to definitions of VME

10.2.5 Update on progress on standardizing an approach to defining SAI

10.2.6 Literature review of connectivity, recruitment and recovery of VME taxa

10.3 Management of VME and SAI

10.3.1 Updated impact assessment for Japan bottom fish fisheries

10.3.2 Updated impact assessment for Canada bottom fish fisheries

10.3.3 Other updated impact assessments

10.3.4 Other recommendations for CMM

Agenda Item 11. Ecosystem considerations

11.1. Summary of FAO Ecosystem Based Fisheries Management Symposium in March 2025

11.2 Preliminary ecosystem indicators and framework for communication to SC

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

12.3 Update on the work of SWG Data as it pertains to BFME

Agenda Item 13. 5-Year (2025-2029) Rolling Work Plan

13.1 North Pacific armorhead

13.2 Splendid alfonsino

13.3 Sablefish

13.4 Vulnerable marine ecosystems

13.5 Other ecosystem components

Agenda Item 14. Review of CMMs 2025-05 and 2025-06 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 SSC 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 and newly proposed PICES WG

16.3 Selection of Chair for SSC BFME

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-2025-SC10-MIP01(Rev1)	Meeting Information
NPFC-2025-SSC BFME06-MIP02	Provisional Agenda
NPFC-2025-SSC BFME06-MIP03 (Rev. 2)	Annotated Indicative Schedule

WORKING PAPERS

Number	Title
NPFC-2025-SSC BFME06-WP01 (Rev. 1)	Five-Year Work Plan of the SSC BF-ME
NPFC-2025-SSC BFME06-WP02	Sablefish Species Summary
NPFC-2025-SSC BFME06-WP03	Blackspotted and Rougheye Rockfishes Species Summary
NPFC-2025-SSC BFME06-WP04	North Pacific Armorhead Species Summary
NPFC-2025-SSC BFME06-WP05	Splendid Alfonsino Species Summary
NPFC-2025-SSC BFME06-WP06	A brief update of Sablefish status in the eastern North Pacific including the NPFC Convention Area - 2025
NPFC-2025-SSC BFME06-WP07	Objective 1: Maps of VME Presence and Absence Observations
NPFC-2025-SSC BFME06-WP08	Objective 2: Maps of VME Density Observations and Kernel Density Estimation - Updated for 2025
NPFC-2025-SSC BFME06-WP09	Updated identification of potential VMEs on the Cobb-Eickelberg seamount chain based on predictive modelling that includes pennatulaceans as VME indicator taxa
NPFC-2025-SSC BFME06-WP10	VME bycatch data comparison between Japan and Korea: Potential challenges of applying data-based method to NW bycatch data
NPFC-2025-SSC BFME06-WP11	An update of fishing impacts assessment: potential impacts of Japanese bottom fisheries on vulnerable marine ecosystems (VMEs) within fished seamounts of the Emperor Seamounts region
NPFC-2025-SSC BFME06-WP12	Small Working Group on NPA and SA - Summary for 2025
NPFC-2025-SSC BFME06-WP13	Catch per unit effort standardization of splendid alfonsino *Beryx splendens* in the Emperor Seamounts
NPFC-2025-SSC BFME06-WP14	Updated identification of VMEs on Cobb Seamount in the Northeast Pacific Ocean by including

	pennatulaceans as VME indicator taxa
NPFC-2025-SSC BFME06-WP15	Report of the Small Working Group on VME: 2025 Activities
NPFC-2025-SSC BFME06-WP16	Preliminary SS3 Results for Splendid Alfonsino
NPFC-2025-SSC BFME06-WP17	Reports on identification of VMEs and assessment of impacts caused by individual fishing activities on VMEs or marine species: 2025 updates
NPFC-2025-SSC BFME06-WP18	Depletion model analysis for North Pacific armorhead in the Southern Emperor–Northern Hawaiian Ridge seamounts
NPFC-2025-SSC BFME06-WP19	VME Risk Assessment - Canada Sablefish Fishery - 2025
NPFC-2025-SSC BFME06-WP20	Skilfish species summary

INFORMATION PAPERS

Number	Title
NPFC-2025-SSC BFME06-IP01	Results of a monitoring survey for North Pacific armorhead in the Emperor Seamounts in 2025
NPFC-2025-SSC BFME06-IP02	Korea's Research Expedition to the Emperor Seamount Chain and Northwestern Hawaiian Ridge
NPFC-2025-SSC BFME06-IP03	Proposed analysis of potential harvest control rule for sablefish in CA
NPFC-2025-SSC BFME06-IP04	Update on progress toward a synchronized approach for assessing and managing the risk of significant adverse impact (SAI)
NPFC-2025-SSC BFME06-IP05	Joint Canada-USA International Seamount Survey – 2022 & 2024 Update for BFME06
NPFC-2025-SSC BFME06-IP06	Summary of Symposium on applying the EAFM to Fisheries Management in ABNJ
NPFC-2025-SSC BFME06-IP07	Preliminary ecosystem indicators and framework for communication to Science Committee
NPFC-2025-SSC BFME06-IP08	Population and Community Structure of Black, Canary, and Yellowtail Rockfishes at Cobb Seamount
NPFC-2025-SSC BFME06-IP09	Report of Japanese sea-floor visual survey in the Emperor Seamount area in 2025

OBSERVER PAPERS

Number	Title
NPFC-2025-SSC BFME06-OP01	Joint Scientists' Letter to NPFC Members Regarding the Emperor Seamount Chain
NPFC-2025-SSC BFME06-OP02	Recommendation to Endorse Approaches for

	Identifying Vulnerable Marine Ecosystems (VMEs) from Imagery and Species Distribution Models in the NPFC Convention Area
NPFC-2025-SSC BFME06-OP03	Recommendations on Impact Assessments for Bottom Fisheries
NPFC-2025-SSC BFME06-OP04	Recommendation to Recognize New Quantitative Scientific Evidence for SAIs from Visual Surveys of Koko Seamount in the NPFC Convention Area

REFERENCE DOCUMENTS

Number	Title
NPFC-2025-SSC BFME06-RP01	Summary of the 1st meeting of the Small Working Group on VME (2025)
NPFC-2025-SSC BFME06-RP02	Summary of the 2nd meeting of the Small Working Group on VME (2025)
	Template for collection of scientific observer data
NPFC-2024-SSC BFME05-Final Report	SSC BFME05 Report
CMM 2025-05	CMM 2025-05 For Bottom Fisheries and Protection of VMEs in the NW Pacific Ocean
CMM 2025-06	CMM 2025-06 For Bottom Fisheries and Protection of VMEs in the NE Pacific Ocean

Annex C:

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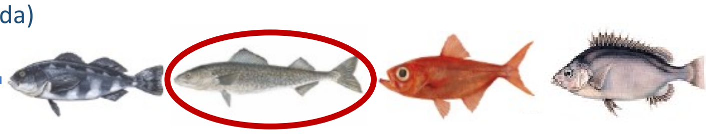
Annex D:
Stock Status Summary Slides for Sablefish, NPA and SA

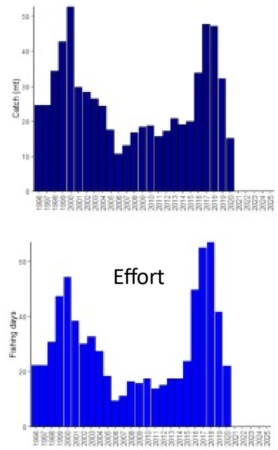
Small Scientific Committee on Bottom Fish & Marine Ecosystems (SSC BF-ME)

Chair: Dr. Chris Rooper (Canada)

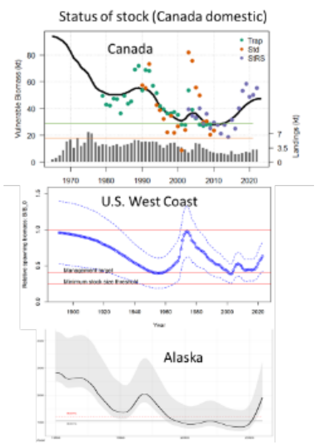


Sablefish

Convention Area



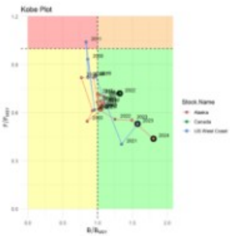
Domestic Assessment



Comments on Status

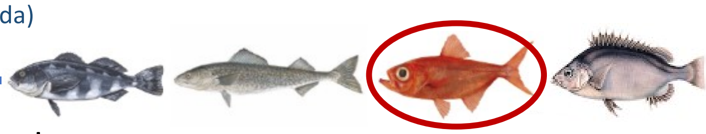
- Fish stock **healthy**

- No CA fishing since 2020
- Economically not profitable
- Likely some fishing in 2026



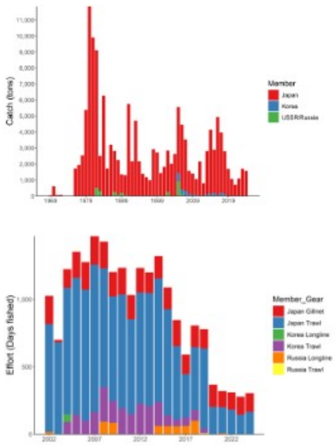
Small Scientific Committee on Bottom Fish & Marine Ecosystems (SSC BF-ME)

Chair: Dr. Chris Rooper (Canada)

