North Pacific Fisheries Commission

NPFC/FAO Workshop
Protection of Vulnerable Marine Ecosystems in the North Pacific Fisheries Commission Area: applying global experiences to regional assessments

REPORT

12-15 March 2018

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NPFC/FAO Workshop
Protection of Vulnerable Marine Ecosystems in the North Pacific Fisheries Commission Area: applying global experiences to regional assessments

12-15 March 2018
Yokohama, Japan

REPORT

Agenda Item 1. Opening of Workshop

1. The NPFC/FAO workshop on *protection of vulnerable marine ecosystems in the North Pacific Fisheries Commission (NPFC) Area: applying global experiences to regional assessments* (NPFC/FAO VME workshop) took place in Yokohama, Japan, on 12-15 March 2018 at the National Research Institute of Fisheries Science (NRIFS), Japan Fisheries Research and Education Agency (FRA). The workshop was sponsored and organized by the NPFC and the Food and Agriculture Organization of the United Nation's (FAO) Areas Beyond National Jurisdiction Program (ABNJ). It was also co-sponsored by the North Pacific Marine Science Organization (PICES). The workshop was attended by Members from Canada, China, Japan, the Republic of Korea, Russia, and the United States. Other participants were representatives and invited experts from Australia, New Zealand, the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), the Deep Sea Conservation Coalition (DSCC), FAO, PICES, and the South Pacific Regional Fisheries Management Organization (SPRFMO).

1.1 Welcome Address

2. The Executive Secretary of the NPFC, Dr. Dae-Yeon Moon, welcomed the participants to the workshop. He extended his gratitude to the Government of Japan for hosting the workshop, and to FAO for initiating and supporting it. He also expressed his hope that the workshop would contribute to further protection of vulnerable marine ecosystems (VMEs).

3. Dr. Hassan Moustahfid (FAO) provided an overview of FAO's ABNJ Deep Seas Project and its Deep-seas Fisheries Programme.

1.2 Purpose of Workshop and Expectations

4. The Co-Chairs, Dr. Masashi Kiyota (Japan) and Dr. Loh-Lee Low, outlined the purposes of the workshop, key issues, and expected tasks and outputs from it.

Agenda Item 2. International Obligations for Assessment of Significant Adverse Impacts (SAIs) on Vulnerable Marine Ecosystems (VMEs)

5. Dr. Tony Thompson (FAO) presented an overview of the international obligations for assessment of significant adverse impacts (SAIs) on VMEs and global legal frameworks related to the definition, conservation, management, and impact assessment of VMEs (NPFC-2018-WS VME01-WP12).

Agenda Item 3. Overview of Seamount Bottom Fisheries Situations and Potential Impacts on Corals

6. Dr. Ellen Kenchington (Canada), on behalf of Dr. Odd Aksel Bergstad (Norway), presented an outline of global seamount bottom fisheries and impacts, covering definitions, history of fisheries, and experiences from the Atlantic ABNJ and regional fisheries management organizations (RFMOs) (NPFC-2018-WS VME01-WP09).

Agenda Item 4. Global Overview of Actions Taken to Prevent SAI on VMEs

4.1 Surveys and VME Identification

7. Dr. Kenchington presented the global overview of actions taken to prevent SAI on VMEs with the emphasis on surveys and VME identification in the Canadian EEZ and Northwest Atlantic Fisheries Organization (NAFO) Convention Area (NPFC-2018-WS VME01-WP10).

8. Dr. Tatiana Dautova (Russia) presented research on VMEs in the Northwestern Pacific as life-supporting resources and VME identification, with a focus on octocorallia (NPFC-2018-WS VME01-WP07).

9. Dr. Amy Baco-Taylor (USA), via webex, presented observations of benthic megafauna on actively fished Hawaiian Ridge and Emperor Seamounts with comparison to seamounts with recovering coral populations (NPFC-2018-WS VME01-IP02).

10. Dr. Robert Stone (USA) presented on VMEs in the North Pacific, highlighting their characteristics and ecological importance, ongoing research, and future research needs (NPFC-2018-WS VME01-WP17).

4.2 VME Encounter Protocols

11. Dr. Kiyota presented a comparison of the VME indicators, encounter thresholds, move-on rules, and post-encounter treatment of various RFMOs (CCAMLR, NAFO, the North East Atlantic Fisheries Commission (NEAFC), NPFC, the South East Atlantic Fisheries Organization

(SEAFO), the Southern Indian Ocean Fisheries Agreement (SIOFA), and SPRFMO) (NPFC-2018-WS VME01-WP02).

