North Pacific Fisheries Commission

4th Meeting of the Small Scientific Committee
on Vulnerable Marine Ecosystems
REPORT

15-16 April 2019

April 2019

North Pacific Fisheries Commission
4th Meeting of the Small Scientific Committee on Vulnerable Marine Ecosystems (VMEs)

15-16 April 2019
Jeju, Republic of Korea

REPORT

Agenda Item 1. Opening of the meeting

1. The 4th Meeting of the Small Scientific Committee on Vulnerable Marine Ecosystems (SSC VME04) took place in Jeju, Republic of Korea on 15-16 April 2019, and was attended by Members from Canada, China, Japan, the Republic of Korea, the Russian Federation and the United States of America. The meeting was opened by Dr. Bai Li (China) who served as the SSC VME Chair.

2. Dr. Seok-Gwan Choi welcomed the participants to Jeju on behalf of the host Member.

Agenda Item 2. Adoption of Agenda

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

Agenda Item 3. Review of outputs and recommendations from the VME&BF Data Workshop and intersessional work

3.1 Recommendations from the Workshop

4. The Chair summarized the outputs of the VME&BF Data Workshop and presented recommendations for consideration by the SSC VME.

5. The recommendations endorsed by the SSC VME are listed under paragraph 37.

3.2 Lists of existing data on bottom fishing footprint and effort, existing taxa data and existing multibeam data

6. The Science Manager, Dr. Aleksandr Zavolokin, presented the lists of existing data for VME assessments (NPFC-2019-SSC VME04-WP04 (Rev.2)), including existing data for potential combined footprint and effort map of all bottom fisheries by gear and time, existing taxa data for combined assessment, and existing multibeam data for combined assessment.

7. The SSC VME reviewed and updated the above lists (Annex D).

3.3 Resolution of data to be shared for mapping and SAI assessment

8. The SSC VME agreed to defer discussions of the appropriate temporal and spatial resolution of data to be shared for mapping and SAI assessment to Agenda Item 5.

3.4 VME indicator taxa

9. Japan presented an updated assessment of the potential impact of Japanese bottom fisheries on VMEs in the Emperor Seamounts region (NPFC-2019-SSC VME04-WP02). Japan conducted an SAI assessment on the potential VMEs in the northwestern part of the NPFC Convention Area in accordance with the guidelines in Annex 2 of CMM 2018-05 for bottom fisheries and protection of vulnerable marine ecosystems in the northwestern Pacific Ocean. Based on the assessment, Japan proposed the designation of two potential VME protection areas (a Gorgonacea (*Paragorgia*) habitat in the northwestern part of Koko Seamount and a Scleractinia (*Solenosmilia variabilis*) habitat on the northern ridge of Colahan Seamount); and the revision of the list of VME indicator taxa (from Gorgonacea, Scleractinia, Antipatharia, and Alcyonacea to Gorgonacea, Scleractinia, Antipatharia, and Porifera).

10. Regarding the proposed designation of two potential VME protection areas, the SSC VME expressed support and recommended the closure of the two areas, while acknowledging that further research needs to be done to define the range of the VME sites.

11. The SSC VME noted that the NPFC does not have a quantitative measure for defining VMEs and discussed the possibility to develop a single, standardized step-by-step protocol for defining VMEs in the future. Such a protocol should be sufficiently flexible to account for the different levels of data availability in the northwestern and northeastern areas of the Pacific Ocean, and enable scientists in each area to use their own methodologies and judgment.

12. The SSC VME suggested that it would be worthwhile comparing the results of Japan's current work and those of its past species distribution modeling work to assess the accuracy of species distribution models for mapping potential VME areas. This may be useful for mapping potential VME areas in the northeastern area of the Pacific Ocean, where there is a paucity of data compared to the northwestern area.

13. Regarding the proposed revision of the list of VME indicator taxa, the SSC VME recognized the value of the work done by Japan but determined that further research is needed.

14. The SSC VME recognized that there may be variation in VMEs between the northeastern and northwestern areas of the Pacific Ocean.

3.5 Post-encounter measure

15. The Chair presented a review of other RFMO/As' practices in relation to VME post-encounter treatment and the NPFC situation (NPFC-2019-SSC VME04-WP01).

16. The SSC VME considered the information presented and drafted a general flow chart for the VME post-encounter reporting process in the NPFC (Annex E). The SSC VME agreed to continue developing the post-encounter measure intersessionally and hold further discussions on the details of the VME post-encounter reporting process in future meetings.

Agenda Item 4. Review of Member's research activities

17. Canada presented a case study that illustrates how spatial trade-off analyses can help maintain the socio-economic benefits of the sablefish fishery while promoting the conservation of VMEs (NPFC-2019-SSC VME04-WP06). Specifically, Canada mapped the locations of potential VMEs by developing species distribution models for six of its VME indicator taxa, developed a spatial footprint of sablefish fishing activity, and used Marxan to evaluate several trade-off scenarios by comparing the potential loss in sablefish landings when protecting potential VME areas where Canada fishes for sablefish. Canada explained that its case study methodology is still in progress but could be applied to other parts of the NPFC Convention Area eventually.

18. The SSC VME discussed the work done by Canada and noted the possibility to apply the same approach using other Members' data in the future.

19. Canada presented an update on work it has done to identify and map seamounts in the northeastern Pacific Ocean (NPFC-2019-SSC VME04-IP01). Canada has now identified and mapped the locations of 52 seamounts, three times the amount known in 2016. Canada has visually surveyed 9 of them and mapped 23 of them with single or multibeam surveys.

20. Korea reported on the coral bycatch by Korean trawl fisheries on the Emperor Seamounts in 2018 (NPFC-2019-SSC VME04-WP08). Korea has reported information on bycatch of VME indicator taxa collected by Korean trawl fisheries based on its scientific observer program since 2013 and has observed more than 70% of hauls during that time. In 2018, one Korean trawl vessel operated in the Convention Area and carried an observer on board. The vessel made 154 hauls, 99 (64%) of which were observed. VME taxa were found in 38 (25%) of the observed hauls. The order Antipatharia accounted for the largest composition (50%) by weight, followed by the order Gorgonacea (29%) in 2018.

Agenda Item 5. SSC VME Work Plan for 2019

5.1 Map of combined fishing footprint and effort

21. The SSC VME recognized the importance of combining data to develop an NPFC map of combined fishing footprint and effort, but acknowledged that Members need more time to determine the type of data to be submitted, and the spatial and temporal resolution of such data. The SSC VME agreed to continue discussions intersessionally, with the aim of reaching a consensus on the type and resolution of data by mid-June and sharing data by November 2019.

5.2 Standardized approach for SAI assessment

22. Noting the work done by Japan and Canada in relation to SAI assessment, the SSC VME requested Japan and Canada to develop a draft standardized approach for SAI assessment to be presented at the next SSC VME meeting.

5.3 Encounter Protocol

23. The SSC VME reviewed the Encounter Protocol and determined that no revisions are currently necessary.

5.4 Exploratory Fishery Protocol

24. The SSC VME reviewed the Exploratory Fishery Protocol and determined that no revisions are currently necessary.

5.5 Management objectives for recovering VME sites

25. The SSC VME agreed to defer discussions on the management objectives for recovering VME sites to future meetings.

Agenda Item 6. Review of the CMMs 2018-05 and 2017-06 for bottom fisheries and protection of vulnerable marine ecosystems

26. The SSC VME reviewed and revised CMM 2018-05 (Annex F).

27. The SSC VME reviewed and revised CMM 2017-06 (Annex G).

Agenda Item 7. Scientific projects

7.1 Ongoing projects

7.1.1 Spatial management of VMEs and bottom fisheries

28. The Data Coordinator, Mr. Mervin Ogawa, reported on the progress of ongoing projects for the spatial management of VMEs and bottom fisheries, and the development of the spatial/temporal map of Members' Pacific saury catch and effort (NPFC-2019-SSC VME04-

WP07).

29. The SSC VME considered the information presented and recommended that the Scientific Committee (SC) consider using the Food and Agriculture Organization of the United Nations' (FAO) publicly-available Vulnerable Marine Ecosystems Map as a template for developing the NPFC's own VME map.