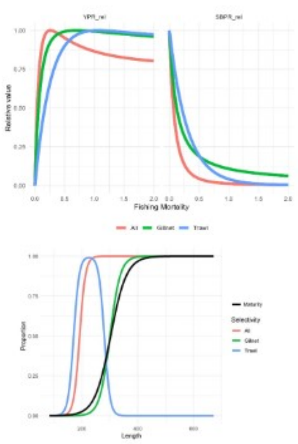


Splendid Alfonsino

Convention Area



Per recruit analyses



Comments on Status

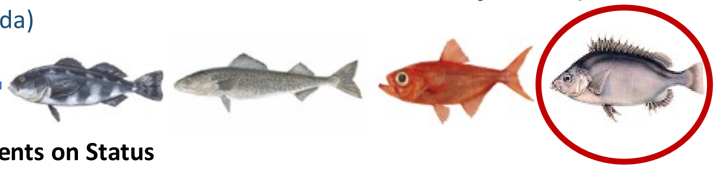
- High likelihood that growth overfishing is occurring (harvest before the size that maximizes YPR)

- 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

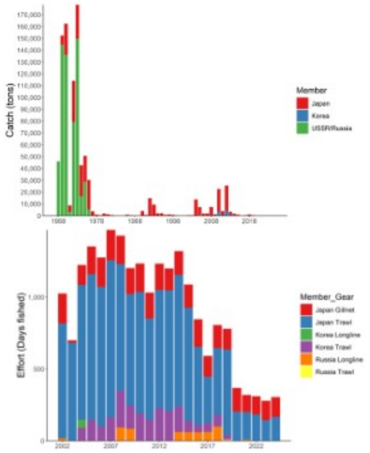
Small Scientific Committee on Bottom Fish & Marine Ecosystems (SSC BF-ME)

Chair: Dr. Chris Rooper (Canada)



North Pacific Armorhead

Convention Area



Comments on Status

- No strong recruitment detected in the recent years (since 2013)
- Stock status remains low
- Harvest rate is likely to be high
- Potential caveats including:
  - Possible effect of target shift
  - Uncertainty in the estimation of recruitment season
  - estimates of harvest rate (>1) in some years and seamounts
  - Potential bias caused by the removal of zero-catch operations

- Keep monitoring possible recruitment events and avoid high harvest rates for recruited fish as specified in CMM 2025-05
- Since recruitment has been weak, SSC BFME recommend reducing the harvest rates as much as possible
- SSC BFME recognize the effort of Japanese fishers to avoid harvest of NPA since 2019

Annex E:

Species Summary for Sablefish

Sablefish (*Anoplopoma fimbria*)

Common names:

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

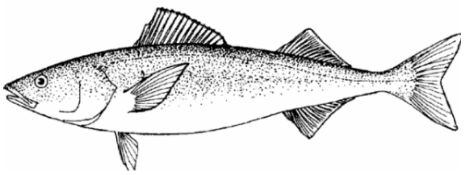


Figure 1. Sablefish (Anaplopoma fimbria).

Management

Active NPFC Management Measures

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

- CMM 2025-06 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)

Convention.or.Management.Principle	Status	Comment.or.Consideration
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.

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 2021-2025 resulting in no catch.

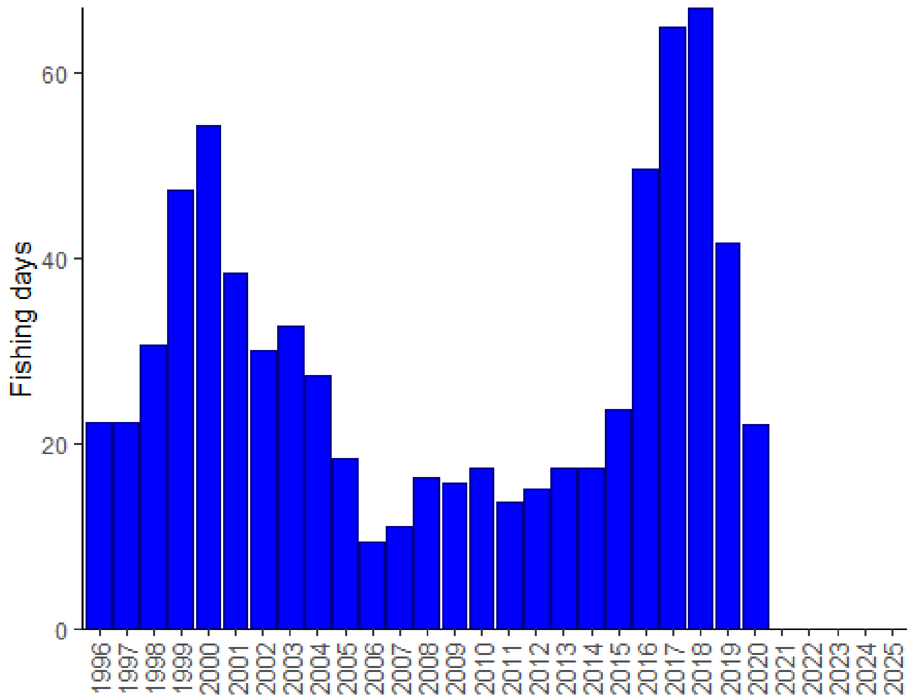


Figure 2. Fishing effort (in number of fishing days) for the Sablefish longline trap fishery conducted in NPFC waters (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

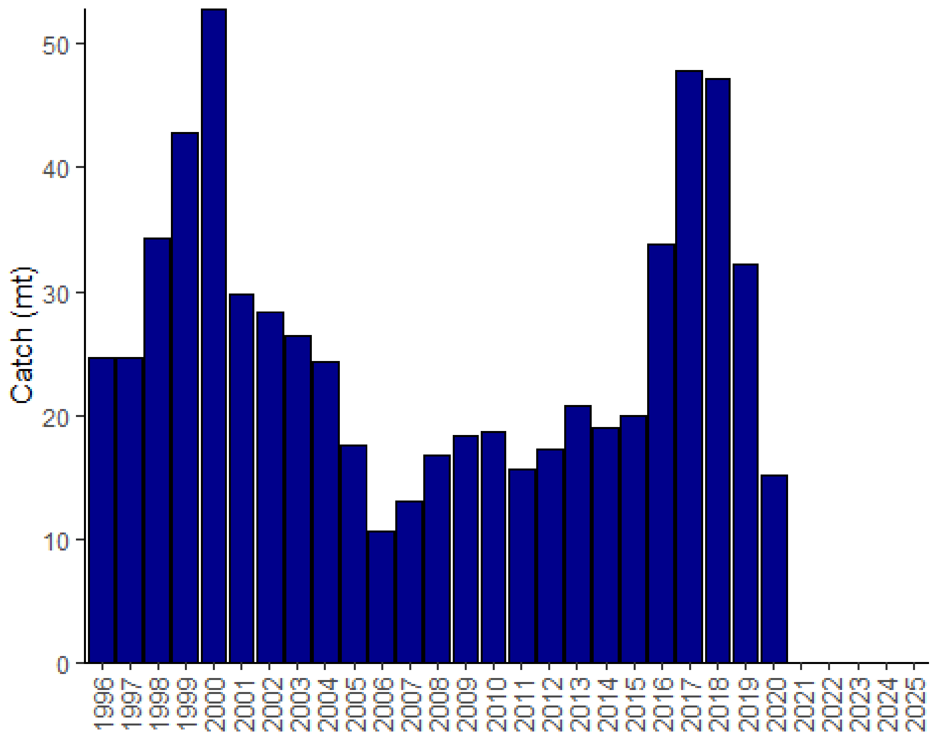


Figure 3. Landings of sablefish in the Canadian Sablefish fishery in NPFC region (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

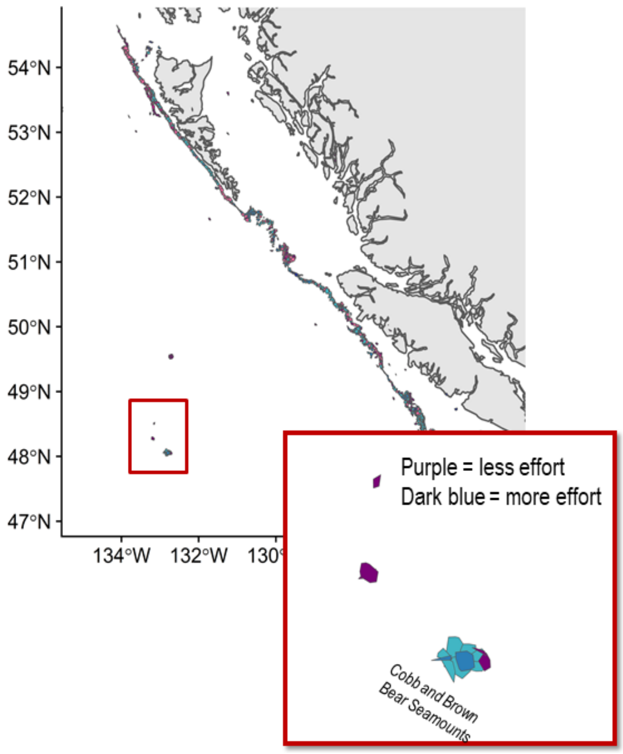


Figure 4. Relative change in spatial distribution of effort for Sablefish trap fishery from 2010-2017 to 2018-2019. Inset shows seamounts in the NPFC Convention Area.

