



North Pacific Fisheries Commission

NPFC-2017-SSC VME02-Final Report

**2nd Meeting of the Small Scientific Committee
on Vulnerable Marine Ecosystems
REPORT**

17-18 April 2017

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**North Pacific Fisheries Commission
2nd Meeting of the Small Scientific Committee
on Vulnerable Marine Ecosystems**

**17-18 April 2017
Shanghai, China**

REPORT

Agenda Item 1. Opening of Meeting

1. The 2nd Meeting of the Small Scientific Committee on Vulnerable Marine Ecosystems (SSC VME) took place in Shanghai, China on 17-18 April 2017, and was attended by Members from Canada, China, Japan, the Republic of Korea, and the Russian Federation. The meeting was opened by Dr. Loh-Lee Low who served as the SSC VME Chair.

Agenda Item 2. Adoption of Agenda

2. The Secretariat explained that an observer paper had been submitted by the Food and Agriculture Organization (FAO). Members acknowledged that the paper will be presented by the Secretariat on behalf of the FAO under Agenda Item 8. Other Matters.
3. Japan proposed beginning Agenda Item 4. Member's Research Activities on VME with an overview of all the research conducted by Japan, encompassing papers NPFC-2017-SSC VME02-IP01-02 and NPFC-2017-SSC VME02-WP01-05. The Members agreed to Japan's proposal.
4. The revised agenda was adopted.

Agenda Item 3. Meeting Arrangements

5. Science Manager Dr. Aleksandr Zavolokin outlined the meeting schedule and Mr. Alexander Meyer was selected as Rapporteur.

Agenda Item 4. Member's Research Activities on VME

6. Participants made reports with respect to their research activities on VMEs. Japan submitted 7 documents and Korea submitted 1 document. Russia presented 1 document, which was treated as an information paper due to its late submission. Specific highlights are noted below.

7. Japan presented an overview of the research it had conducted towards proposing a scheme to assess and manage potential impacts of bottom fisheries on VMEs in the western part of the Convention Area. Japan informed participants about the activities of the Corresponding Group on Encounter Protocol comparing the VME encounter protocols of different RFMOs (NPFC-2017-SSC VME02-IP01) and also the application of association analysis for identifying indicator taxa of VMEs in the Emperor Seamounts area (NPFC-2017-SSC VME02-IP02). Japan noted that there is a necessity for different encounter protocols between existing fishery grounds and unfished areas. Japan also pointed out that the identification of fished and unfished areas were the foundation of significant adverse impact assessment (SAI) and conservation measures, and recommended encounter protocols, scientific surveys and VME closures as measures for existing fishery grounds. Furthermore, Japan recommended that a more precautionary approach be taken with regard to unfished areas.
8. Japan presented on existing fishing grounds and unfished areas (NPFC-2017-SSC VME02-WP01). Japan studied historical fishery activity and pointed out that fishery activity has been occurring in the Emperor Seamounts for 50 years since 1967. Japan also presented data on trawl and gillnet activities, and the depth of fishery activities. Japan concluded that the fished seamounts in the western part of the Convention Area are located between 31°N and 45°N, and that the existing fishing grounds are the flat tops and upper slopes up to a depth of 1500 m. Japan recommended that similar analysis be made for other bottom fishing fleets operating in the Emperor Seamounts, and that once existing fishing areas were defined explicitly, Members should share maps and the official names of the fished seamounts.
9. Participants noted the differences in the identification of vessel position among Members, but acknowledged that at this stage it may not be necessary to unify position identification.
10. Participants discussed the possibility of Japan conducting similar analysis using the data of other Members. Japan explained that from a technical standpoint, this would be possible. However, further discussions would be required on issues of data sharing and confidentiality.
11. Korea asked about the target species in the study. Japan explained that all vessels primarily targeted North Pacific armorhead and that the actual target species might change depending on the abundance of North Pacific armorhead.
12. Japan presented on fishery bycatch and survey data for corals and sponges (NPFC-2017-SSC VME02-WP02). Japan studied the frequency and intensity of fisheries bycatches of VME

indicator taxa to confirm actual levels of interactions between bottom fisheries and potential VMEs within existing fishing grounds. The research was aimed at addressing issues identified at the 1st SSC VME meeting, namely studying the differences in bycatch frequencies among different fishing fleets and conducting further statistical analysis of the bycatch data. The study found Gorgonacea to be dominant in both commercial fisheries and scientific surveys in terms of frequency. By weight, Gorgonacea was dominant in commercial catches, while sponge composition percentage increased due to the weight of the water content. The study also found similar patterns in the frequency distribution of non-zero bycatch weights of the VME indicator taxa across trawl, gillnet, and surveys, and the lack of flexion points suggests that encounters with dense patches of VME indicator taxa were not detected. The study also found a large discrepancy between the occurrence rate of non-zero catches by commercial fisheries and scientific surveys.

13. China pointed out that Japan had presented aggregated data that assumed a constant weight composition of species each year and asked whether there may be annual weight compositions that impact the representativeness of Japan's data. Japan believed that there was no clear trend of weight fluctuations in existing fishing grounds, but acknowledged that it should conduct further analyses to confirm if its belief was correct. As for unfished areas, Japan agreed that annual changes in bycatch weight could be a big factor in exploratory fishery.
14. The Members also discussed the identification of outliers and whether the survey data were truly representative of the conditions on the sea floor. China suggested employing resampling techniques. The Members also noted that outlier information may have important implications for determining encounter protocols and fishing rules.
15. Japan presented on potential impacts of Japanese bottom fisheries on VMEs within fished seamounts (NPFC-2017-SSC VME02-WP03 (Rev 1)). In the study, Japan characterized benthic communities observed on fished seamounts, identifying six clusters. Japan analyzed the fine-scale geographical overlap of bottom fishing activities and potential VME indicator taxa to identify potential VME risk sites. Japan then narrowed down the sites through risk scoring, and subsequently through further visual re-confirmation of these sites. Two sites were identified as being very likely to be at risk and two others as requiring further study. Japan concluded that while the density of potential VME indicator taxa was very low and no potential VME sites were detected within the main fishing grounds, dense patches of large colonies of Gorgonacea and Scleractinia were observed in a few locations at the outer edge of the main fishing grounds on fished seamounts. Japan suggested that small-scale spatial protection of potential risk sites, coupled with development of encounter protocols, be conducted for

preventing unanticipated fisheries interactions. In addition, Japan proposed that Members hold discussion for establishing an SAI assessment process and encouraged Members engaged in bottom fisheries in the Emperor Seamounts to collaborate in the assessment. Japan also called for improvement of exploratory fishery protocols for unfished areas.