4.3 Exploratory Fishing Protocols

12. Dr. Dirk Welsford (Australia/CCAMLR) presented CCAMLR's experience in developing and implementing management measures, particularly exploratory fishing protocols (NPFC-2018-WS VME01-WP14).

4.4 Spatial Management Strategies

13. Dr. Ashley Rowden and Dr. Martin Cryer (New Zealand/SPRFMO) presented New Zealand's experience within SPRFMO of developing spatial management strategies, including the underlying research and gaining the acceptance of stakeholders (NPFC-2018-WS VME01-WP16).

Agenda Item 5. Historical SAI Assessments of NPFC Members (primarily from 2008-2009)

14. Dr. Low presented Members' historical SAI assessments, and measures taken voluntarily by the Contracting Parties during the negotiation period and later adopted by the NPFC (NPFC-2018-WS VME01-WP06).

Agenda Item 6. Protection of Corals and VMEs in Fished and Unfished Areas

15. Dr. Chris Rooper (USA/PICES) presented on the management of VMEs in US waters, focusing on species distribution modelling in Alaska (Aleutian Islands, Gulf of Alaska, Eastern Bering Sea) and the wider North Pacific (NPFC-2018-WS VME01-WP08), and identified how these tools can be used to protect VMEs from mobile bottom contact gear.

Agenda Item 7. Reports on Current SAI Assessments

7.1 Northeastern Pacific Ocean

16. Dr. Cherisse Du Preez (Canada) reported on the updated SAI assessment of Canada's bottom fisheries in the Northeastern Pacific Ocean (NPFC-2018-WS VME01-WP15). Canada fishes in four seamount aggregations in the Convention Area, comprised of eight seamounts, targeting Sablefish with longline traps. The fishing effort is relatively low, with a maximum of six vessels per year drawn from a lottery system (e.g. one vessel per month is authorized to fish between April and September inclusive). It is also possible that no vessels fish in the Convention Area in a given year. The current Canadian fishery does not pose any known conservation concern to Sablefish populations. Since fishing grounds overlap with the known or predicted distribution of several VME indicator taxa (including corals, glass sponges and hydrocorals), impact by the seamount fisheries is considered likely, although small, given low effort.

Although Canada is the only NPFC Member currently fishing the Northeastern Pacific seamounts, commercial fishing activities on these seamounts began in the 1970s with multiple nations known to have fished using bottom-contact and mid-water trawl, bottom long-line hook and trap, and gillnet gear.

7.2 Northwestern Pacific Ocean

17. Dr. Kiyota reported on the updated SAI assessment for Japan's bottom fisheries in the Northwestern Pacific Ocean (NPFC-2018-WS VME01-WP01, 03, 04, 05; IP01). Japan currently operates three trawlers and one gillnet vessel in the southern Emperor Seamounts. The primary and secondary target species are North Pacific armorhead and splendid alfonsino, respectively. Based on a fine-scale analysis of spatial overlap between fishing activities and benthic taxa, and by the VME criteria specified in NPFC CMM 2017-05, Japan identified two VME sites on the outer margins of the main fishing grounds. Japan suggests that it is possible to avoid SAIs on fished seamounts through spatial protection of identified VMEs, supplemented by improvement of encounter protocols. Japan also recommends refining exploratory fishing protocols for unfished areas.

18. Dr. Eunjung Kim (Korea) reported on the updated SAI of Korea's bottom fisheries in the Northwestern Pacific Ocean (NPFC-2018-WS VME01-WP11). Since 2015, only one trawler has been operating in the Convention Area, targeting North Pacific armorhead and splendid alfonsino. The average number of fishing days from 2015 to 2017 was 65. The main fishing months were March to May. Korea lacks VME specialists and equipment, and relies on VME indicator taxa bycatch data collected by on-board scientific observers. However, the ability of observers may result in bias in the data and Korea has therefore proposed that the NPFC create a VME field guide. Korea also believes in the importance of data sharing for mapping VME species for further work.