Catch per unit of effort (mt/fishing days) for Sablefish has been increasing over the last 10 years (Figure 5), averaging 0.79 mt/fishing day (CV = 50%). CPUE was not calculated in 2025, but has generally been increasing from 2012 - 2020.

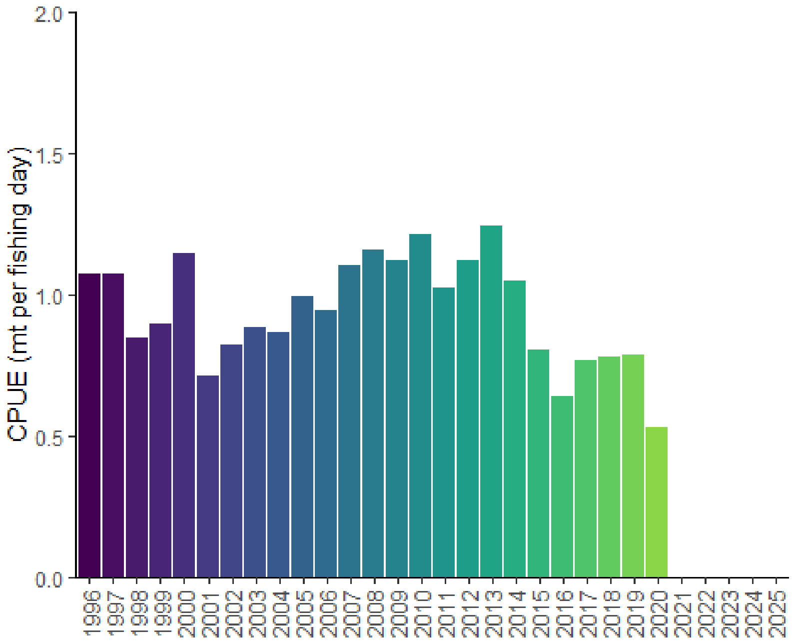


Figure 5. Catch per unit of effort for Canadian Sablefish fishery in NPFC region. Data are averaged across 3 years to comply with data privacy restrictions.

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

Data	Source	Years	Comment
Maturity/fecundity	USA	variable	Commercial and survey catches
	Canada	variable	Commercial and survey catches in national waters
	USA	variable	Research cruises in national waters

Special Comments

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

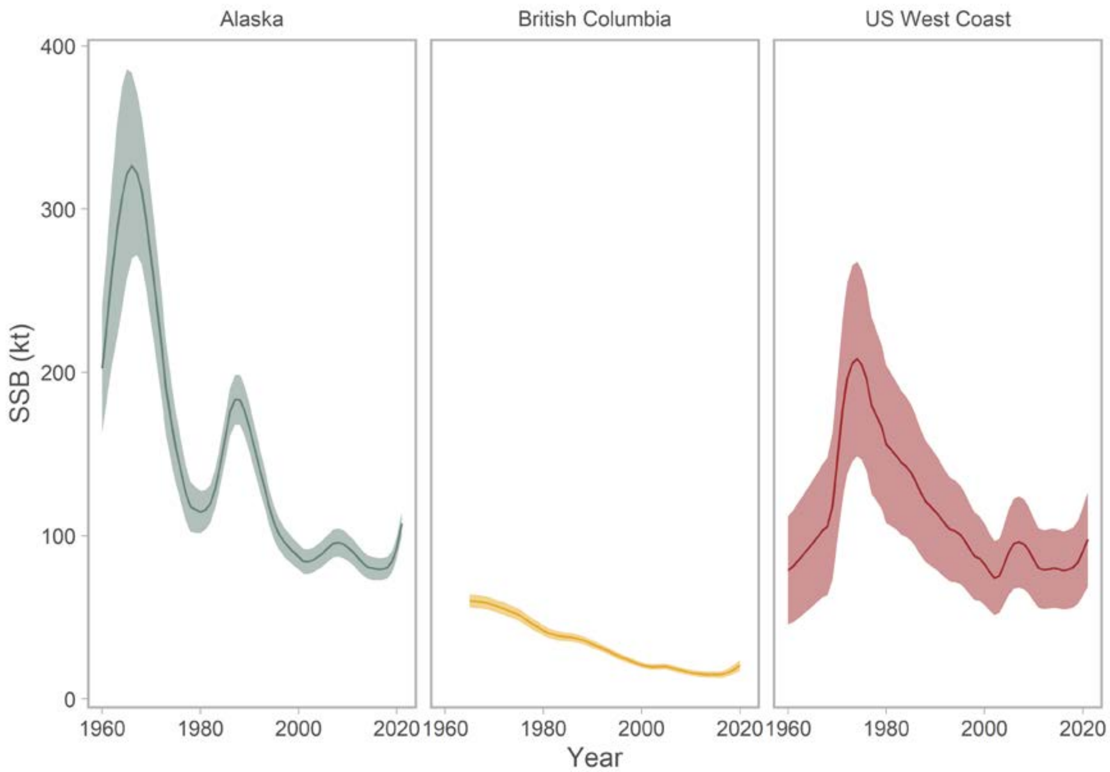


Figure 6. Sablefish (Anaplopoma fimbria) biomass estimated from stock assessments in Alaska, Canada and the US West Coast.

Biological Information

Distribution

Sablefish are widely distributed throughout the Pacific Ocean from northern Mexico to the Gulf of Alaska, westward to the Aleutian, and northward into the Bering Sea (Figure 7; Wolotira et al. 1993). They are also found along the western margin of the Pacific Ocean from southern Japan through the Kamchatka Peninsula and northward into the Bering Sea. Adult sablefish occur along the continental slope, shelf gullies, and in deep fjords, generally at depths greater than 200 m. Juvenile sablefish spend their first two to three years on the continental shelf at shallower depths. Spawning is generally in the winter and spring (October-April) and occurs near the shelf break. Spawning timing generally occurs earlier in the south (October-February in California) and later in the north (January – April in Alaska). Eggs are found at depth and larvae are found in surface waters (Shotwell et al. 2020).

Life history

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

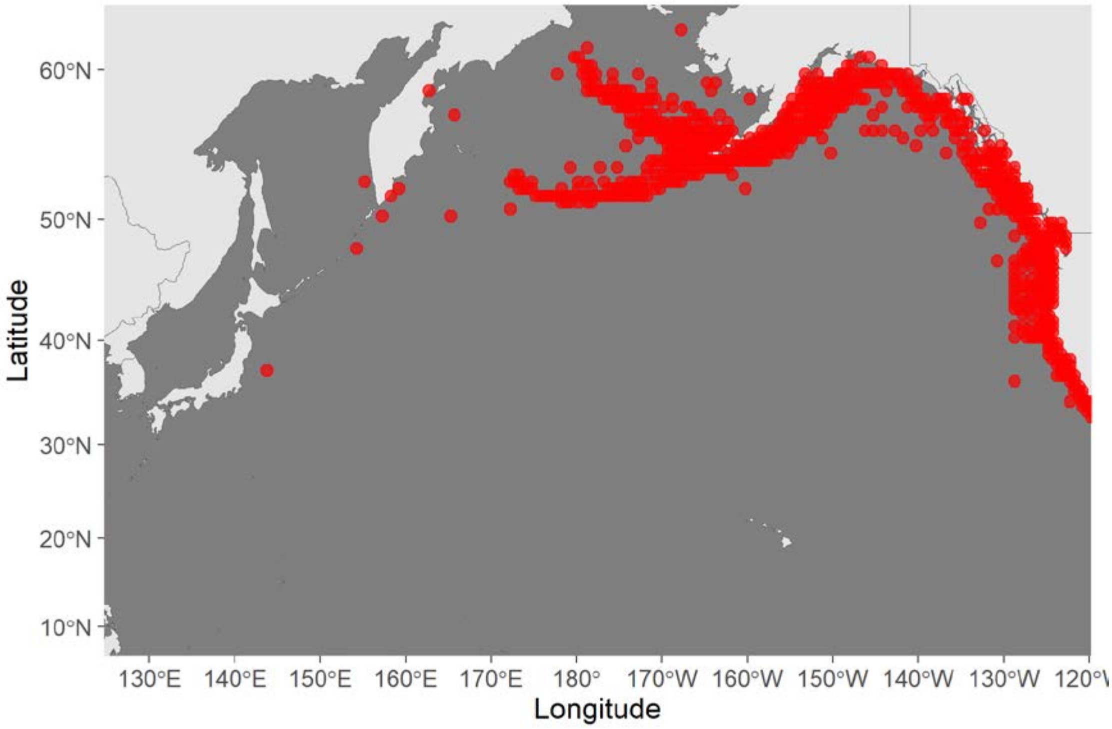


Figure 7. Map of distribution of sablefish in the North Pacific.

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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.