7.1.2 VME taxa identification guide

30. The Science Manager presented a summary of the intersessional work of the small working group on the development of a VME taxa identification field guide (NPFC-2019-SSC VME04-WP03 (Rev. 1)). The work included a review of the VME taxa identification guides of four RFMOs, sharing of Members' photos and other documents, discussion of the design and content of the NPFC guide, and preparation of a first draft of the guide for the northwestern area of the Pacific Ocean.

31. The SSC VME reviewed the draft guide and agreed on a list of specifications regarding the design and content of the VME taxa identification guide (Annex H).

7.2 New projects

32. Russia proposed a new project Course/School for NPFC observers and High School students (Annex I). The aim of the project is to share knowledge on the identification of the VME indicator taxa including potential groups which can be added in the list of VME indicators in the future.

Agenda Item 8. Review/update of the 2017-2021 Work Plan

33. The SSC VME reviewed the 2017-2021 Work Plan and updated it as detailed in NPFC-2019-SSC VME04-WP05 (Rev. 1).

Agenda Item 9. Other matters

9.1 Selection of SSC VME Chair

34. The SSC VME selected Dr. Chris Rooper (Canada) to serve as the new SSC VME Chair.

35. The SSC VME thanked Dr. Li for her hard work and excellent chairing over the past two years.

9.2 Other issues

36. No other issues were discussed.

Agenda Item 10. Recommendations to the Scientific Committee

37. The SSC VME informs the SC that it endorses the following recommendations made by the VME&BF Data Workshop:

(a) Review the draft list of potentially available data to better identify current and historical bottom fishing grounds in the Convention Area and fishing footprint and effort in relation to assessing SAI in the Convention Area (Annex D).

(b) Identify appropriate temporal and spatial resolution of data to be shared in order to map a combined fishing footprint and effort to better identify fishing grounds.

(c) Identify appropriate temporal and spatial resolution of data to be shared in order to define the fishing footprint in relation to assessing SAI.

(d) Continue working on whether or not the current indicator taxa are sufficient for determining VME, and whether or not the practices of the NPFC in relation to VME in the Convention Area are consistent with that of other regional fisheries management organizations (RFMOs).

(e) When consolidating available data and relevant information from inside and outside the Convention Area to map VMEs, consider the benefits and limitations of publicly available high-resolution fishing activity data and existing predictive species distribution models.

(f) Review the summary table of the status of the NPFC's identification and protection of VMEs and data requirements (Annex J).

(g) Consider using the summary of potential data, methods and collaborators for predictive models (Annex K.

(h) For the Encounter protocol (CMM 2018-05, Paragraph 4G and CMM 2017-06, Paragraph 3j), require that encounters are reported to the Secretariat as soon as possible and requirement to report encounters is included in the Annex 4 of the CMMs.

(i) Continue work on quick reporting protocol to avoid multiple impacts on the same VME site.

(j) Continue the work to develop a common NPFC VME field guide.

(k) Consider including standardized systematic sampling, including photographs and biological sampling, as part of the scientific observer program.

(l) Consolidate all available VME bycatch data for combined mapping assessment.

(m) Review updates and continue to revise the table of data availability and progress in VME protection in the NPFC against data requirements from the FAO DSF Guidelines (NPFC-2018-WS DATA01-WP01 (Rev. 1)).

(n) Consider the revision of Interim Guidance for Management of Scientific Data [(Annex L] and continue its development.

(o) Consider continuing to develop templates to summarize existing data potentially available on bottom fishing footprint and effort, taxa, multibeam and VME predictive modelling (Annex D).

38. The SSC VME recommends the following to the SC:
   (a) Endorse a plan and timelines to determine the type and resolution of data to be shared for SAI assessment and a map of combined fishing footprint and effort (paragraph 21).
   (b) Endorse a flowchart for VME post-encounter treatment in the NPFC and continue developing the details of the post-encounter measure intersessionally (Annex E)
   (c) Conduct further research to define the range of the two VME sites identified in NPFC-2019-SSC VME04-WP02 and close them to fishing.
   (d) Endorse the revised CMM 2018-05 (Annex F).
   (e) Endorse the revised CMM 2017-06 (Annex G).
   (f) Consider using the FAO's publicly-available Vulnerable Marine Ecosystems Map as a template for developing the NPFC's own VME map.
   (g) Consider the holding of a course/school on VME indicator taxa identification as a new project (Annex I).
   (h) Endorse the draft guide and a list of specifications regarding the design and content of the common VME taxa identification guide in the western North Pacific Ocean (Annex H).
   (i) Endorse the updated 2017-2021 SSC VME Work Plan (NPFC-2019-SSC VME04-WP05 (Rev. 1)).

Agenda Item 11. Next meeting
39. The SSC VME requests the guidance of the SC for determining the date and location of the next meeting.

Agenda Item 12. Adoption of the Report
40. The SSC VME04 Report was adopted by consensus.

Agenda Item 13. Close of the Meeting
41. The meeting closed at 14:47 on 16 April 2019.

Annexes:
Annex A – Agenda
Annex B – List of Documents
Annex C – List of Participants
Annex D – List of Existing Data for VME Assessments
Annex E – Flowchart for VME Post-encounter Treatment
Annex F – Revised CMM 2018-05 - Conservation and Management Measure for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean
Annex G – Revised CMM 2017-06 - Conservation and Management Measure for Bottom Fisheries

Agenda

Agenda Item 1.   Opening of the meeting

Agenda Item 2.   Adoption of Agenda

Agenda Item 3.   Review of outputs and recommendations from the VME&BF Data
                    Workshop and intersessional work
   3.1 Recommendations from the Workshop
   3.2 Lists of existing data on bottom fishing footprint and effort, existing taxa data and
     existing multibeam data
   3.3 Resolution of data to be shared for mapping and SAI assessment
   3.4 VME indicator taxa
   3.5 Post-encounter measure

Agenda Item 4.   Review of Members' research activities

Agenda Item 5.   SSC VME Work Plan for 2019
   5.1 Map of combined fishing footprint and effort
   5.2 Standardized approach for SAI assessment
   5.3 Encounter Protocol
   5.4 Exploratory Fishery Protocol
   5.5 Management objectives for recovering VME sites

Agenda Item 6.   Review of CMMs 2018-05 and 2017-06 for bottom fisheries and protection
                    of vulnerable marine ecosystems

Agenda Item 7.   Scientific projects
   7.1 Ongoing projects
     7.1.1 Spatial management of VMEs and bottom fisheries
     7.1.2 VME taxa identification guide
   7.2 New projects

Agenda Item 8.   Review/update of the 2017-2021 Work Plan

Agenda Item 9.   Other matters
   9.1 Selection of SSC VME Chair
   9.2 Other issues

Agenda Item 10.   Recommendations to the Scientific Committee

Agenda Item 11.   Next meeting

Agenda Item 12.   Adoption of the Report

Agenda Item 13.   Close of the Meeting

List of Documents

MEETING INFORMATION PAPERS

Document number	Title
NPFC-2019-SC04-MIP01 (Rev. 3)	Details for the Meetings of the Scientific Committee and Small Scientific Committees
NPFC-2019-SSC VME04-MIP02	Provisional Agenda
NPFC-2019-SSC VME04-MIP03	Provisional Annotated Agenda
NPFC-2019-SSC VME04-MIP04	Indicative Schedule

REFERENCE DOCUMENTS

Document number	Title
CMM 2018-05	CMM For Bottom Fisheries and Protection of VMEs in the NW Pacific Ocean
CMM 2017-06	CMM For Bottom Fisheries and Protection of VMEs in the NE Pacific Ocean

WORKING PAPERS

Document number	Title
NPFC-2019-SSC VME04-WP01	VME post-encounter treatment: Review of other RFMO/As' practices and the NPFC situation
NPFC-2019-SSC VME04-WP02	Updating assessment of the potential impacts of Japanese bottom fisheries on vulnerable marine ecosystems (VMEs) in the Emperor Seamounts region
NPFC-2019-SSC VME04-WP03 (Rev. 1)	Design and content of other RFMOs' VME Taxa ID Guides and suggestions from the NPFC Members
NPFC-2019-SSC VME04-WP04 (Rev. 2)	List of existing data for VME assessments
NPFC-2019-SSC VME04-WP05	SSC VME Work Plan, 2017-2021
NPFC-2019-SSC VME04-WP06	Update on Canada's analysis of balancing fisheries with the protection of vulnerable marine ecosystems
NPFC-2019-SSC VME04-WP07	Spatial management of VMEs and bottom fisheries, spatial/temporal map of Members' Pacific saury catch and effort
NPFC-2019-SSC VME04-WP08	Coral bycatch by Korean trawl fisheries on the Emperor Seamounts in 2018