16. China pointed out that in this study as well, the risk level could be averaged out using aggregated data. China suggested that annual effects of fishing operations need to be further explored. Japan acknowledged that the study only presented an aggregated snapshot and that it was necessary to be aware of historical fishery activity and potential overlap. Nevertheless, Japan believed that the study was meaningful in terms of identifying VME sites that were potentially at risk under the current fishing activities.
17. Korea presented on the bycatch of cold water corals by Korean trawl fisheries in the Emperor Seamounts from 2013-2016 (NPFC-2017-SSC VME02-WP06). The Koko Seamount was identified as the area with the highest average weight per haul and also the site of the largest bycatch of 5.12 kg. The composition of taxa changed over the study period, with Antipatharia being the dominant taxa in 2013 and 2014, and Gorgonacea in 2015 and 2016. Korea is also working on compiling a VME coral field guide based on the specimens identified in the Emperor Seamounts.
18. The Members agreed on the importance of distinguishing between live and dead coral in bycatches and the different implications each has. Japan volunteered to share its practices for distinguishing between live and dead coral with the other Members.
19. The participants discussed reasons why the dominant species changed over the course of the study period. The participants recognized that, although differences in composition may not be resolved, similar taxa had been identified in each Member's study, and that these taxa were in line with the four orders of indicator VME designated by the NPFC.
20. Russia reported on bycatch data from the Russian vessel in the NPFC Convention Area in 2016 (NPFC-2017-SSC VME02-IP03). The fact that the bycatch of invertebrates did not exceed several kilograms during the entire fishing season using longlines and that VME indicator species were absent in longline catches suggests that longline fishing did not impact VMEs on the Emperor Seamounts in existing fishery grounds.
21. Japan presented the results of the bottom environmental survey of the Emperor Seamount chain trawl fishing grounds in 2016 (NPFC-2017-SSC VME02-WP04). Japan conducted the survey

to confirm the spatial extent of the known coral assemblages using 1000 m-class remotely-operated vehicle, namely the Scleractinian assemblage on the Colahan Seamount and the gorgonian *Paragorgia* sp. assemblage on the northwest bank of the Koko Seamount, as well as to confirm the existence of VMEs in the area of the large bycatch operation. The study found *S. variabilis* sparsely distributed on the north ridge at depths between 770 m and 850 m in the Colahan Seamount. It also found that on the northwest bank of the Koko Seamount, the distribution of *Paragorgia* sp. was larger than previously known, and that Oxeye oreo also used this area as a habitat. Furthermore, the study confirmed that the same corals as bycatch corals were distributed sparsely in the area where the bycatch exceeded 10 kg, but there was no evidence to indicate that the bycatch corals were distributed intensively.

22. Japan presented the results from its multi-beam bathymetric survey of the Emperor Seamounts (NPFC-2017-SSC VME02-WP05). Japan conducted a multi-beam acoustic study in the Emperor Seamounts, combined with ground truth observation studies, to create detailed high-resolution seabed maps and contribute to predicting the existence of VMEs and assessing the impact of bottom fisheries on VMEs. The survey clarified the detailed bottom topography of the Emperor Seamounts, and attempted to estimate the sediment map. Furthermore, the threshold range of the backscatter of each sediment type obtained at Kammu Seamount showed nearly the same value as the results obtained at the other seamounts, suggesting the effectiveness of the sediment classification by the acoustic study. Data obtained from these analyses are currently being applied to the distribution prediction of cold-water corals in the Emperor Seamounts.
23. The Members agreed on the value of the topography and sediment-type data and discussed how this data could be shared. Japan explained that on the technical side there were difficulties posed by the size of the data. In addition, there are issues of data ownership that need to be addressed as well. Japan noted that information security guidelines would be proposed by the Secretariat for discussion at the upcoming SC meeting.

Agenda Item 5. Review of the CMMs 2016-05 and 2016-06 for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems

5.1 Encounter Protocol

5.2 Other Scientific Issues

5.3 Drafting Revision for CMM 2016-06

24. The Members reviewed CMMs 2016-05 and 2016-06 and discussed whether or not it was necessary to revise them.

25. The Members agreed to maintain the current wording of the CMMs related to the encounter protocol but acknowledged that, in the long term, it could be further refined. In particular, the uniform threshold of 50 kg of cold water corals in one gear retrieval, regardless of species or gear, was identified as lacking a scientific basis. The Members have been advancing scientific research and gathering data towards further refining the encounter protocol, and will continue to do so.
26. Japan proposed that more detailed technical guidance was needed with regard to the exploratory fishery protocol.
27. Canada presented the revisions to CMM 2016-06 by WebEx regarding fished seamounts in the Northeastern Pacific Ocean (NPFC-2017-SSC VME02-WP07), references to annexes 3-5 as well as editorial corrections. The participants endorsed the proposal (Annex D). Furthermore, the Members encouraged Canada to conduct an updated review of its fisheries in the Northeastern Pacific Ocean and present the findings to the SSC VME in the near future, in order to contribute to the future SAI assessment activities discussed at the current SSC VME meeting.

Agenda Item 6. Review of Identifications of VMEs and Assessment of SAI on VMEs

28. The Members reviewed the current identifications of VMEs and assessment of SAI on VMEs, and discussed whether or not it was necessary to revise them.
29. The Members agreed that, at this point in time, the four current indicator VME species were sufficient for fished seamounts of the western Convention Area. They identified Porifera and Hydrocorals as potential VME indicator taxa. However, further scientific analysis is needed to determine whether or not this is necessary.
30. The Members agreed to prepare a consolidated SAI assessment report for the NPFC Convention Area. Furthermore, in order to hold more in-depth discussions, the Members proposed holding a workshop on SAI assessment.