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

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

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

Annex F:

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)

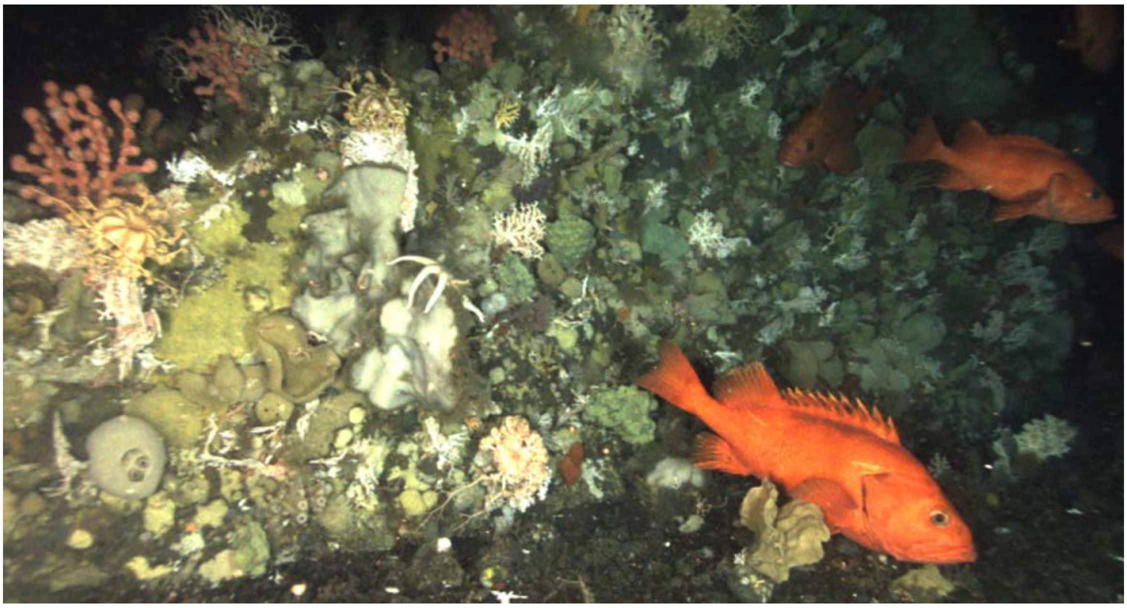

Figure 1. Blackspotted rockfish (Sebastes melanostictus).

Management

Active NPFC Management Measures

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

- CMM 2025-06 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.

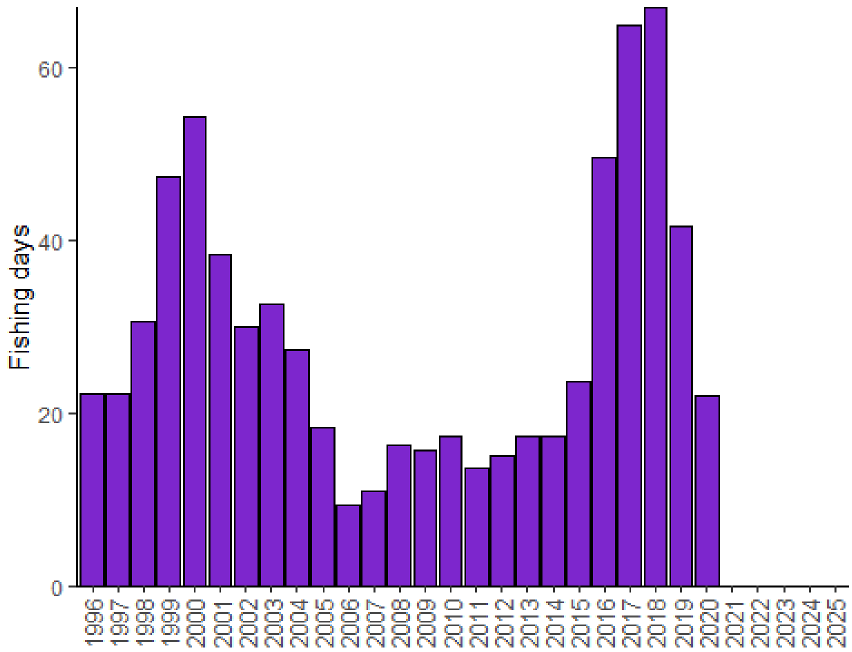

Figure 2. Fishing effort (in number of fishing days) for the Sablefish longline trap fishery conducted in NPFC waters (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

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 2021-2025 resulting in no catch.

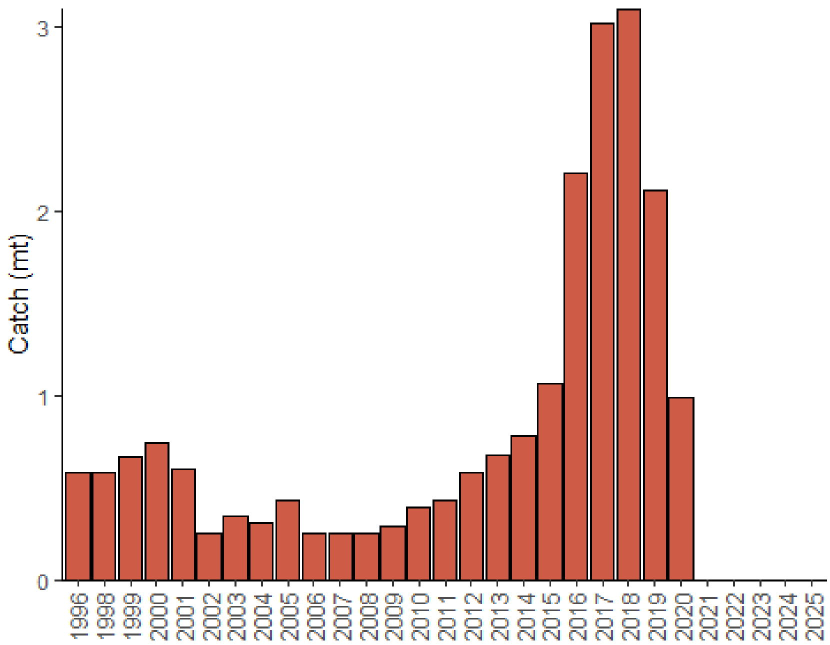

Figure 3. Landings of blackspotted and rougheye rockfishes in the Canadian Sablefish fishery in NPFC region (1996-present). Data are averaged across 3 years to comply with data privacy restrictions.

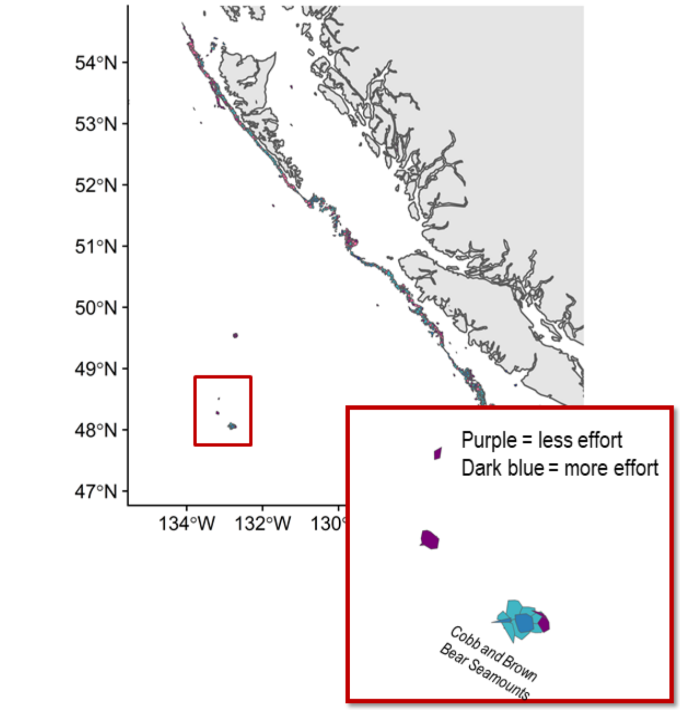

Figure 4. Relative change in spatial distribution of effort for Sablefish trap fishery from 2010-2017 to 2018-2019. Inset shows seamounts in the NPFC Convention Area.

Catch per unit of effort (mt/fishing days) for blackspotted and rougheye rockfishes has been increasing over the last 10 years (Figure 5), averaging 0.02 mt/fishing day (CV = 70%). CPUE was not calculated in 2025 due to the absence of fishing in the Convention Area, but has generally been increasing since 2012.

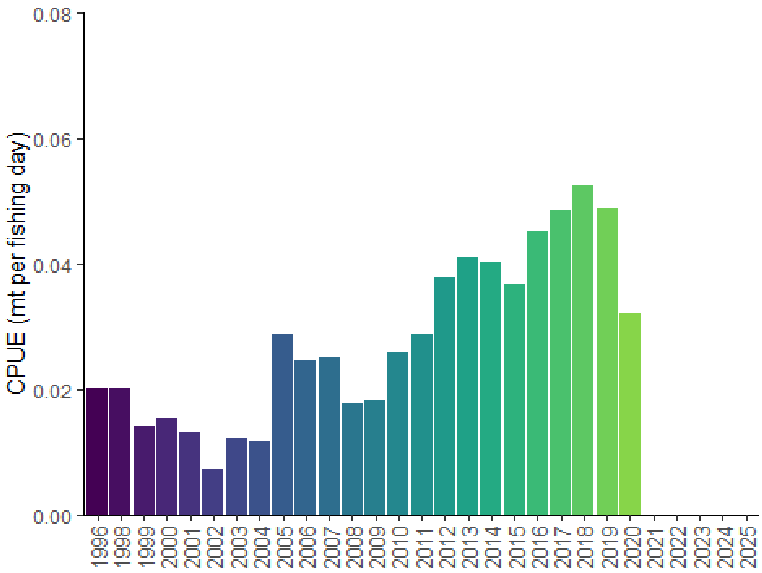

Figure 5. Catch per unit of effort for blackspotted and rougheye rockfishes in the Canadian Sablefish fishery in NPFC region. Data are averaged across 3 years to comply with data privacy restrictions.