19. Based on the presentations, the participants discussed the status of SAI assessments on VMEs in the Convention Area, noting the following:
    a. It would be desirable to develop a standardized approach to assess the cumulative impact of all Members' fisheries together, and care should be taken when drawing conclusions from individual assessments;
    b. There remains significant uncertainty over SAI in the Convention Area; however, participants generally agreed that SAI took place in the past, and that the impact is likely to be occurring in the fished areas as fishing continues;
    c. The encounter protocols may need to be modified to address the fact that Scleractinian coral are not appearing in bycatch in areas where they are known to exist;

d. It would be desirable for the NPFC to set measurable objectives for determining the occurrence of SAI;
e. In terms of the scope of SAI assessment, it is appropriate to focus on a smaller scale in areas where fishing is occurring, while also taking into account the broader ecosystem;
f. It is worthwhile considering the assessment and protection of degraded and recovering VME sites, in addition to pristine VME sites.

Agenda Item 8. Global Overview Paper on Data Requirements to Implement Deep Sea Fisheries Measures to Protect VMEs

20. The participants discussed data availability and progress in VME protection in the NPFC, while referencing the data requirements set out in the FAO Deep-Sea Fisheries Guidelines. A summary of the information with comments is presented in NPFC-2018-WS VME01-WP20. The participants pointed out the following:
    a. There is a need for combined and collaborative monitoring, and cooperative research programs;
    b. There is a need for a regional NPFC observer program. This would be particularly important for the Emperor Seamount area;
    c. It would be useful to have observer training and coordinate training programs to support the NPFC observer program;
    d. The participants support the ongoing work of the NPFC to create a regional coral identification field guide;
    e. It would be useful to hold a workshop on conducting joint species distribution maping research;
    f. It would be desirable to refine the mapping of the fishing footprint to incorporate effort and gear information;
    g. Documentation of the types of gear used in fisheries would be useful for understanding the impact of historical and existing bottom fishing;
    h. It would be useful to develop approaches to monitor time/space changes in VMEs.

Agenda Item 9. Reports of the Members on Data Availability and Deficiencies

21. Dr. Du Preez presented a report of Canada's data availability and deficiencies (NPFC-2018-WS VME01-WP18). All Canadian vessels are required to have 100% at-sea monitoring either through independent observers or electronic monitoring. Fishing event data includes location, time, date, depth, gear configuration, and how the catch was handled (retained, released, etc.). There is 100% dockside monitoring of fisheries for landed catch, which is identified by species and weight. Lost gear is recorded but effort to retrieve lost gear is not recorded. Long-line gear does not retain sessile organism bycatch well. Indices of abundance of bycatch species are not

currently available for the offshore southern seamount fishery. Canada has conducted visual surveys and collected much scientific data for the Cobb Seamount and seamounts within the Canadian EEZ, but has conducted little to no visual surveys for the other seamounts in the Convention Area.

22. Dr. Kiyota presented a report of Japan's data availability and deficiencies (NPFC-2018-WS VME01-WP19). Commercial fishery data showing catch and effort is obtained from logbooks. Data sets are complete from the 1990s onwards but incomplete before that. VMS (Vessel Monitoring System) data exists but is not available for scientific analysis due to confidentiality issues. Scientific observer data and samples have been collected from 2009 based on the format set out in NPFC CMM 2017-05. Japan has been conducting annual scientific seamount surveys since 2006. It is also conducting multibeam echosounder surveys for fine-scale bathymetry.

23. Dr. Kim presented a report of Korea's data availability and deficiencies. Commercial fisheries data is obtained from logbooks. An electronic logbook system was started in 2015. VME bycatch data is not yet reported but was added to the electronic logbook system in 2017. All Korean vessels have scientific observers who collect bycatch data and biological samples, including samples of VME species.

Agenda Item 10. The Global Picture – Discussions on Comparisons of the NPFC Approach with That of Other Regions (including data needs)

10.1 Surveys and VME Identification

24. Dr. Stone and Dr. Du Preez led a discussion on surveys and VME identification. With regard to surveys, the participants discussed their value, challenges, technology options, and the potential for collaboration. Concerning field guides, the participants discussed taxonomic resolution, the need to balance scientific and functional information, the need to ensure consistency across Members' field guides, and other sources of data worth considering (e.g., video from cameras deployed on fishing gear).