Agenda Item 7. Suggestions for the SC Research Plan and 5-year Work Plan

31. The Members discussed suggestions for the SC Research Plan, referring to NPFC-2017-SC02-WP01 and NPFC-2017-SC02-WP05 and agreed to implement research in the seven work areas identified by the SC in its Research Plan. The Members also began developing a preliminary 5-year work plan for each of the VME work areas, including the holding of a workshop on SAI assessment and a workshop on VME data analysis (Annex E).

Agenda Item 8. Other Matters

32. The Members discussed a proposal presented by the Science Manager of the NPFC on behalf of the FAO regarding the holding of a workshop to support the VME data analysis of the NPFC, in relation to the Sustainable Fisheries Management and Biodiversity Conservation of Deep Sea Living Resources in Areas Beyond National Jurisdiction Project (NPFC-2017-SSC VME02-OP01). The Members supported the proposal in principle but believed that there remained questions about the nature and organization of the workshop that could only be clarified through discussion with the FAO. Therefore, the Members requested that further discussion of the proposal and any decision thereon be deferred to the Scientific Committee (SC) meeting.
33. The Members discussed Japan's suggestion on special project fund items for VME scientific projects (NPFC-2017-SC02-WP06) and agreed to forward the proposal to produce a common NPFC VME field guide to the SC for approval. The Members also discussed the importance of a GIS database for the spatial management of bottom fisheries and VMEs but decided to defer discussions to the SC, noting that this matter pertained to the broader issue of NPFC database management systems. In addition, the Members request that the Financial and Administration Committee (FAC) establish a guideline for proposal, review and implementation of projects submitted by NPFC subsidiary bodies and/or Members.
34. The Members selected Ms. Bai Li (China) as the new Chair and acknowledged the great efforts of Dr. Loh-Lee Low to date as Chair of the SSC VME.

Agenda Item 9. Recommendations to the SC

35. The SSC VME recommends the following to the SC:
 - a. VME taxa – no change, but continue research on inclusion of other VME indicators in future and produce a common NPFC VME field guide.
 - b. Encounter threshold – no change, but continue research toward identifying more scientifically-valid thresholds.
 - c. Move-on rule – no change.
 - d. Reporting requirements – no change.
 - e. CMM for the Northwestern Pacific Ocean – no change, as adopted by the 2nd Commission meeting.
 - f. CMM for the Northeastern Pacific Ocean – endorse revised CMM 2016-06 as proposed by Canada.

- g. Exploratory Fishery Protocol in the North Pacific Ocean – refer to SC for consideration of more detailed technical guidance.
- h. SAI assessment – propose a workshop to further assess SAI (2017-2018).
- i. VME data collection standards – no change, but hold a workshop for further discussions.
- j. Data sharing – refer to SC for development of data sharing policy.
- k. Spatial management of bottom fisheries and VMEs – Discuss establishing GIS database.

Agenda Item 10. Next Meeting

- 36. The Members request the guidance of the SC for determining the date and location of the next meeting.

Agenda Item 11. Adoption of the Report

- 37. The draft report was adopted by consensus.

Agenda Item 12. Close of the Meeting

- 38. The SSC VME meeting closed at 17:51 on 18 April 2017.

Annexes

Annex A – Agenda

Annex B – List of Documents

Annex C – Participants List

Annex D – Revision for CMM 2016-06

Annex E – Suggestions from SSC VME for the SC Research Plan

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Agenda

- Agenda Item 1. Opening of the meeting
- Agenda Item 2. Adoption of Agenda
- Agenda Item 3. Meeting arrangements
- Agenda Item 4. Member's research activities on VME
- Agenda Item 5. Review of the CMMs 2016-05 and 2016-06 for bottom fisheries and protection of vulnerable marine ecosystems
 - 5.1 Encounter Protocol
 - 5.2 Other scientific issues
 - 5.3 Drafting Revision for CMM 2016-06
- Agenda Item 6. Review of identifications of VMEs and assessment of significant adverse impact on VMEs
- Agenda Item 7. Suggestions for the SC Research Plan and 5-year Work Plan
- Agenda Item 8. Other matters
 - Selection of next Chair
 - Coral taxa guide for observers
- Agenda Item 9. Recommendations to the Scientific Committee
- Agenda Item 10. Next meeting
- Agenda Item 11. Adoption of the Report
- Agenda Item 12. Close of the Meeting

LIST OF DOCUMENTS**MEETING INFORMATION PAPERS**

Symbol	Title
NPFC-2017-SC02-MIP01	Meeting Notice and Information
NPFC-2017-SSC VME02-MIP02	Provisional Agenda
NPFC-2017-SSC VME02-MIP03	Provisional Annotated Agenda
NPFC-2017-SSC VME02-MIP04 (Rev. 2)	Indicative Schedule
NPFC-2017-SSC VME02-MIP05 (Rev. 1)	Provisional List of Documents

REFERENCE DOCUMENTS

Symbol	Title
	Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean
	NPFC Rules of Procedure
CMM 15-02	CMM15-02_Conservation and Management Measure for Pacific Saury
CMM 2016-01	CMM On Information Requirements For Vessel Registration
CMM 2016-02	CMM To Establish A List Of Vessels Presumed To Have Carried Out IUU Activities In The NPFC CA
CMM 2016-03	CMM On The Interim Transshipment Procedures For The NPFC
CMM 2016-04	CMM On Vessels Without Nationality
CMM 2016-05	CMM For Bottom Fisheries And Protection Of VMEs In The NW Pacific Ocean
CMM 2016-06	CMM For Bottom Fisheries And Protection Of VMEs In The NE Pacific Ocean
CMM 2016-07	CMM For Chub Mackerel