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

Special Comments

None

Biological Information

Distribution

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

Life history

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

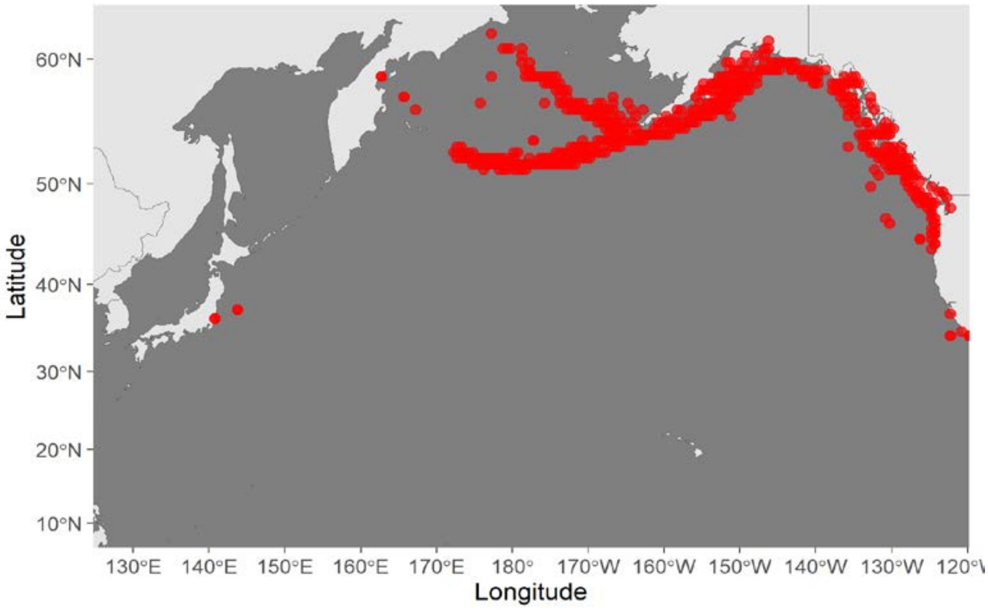

Figure 6. Map of distribution of blackspotted and rougheye rockfishes in the North Pacific.

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Annex G:

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)

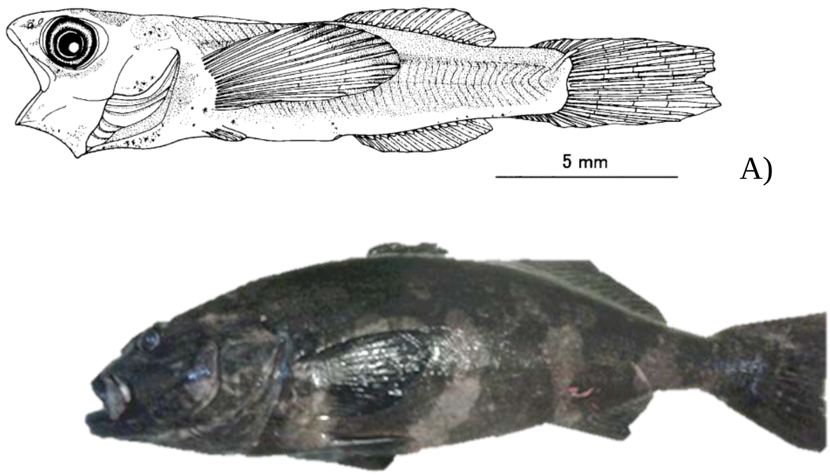
Biological Information

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).



B)

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

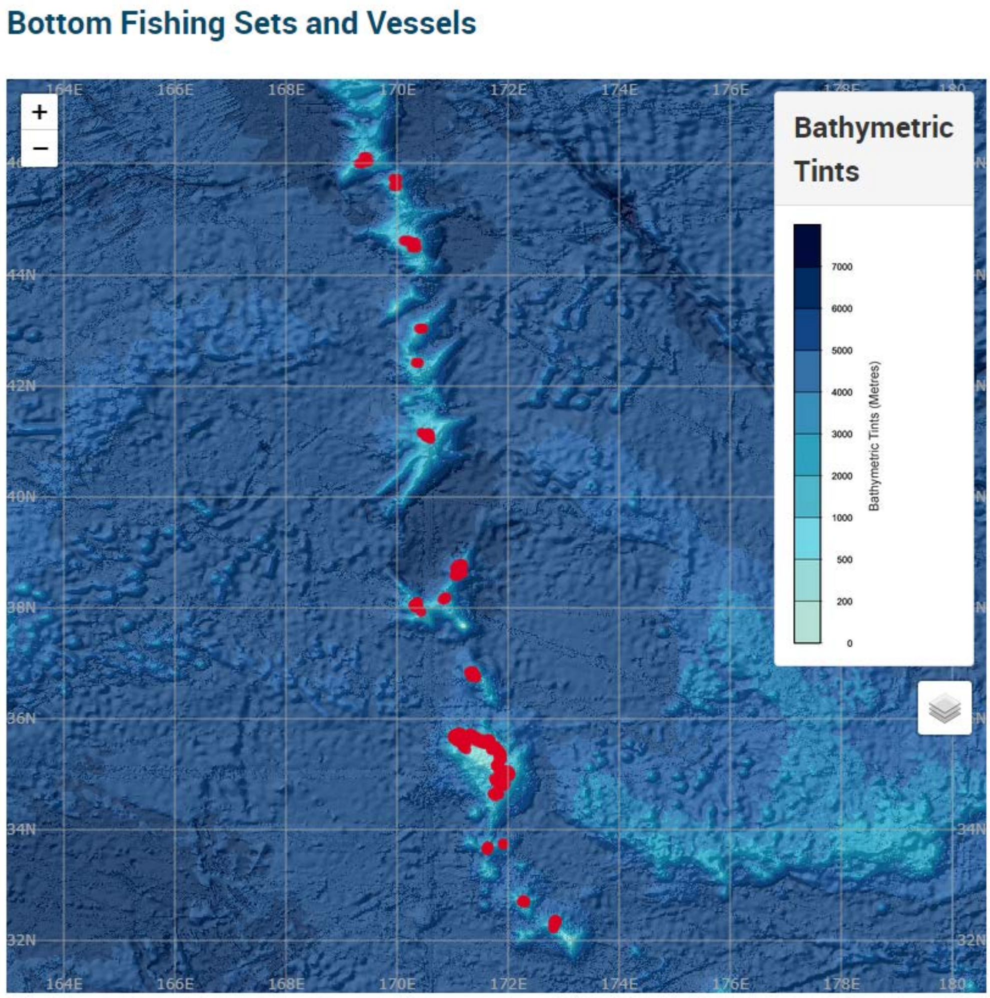


Figure 2: Surveyed area by Russian Long-Liners [https://www.npfc.int/science/gis/bottom_fishing]

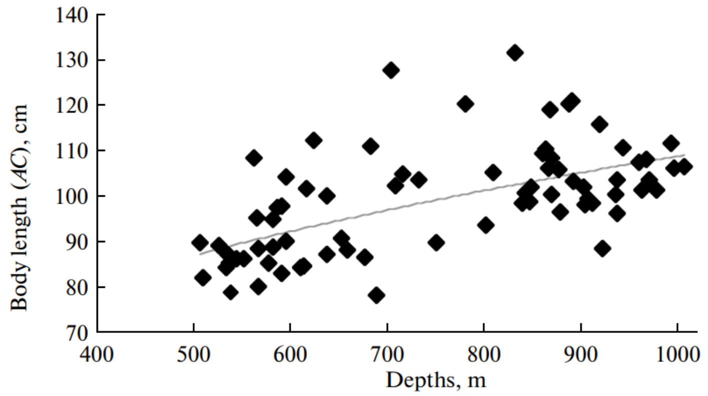


Figure 3: Skilfish body length versus habitat depth at the Emperor Seamounts, June–July 2009: $y = 11.632x^{0.3239}$, $R^2 = 0.3692$ [Zolotov et al., 2014]