10.2 Bottom Fishing Footprints (including monitoring gear and effort changes)

25. Dr. Kenchington led a discussion on bottom fishing footprints. The participants discussed practical data collection issues, the potential of interactive apps for data collection and sharing, benefits of VMS for fine tuning the fishing footprints and establishment of spatial management mechanisms, data confidentiality issues, the importance of assessing the combined fishing footprint and cumulative impact, the value of optimization routines for conservation and management objectives conducted by SPRFMO, and gear modifications and fishing procedures that could reduce impact on the sea bottom.

10.3 VME Encounter Protocols

26. Dr. Kiyota led a discussion on VME encounter protocols. The participants discussed the potential need for different protocols for the eastern and western parts of the Convention Area, and for fished and unfished areas; encounters occurring from exploratory fisheries; gear-specific and species-specific thresholds; ways to improve the accuracy of thresholds; move-on rules; temporary closures; and the importance of immediate notification of an encounter to other Members to avoid multiple encounters on the same VME.

10.4 Exploratory Fishing Protocols

27. Dr. Welsford led a discussion on exploratory fishing protocols. The participants discussed the approaches of different RFMOs, the potential need to distinguish between research and non-research vessels, the potential value of sharing information obtained from exploratory fisheries, and the importance of ensuring that there are no loopholes in protocols that can be exploited.

10.5 Spatial management measures

28. Dr. Rowden led a discussion on spatial management measures. The participants discussed the need to assess the cumulative impact of Members' fishing, the usefulness of habitat suitability modeling, the value of collating data from all Members, data confidentiality issues, the value of fisheries independent data, the value of a formal stakeholder process, the usefulness of decision-support tools, the importance of periodic review, and the status of recovering VME areas on fished seamounts.

Agenda Item 11. Discussions on Future Options for NPFC to Prevent SAI on VMEs:

11.1 Data and Data Gaps

11.2 Encounter Protocols

11.3 SAI Assessments

11.4 Fishing Footprints and Exploratory Fishing Protocols

11.5 Spatial management measures

29. The participants discussed future options for the NPFC to prevent SAI on VMEs and compiled recommendations, as presented in Agenda Item 13, below.

Agenda Item 12. Concluding Remarks on Major Findings of the Workshop

30. The Co-Chairs and the Science Manager thanked the participants for their fruitful discussions, which will be invaluable to the NPFC. They also commended the great spirit of cooperation exhibited by all participants.

Agenda Item 13. Recommendations to the SSC VME

31. The following recommendations were made:

DATA

a. Review data availability against data requirements from the FAO DSF Guidelines (NPFC-2018-WS VME01-WP20), clarify data deficiencies and prioritize actions to fill data gaps;
b. Cooperate with TCC in getting information on vessel positions to develop scientific advice on fine scale spatial management in the Emperor Seamount area;
c. Continue development of the regional observer program and address the issue of observer data sharing;
d. Consider conducting standardized training programs for observers with support from FAO;
e. Continue work on the ID guides for VME indicators;
f. Consolidate all available data including bycatch, scientific surveys, fisheries independent surveys, historical literature, from fishing industry itself (e.g., bathymetric data), and potentially relevant information from within EEZs, to get more detailed information about interactions between VMEs and bottom fisheries, including coral drag fishing;
g. Collect and make use of additional data relevant to protection of VMEs including data on potential impacts of climate change and lost fishing gear;
h. Establish data sharing protocols which consider privacy issues to collate all data across Members;
i. Create a central data repository for the NPFC and ensure data security;

ENCOUNTER PROTOCOL

j. VME indicator taxa – Develop area-specific indicators with regional characteristics of benthic fauna taken into account, and choose proper taxonomic resolution that will represent the ecological function of the indicator groups taking the balance of practicality and scientific validity;
k. Encounter threshold – Refine the current thresholds on the basis of scientific information including bycatch levels and catchability estimates, and use taxon-specific and gear-specific thresholds;
l. Move-on rule – Albeit the change from 5 nm to 2 nm appears reasonable, consider refining the move-on distance in relation to the size and distribution of observed VME patches, as well as the size of fishable seamounts;
m. Post-encounter requirements – Prepare a quick reporting protocol to avoid multiple impacts on the same VME site, and consider a process to introduce provisional area-protection around the encounter location, for example, a box with a set distance around the tow path;

SAI ASSESSMENTS

n. Assess SAI by bottom fisheries on any other relevant VME indicator taxa, in addition to the four existing taxa, for example sponges and hydrocorals where they are found in the Convention Area;
o. Develop a standardized approach and metrics to assess the cumulative impact of all Members' bottom fisheries on VMEs through time;
p. Develop measurable objectives for determining the occurrence of SAI;
q. Assess the recovery of VME sites and protect recovering sites in addition to pristine VME sites; monitor the recovery process;