WORKING PAPERS

Symbol	Title
NPFC-2017-SSC VME02-WP01	Identification Of Existing Fishing Grounds And Unfished Areas In The Emperor Seamounts Region
NPFC-2017-SSC VME02-WP02	Analysis Of Fishery Bycatch And Scientific Survey Data For Cold-Water Corals And Sponges In The Existing Fishing Grounds Of The Emperor Seamounts Region
NPFC-2017-SSC VME02-WP03 (Rev.1)	An Assessment Of The Potential Impacts Of Japanese Bottom Fisheries On Vulnerable Marine Ecosystems (VMEs) Within Fished Seamounts Of The Emperor Seamounts Region
NPFC-2017-SSC VME02-WP04	Results Of The Bottom Environmental Survey Of The Emperor Seamount Chain Trawl Fishing Grounds In 2016: Exploration For Spatial Extent Of Known Coral Assemblages And Distribution Of Bycatch Corals Collected By A Trawl Operation
NPFC-2017-SSC VME02-WP05	Multi-Beam Bathymetric Survey Of The Emperor Seamounts
NPFC-2017-SSC VME02-WP06	Bycatch On Cold Water Coral By Korean Trawl Fisheries In The Emperor Seamounts From 2013-2016
NPFC-2017-SSC VME02-WP07	Revision For Conservation And Management Measure 2016-06 For Bottom Fisheries And Protection Of Vulnerable Marine Ecosystems In The Northeastern Pacific Ocean
NPFC-2017-SC02-WP01	Draft 2017-2021 Research Plan

INFORMATION PAPERS

Symbol	Title
NPFC-2017-SSC VME02-IP01	Summary Comparison Of VME Encounter Protocols In Bottom Fish RFMO/As
NPFC-2017-SSC VME02-IP02	Application Of Association Analysis For Identifying Indicator Taxa Of Vulnerable Marine Ecosystems In The Emperor Seamounts Area, North Pacific Ocean
NPFC-2017-SSC VME02-IP03	Bycatch Data from Russian Fishing Vessels in the NPFC Convention Area in 2016

OBSERVER PAPERS

Symbol	Title
NPFC-2017-SSC VME02-OP01	The ABNJ Deep Seas Project UPDATE to the NPFC Scientific Committee

ANNUAL REPORTS

Symbol	Title
NPFC-2017-AR Canada	2016 Annual Report of Canada
NPFC-2017-AR China	2016 Annual Report of China
NPFC-2017-AR Japan (Rev 1)	2016 Annual Report of Japan (Rev 1)
NPFC-2017-AR Korea	2016 Annual Report of Republic of Korea
NPFC-2017-AR Chinese Taipei	2016 Annual Report of Chinese Taipei
NPFC-2017-AR Russia	2016 Annual Report of Russian Federation
NPFC-2017-AR United States of America	2016 Annual Report of United States of America
NPFC-2017-AR-Annual Summary Footprint - Bottom Fisheries	Annual Summary Footprint For Bottom Fisheries in the NPFC Area Of Competence

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**REVISION FOR CONSERVATION AND MANAGEMENT MEASURE 2016-06
FOR BOTTOM FISHERIES AND PROTECTION OF VULNERABLE MARINE
ECOSYSTEMS IN THE NORTHEASTERN PACIFIC OCEAN**

The North Pacific Fisheries Commission (NPFC):

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

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

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

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

Hereby adopt the following Conservation and Management Measure (CMM) for bottom fisheries of the Northeastern Pacific Ocean while working to develop and implement other permanent management arrangements to govern these and other fisheries in the North Pacific Ocean.

Scope

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

fisheries management instruments, including bilateral agreements and Regional Fisheries Management Organizations or Arrangements.

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

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

3. Actions by Members of the Commission

Members of the Commission will take the following actions in respect of vessels operating under its Flag or authority in the area covered by these Measures:

- a. Conduct the assessments called for in paragraph 83(a) of UNGA Resolution 61/105, in a manner consistent with the FAO Guidelines and the Standards and Criteria included in Annex 2;
- b. Submit to the SC their assessments conducted pursuant to subparagraph (a) of this paragraph, including all relevant data and information in support of any such assessment, and receive advice and recommendations from the SC, in accordance with the procedures in Annex 23;
- c. Taking into account all advice and recommendations received from the SC, determine whether the fishing activity or operations of the vessel in question are likely to have a significant adverse impact on any vulnerable marine ecosystem;
- d. If it is determined that the fishing activity or operations of the vessel or vessels in question would have a significant adverse impact on vulnerable marine ecosystems, adopt conservation and management measures to prevent such impacts on the basis of advice and recommendations of the SC, which are subject to adoption by the Commission;
- e. Ensure that if any vessels are already engaged in bottom fishing, that such assessments have been carried out in accordance with paragraph 119(a)/UNGA RES 2009, the determination called for in subparagraph (c) of this paragraph has been rendered and, where appropriate, managements measures have been implemented in accordance with the advice and recommendations of the SC, which are subject to adoption by the Commission;
- f. Further ensure that they will only authorize fishing activities on the basis of such assessments

and any comments and recommendations from the SC;

- g. Prohibit its vessels from engaging in directed fishing on the following orders: Alcyonacea, Antipatharia, Gorgonacea, and Scleractinia as well as any other indicator species for vulnerable marine ecosystems as may be identified from time to time by the SC and approved by the Commission;
- h. In respect of areas where vulnerable marine ecosystems are known to occur or are likely to occur, based on the best available scientific information, ensure that bottom fishing activities do not proceed unless conservation and management measures have been established to prevent significant adverse impacts on vulnerable marine ecosystems;
- i. Limit fishing effort in bottom fisheries on the Eastern part of the Convention Area to the level of a historical average (baseline to be determined through consensus in the SC) in terms of the number of fishing vessels and other parameters which reflect the level of fishing effort, fishing capacity or potential impacts on marine ecosystems dependent on new SC advice;
- j. Further, considering accumulated information regarding fishing activities in the Eastern part of the Convention Area, in areas where, in the course of fishing operations, cold water corals or other indicator species as identified by the SC that exceed 50Kg are encountered in one gear retrieval, Members of the Commission shall require vessels flying their flag to cease bottom fishing activities in that location. In such cases, the vessel shall not resume fishing activities until it has relocated a sufficient distance, which shall be no less than 2 nautical miles, so that additional encounters with VMEs are unlikely. All such encounters, including the location and the species in question, shall be reported to the Secretariat, who shall notify the other Members of the Commission so that appropriate measures can be adopted in respect of the relevant site. It is agreed that the cold water corals include: Alcyonacea, Antipatharia, Gorgonacea, and Scleractinia, as well as any other indicator species for vulnerable marine ecosystems as may be identified from time to time by the SC and approved by the Commission.

3-4. All assessments and determinations by any Member as to whether fishing activity would have significant adverse impacts on vulnerable marine ecosystems, as well as measures adopted in order to prevent such impacts, will be made publicly available through agreed means.

