

Discussion Paper: Exploratory Fishing in Global Regional Fishery Management Organizations

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1 Introduction

In June 2017, the Council directed staff to produce a discussion paper that reviews international fishery agreements (North Pacific, North Atlantic, Antarctic, etc.) and provisions regarding exploratory fishing. The Council requested that the paper identify how the agreements define exploratory fishing, lay out any management measures applied to exploratory fishing under each of the agreements, discuss any problem areas and challenges for management as well as successes, and describe any “best practices” or “lessons learned” that might be applied to the Central Arctic Ocean. The Council noted that they intend to amend the Fishery Management Plan for Fish Resources of the Arctic Management Area (Arctic FMP) to incorporate guidance on exploratory fishing that would inform the Council’s precautionary approach to opening commercial fisheries in the Arctic.

The Arctic FMP currently identifies three species for which harvestable biomass may exist in the Arctic Management Area: snow crab, Arctic cod, and saffron cod. However, because of relevant socio-economic factors (costs), and potential ecological effects from commercial harvest (relevant ecological factors), MSY for each species has been reduced by 100% which results in *de minimis* OY, sufficient only to account for bycatch in subsistence fisheries for other species. Therefore, the Council established policy to prohibit commercial harvests of all fish resources of the Arctic Management Area until sufficient

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information is available to support the sustainable management of a commercial fishery. The Council motion from June 2017 considers an amendment to the Arctic FMP to describe minimum standards for exploratory fishing in the Arctic Management Area in order to comply with the Council's precautionary approach to opening commercial fisheries in the Arctic Management Area.

At the time the Council made the request, the United States and other countries were negotiating an agreement to manage commercial fishing in the Central Arctic Ocean (beyond the 200 nmi EEZ). The agreement was signed on November 30, 2017 and established a moratorium on commercial fishing in the area for at least 16 years while research is conducted to learn more about the Central Arctic ecosystem. The agreement, which must undergo legal and technical review, establishes and operates a joint program of scientific research and monitoring designed to understand the Central Arctic ecosystem and, in particular, determining whether fish stocks exist in the area that could be harvested on a sustainable basis. If harvestable fish stocks occur in the area, one or more regional fishery management organizations may be established to manage those international fisheries. Because commercial fisheries have not occurred in the Central Arctic Area, development of commercial fisheries would require exploratory fisheries, either scientific or commercial, to determine whether the potential fisheries are commercially and ecological sustainable.

1.1 Terms

Throughout this paper a number of terms are used that might have slightly different meanings for each RFMO described. The intended meanings are described here.

Exploratory fishery means fishing in new areas or areas where fishing is prohibited or has not occurred or with gear that has not previously been used in the existing fishing areas.

Vulnerable Marine Ecosystems (VMEs) are marine ecosystems that can be defined by (FAO 2013):

- Uniqueness or rarity – an area of ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas of ecosystems, including habitats that contain endemic species; habitats or rare, threatened or endangered species that occur only in discrete areas; nurseries or discrete feeding, breeding or spawning areas.
- 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.
- Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities.
- 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: slow growth rates, late age of maturity, low of unpredictable recruitment, long lived.
- 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.

Significant Adverse Impacts (SAIs) are impacts that compromise ecosystem integrity (i.e., ecosystem structure or function) in a manner that impairs the ability of affected populations to replace themselves, degrades the long-term natural productivity of habitats, or causes, on more than a temporary basis, significant loss of species richness, habitat or community types (FAO 2013).

2 Regional Fishery Management Organizations

The Council's motion from June 2017 requested that staff review "relevant" international fishery agreements, and parenthetically identified organizations that spanned the globe from the North Pacific and North Atlantic to Antarctica. No other guidance on what constituted a "relevant" fishery agreement was provided. Staff, therefore, reviewed a broad spectrum of regional fishery management organizations (RFMOs) to census which organizations had policies or directives to address exploratory fisheries. Many of the RFMOs currently in place were developed to address or prevent overfishing in existing fisheries and do not necessarily address exploratory fisheries (e.g., myriad tropical tuna RFMOs). Some of these organizations do address new or exploratory fishing (e.g., South Pacific Regional Management Organisation), but may not have published provisions or management measures specifically to address exploratory fisheries, or management measures for new or exploratory fisheries may be identical to their management measures for established fisheries. Rather than prepare a list of organizations with information about whether or not they addressed exploratory fisheries, staff chose to summarize six RFMOs that address fisheries in temperate or polar marine environments, that have published provisions or management measures specifically to address new or exploratory fisheries. Staff notes that there are other RFMOs not discussed here that address new or exploratory fisheries, if the Council wishes to expand the review beyond the six RFMOs outlined here, those will be addressed in another draft of this discussion paper.

The RFMOs summarized in this paper include:

- North Pacific Fisheries Commission
- Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea
- Commission for the Conservation of Antarctic Marine Living Resources
- North-East Atlantic Fisheries Commission
- Northwest Atlantic Fisheries Organization
- European Union

Staff also included brief descriptions of the International Council for the Exploration of the Seas (ICES) and the North Pacific Marine Science Organization (PICES) because, although they are not RFMOs, they have a role in providing scientific review and advice to manage fisheries in the North Atlantic and North Pacific, respectively.