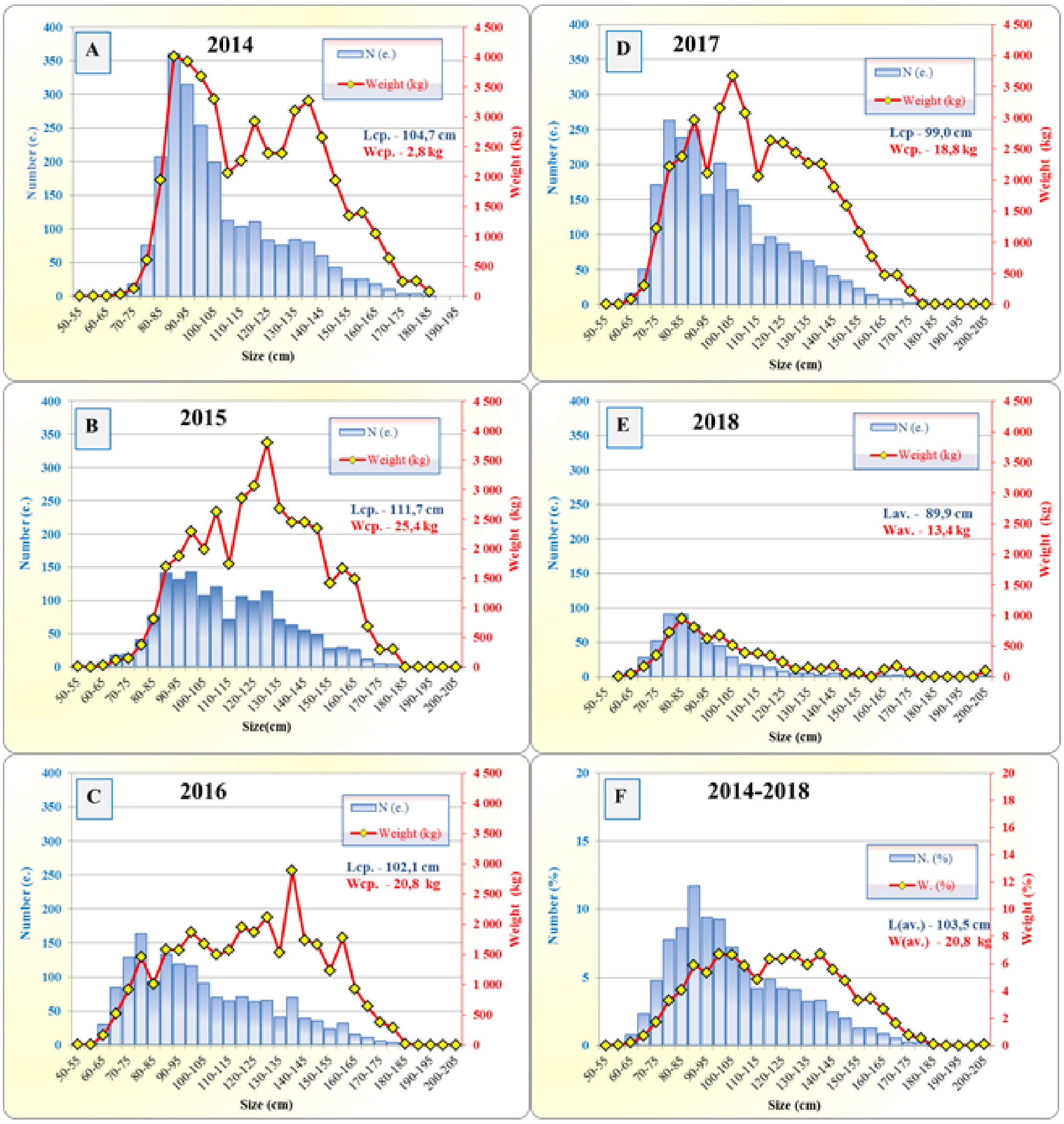


Figure 4: Skilfish body length and weight at the Emperor Seamounts based on longline catches during 2014-2017 (fishing vessel "Palmer") and in 2018 (fishing vessel "Vostok-7"); F – average long-term data, %

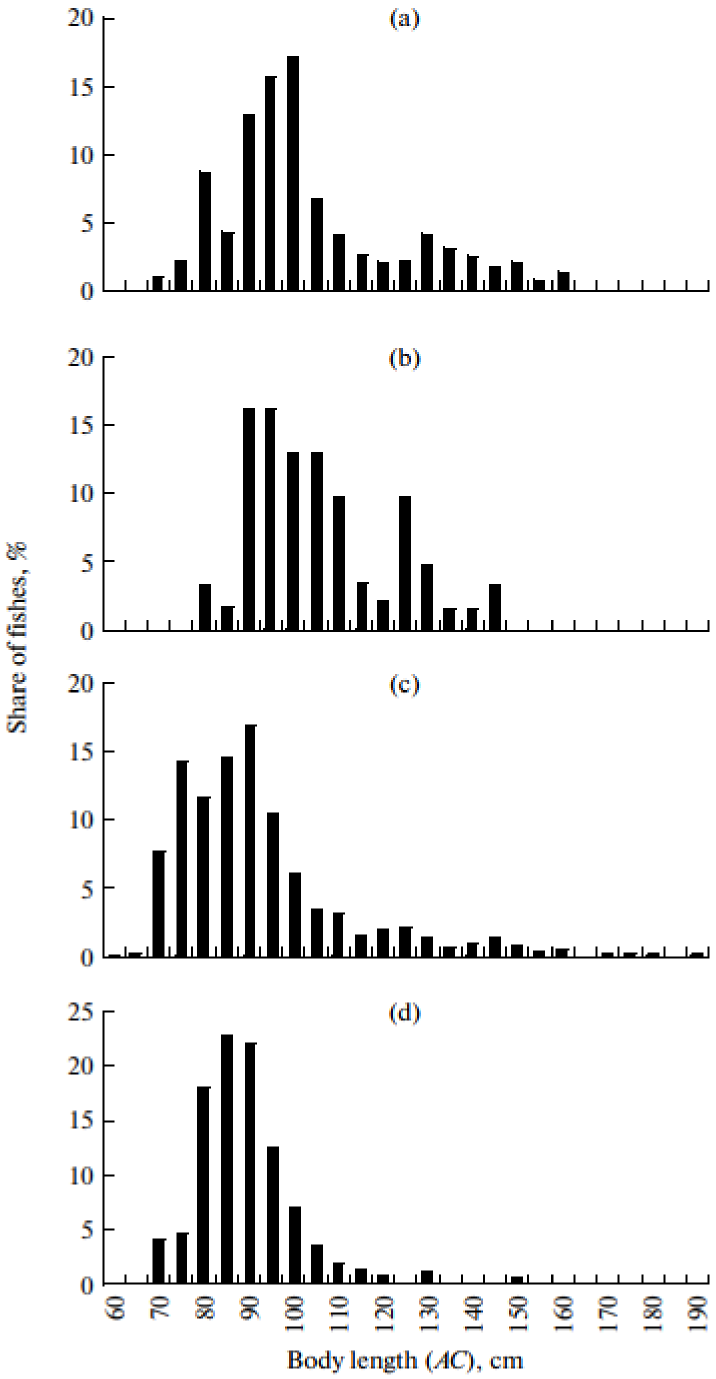


Figure 5: Skilfish body length at the Emperor Seamounts, June–July of 2009: (a) Jingu (M = 103.28 cm, n = 762); (b) Ojin (M = 105.74 cm, n = 61); (c) Northern Koko (M = 92.40 cm, n = 573); (d) Koko (M = 89.07 cm, n = 199)

Fishery

Skilfish was one of the priority species in the Japanese [Belyaev and Darnitskiy, 2005] and Korean (Kwon et al., 2008) 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. 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).

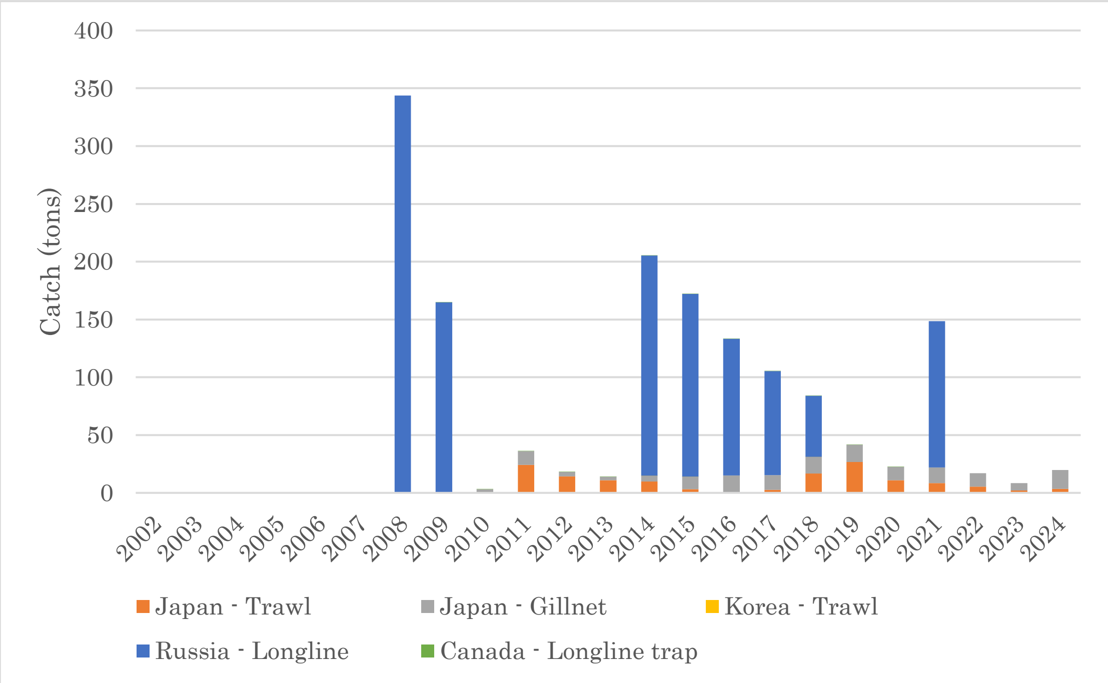


Figure 6: Historical catches of Skilfish in NPFC waters (metric tons)