Control of Bottom Fishing Vessels

4-5. Members will exercise full and effective control over each of their bottom fishing vessels operating in the high seas of the Northeastern Pacific Ocean, including by means of fishing licenses, authorizations or permits, and maintenance of a record of these vessels as outlined in the Convention and applicable CMM.

5-6. New and exploratory fishing will be subject to the exploratory fishery protocol included as Annex

1.

Scientific Committee (SC)

~~6-7.~~ Scientific Committee will provide scientific support for the implementation of these CMMs.

Scientific Information

~~7-8.~~ The Members shall provide all available information as required by the Commission for any current or historical fishing activity by their flag vessels, including the number of vessels by gear type, size of vessels (tons), number of fishing days or days on the fishing grounds, total catch by species, ~~and~~ areas fished (names or coordinates of seamounts), and information from scientific observer programmes (see Annexes 4 and 5) to the NPFC Secretariat as soon as possible and no later than one month prior to SC meeting. The Secretariat will make such information available to SC.

~~8-9.~~ Scientific research activities for stock assessment purposes are to be conducted in accordance with a research plan that has been provided to SC prior to the commencement of such activities.

Annex 1

EXPLORATORY FISHERY PROTOCOL IN THE NORTH PACIFIC OCEAN

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

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

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

- v. comprehensive monitoring of all fishing effort, capture of all species and interactions with VMEs.

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

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

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

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

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

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

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

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

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

Appendix Annex 1.1

Information to be provided before exploratory fisheries start

1. A harvesting plan
 - Name of vessel
 - Flag member of vessel
 - Description of area to be fished (location and depth)
 - Fishing dates
 - Anticipated effort
 - Target species
 - Bottom fishing gear-type used
 - Area and effort restrictions to ensure that fisheries occur on a gradual basis in a limited geographical area.
2. A mitigation plan
 - Measures to prevent SAIs to VMEs that may be encountered during the fishery
3. A catch monitoring plan
 - Recording/reporting of all species brought onboard to the lowest possible taxonomic level
 - 100% satellite monitoring
 - 100% observer coverage
4. A data collection plan
 - Data is to be collected in accordance with “Type and Format of Scientific Observer Data to be Collected” (Annex 5)

Appendix Annex 1.2

Information to be included in the report

- Name of vessel
- Flag member of vessel
- Description of area fished (location and depth)
- Fishing dates
- Total effort

- Bottom fishing gear-type used
- List of VME encountered (the amount of VME indicator species for each encounter specifying the location: longitude and latitude)
- Mitigation measures taken in response to the encounter of VME
- List of all organisms brought onboard
 - List of VMEs indicator species brought onboard by location: longitude and latitude

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

1. Introduction

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

2. Purpose

(1) The purpose of the standards and criteria is to provide guidelines for each member of the Commission in identifying VMEs and assessing SAIs of individual bottom fishing activities¹ on VMEs or marine species in the Convention Area. Each member of the Commission, using the best information available, is to decide which species or areas are to be categorized as VMEs, identify areas where VMEs are known or likely to occur, and assess whether individual bottom fishing activities would have SAIs on such VMEs or marine species. The results of these tasks are to be submitted to and reviewed by the Scientific Committee with a view to reaching a common understanding among the members of the Commission.

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

- (a) The fisheries are conducted in the Convention Area;
- (b) The total catch (everything brought up by the fishing gear) includes species that can only sustain low exploitation rates; and
- (c) The fishing gear is likely to contact the seafloor during the normal course of fishing operations

3. Definition of VMEs

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

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

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

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

- (a) Uniqueness or rarity - an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by other similar areas. These include:
 - (i) Habitats that contain endemic species;
 - (ii) Habitats of rare, threatened or endangered species that occur in discrete areas;
 - (iii) Nurseries or discrete feeding, breeding, or spawning areas
- (b) Functional significance of the habitat – discrete areas or habitats that are necessary for the survival, function, spawning/reproduction or recovery of fish stocks, particular life-history stages (e.g. nursery grounds or rearing areas), or of rare, threatened or endangered marine species.
- (c) Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities
- (d) Life-history traits of component species that make recovery difficult – ecosystems that are characterized by populations or assemblages of species with one or more of the following characteristics:
 - (i) Slow growth rates
 - (ii) Late age of maturity
 - (iii) Low or unpredictable recruitment
 - (iv) Long-lived
- (e) Structural complexity – an ecosystem that is characterized by complex physical structures created by significant concentrations of biotic and abiotic features. In these ecosystems, ecological processes are usually highly dependent on these structured systems. Further, such ecosystems often have high diversity, which is dependent on the structuring organisms.

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

4. Identification of potential VMEs

(1) Fished seamounts

(a) Identification of fished seamounts

It is reported that ~~four-two~~ types of fishing gear are currently used by ~~the~~ members of the Commission in the NE ES-NHR-area, namely long-line hook and long-line trap, bottom trawl, bottom gillnet, bottom longline and pot. ~~A fifth type of fishing gear (coral drag) was used in the ES-NHR area from the mid 1960s to the late 1980s and is possibly still used by non-members of the Commission. These types of fishing gear are usually used on the top or slope of seamounts, which could be considered VMEs. It is therefore necessary to identify the~~ The footprint of the bottom fisheries (fished seamounts) is identified based on the available fishing record. The following seamounts have been identified as fished seamounts at some point in the past: Brown Bear, Cobb, Warwick, Eickelberg, Pathfinder, Miller, Murray, Cowie, Surveyor, Pratt, and Durgin. ~~The following seamounts have been identified as fished seamounts: Suiko, Showa, Youmei, Nintoku, Jingu, Ojin, Northern Koko, Koko, Kinmei, Yuryaku, Kammu, Colahan, and C H.~~ Since the use of most of these gears in the ES-NHR area dates back to the late 1960s and 1970s, it It is important to establish, to the extent practicable, a time series of where and when these gears have been used in order to assess potential long-term effects on any existing VMEs.