INFORMATION PAPERS

Document number	Title
NPFC-2019-SSC VME04-IP01	Other VME research activities in Canada

MEETING REPORTS

Document number	Title
NPFC-2018-WS DATA01-Final Report	Workshop on Data Requirements and Data Sharing for Small Scientific Committees on Vulnerable Marine Ecosystems and Bottom Fish

List of Participants

CHAIR

Bai LI
Shanghai Ocean University
bai.li@maine.edu

CANADA

Chris ROOPER
Fisheries and Oceans Canada
chris.rooper@dfo-mpo.gc.ca

Janelle CURTIS
Fisheries and Oceans Canada
Janelle.Curtis@dfo-mpo.gc.ca

CHINA

Chuanxiang HUA
Shanghai Ocean University
cxhua@shou.edu.cn

Qiuyun MA
Shanghai Ocean University
qyma@shou.edu.cn

JAPAN

Hideki NAKANO
National Research Institute of Far Seas
Fisheries
hnakano@affrc.go.jp

Naohiko AKIMOTO
Japan Overseas Fishing Association
naohiko@sol.dti.ne.jp

Takumi FUKUDA
Fisheries Agency of Japan
takumi_fukuda720@maff.go.jp

Taro ICHII
National Research Institute of Far Seas
Fisheries
ichii@affrc.go.jp

Mai MIYAMOTO
National Research Institute of Far Seas
Fisheries
maim@affrc.go.jp

Kota SAWADA
National Research Institute of Far Seas
Fisheries
kotasawada@affrc.go.jp

Aigo TAKESHIGE
National Research Institute of Far Seas
Fisheries
atakeshige@affrc.go.jp

Shiroh YONEZAKI
National Research Institute of Far Seas
Fisheries
yonez@affrc.go.jp

KOREA

Seok-Gwan CHOI
National Institute of Fisheries Science
sgchoi@korea.kr

Kyum Joon PARK
National Institute of Fisheries Science
mogas@korea.kr
82517202321

Junghyun LIM
National Institute of Fisheries Science
jhlim1@korea.kr

Sanggyu SHIN
National Institute of Fisheries Science
gyuyades82@gmail.com

Woo Sung YANG
National Institute of Fisheries Science
sdininetty@gmail.com

RUSSIA

Sergey MELNIKOV
Russian Federal Research Institute of
Fisheries and Oceanography
melnikov@vniro.ru

Tatiana DAUTOVA
National Scientific Centre of Marine Biology,
Far Eastern Branch Russian Academy of
Science
tndaut@mail.ru

Vladimir KULIK
Pacific Branch of the Federal Scientific
Research Institute of Fisheries and
Oceanography
vladimir.kulik@tinro-center.ru

UNITED STATES OF AMERICA

Kari FENSKE
NOAA Alaska Fisheries Science Center
kari.fenske@noaa.gov

NPFC SECRETARIAT

Dae-Yeon MOON
Executive Secretary
dymoon@npfc.int
+81-3-5479-8717

Aleksandr ZAVOLOKIN
Science Manager
azavolokin@npfc.int
+81-3-5479-8717

Mervin OGAWA
Data Coordinator
mogawa@npfc.int
+81-3-5479-8717

Alex MEYER
Rapporteur
meyer@urbanconnections.jp
+81-3-6432-5691

List of existing data for VME assessments

Table 1. Existing Data for Potential Combined Footprint and Effort Map of all Bottom Fisheries by Gear and Time

Gear type	Time period	Temporal resolution	Spatial resolution
Eastern North Pacific			
CANADA			
Longline	Recent/current (1996-2018)	Set by set (1-2 days)	1'' x 1''
JAPAN			
Non-commercial			
RUSSIA			
Bottom Trawl (observer or fishery independent data)	1973- 1985, not annual	Set by set (finer than a day)	6''x 6''
USA			
TBD			
Western North Pacific			
JAPAN			
Trawl	Historical (1969-1981)	Month	1º (long) x 30'(lat)
	Historical (1989-present) – logbook data	Day	1º (long) x 30'(lat)
	Recent/current (from 2009) – scientific observer data	Haul by haul (finer than a day)	30'' x 30''
Gillnet	Historical (2000-present) – logbook data	Day	1º (long) x 30' (lat)
	Recent/current (from 2009) - scientific observer data	Set by set (finer than a day)	30'' x 30''

KOREA			
Trawl	Historical (2004-present)	Day	20'x 20'
	Recent/current (from 2014)	Haul by haul (finer than a day)	30'' x 30''
RUSSIA			
Longline (observer data)	Recent/current (from 2014)	Set by set (finer than a day)	6''x 6''
Bottom Trawl (observer or fishery independent data)	1969- 2019, not annual	Set by set (finer than a day)	6''x 6''

Minimum common resolution for combined fishing footprint and effort mapping and SAI assessments:

(1969-1981) temporal resolution – Month, spatial resolution - 1º (long) x 30'(lat)

(After 1989) temporal resolution – Day, spatial resolution - 1º (long) x 30'(lat)

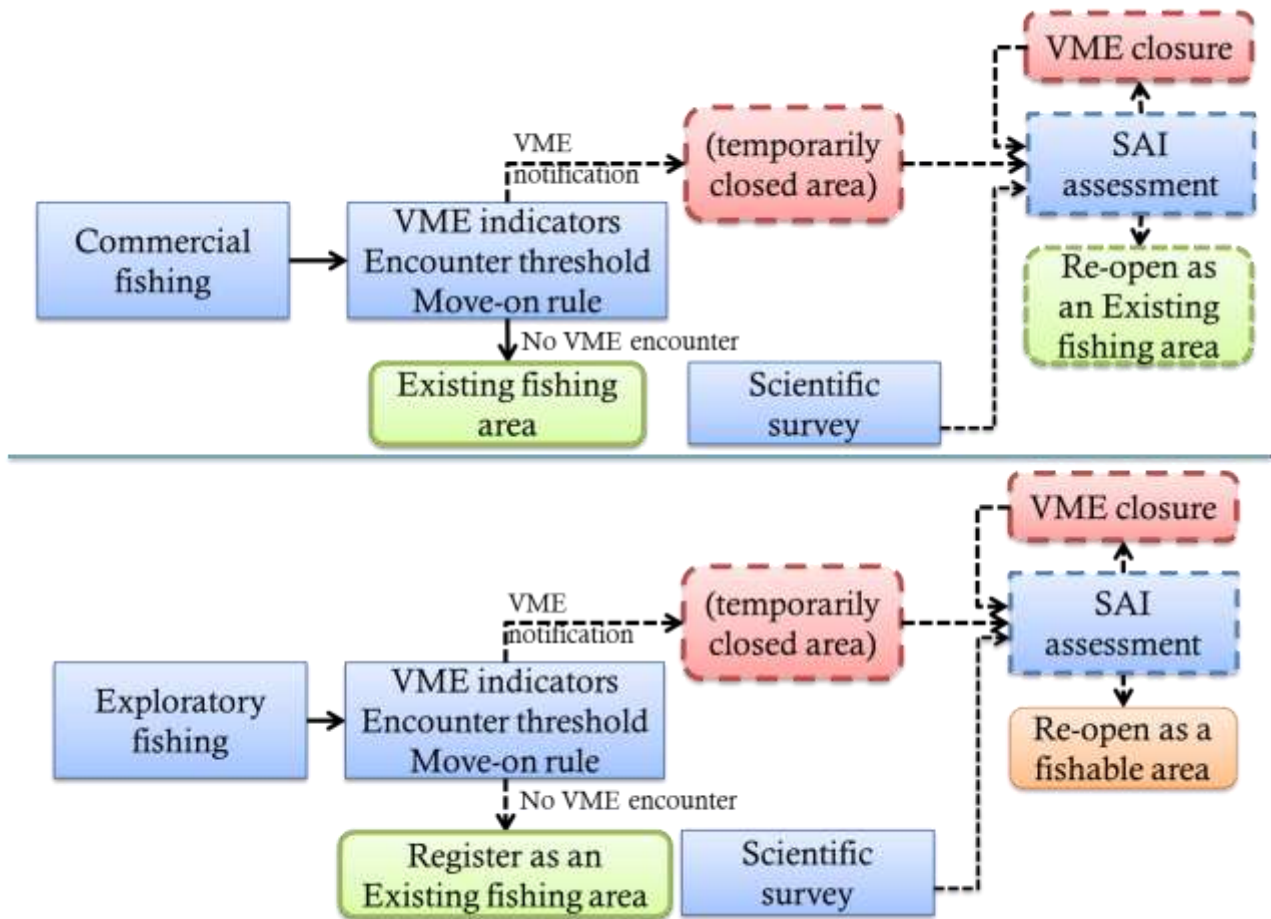(Recent) temporal resolution – haul by haul or set by set, spatial resolution – 30'' x 30''