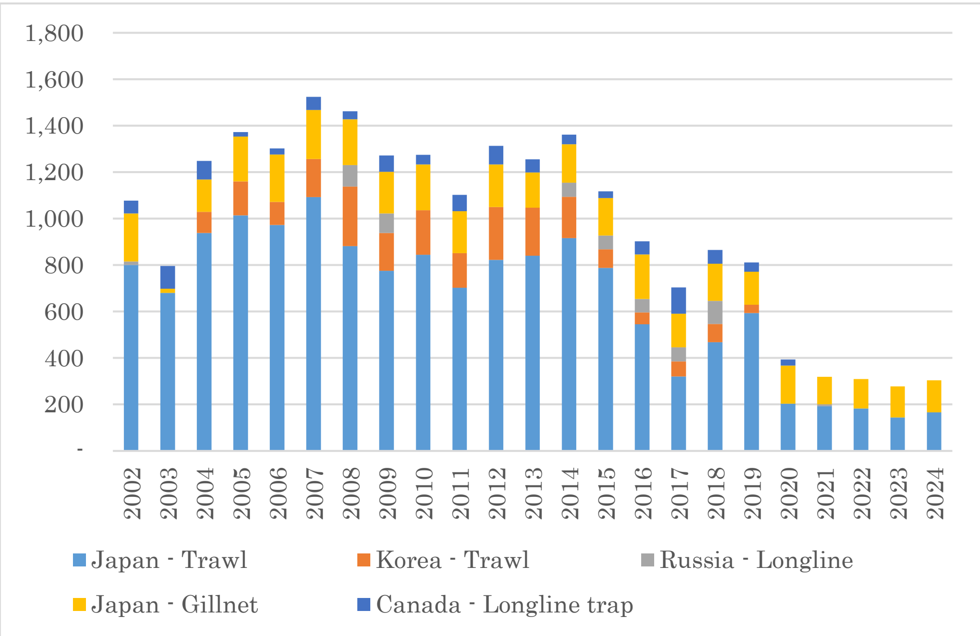


Figure 7: Historical bottom fishing effort by Members

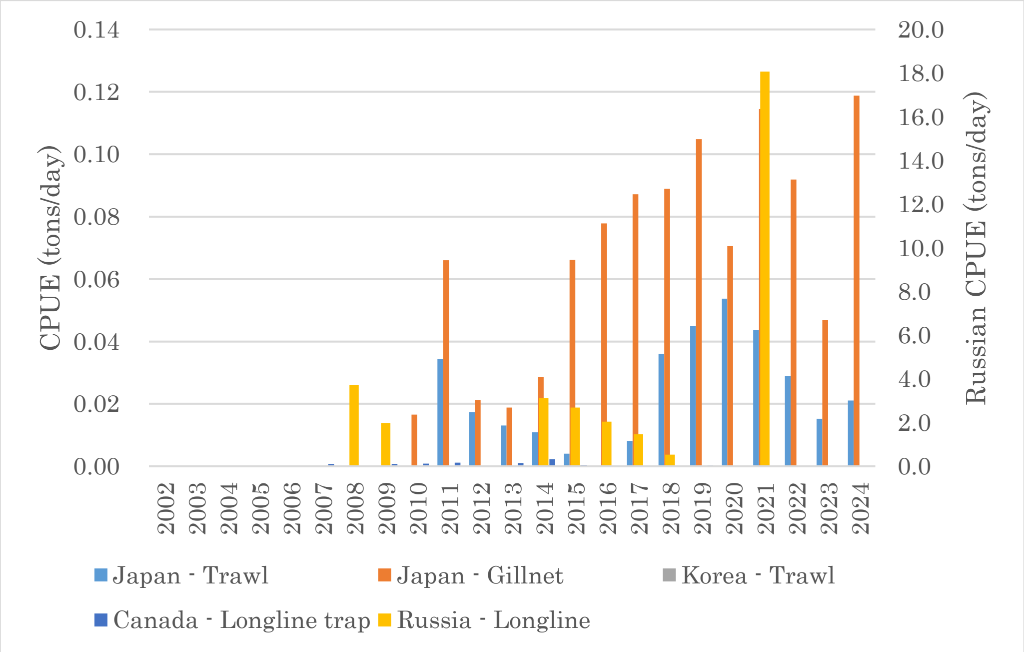


Figure 8: Historical Nominal CPUE for Skilfish (Catch per day per vessel)

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].

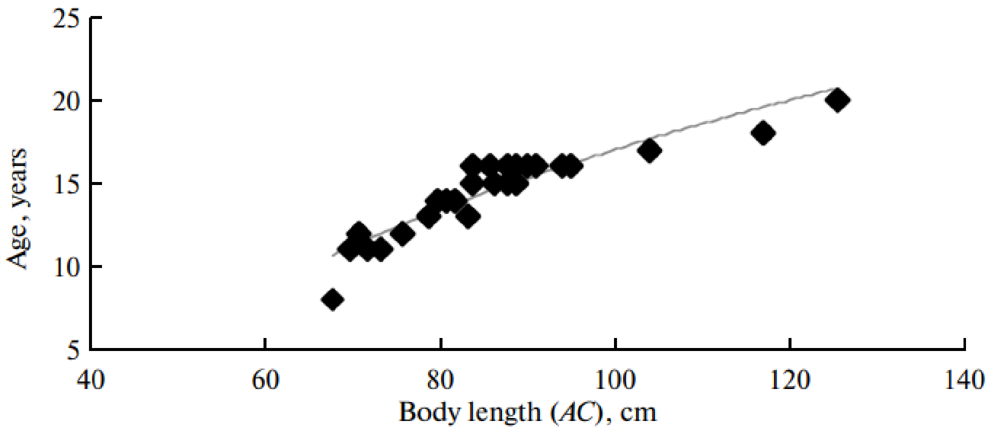


Figure 9: Growth curve of skilfish Erilepis zonifer at the Emperor Seamounts: y = 16.337ln(x) – 58.222, R^2 = 0.8592 [Zolotov et al., 2014]

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.

There have been no fishers targeting Skilfish after 2021, so the catches reported since then are bycatch in fisheries targeting other species.

Data Availability

Table 2: Catch data

Data	Member	Fishery	Year	Comments
Annual catch	Japan	Trawl	2010-present	
		Gillnet	2010-present	
	Korea	Trawl	2004-2019	
	Russia	Long-Line	2000	
CPUE	Japan	Trawl	2010-present	

Data	Member	Fishery	Year	Comments
		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	

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Annex H:

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.

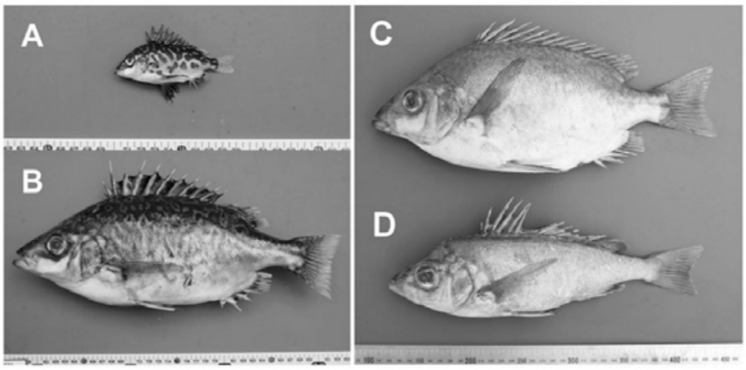

Figure 1: Photographs of Pentaceros wheeleri. *A) Pelagic juvenile, B) pelagic subadult, C) demersal adult (fat type), D) demersal adult (lean type) (from Kiyota et al. 2016)*

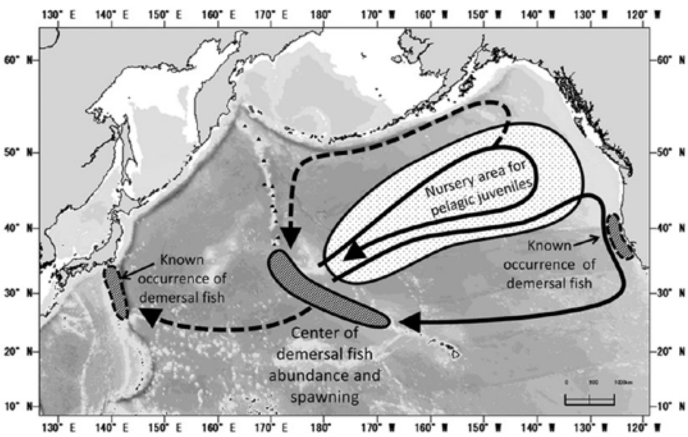

Figure 2: Known demersal habitats and hypothesized pelagic migration routes of Pentaceros wheeleri *(Kiyota et al. 2016 Figure 4, modified from Boehlert and Sasaki 1988).*

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.