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

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

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

After identifying the fished seamounts or fished areas of seamounts, it is necessary to assess whether

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

(2) New fishing areas

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

5. Assessment of SAIs on VMEs or marine species

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

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

- (a) The intensity or severity of the impact at the specific site being affected;
- (b) The spatial extent of the impact relative to the availability of the habitat type affected;
- (c) The sensitivity/vulnerability of the ecosystem to the impact;
- (d) The ability of an ecosystem to recover from harm, and the rate of such recovery;
- (e) The extent to which ecosystem functions may be altered by the impact; and
- (f) The timing and duration of the impact relative to the period in which a species needs the habitat during one or more life-history stages.

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

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

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

- (a) Type of fishing conducted or contemplated, including vessel and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing;
- (b) Best available scientific and technical information on the current state of fishery resources, and baseline information on the ecosystems, habitats and communities in the fishing area, against which future changes are to be compared;
- (c) Identification, description and mapping of VMEs known or likely to occur in the fishing area;
- (d) The data and methods used to identify, describe and assess the impacts of the activity, identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment
- (e) Identification, description and evaluation of the occurrence, scale and duration of likely impacts, including cumulative impacts of activities covered by the assessment on VMEs and low-productivity fishery resources in the fishing area;
- (f) Risk assessment of likely impacts by the fishing operations to determine which impacts are likely to be SAIs, particularly impacts on VMEs and low-productivity fishery resources (Risk assessments are to take into account, as appropriate, differing conditions prevailing in areas where fisheries are well established and in areas where fisheries have not taken place or only occur occasionally);
- (g) The proposed mitigation and management measures to be used to prevent SAIs on VMEs and ensure long-term conservation and sustainable utilization of low-productivity fishery resources, and the measures to be

used to monitor effects of the fishing operations.

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

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

6. Proposed conservation and management measures to prevent SAIs

As a result of the assessment in 5 above, if it is considered that individual fishing activities are causing or likely to cause SAIs on VMEs or marine species, the member of the Commission is to adopt appropriate conservation and management measures to prevent such SAIs. The member of the Commission is to clearly indicate how such impacts are expected to be prevented or mitigated by the measures.

7. Precautionary approach

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

- (a) Precautionary, conservation and management measures to prevent SAIs;
- (b) Measures to address unexpected encounters with VMEs in the course of fishing operations;
- (c) Measures, including ongoing scientific research, monitoring and data collection, to reduce the uncertainty; and
- (d) Measures to ensure long-term sustainability of deep sea fisheries.

8. Template for assessment report

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

ANNEX 2.1

EXAMPLES OF POTENTIAL VULNERABLE SPECIES GROUPS, COMMUNITIES AND HABITATS AS WELL AS FEATURES THAT POTENTIALLY SUPPORT THEM

The following examples of species groups, communities, habitats and features often display characteristics consistent with possible VMEs. Merely detecting the presence of an element itself is not sufficient to identify a VME. That identification is to be made on a case-by-case basis through application of relevant provisions of the Standards and Criteria, particularly Sections 3, 4 and 5.

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

a.	certain coldwater corals, e.g., reef builders and coral forest including: stony corals (scleractinia), alcyonaceans and gorgonians (octocorallia), black corals (antipatharia), and hydrocorals (stylasteridae),
b.	Some types of sponge dominated communities,
c.	communities composed of dense emergent fauna where large sessile protozoans (xenophyophores) and invertebrates (e.g., hydroids and bryozoans) form an important structural component of habitat, and

d.	seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e., endemic).
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Examples of topographical, hydrophysical or geological features, including fragile geological structures, that potentially support the species groups or communities, referred to above:

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

ANNEX 2.2

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

1. Name of the member of the Commission
2. Name of the fishery (e.g., bottom trawl, bottom gillnet, bottom longline, pot)
3. Status of the fishery (existing fishery or exploratory fishery)
4. Target species
5. Bycatch species
6. Recent level of fishing effort (every year at least since 2002)
 - (1) Number of fishing vessels
 - (2) Tonnage of each fishing vessel
 - (3) Number of fishing days or days on the fishing ground
 - (4) Fishing effort (total operating hours for trawl, # of hooks per day for long-line, # of pots per day for pot, total length of net per day for gillnet)
 - (5) Total catch by species
 - (6) Names of seamounts fished or to be fished
7. Fishing period
8. Analysis of status of fishery resources
 - (1) Data and methods used for analysis
 - (2) Results of analysis
 - (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties
9. Analysis of status of bycatch species resources
 - (1) Data and methods used for analysis
 - (2) Results of analysis
 - (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties
10. Analysis of existence of VMES in the fishing ground
 - (1) Data and methods used for analysis
 - (2) Results of analysis
 - (3) Identification of uncertainties in data and methods, and measures to overcome such uncertainties
11. Impact assessment of fishing activities on VMES or marine species including cumulative impacts, and identification of SAIs on VMES or marine species, as detailed in Section 5 above, Assessment of SAIs on VMES or marine species
12. Other points to be addressed
13. Conclusion (whether to continue or start fishing with what measures, or stop fishing)

SCIENTIFIC COMMITTEE ASSESSMENT REVIEW PROCEDURES FOR BOTTOM FISHING ACTIVITIES

1. The Scientific Committee (SC) is to review identifications of vulnerable marine ecosystems (VMEs) and assessments of significant adverse impact on VMEs, including proposed management measures intended to prevent such impacts submitted by individual Members.
2. Members of the Commission shall submit their identifications and assessments to members of the SC at least 21 days prior to the SC meeting at which the review is to take place. Such submissions shall include all relevant data and information in support of such determinations.
3. The SC will review the data and information in each assessment in accordance with the Science-based Standards and Criteria for Identification of VMEs and Assessment of Significant Adverse Impacts on VMEs and Marine Species (Annex 2), previous decisions of the Commission, and the FAO Technical Guidelines for the Management of Deep Sea Fisheries in the High Seas, paying special attention to the assessment process and criteria specified in paragraphs 47-49 of the Guidelines.
4. In conducting the review above, the SC will give particular attention to whether the deep-sea bottom fishing activity would have a significant adverse impact on VMEs and marine species and, if so, whether the proposed management measures would prevent such impacts.
5. Based on the above review, the SC will provide advice and recommendations to the submitting Members on the extent to which the assessments and related determinations are consistent with the procedures and criteria established in the documents identified above; and whether additional management measures will be required to prevent SAIs on VMEs.
6. Such recommendations will be reflected in the report of the SC meeting at which the assessments are considered.