Table 2. Existing Taxa Data for Combined Assessment

Survey type	Gear type	Taxa resolution	Time period	Temporal resolution	Spatial resolution
Eastern NP					
CANADA					
Fisheries	Longline	≥species	Recent/current (1996-2018)	Set by set (1-2 days)	1' (long) x 1' (lat)
Fisheries independent	Underwater image survey	≥species	2012	~1 sec	<1' (long) x 1' (lat)
Eastern NP (outside CA)					
CANADA					
Fisheries independent adjacent to CA	Underwater image survey	≥species	2017-2018	~1 sec	<1' (long) x 1' (lat)
Western NP					
JAPAN					
Fisheries	Trawl, Gillnet	≥species	2009-2018 (continue)	Set by set	30" (long) x 30" (lat)
Fisheries independent	Beam trawl	≥species	2009-2018 (continue)	Set by set	30" (long) x 30" (lat)
Fisheries independent	Underwater image survey	≥species	2009-2018 (continue)	~1 sec	30" (long) x 30" (lat)
KOREA					
Fisheries	Trawl	≥species	2016-2018 (continue)	Haul by haul	30" (long) x 30" (lat)

Table 3. Existing Multibeam Data for Combined Assessment

Seamount	Collected by	Survey and gear type	Time period	Spatial resolution	Back-scatter	Stored by	Publicly available?
Eastern NP							
Canada/ USA							
Cobb	United States	Survey RB0002; SeaBeam2112 onboard the NOAA Ship RV *Ronald Brown*	2000	20 m x 20 m	No	NOAA	Y website
Far Cobb	na						
Cobb South	na						
Western NP							
JAPAN							
C-H, Colahan, Kammu, part of Koko (ongoing)	National Fisheries University	EM710S MBES onboard the TV Koyo-maru	2010-present	30" x 30"	Y	Fisheries Agency of Japan	Y

Flowchart for VME post-encounter treatment

Note: Solid and dash lines show existing and missing parts of the VME post-encounter process in the NPFC, respectively

CMM 2018-05 (Rev. 1)

(Entered into force on 17 November 2018)

Conservation and Management Measure
for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northwestern Pacific Ocean

The North Pacific Fisheries Commission (NPFC),

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

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

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

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

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

Concerned about possible adverse impacts of unregulated expansion of bottom fisheries on marine species and VMEs in the western part of the Convention Area.

Adopts the following Conservation and Management Measure:

1. Scope
A. Coverage

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

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

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

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

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

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

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

4. Measures

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

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

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

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

D. Any determinations pursuant to subparagraph C that any proposed fishing activity will not have SAIs on marine species or any VME are to be in accordance with the Science-based Standards and Criteria (Annex 2), which are consistent with the FAO International Guidelines for the Management of Deepsea Fisheries in the High Seas.

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

F. Prohibit its vessels from engaging in directed fishing on the following taxa: *Alcyonacea, Antipatharia, Gorgonacea,* and *Scleractinia* as well as any other indicator

species for VMEs as may be identified from time to time by the SC and approved by the Commission.

G. Further, considering accumulated information regarding fishing activities in the western part of the Convention Area, in areas where, in the course of fishing operations, cold water corals more than 50Kg 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 as soon as possible, 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*.

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

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

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

K. Limit annual catch of North Pacific armorhead to 15,000 tons for Japan.

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

M. In years when strong recruitment of North Pacific armorhead is not detected (Annex 6-1), the Commission encourages Japan to limit the annual catch of North Pacific armorhead by vessels flying its flag to 500 tons, and encourages Korea to limit the annual catch of North Pacific armorhead by vessels flying its flag to 200 tons. The Commission encourages that catch overages for any given year be subtracted from the applicable annual catch limit in the following year, and that catch under ages during any given year not be added to the applicable annual catch limit during the following year.

N. Notwithstanding subparagraph K, when a strong recruitment of North Pacific armorhead is detected through the monitoring surveys as specified in Annex 6-1, the Commission encourages that Japan limit the annual catch of North Pacific armorhead by vessels flying its flag to 10,000 tons, and that Korea limit the annual catch of North Pacific armorhead by vessels flying its flag to 2,000 tons. The Commission encourages that catch overages for any given year be subtracted from the applicable annual catch limit in the following year, and that catch under ages during any given year not be added to the applicable annual catch limit during the following year. During a year when high recruitment is detected, bottom fishing with trawl gear shall be prohibited in specific areas in the Emperor seamounts where half of the catch occurred in 2010 and 2012. Determination of a strong recruitment year and of the specific areas where bottom fishing with trawl gear is prohibited shall be communicated to all Members and Cooperating Non-Contracting parties following the procedure specified in Annex 6-2.

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

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

Q. Task the Scientific Committee with reviewing the appropriate methods for establishing catch limits, and the adequacy and practicability of the adaptive management plan described in subparagraphs K, L, M, N, O, P and Annexes 6-1 and 6-2 from time to time and recommending revisions and actions, if necessary.

5.Contingent Action

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

6.Scientific Information

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

A. Collection of information for purposes of defining the footprint

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

B. Collection of information

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

      (a) Catch and effort data

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

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

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

    (b) Ecosystem surveys.

(iii) Collection of observer data

Duly designated observers from the flag member shall collect information from bottom fishing vessels operating in the western part of the Convention Area. Observers shall collect data in accordance with Annex 5. Each Member of the Commission shall submit the reports to the Secretariat in accordance with Annex 4.

The Secretariat shall compile this information on an annual basis and make it available to the Members of the Commission.

7.Control of bottom fishing vessels

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

8.Observers

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

EXPLORATORY FISHERY PROTOCOL IN THE NORTH PACIFIC OCEAN

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

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

(i) precautionary effort limits, particularly where reliable assessments of sustainable exploitation rates of target and main by-catch species are not available;

(ii) precautionary measures, including precautionary spatial catch limits where appropriate, to prevent serial depletion of low-productivity stocks;

(iii) regular review of appropriate indices of stock status and revision downwards of the limits listed above when significant declines are detected;

(iv) measures to prevent significant adverse impacts on vulnerable marine ecosystems; and

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

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

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

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

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

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

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

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

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

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

Information to be provided before exploratory fisheries start

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

Information to be included in the report

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

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

1. Introduction

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

2. Purpose

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

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

The fisheries are conducted in the Convention Area;

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

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

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

3. <u>Definition of VMEs</u>

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

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

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

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

(i) Habitats that contain endemic species;

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

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

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

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

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

  (i) Slow growth rates

  (ii) Late age of maturity

  (iii) Low or unpredictable recruitment

  (iv) Long-lived

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

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

4. Identification of potential VMEs

(1)   Fished seamounts

    (a)   Identification of fished seamounts

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

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

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

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

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

(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

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

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

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

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

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

8.   Template for assessment report

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

ANNEX 2.1

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

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

Examples of species groups, communities and habitat forming species that are documented or considered sensitive and potentially vulnerable to deep-sea fisheries in the high-seas, and which may contribute to forming VMEs:	
a.	certain cold-water corals, e.g., reef builders and coral forest including: stony corals (scleractinia), alcyonaceans and gorgonians (octocorallia), black corals (antipatharia), and hydrocorals (stylasteridae),
b.	Some types of sponge dominated communities,
c.	communities composed of dense emergent fauna where large sessile protozoans (xenophyophores) and invertebrates (e.g., hydroids and bryozoans) form an important structural component of habitat, and
d.	seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e., endemic).