FISHING FOOTPRINTS

r. Map a combined fishing footprint and effort to better identify fishing grounds using data from all NPFC Members by gear type and time;
s. Determine the appropriate scale for collecting and identifying fishing locations to define the fishing footprint in relation to assessing SAI;
t. Consider methods for accessing electronic data from the fishing vessels operating in the NPFC and from any research vessels, and encourage Members to deploy electronic reporting systems whenever possible including data on position and catch;
u. Provide descriptions of the current and historical fishing gears operating in the NPFC;

EXPLORATORY FISHING PROTOCOL

v. Consider the following points with respect to avoiding SAIs to VMEs in the course of exploratory fishing:
    i. Conduct reconnaissance for VME in the area to be explored, through fishery-independent surveys, drop-camera deployments from fishing vessels or other low impact sampling prior to fishing, beyond the requirements currently contained in the NPFC regulations;
    ii. Initial exploratory fishing trips should be short to allow for timely assessment of both VME and fishery but at the same time minimizing any SAI;
w. Consider banning exploratory fishing in VME closed areas;
x. Clarify the role of observers in collecting and reporting data during exploratory fishing;
y. Review the application of the exploratory fishery measure to learn from others' experiences in implementing their exploratory fisheries measures;

SPATIAL MANAGEMENT MEASURES

z. Assess management needs and decide on objectives that are aligned with the UNGA resolutions and NPFC convention;

aa. Use spatial mitigation measures that could include gear-specific closures, full-seamount closures, and within-seamount closures (on large seamounts with fine-scale spatial information and if practically possible);
bb. Develop habitat suitability models and use them with decision-support tools to aid a formal spatial management planning process, as used in SPRFMO;
cc. Introduce periodic review process (enables flexibility to change needs and objectives of spatial management, as well as availability of new data to re-test results of analysis and decisions on which they are based);

GENERAL

dd. Introduce periodic internal review processes for VME management;
ee. Consider external reviews to audit RFMO performance on VME protection;
ff. Conduct annual pre-reporting of research plans between Members to facilitate collaboration;
gg. Seek cooperation with other organizations which have related missions.

Agenda Item 14. Adoption of the Report

32. The Workshop Report was adopted by participants.

Agenda Item 15. Close of the Workshop

33. The Workshop closed at 16:22 on 15 March 2018.

Annexes

Annex A – Agenda
Annex B – List of Documents
Annex C – Participants List

Annex A

AGENDA

Agenda Item 1. Opening of the Workshop

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1.2 Purpose of Workshop and Expectations

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Agenda Item 3. Overview of Seamount Bottom Fisheries Situations and Potential Impacts on Corals

Agenda Item 4. Global Overview of Actions Taken to Prevent SAI on VMEs

4.1 Surveys and VME Identification

4.2 VME Encounter Protocols

4.3 Exploratory Fishing Protocols

4.4 Spatial management strategies

Agenda Item 5. Historical SAI Assessments of NPFC Members (primarily from 2008-2009)

Agenda Item 6. Protection of Corals and VMEs in Fished and Unfished Areas

Agenda Item 7. Reports on Current SAI Assessments

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7.2 Northwestern Pacific Ocean

Agenda Item 8. Global Overview Paper on Data Requirements to Implement Deep Sea Fisheries Measures to Protect VMEs

Agenda Item 9. Reports of the Members on Data Availability and Deficiencies

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Agenda Item 13. Recommendations to the SSC VME

Agenda Item 14. Adoption of the Report

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Annex B

LIST OF DOCUMENTS

MEETING INFORMATION PAPERS

Number	Title
NPFC-2018-WS VME01-MIP01 (Rev. 1)	Meeting Information
NPFC-2018-WS VME01-MIP02	Provisional Agenda
NPFC-2018-WS VME01-MIP03 (Rev. 2)	Provisional Annotated Agenda
NPFC-2018-WS VME01-MIP04 (Rev. 2)	Indicative Schedule
NPFC-2018-WS VME01-MIP05 (Rev. 2)	Provisional List of Documents
NPFC-2018-WS VME01-MIP06 (Rev. 1)	Workshop Program