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

Report Components

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

A. Observer Training

An overview of observer training conducted, including:

- Overview of training programme provided to scientific observers.
- Number of observers trained.

B. Scientific Observer Programme Design and Coverage

Details of the design of the observer programme, including:

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

Details of observer coverage of the above fleets, including:

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

C. Observer Data Collected

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

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

D. Tag Return Monitoring

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

E. Problems Experienced

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

**NPFC BOTTOM FISHERIES
OBSERVER PROGRAMME STANDARDS: SCIENTIFIC COMPONENT**

TYPE AND FORMAT OF SCIENTIFIC OBSERVER DATA TO BE COLLECTED

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

1. Vessel and observer details are to be recorded only once for each observed trip.
2. The following vessel data are to be collected for each observed trip:
 - a) Current vessel flag.
 - b) Name of vessel.
 - c) Name of the Captain.
 - d) Name of the Fishing Master.
 - e) Registration number.
 - f) International radio call sign (if any).
 - g) Lloyd's / IMO number (if allocated).
 - h) Previous Names (if known).
 - i) Port of registry.
 - j) Previous flag (if any).
 - k) Type of vessel.
 - l) Type of fishing method(s).
 - m) Length (m).
 - n) Beam (m).
 - o) Gross register tonnage (international tonnage).
 - p) Power of main engine(s) (kilowatts).
 - q) Hold capacity (cubic metres).
 - r) Record of the equipment on board which may affect fishing power factors (navigational equipment, radar, sonar systems, weather fax or satellite weather receiver, sea-surface temperature image receiver, Doppler current monitor, radio direction finder).
 - s) Total number of crew (all staff, excluding observers).
3. The following observer data are to be collected for each observed trip:
 - a) Observer's name.
 - b) Observer's organisation.
 - c) Date observer embarked (UTC date).
 - d) Port of embarkation.
 - e) Date observer disembarked (UTC date).
 - f) Port of disembarkation.

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

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

- j) Width of net opening (m).
- k) Mesh size of the cod-end net (stretched mesh, mm) and mesh type (diamond, square, etc).
- l) Gear depth (of footrope) at start of fishing (m).
- m) Bottom (seabed) depth at start of fishing (m).
- n) Gear depth (of footrope) at end of fishing (m).
- o) Bottom (seabed) depth at end of fishing (m).
- p) Status of the trawl operation (no damage, lightly damaged*, heavily damaged*, other (specify)). *Degree may be evaluated by time for repairing (<=1hr or >1hr)
- q) Duration of estimated period of seabed contact (minute)
- r) Intended target species.
- s) Catch of all species retained on board, split by species, in weight (to the nearest kg).
- t) Estimate of the amount (weight or volume) of all living marine resources discarded, split by species.
- u) Record of the numbers by species of all marine mammals, seabirds or reptiles caught.
- v) Record of sensitive benthic species in the trawl catch, particularly vulnerable or habitat-forming species such as sponges, sea-fans or corals.

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

1. Data are to be collected on an un-aggregated (set by set) basis for all observed bottom gillnet sets.
2. The following data are to be collected for each observed bottom gillnet set:
 - a) Set start date (UTC).
 - b) Set start time (UTC).
 - c) Set end date (UTC).
 - d) Set end time (UTC).
 - e) Set start position (Lat/Lon, 1 minute resolution).
 - f) Set end position (Lat/Lon, 1 minute resolution).
 - g) Net panel ("tan") length (m).
 - h) Net panel ("tan") height (m).
 - i) Net mesh size (stretched mesh, mm) and mesh type (diamond, square, etc)
 - j) Bottom depth at start of setting (m).
 - k) Bottom depth at end of setting (m).
 - l) Number of net panels for the set.
 - m) Number of net panels retrieved.
 - n) Number of net panels actually observed during the haul.
 - o) Actually observed catch of all species retained on board, split by species, in weight (to the nearest kg).
 - p) An estimation of the amount (numbers or weight) of marine resources discarded, split by species, during the actual observation.
 - q) Record of the actually observed numbers by species of all marine mammals, seabirds or reptiles caught.
 - r) Intended target species.
 - s) Catch of all species retained on board, split by species, in weight (to the nearest kg).
 - t) Estimate of the amount (weight or volume) of all marine resources discarded* and dropped-off, split by species. * Including those retained for scientific samples.
 - u) Record of the numbers by species of all marine mammals, seabirds or reptiles caught (including those discarded and dropped-off).

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

1. Data are to be collected on an un-aggregated (set by set) basis for all observed longline sets.
2. The following fields of data are to be collected for each set:
 - a) Set start date (UTC).

- b) Set start time (UTC).
- c) Set end date (UTC).
- d) Set end time (UTC).
- e) Set start position (Lat/Lon, 1 minute resolution).
- f) Set end position (Lat/Lon, 1 minute resolution).
- g) Total length of longline set (m).
- h) Number of hooks for the set.
- i) Bottom (seabed) depth at start of set.
- j) Bottom (seabed) depth at end of set.
- k) Number of hooks actually observed during the haul.
- l) Intended target species.
- m) Actually observed catch of all species retained on board, split by species, in weight (to the nearest kg).
- n) An estimation of the amount (numbers or weight) of marine resources discarded* or dropped-off, split by species, during the actual observation. * Including those retained for scientific samples.
- o) Record of the actually observed numbers by species of all marine mammals, seabirds or reptiles caught (including those discarded and dropped-off).

E. Length-Frequency Data to Be Collected

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

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

1. The following biological data are to be collected for representative samples of the main target species and, time permitting, for other main by-catch species contributing to the catch:
 - a) Species
 - b) Length (to the nearest mm), with record of the type of length measurement used.
 - c) Length and depth in case of North Pacific armorhead.
 - d) Sex (male, female, immature, unsexed)
 - e) Maturity stage (immature, mature, ripe, ripe-running, spent)
2. Representative stratified samples of otoliths are to be collected from the main target species and, time permitting, from other main by-catch species regularly occurring in catches. All otoliths to be collected are to be labelled with the information listed in 1 above, as well as the date, vessel name, observer name and catch position.
3. Where specific trophic relationship projects are being conducted, observers may be requested to also collect stomach samples from certain species. Any such samples collected are also to be labelled with the information listed in 1 above, as well as the date, vessel name, observer name and catch position.
4. Observers may also be required to collect tissue samples as part of specific genetic research programmes implemented by the SC.