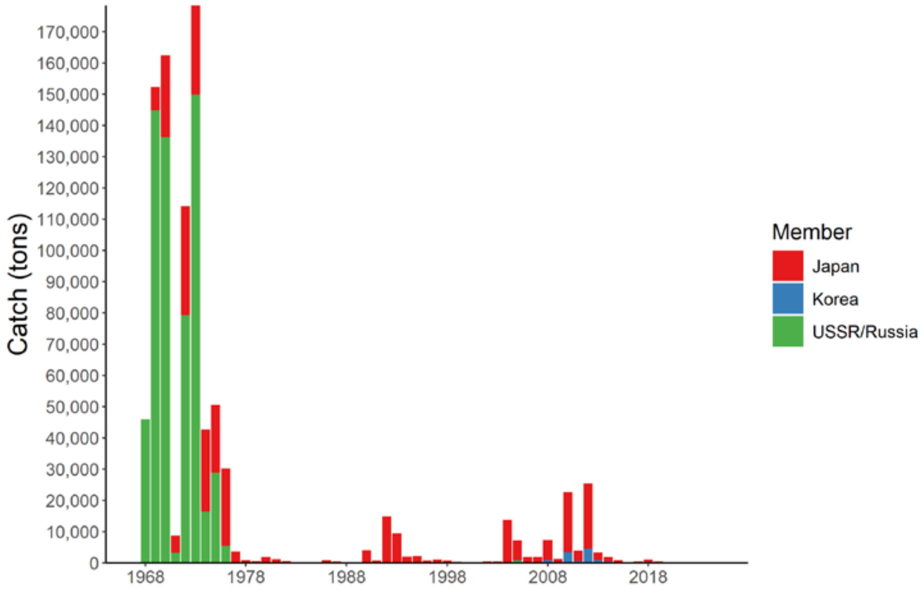

Figure 3: Historical trends of North Pacific armorhead catches in NPFC waters. *The annual amounts of catch by each Member are shown by the bar plot.*

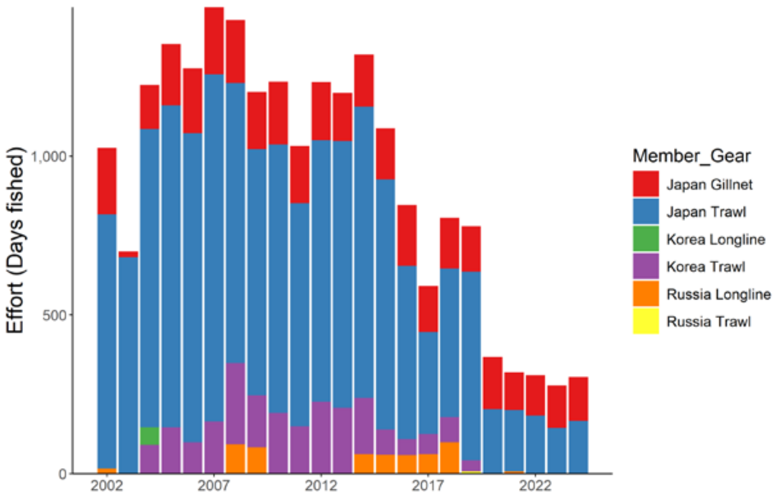

Figure 4. Historical fishing effort for North Pacific armorhead. *The annual fishing efforts by each country and each gear are shown by barplot. The efforts are calculated by the total fishing days operated during the year*

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.

It was suggested that Japanese fishers avoid targeting North Pacific armorhead in the recent years, and thus the catch level may not reflect stock status (NPFC-2024-SSC BFME05-Final Report).

Management

Active Management Measures

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

- CMM 2025-05 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	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) and was revised in 2024 (CMM 2024-05). 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 applied. In low recruitment years, a 700 ton catch limit is applied.

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
	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

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Annex I:

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).

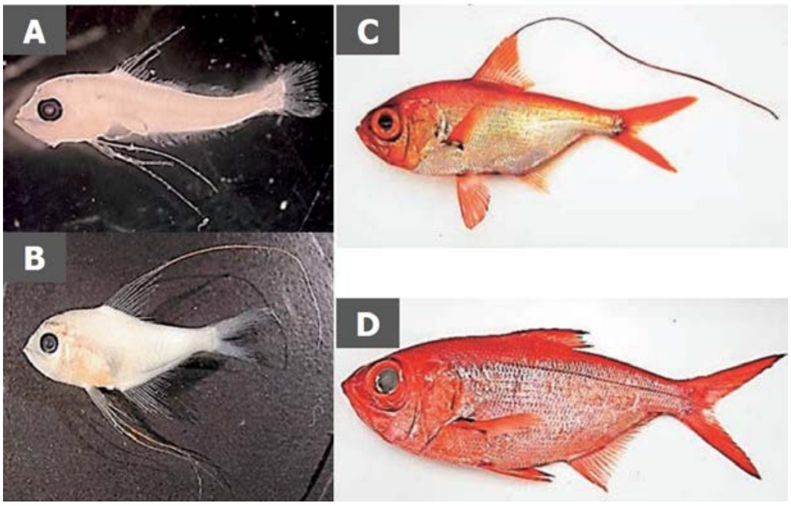

Figure 1: Photographs of Beryx splendens on different developmental stages *A) postlarva, B) juvenile, C) young, D) adult (from Watari et al. 2017)*

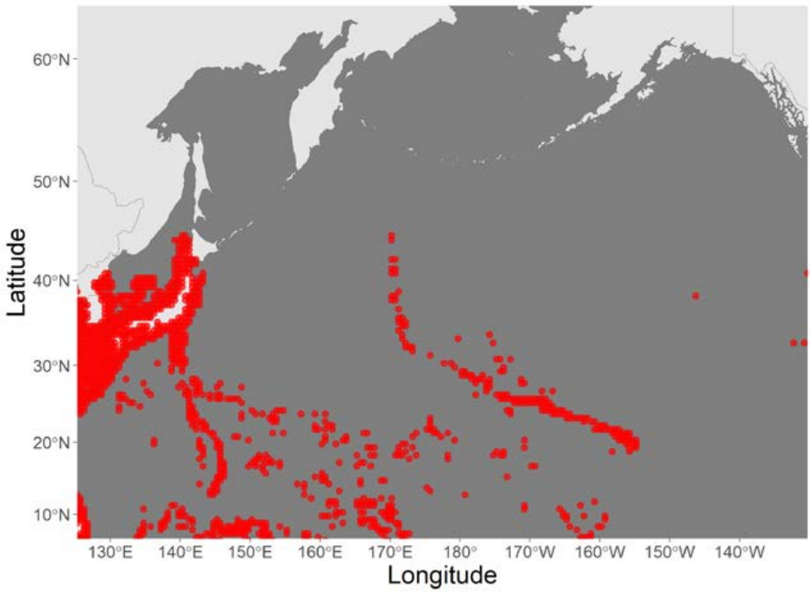

Figure 2: Known distribution of Beryx splendens around NPFC waters. *Points indicate observation data from original sources (AquaMaps 2019, October)*

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).

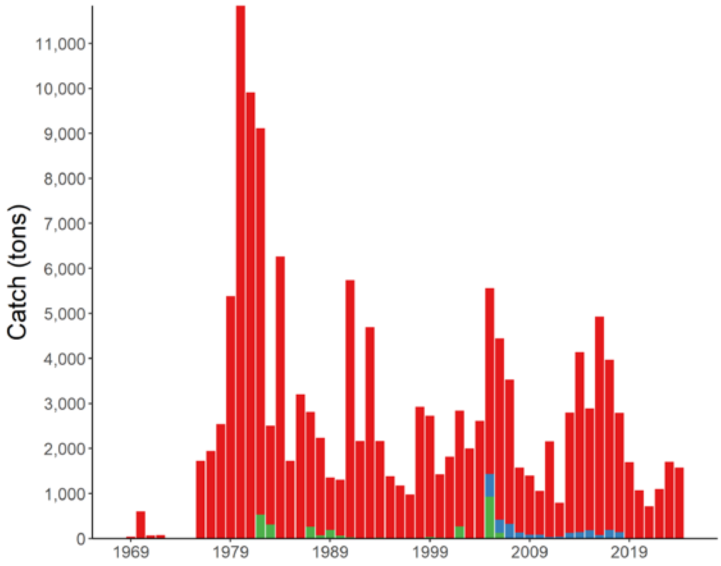

Figure 3: Historical trends of Splendid alfonsino catches in NPFC waters. *The annual amounts of catch by each country are shown by the bar plot.*

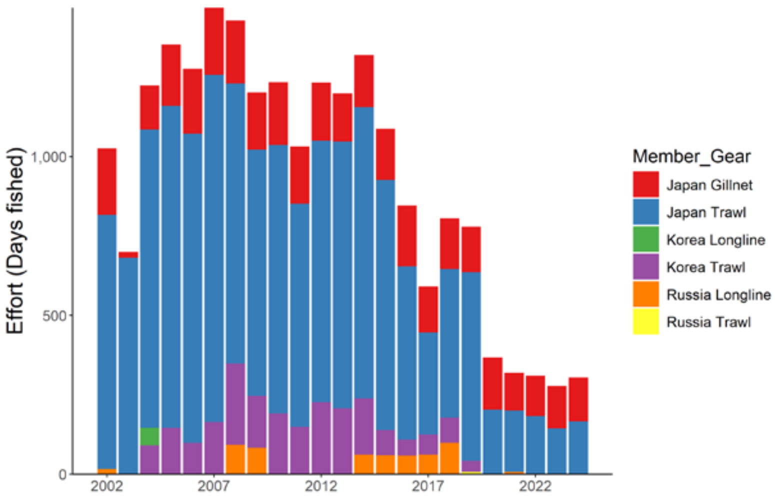

Figure 4. Historical fishing efforts for Splendid alfonsino. *The annual fishing efforts by each country and each gear are shown by the bar plot. The efforts are calculated by the total fishing days operated during the year*

Assessment

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

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.

In 2024, Yield Per Recruit (YPR) and Spawning Biomass Per Recruit (SBPR) was conducted by NPFC, and concluded that growth overfishing is occurring with high likelihood, and that Splendid alfonsino is being captured before they are mature, likely reducing the spawning potential, while the dome-shaped selectivity in trawl fisheries may make the analyses pessimistic on the stock status (NPFC-2024-SSC BFME05-Final Report).

Management

Active Management Measures

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

- CMM 2025-05 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	Intermediate	High likelihood of growth overfishing, likely reduced spawning potential, though the analyses may be pessimistic
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	

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