Examples of topographical, hydrophysical or geological features, including fragile geological structures, that potentially support the species groups or communities referred to above:	
a.	Submerged edges and slopes (e.g., corals and sponges)
b.	Summits and flanks or seamounts, guyots, banks, knolls, and hills (e.g. corals, sponges and xenophyphores
c.	canyons and trenches (e.g., burrowed clay outcrops, corals),
d.	hydrothermal vents (e.g., microbial communities and endemic invertebrates), and
e.	cold seeps (e.g., mud volcanoes, microbes, hard substrates for sessile invertebrates).

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. Detection of Fishing in Association with Vulnerable Marine Ecosystems

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

ED. Tag Return Monitoring

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

FE. 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) (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 example, see: Gislason, H. et al. (2000. ICES J Mar Sci 57: 468-475), Yamane et al. (2005. ICES J Mar Sci, 62: 374-379), and Shin, Y-J. et al. (2005. ICES J Mar Sci, 62: 384-396)).

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

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

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

    (a) Species

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

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

    (d) Sex (male, female, 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 (m^3)) of each listed benthic species caught in the fishing operation.
    (c) An overall estimate of the total quantity (weight (kg) or volume (m^3)) of all invertebrate benthic species caught in the fishing operation.
    (d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitable preserved for identification on shore.

I. Data to be collected for all Tag Recoveries

1. The following data are to be collected for all recovered fish, seabird, mammal or reptile tags:
    (a) Observer name. (b) Vessel name.
        (c) Vessel call sign.
        (d) Vessel flag.
        (e) Collect, label (with all details below) and store the actual tags for later return to the tagging agency.
        (f)Species from which tag recovered.
        (g) Tag colour and type (spaghetti, archival).
        (h) Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)
        (i) Date and time of capture (UTC).

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

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

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

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

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

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

J. Hierarchies for Observer Data Collection

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

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

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

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

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

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

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

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

K. Coding Specifications to be used for Recording Observer Data
1. Unless otherwise specified for specific data types, observer data are to be collected in accordance with the same coding specifications as specified in this Annex.

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

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

4. The following coding schemes are to be used:
    (a) Species are to be described using the FAO 3 letter species codes.
    (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.

Monitoring survey plan for the detection of strong recruitment of North Pacific armorhead

➢ **Monitoring period and location**

Nishida et al. (2016) estimated the recruitment period of North Pacific armorhead (NPA) based on the temporal variation in CPUE and fatness index (FI) from 2010 to 2014. Recruitment of this species probably started in between January and March, because the percentage of higher FI individuals (FI ≥ 0.3) increased in these months. Nominal CPUEs increased between February and early May following the rise of the percentage of individuals with higher FI in years of strong recruitments. Generally, sea condition is not appropriate in February. Therefore, the monitoring period is set from March to June every year.

Miyamoto et al. (2017) identified fished seamounts in the Emperor Seamounts region on the basis of historical data sets currently available for commercial bottom fisheries in the area. They also analyzed recent Japanese scientific observer data to demonstrate the fine-scale distribution of fishing efforts and to characterize the current fishing area within the fished seamounts. Based on these results, seamounts which are frequently used as fishing grounds for NPA were extracted and sea areas with high fishing efforts for trawl fishing were set as monitoring blocks (Table 1, Figs. 1-1 and 1-2).

Table 1. The location of monitoring blocks.

Survey Gear	Seamount	Latitude	Longitude	Fig. No.	Remarks
Trawl	Koko (South eastern)	34°51′ N -35°04′ N	171°49′ E -172°00′ E	Fig. 1-1	Except closed area precautionary for potential VME conservation (this CMM, paragraph 4H)
Trawl	Kammu (North western)	32°10′ N -32°21′ N	172°44′ E -172°57′ E	Fig. 1-2	

➢ Monitoring surveys methods

In each monitoring block, vessels conduct monitoring surveys with bottom trawl from March to June. For one monitoring survey, trawl net is towed for one hour. Respective surveys should be conducted at least one week apart.

➢ Collecting data and samples

Monitoring survey data are recorded according to the scientific observer manual of NPFC (Annex 4).

✓ North Pacific armorhead (NPA)

For each survey operation, the total weight of NPA is measured. Nominal-CPUE (Trawl; kg / hour) is calculated. From NPA samples, 100 individuals are randomly extracted, the individuals are measured for fork lengths (FL) and body heights (BH). The composition of FL and FI (BH / FL) are determined for each survey operation.

✓ Splendid alfonsino (SA)

For each survey operation, the total weight of SA is measured. Nominal-CPUE (Trawl; kg / hour) is calculated. From SA samples, 100 individuals are randomly extracted, the individuals are measured for fork lengths (FL). The composition of FL is determined for each survey operation.

➢ Reporting

Scientific observer transmits the collected data immediately after the respective survey to the NPFC secretariat via flag Members.

➢ Criteria for strong recruitment of NPA

The criteria for one monitoring survey by trawl is as follows based on the best scientific knowledge available on trawl fishery (Nishida et al. (2016)): trawl nominal CPUE > 10 t/ h and individuals of FI > 0.3 account for 80% or more.

It is considered that a strong recruitment is occurring if the above criteria are met in four consecutive surveys by trawl in two seamounts. The four consecutive surveys that meet the criteria need to be located in different months, and if all of the four surveys are conducted within a same month, it will not be considered that a strong recruitment is occurring.

➢ Future use and contribution to the Adaptive Management process

The survey is conducted as part of the Adaptive Management process for NPA under the management objective that sufficient spawning stocks will be left uncaught to let them spawn at least once. The results will be used for recruitment strength and are expected to contribute to the setting of more concrete management objectives for the Adaptive Management process for NPA.

References

Miyamoto M, Okuda T, and Kiyota M. 2017. Identification of existing fishing grounds and unfished areas in the Emperor Seamounts region. NPFC-2017-SSC VME02WP01.