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

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

1. Flag members operating observer programs are to develop, in cooperation with the SC, lists and identification guides of protected species or species of concern (seabirds, marine mammals or marine reptiles) to be monitored by observers.
2. The following data are to be collected for all protected species caught in fishing operations:
 - a) Species (identified as far as possible, or accompanied by photographs if identification is difficult).
 - b) Count of the number caught per tow or set.
 - c) Life status (vigorous, alive, lethargic, dead) upon release.
 - d) Whole specimens (where possible) for onshore identification. Where this is not possible, observers may be required to collect sub-samples of identifying parts, as specified in biological sampling protocols.

H. Detection of Fishing in Association with Vulnerable Marine Ecosystems

1. The SC is to develop a guideline, species list and identification guide for benthic species (e.g. sponges, sea fans, corals) whose presence in a catch will indicate that fishing occurred in association with a vulnerable marine ecosystem (VME). All observers on vessels are to be provided with copies of this guideline, species list and ID guide.
2. For each observed fishing operation, the following data are to be collected for all species caught, which appear on the list of vulnerable benthic species:
 - a) Species (identified as far as possible, or accompanied by a photograph where identification is difficult).
 - b) An estimate of the quantity (weight (kg) or volume (m³)) of each listed benthic species caught in the fishing operation.
 - c) An overall estimate of the total quantity (weight (kg) or volume (m³)) of all invertebrate benthic species caught in the fishing operation.
 - d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitable preserved for identification on shore.

I. Data to be collected for all Tag Recoveries

1. The following data are to be collected for all recovered fish, seabird, mammal or reptile tags:
 - a) Observer name.
 - b) Vessel name.
 - c) Vessel call sign.
 - d) Vessel flag.
 - e) Collect, label (with all details below) and store the actual tags for later return to the tagging agency.
 - f) Species from which tag recovered.
 - g) Tag colour and type (spaghetti, archival).
 - h) Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)
 - i) Date and time of capture (UTC).
 - j) Location of capture (Lat/Lon, to the nearest 1 minute)
 - k) Animal length / size (to the nearest cm) with description of what measurement was taken (such as total length, fork length, etc).

- l) Sex (F=female, M=male, I=indeterminate, D=not examined)
- m) Whether the tags were found during a period of fishing that was being observed (Y/N)
- n) Reward information (e.g. name and address where to send reward)

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

J. Hierarchies for Observer Data Collection

1. Trip-specific or programme-specific observer task priorities may be developed in response to specific research programme requirements, in which case such priorities should be followed by observers.
2. In the absence of trip- or programme-specific priorities, the following generalised priorities should be followed by observers:
 - a) Fishing Operation Information
 - All vessel and tow / set / effort information.
 - b) Monitoring of Catches
 - Record time, proportion of catch (e.g. proportion of trawl landing) or effort (e.g. number of hooks), and total numbers of each species caught.
 - Record numbers or proportions of each species retained or discarded.
 - c) Biological Sampling
 - Length-frequency data for target species.
 - Length-frequency data for main by-catch species.
 - Identification and counts of protected species.
 - Basic biological data (sex, maturity) for target species.
 - Check for presence of tags.
 - Otoliths (and stomach samples, if being collected) for target species.
 - Basic biological data for by-catch species.
 - Biological samples of by-catch species (if being collected)
 - Photos
3. The monitoring of catches and biological sampling procedures should be prioritised among species groups as follows:

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

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

K. Coding Specifications to be used for Recording Observer Data

1. Unless otherwise specified for specific data types, observer data are to be collected in accordance with the same coding specifications as specified in this Annex.
2. Coordinated Universal Time (UTC) is to be used to describe times.
3. Degrees and minutes are to be used to describe locations.
4. The following coding schemes are to be used:
 - a. Species are to be described using the FAO 3 letter species codes.
 - b. Fishing methods are to be described using the International Standard Classification of Fishing Gear (ISSCFG - 29 July 1980) codes.
 - c. Types of fishing vessel are to be described using the International Standard Classification of Fishery Vessels (ISSCFV) codes.
5. Metric units of measure are to be used, specifically:
 - a. Kilograms are to be used to describe catch weight.
 - b. Metres are to be used to describe height, width, depth, beam or length.
 - c. Cubic metres are to be used to describe volume.
 - d. Kilowatts are to be used to describe engine power.

Suggestions from SSC VME for the SC Research Plan

2. Ecosystem approach to fisheries

Areas of work

- 1. Review existing NPFC standards on VME data collection, including guidelines set forth in the CMMs for bottom fisheries and protection of vulnerable marine ecosystems in the northwestern and northeastern Pacific Ocean (CMM 2016-05 and CMM 2016-06), and determine if any modifications to these standards are needed in the short-term and/or longer term**
- 2. Review of Encounter Protocol for bottom fisheries on Vulnerable Marine Ecosystems**
3. Determination of data requirements and identification of what data may be collected through commercial fishing operations
4. Develop consensus on criteria used to identify VMEs and how this might be applied in the NPFC (note that guidelines from the FAO are already referenced in Annex 2 of the CMM 2016-05 and CMM 2016-06)
5. Analysis of known or suspected VMEs in the Convention Area
6. Surveys of VMEs for data collection
7. Development of a framework to conduct assessments of Impacts of Bottom Fishing Activities on Vulnerable Marine Ecosystems

Areas of work	2017	2018	2019	2020	2021
1. Review existing NPFC standards on VME data collection	[FAO workshop]				
2. VME encounter protocols	Identification of fished and unfished areas; Exploration of the SAI assessment methods for	Assessment of the bottom fishery impacts on VMEs in the western CA [NPFC workshop]	Refinement of the VME conservation measures for the existing fishing grounds in the western	Reinforcement of the experimental fishing protocol	Establishment of the conservation methods for VMEs

	VMEs in the western CA		CA		
3. Determination of data requirements					
4. Develop consensus on criteria used to identify VMEs					
5. Analysis of known or suspected VMEs in the CA					
6. Surveys of VMEs for data collection					
7. Development of a framework to conduct assessments of Impacts of Bottom Fishing Activities on VMEs					