REFERENCE DOCUMENTS

Reference	Title
https://www.npfc.int/key-documents/reports-vmes-and-assessment-impacts-caused-bottom-fishing-activities	Historical SAI Assessment Reports
https://www.npfc.int/cmm-2017-05-bottom-fisheries-and-protection-vmes-nw-pacific-ocean	CMM 2017-05 For Bottom Fisheries and Protection of VMEs in the NW Pacific Ocean
https://www.npfc.int/cmm-2017-06-bottom-fisheries-and-protection-vmes-ne-pacific-ocean-0	CMM 2017-06 For Bottom Fisheries and Protection of VMEs in the NE Pacific Ocean
https://www.npfc.int/summary-footprint-bottom-fisheries	Summary Footprint of Bottom Fisheries
https://www.npfc.int/international-guidelines-management-deep-sea-fisheries-high-seas	International Guidelines for the Management of Deep-sea Fisheries in the High Seas

WORKING PAPERS

Symbol	Title
NPFC-2018-WS VME01-WP01	Report on identification of VMEs and assessment of impacts caused by Japanese bottom fishing activities on VMEs and other marine species in the western part of the NPFC Convention Area
NPFC-2018-WS VME01-WP02	Updated summary comparison of VME encounter protocols in bottom fish RFMO/As
NPFC-2018-WS VME01-WP03	Identification of existing fishing grounds and unfished areas in the Emperor Seamounts region
NPFC-2018-WS VME01-WP04	Analysis of fishery bycatch and scientific survey data for cold-water corals and sponges in the existing fishing grounds of the Emperor Seamounts region
NPFC-2018-WS VME01-WP05	An assessment of the potential impacts of Japanese bottom fisheries on vulnerable marine ecosystems (VMEs) within fished seamounts of the Emperor Seamounts region
NPFC-2018-WS VME01-WP06	Historical Significant Adverse Impact Assessments of the North Pacific Fisheries Commission Members (abstract)
NPFC-2018-WS VME01-WP07	VMEs in North Western Pacific as life-supporting resources – challenges and possible science-based approaches to solutions (abstract and presentation)
NPFC-2018-WS VME01-WP08	An overview on protection of corals and VMEs in fished and unfished areas (abstract and presentation)
NPFC-2018-WS VME01-WP09	Overview of Seamount Bottom Fisheries Situations and Potential Impacts on Corals (abstract and presentation)
NPFC-2018-WS VME01-WP10	Global Overview of Actions Taken to Prevent SAI on VMEs: Surveys and VME Identification (abstract and presentation)
NPFC-2018-WS VME01-WP11	Report on identification of VMEs and assessment of impacts caused by Korean Bottom Trawl Fishing Activities on VMEs or other marine species in the Western part of the NPFC Convention Area
NPFC-2018-WS VME01-WP12	International Obligations for Assessment of Significant Adverse Impacts (SAIs) on Vulnerable Marine Ecosystems (VMEs) (abstract and presentation)
NPFC-2018-WS VME01-WP13	Global Overview Paper on Data Requirements to Implement Deep Sea Fisheries Measures to Protect VMEs (abstract and presentation)
NPFC-2018-WS VME01-WP14	Managing Fishery Interactions with Vulnerable Marine Ecosystems in the Southern Ocean (presentation)

NPFC-2018-WS VME01-WP15	Report on the identification of vulnerable marine ecosystems (VMEs) & assessment of significant adverse impact (SAI) on seamounts currently fished by Canada (presentation)
NPFC-2018-WS VME01-WP16	Spatial Management Strategies: The SPRFMO (New Zealand) Experience (presentation)
NPFC-2018-WS VME01-WP17	VME - North Pacific Perspective (presentation)
NPFC-2018-WS VME01-WP18	Report on the Members on Data Availability and Deficiencies by Canada (presentation)
NPFC-2018-WS VME01-WP19	Data Availability and Deficiencies by Japan (presentation)
NPFC-2018-WS VME01-WP20	Data availability and progress in VME protection in the NPFC against data requirements from the FAO DSF Guidelines

INFORMATION PAPERS

Symbol	Title
NPFC-2018-WS VME01-IP01	Application of association analysis for identifying indicator taxa of vulnerable marine ecosystems in the Emperor Seamounts area, North Pacific Ocean
NPFC-2018-WS VME01-IP02	Defying Dissolution: Discovery of Deep-Sea Scleractinian Coral Reefs in the North Pacific

Annex C

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