Nishida, K., Kiyota, M., Yonezaki, S., and Okuda, T. 2016. Estimation of recruitment period of North Pacific armorhead, *Pentaceros wheeleri* based on CPUE and fatness index. NPFC01-2016-SSC NPA01-WP02.
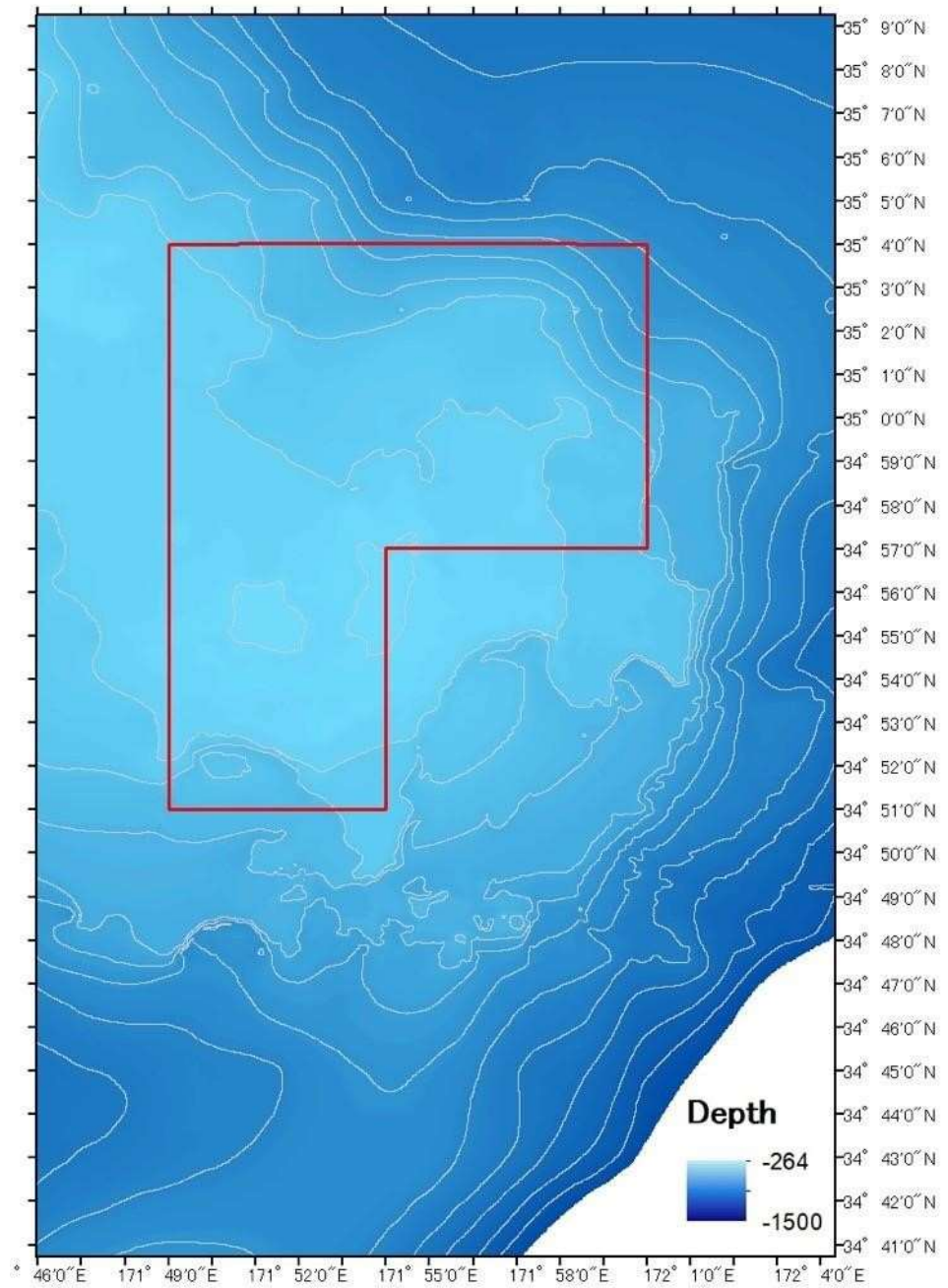
Fig. 1-1. Monitoring block by trawl fishery in the southeastern part of Koko Seamount. Except closed area precautionary for potential VME conservation (this CMM, paragraph 4H).
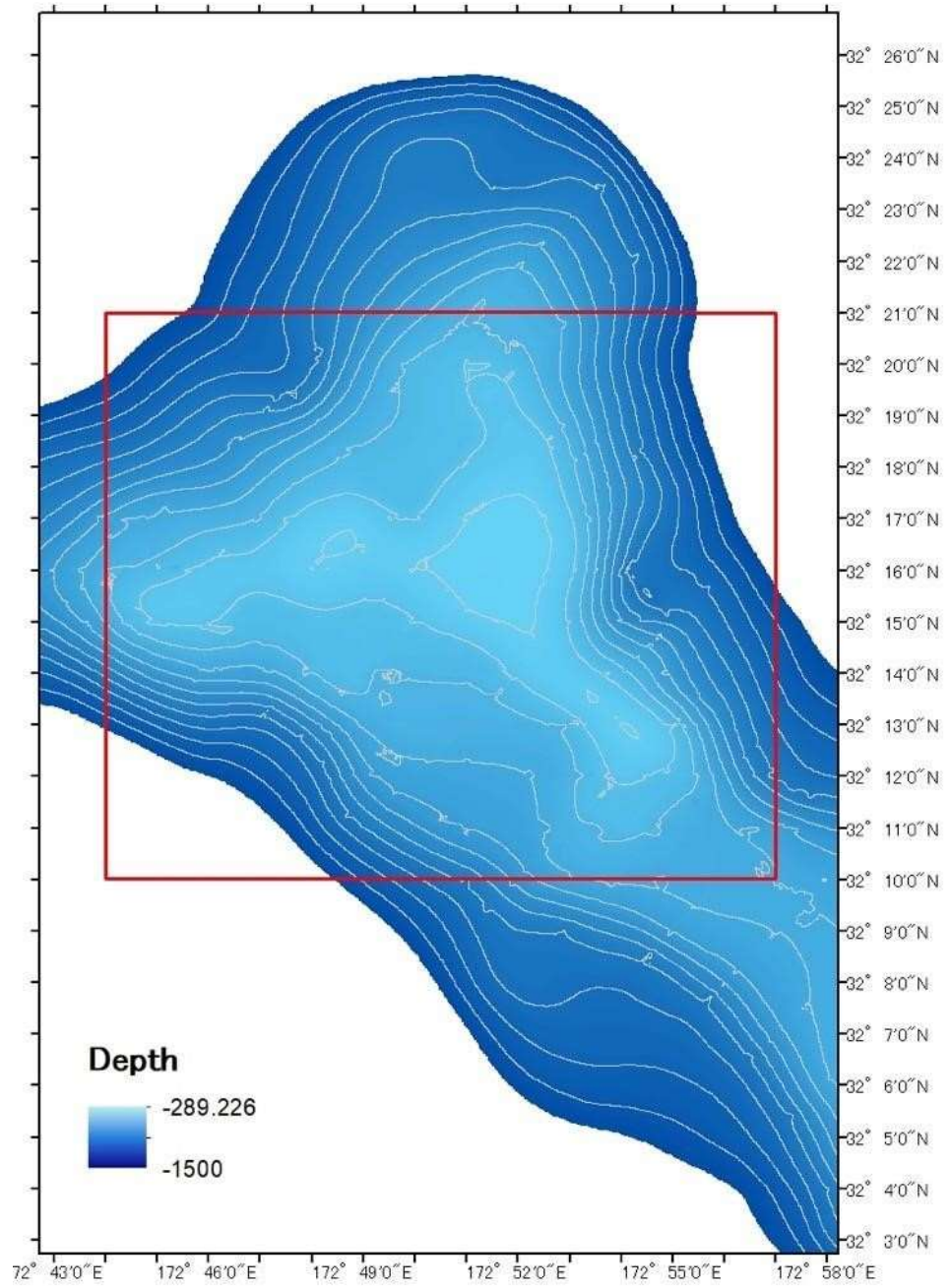
52

Fig. 1-2. Monitoring block by trawl fishery in the north western part of Kammu Seamount.

Protocol for the detection of strong recruitment of North Pacific armorhead

1.   Purpose

This protocol is 1) to specify transmission of data obtained in the monitoring survey and a protocol for circulating the detection of strong recruitment of North Pacific armorhead, and 2) to specify areas closed in the Emperor seamounts when the strong recruitment is detected.

2.   Transmission of data

Data obtained in the monitoring survey is transmitted from observers on the vessels participating in the survey to the Science Manager of NPFC Secretariat via the flag Member with appropriate manners. Data should be transmitted as soon as possible after being obtained.

3.   Announcement of detecting strong recruitment

The Science Manager analyzes the data based on the pre-determined process in the monitoring survey plan (Annex 6-1). If the criteria for detecting strong recruitment are met based on the analysis, the Executive Secretary circulates the detection of strong recruitment to all the Members and announces that paragraph 4-N of this CMM is applied for North Pacific armorhead as a management measure, as soon as possible after the analysis is completed. Members immediately notify the vessels with its own flags of the announcement by the Executive Secretary (Fig. 1).

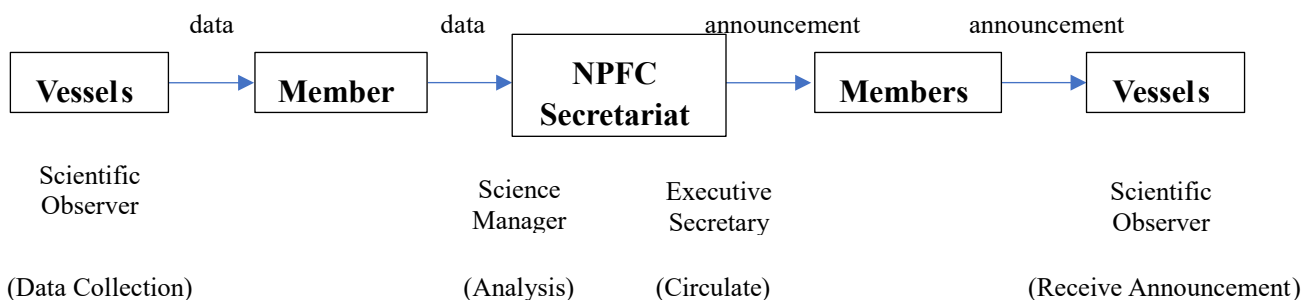|	data		data		announcement		announcement	
Vessels	→	**Member**	→	**NPFC Secretariat**	→	**Members**	→	**Vessels**
Scientific Observer				Science Manager	Executive Secretary			Scientific Observer
(Data Collection)				(Analysis)	(Circulate)			(Receive Announcement)

Fig. 1 Diagram for the announcement of strong recruitment

Conservation and Management Measure
for Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northeastern
Pacific Ocean

The North Pacific Fisheries Commission (NPFC):

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

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

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

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

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

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

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

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

d. incorporate an ecosystem approach to fisheries management.

3. Actions by Members of the Commission

    Members of the Commission will take the following actions in respect of vessels operating under its Flag or authority in the area covered by these Measures:
    a. Conduct the assessments called for in paragraph 83(a) of UNGA Resolution 61/105, in a manner consistent with the FAO Guidelines and the Standards and Criteria included in Annex 2;
    b. Submit to the SC their assessments conducted pursuant to subparagraph (a) of this paragraph, including all relevant data and information in support of any such assessment, and receive advice and recommendations from the SC, in accordance with the procedures in Annex 3;
    c. Taking into account all advice and recommendations received from the SC, determine whether the fishing activity or operations of the vessel in question are likely to have a significant adverse impact on any vulnerable marine ecosystem;
    d. If it is determined that the fishing activity or operations of the vessel or vessels in question would have a significant adverse impact on vulnerable marine ecosystems, adopt conservation and management measures to prevent such impacts on the basis of advice and recommendations of the SC, which are subject to adoption by the Commission;
    e. Ensure that if any vessels are already engaged in bottom fishing, that such assessments have been carried out in accordance with paragraph 119(a)/UNGA RES 2009, the determination called for in subparagraph (c) of this paragraph has been rendered and, where appropriate, managements measures have been implemented in accordance with the advice and recommendations of the SC, which are subject to adoption by the Commission;
    f. Further ensure that they will only authorize fishing activities on the basis of such assessments and any comments and recommendations from the SC;
    g. Prohibit its vessels from engaging in directed fishing on the following 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 based on information to be provided by Members) in terms of the number of fishing vessels and other parameters which reflect the level of fishing effort, fishing capacity or potential impacts on marine ecosystems dependent on new SC advice;
    j. Further, considering accumulated information regarding fishing activities in the Eastern part of the Convention Area, in areas where, in the course of fishing operations, 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 as soon as possible, 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.

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

Control of Bottom Fishing Vessels

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

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

Scientific Committee (SC)

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

Scientific Information

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

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

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.

Information to be provided before exploratory fisheries start

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

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

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

4. A data collection plan
   - Data is to be collected in accordance with "Type and Format of Scientific Observer Data to be Collected" (Annex 5)

Information to be included in the report

- Name of vessel
- Flag member of vessel
- Description of area fished (location and depth)
- Fishing dates
- Total effort
- Bottom fishing gear-type used

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

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

1. Introduction

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

2. Purpose

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

(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

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

3. Definition of VMEs

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

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

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

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

63

diversity, which is dependent on the structuring organisms.

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

4. Identification of potential VMEs

(1) Fished seamounts
      (a) Identification of fished seamounts

         It is reported that two types of fishing gear are currently used by members of the Commission in the NE area, namely long-line hook and long-line trap.   The footprint of the bottom fisheries (fished seamounts) is identified based on the available fishing record.   The following seamounts have been identified as fished seamounts at some point in the past: Brown Bear, Cobb, Warwick, Eickelberg, Pathfinder, Miller, Murray, Cowie, Surveyor, Pratt, and Durgin. It is important to establish, to the extent practicable, a time series of where and when these gears have been used in order to assess potential long-term effects on any existing VMEs.

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

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

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

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

(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.

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

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

	Examples of species groups, communities and habitat forming species that are documented or considered sensitive and potentially vulnerable to deep-sea fisheries in the high-seas, and which may contribute to forming VMEs:	
a.	certain coldwater corals, e.g., reef builders and coral forest including: stony corals (scleractinia), alcyonaceans and gorgonians (octocorallia), black corals (antipatharia), and hydrocorals (stylasteridae),	
b.	Some types of sponge dominated communities,	
c.	communities composed of dense emergent fauna where large sessile protozoans (xenophyophores) and invertebrates (e.g., hydroids and bryozoans) form an important structural component of habitat, and	
d.	seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e., endemic).	

	Examples of topographical, hydrophysical or geological features, including fragile geological structures, that potentially support the species groups or communities, referred to above:	
a.	submerged edges and slopes (e.g., corals and sponges),	
b.	summits and flanks of seamounts, guyots, banks, knolls, and hills (e.g., corals, sponges, xenophyphores),	
c.	canyons and trenches (e.g., burrowed clay outcrops, corals),	
d.	hydrothermal vents (e.g., microbial communities and endemic invertebrates), and	
e.	cold seeps (e.g., mud volcanoes, microbes, hard substrates for sessile invertebrates).	

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

1. Name of the member of the Commission

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

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

4. Target species

5. Bycatch species

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

   (1) Number of fishing vessels

   (2) Tonnage of each fishing vessel

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

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

   (5) Total catch by species

   (6) Names of seamounts fished or to be fished

7. Fishing period

8. Analysis of status of fishery resources

   (1) Data and methods used for analysis

   (2) Results of analysis

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

9. Analysis of status of bycatch species resources

   (1) Data and methods used for analysis

   (2) Results of analysis

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

10. Analysis of existence of VMEs in the fishing ground

   (1) Data and methods used for analysis

   (2) Results of analysis

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

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

12. Other points to be addressed

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

SCIENTIFIC COMMITTEE ASSESSMENT REVIEW PROCEDURES FOR BOTTOM FISHING ACTIVITIES

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

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

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

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

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

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

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

Report Components

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

A. Observer Training

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

B. Scientific Observer Programme Design and Coverage

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

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

C. Observer Data Collected

List of observer data collected against the agreed range of data set out in Annex 5, including:
- Effort Data: Amount of effort observed (vessel days, net panels, hooks, etc), by area and season and % observed out of total by area and seasons
- Catch Data: Amount of catch observed of target and by-catch species, by area and season, and % observed out of total estimated catch by species, area and seasons
- Length Frequency Data: Number of fish measured per species, by area and season.
- Biological Data: Type and quantity of other biological data or samples (otoliths, sex, maturity, etc) collected per species.
- The size of length-frequency and biological sub-samples relative to unobserved quantities.

D. Detection of Fishing in Association with Vulnerable Marine Ecosystems

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

E~D~. Tag Return Monitoring
- Number of tags returns observed, by fish size class and area.

F~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 example, see: Gislason, H. et al. (2000. ICES J Mar Sci 57: 468-475), Yamane et al. (2005. ICES J Mar Sci, 62: 374-379), and Shin, Y-J. et al. (2005. ICES J Mar Sci, 62: 384-396)).

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

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

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

a) Species

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

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

d) Sex (male, female, 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 (m^3)) of each listed benthic species caught in the fishing operation.
   c) An overall estimate of the total quantity (weight (kg) or volume (m^3)) of all invertebrate benthic species caught in the fishing operation.
   d) Where possible, and particularly for new or scarce benthic species which do not appear in ID guides, whole samples should be collected and suitable preserved for identification on shore.

I. Data to be collected for all Tag Recoveries

1. The following data are to be collected for all recovered fish, seabird, mammal or reptile tags:
   a) Observer name.
   b) Vessel name.
   c) Vessel call sign.
   d) Vessel flag.
   e) Collect, label (with all details below) and store the actual tags for later return to the tagging agency.
   f) Species from which tag recovered.
   g) Tag colour and type (spaghetti, archival).
   h) Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)
   i) Date and time of capture (UTC).
   j) Location of capture (Lat/Lon, to the nearest 1 minute)
   k) Animal length / size (to the nearest cm) with description of what measurement was taken (such as total length, fork length, etc).
   l) Sex (F=female, M=male, I=indeterminate, D=not examined)
   m) Whether the tags were found during a period of fishing that was being observed (Y/N)
   n) Reward information (e.g. name and address where to send reward)

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

J. Hierarchies for Observer Data Collection

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

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

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

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

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

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

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

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

K.   Coding Specifications to be used for Recording Observer Data

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

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

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

4. The following coding schemes are to be used:
    a. Species are to be described using the FAO 3 letter species codes.
    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.

Draft guide and a list of specifications regarding the design and content of the common VME taxa identification guide in the western North Pacific Ocean

Design		Scientific content	
Paper quality	Waterproof	Structure of Guide	One page – one or two specimen Or One-two pages for one genus (a genus includes one or more species)
Size of paper	A5	Instruction for users	2 pages
Orientation	Landscape	Taxonomic resolution	From species to genus
Number of pages		Common English name	Various (from Genus to species). Latin name is needed because not every taxon has the common English name
Theme font	Arial, TNR	Size information (text or scale)	Text + scale
Size of font	12	Information about specimen's color and its variability	Text and color scale
Color of main text font	Black + red (where needed)	Physical description	+ very short (in the beginning of the guide) Generic key
Size of illustrations	As large as possible	Relative size of coral to human body/common object like a matchbox or lighter	-
Illustration background	various	Diagnostic features on pictures	Narrow with description
Deck/lab photo	+ with a scale/ruler	Habitat and depth	+

	(on the edge of first page)		
Photo in natural habitat	If possible	Commonly mistaken for other indicator groups	If possible
		Code	+

Alcyonacea (Soft corals)

Aleeanacea standing on the sea-floor without solid axis and exclude Scleraxonia, Holaxonia, and Calcaxonia.

➢ Family Alcyoniidae (example)

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Species: *Anthomasthus* sp

Identification keys:
- Mashroomy corallum.
- (other descriptions)
-

➢ Family Nidaliidae (example)

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Species: *Chironephthya* sp.

Identification keys:
- (simply descriptions)
-
-

Project: International Course/School for NPFC observers and High School students
By Russia

Aim: to share knowledge on the identification of the VME Indicator taxa (including potential groups which can be included in nearest future into the List of VME indicators).

Lecturers/teachers: specialists on corals, hydrocorals, sponges, etc. from all countries involved if possible.

For whom: observers and students who will specialize in fishery observing or science.

Content:
1) Lecturers on the taxonomy, physiology and geographical distribution of the VME indicator taxa including potential taxa which may be included in nearest future
2) Practical seminars/training to teach observers and students how to identify specimens in the laboratory and also in the field and how to use the Guide.

Certification: final examination and certification of successful students. NPFC Certificate can be designed and arranged basing on the NAFO experience.

Required funds: to be estimated.

Summary Table of the Status of the NPFC's Identification and Protection of VMEs and Data Requirements

(framework based on Ardron et al. 2013 "A systematic approach towards the identification and protection of vulnerable marine ecosystems")

	1. Assess potential VMEs	2. Thresholds	3. Ecologically important areas	4. Compile taxa & environmental data	5. Predictive distribution models	6. Fishing impact	7. VME naturalness distribution
Previously addressed?	Yes, partially. NPFC-2017-SSC VME02-WP02: 4 coral taxa VME indicators	Yes, partially. Based on 4 coral taxa: 50 kg threshold encounter protocol	Yes, two current examples in CMM 2018-05: closures for potential VMEs & fish stock	No	Yes, partially for the Northeast (PICES WG 32)	Partially (each Member report annually at seamount-scale "footprint" resolution	No
Need to address, readdress, or review?	Yes, NPFC-2018-COM04 #12: "additional VME taxa" part A & B	Yes, NPFC-2018-SSC VME03 recom. #10: Refine for taxa- & gear-specific	Yes (?), on-going, as information becomes available	Yes, combined assessment (recom. at NPFC-2018-WS-VME01, ultimately adopted in NPFC-2018-COM04)	Yes, NPFC-2018-SSC VME03 recom. #25: Develop habitat suitability models	Yes, NPFC-2018-SSC VME03 recom. #15, 16, 18 on combined fishing footprint	NPFC-2018-SSC VME03 recom. #22, 27: on "recovery sites" + NPFC-2018-COM04 #43m
If yes, data required?	Comprehensive taxa list for CA with information on the 5 FAO/NPFC criteria (CCM-2017 Annex 2) provided by experts	2018-SSC VME03 recom. #10: "scientific information including bycatch levels and catchability estimates"	Location & characterization of areas of high ecological importance	The data wish list from this WS: VME & environmental data	"4"	The data wish list from this workshop: BF footprint data	"3" + "4" + "5" + "6"

Potential Data to be Consolidated for Predictive Modeling, Potential Iterative Predictive Models and Potential Collaborators

Potential data to be consolidated for predictive modeling

Input data: taxa (point data)

- Taxa abundance, presence-absence, or presence only data from
    - Fisheries bycatch
    - Science survey collections (e.g., university records; museum records)
    - Underwater-image derived data
      *Consideration: what is the probability of detecting presence (i.e., catchability or sampling effectiveness)
      *Consideration: taxa to be included, taxa resolution

Input data: environmental (continuous data)

- Anthropogenic
    - Fisheries bycatch
    - Naturalness (e.g., historic fishing)
    - Location of fishing activity (consider gear type)
    - Other local human impacts
- Benthic
    - Depth (e.g., at specific location; at-summit)
    - Substrate type (e.g., multibeam backscatter; online models)
    - Slope
    - Rugosity, roughness, complexity
    - Aspect
- Oceanographic (at-surface, at-depth, at-summit, and/or considering a temporal variability, such as annual mean)
    - Current flow strength
    - Current flow direction
    - Temperature (sea surface; at depth)
    - pH (alkalinity)
    - Salinity
    - Oxygen
    - Aragonite and calcite saturation states
    - Nitrate
    - Silicic acid
    - Primary productivity (chlorophyll a)
    - Particulate organic carbon

- Geographic
  – Biogeographic region
  – Locality (Eastness, Northness)
  – Isolation/proximity

Potential iterative predictive models
- Models used by Members
  – Marxan (i.e., decision-support tool)
  – Maxent (maximum entropy modelling)
  – Random Forest (can take both abundance & presence-absence data)
- Additional Models
  – GLM/GAM
  – Boosted regression models
  – Validation and sensitivity assessment (e.g., post hoc; independent data)

Potential collaborations
- PICES WG 32 recently ended but their deliverables will still be made available (there is potential for a future PICES proposal on seamounts)
- Deep-sea SDM group lead by Ellen Kenchington (1st meeting May 2018; ~25 experts)

Interim Guidance for Management of Scientific Data ~~Used in Stock Assessments~~
(Revised)

This Interim Guidance is intended to apply while the NPFC develops comprehensive rules and procedures governing the security of, exchange of, access to and dissemination of data held by, or accessed by Members of the Commission, its subsidiary bodies, the Secretariat, and by service providers, contractors, or consultants acting on their behalf or others so authorized for access by the Secretariat.

1. Objectives

The objectives of this Interim Guidance are (1) to support stock assessments and VME assessments and accumulation of scientific knowledge of fisheries resources under the Commission's jurisdiction, (2) to encourage cooperation on scientific analyses among Members, and (3) to establish an interim guidance on handling scientific data.

2. Scientific Data included in Members' Annual Reports

Scientific data (e.g., catch amount, number of vessels, number of fishing days and so on) included in Members' Annual Reports should be uploaded to the public section of the NPFC website for public access and use.

3. Other scientific data, not included in Members' Annual Reports, submitted for use in stock assessments and VME assessments

The Secretariat should not disclose Members' scientific data submitted by means other than Members' Annual Reports.

Members may cite and/or use such data when working on matters under consideration by the Scientific Committee/SSCs.

If a Member or cooperating non-Member wishes to cite and/or use these data for work that is intended to be conducted or shared outside of the NPFC, such Member or non-Member should consult with the data provider(s) through the Secretariat, stating 1) the data subject to the request, and 2) the purpose for which the data is intended to be used. The Secretariat should immediately notify the data provider(s) of the request. The data provider(s) should inform the Secretariat within 30 calendar days whether to accept or reject the request. If the data provider(s) reject the request, the data provider(s) should state the reason(s) for the rejection. If the data provider(s) accept the request, the data provider(s) may request an agreed-upon credit line in any subsequently-created product. Those who cited/used data should not distribute the data further nor use it for the purpose not declared.

If the Secretariat proposes to outsource analyses of such scientific data to a contractor, the Secretariat should seek agreement from all the data providers concerned. If all data providers do not agree, the relevant data should not be disclosed to the contractor.