2.1 North Pacific Fisheries Commission

The North Pacific Fisheries Commission (NPFC) is an inter-governmental organization established by the Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean (Convention). The objective of the Convention is to ensure the long-term conservation and sustainable use of the fisheries in the Convention Area while protecting the marine ecosystem of the North Pacific Ocean in which these resources occur". Convention members include Canada, China, the Republic of Korea, the Russian Federation, Chinese Taipei, the United States of America, and Vanuatu.

The Convention Text General Principles (Article 3) includes a paragraph that states that the Convention "will ensure that any expansion of fishing effort, development of new or exploratory fisheries, or change in the gear used for existing fisheries, does not proceed without prior assessment of the impacts of those fishing activities on the long-term sustainability of fisheries resources and a determination that those activities would not have SAIs on VMEs, or ensuring that those activities are managed to prevent those impacts or are not authorized to proceed".

The NPFC published two Conservation and Management Measures on 28 November 2017 to describe requirements to affect the conservation and management of all fisheries in the northeastern and northwestern Pacific Ocean, respectively. Additionally, each Conservation Measure includes, in Annex 1,

protocols for exploratory fisheries in their respective Convention Areas. These Annexes describe exploratory fisheries as “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”. The Annexes call for precautionary conservation and management measures including precautionary effort limits, precautionary spatial catch limits, regular review of appropriate indices of stock status, and measures to prevent adverse impacts on vulnerable marine ecosystems. The Annexes also publish a protocol for any Members of the Commission that plan to conduct exploratory fisheries. The steps of the protocol are summarized below:

1. Commission members must provide information and an assessment of planned fishing activities to other members and to the Scientific Committee (SC) for review at least 30 days before fishing.
2. The assessment in (1) must be conducted in accordance with the procedure described in Annex 2 of the Conservation and Management Measure, with particular care given to the evaluation of risks of SAI on VMEs.
3. The SC will review the information and the assessment according to the SC Assessment Review Procedures (Annex 3).
4. If approved, all exploratory fisheries are to be permitted only where the assessment concludes that they would not cause SAI on marine species or any VMEs, and on the basis and recommendation of the SC.
5. Members of the Commission must ensure that all vessels flying its flag conducting exploratory fisheries are equipped with a satellite monitoring device and have an observer onboard at all times.
6. Within 3 months of the end of the exploratory fishing, or within 12 months of the commencement of fishing, the member of the Commission will provide a report of the results of their activities to the members of the SC and all Members of the Commission.
7. The SC will review the report and decide whether the exploratory fishing activities had SAIs on marine species or any VME. The SC will then send its recommendations to the Commission on whether the exploratory fisheries can continue and whether additional management measures shall be required.
8. Members of the Commission shall only authorize continuation of exploratory fishing activities or commencement of commercial fishing activities, under this protocol on the basis of comments and recommendations of the SC.

Appendix 1.1 and 1.2 to Annex 1 include information to be provided before exploratory fisheries start, and information to be included in the report to the SC. Information to be submitted before exploratory fisheries commence include:

1. A harvesting plan including
 - a. Name of vessel
 - b. Flag member of vessel
 - c. Description of area to be fished (location and depth)
 - d. Fishing dates
 - e. Anticipated effort
 - f. Target species
 - g. Bottom fishing gear-type used
 - h. Area and effort restrictions to ensure that fisheries occur on a gradual basis in a limited geographical area
2. A mitigation plan including measures to prevent SAI to VMEs that may be encountered during the fishery
3. A catch monitoring plan including
 - a. Recording/reporting of all species brought onboard to the lowest possible taxonomic level

- b. 100% satellite monitoring
- c. 100% observer coverage
4. A data collection plan that ensures data are collected in accordance with Annex 5.

The report to the SC must contain:

1. Name of vessel
2. Flag member of vessel
3. Description of area fished (location and depth)
4. Fishing dates
5. Total effort
6. Bottom fishing gear-type used
7. List of VME encountered (the amount of VME indicator species for each encounter, with latitude and longitude of encounter)
8. Mitigation measures taken in response to VME encounter
9. List of all organisms brought onboard

2.2 Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea

The Convention on the Conservation and Management of the Pollock Resources in the Central Bering Sea was signed in 1994 by the People's Republic of China, The Republic of Korea, the Republic of Poland, the Russian Federation, and the United States of America to establish an international regime for conservation, management, and optimum utilization of the pollock resources in the international waters (beyond 200 nautical miles) in the Bering Sea. Additional objectives include restoring and maintaining pollock resources in the Bering Sea at levels that permit their maximum sustainable yield, cooperating in gathering and examining factual information concerning pollock and other living marine resources in the Bering Sea, and providing a forum in which to consider the establishment of necessary conservation and management measures for living marine resources other than pollock in the Bering Sea as may be required. The first Annual Conference of Parties was held in Moscow in 1996, and every year since on a rotating venue of each of the six Parties. Reports of the conventions up to 2015 are archived on the AFSC website.

The Convention text, in Article IV states that terms and conditions for any trial fishing to occur in the Convention Area, and any cooperative scientific research on living marine resources other than pollock shall be established at the annual meetings. Trial fishing may be authorized by the Convention for any year in which the Allowable Harvest Level (AHL) is zero. The Convention text does not require any advance notice for any party to conduct trial fishing, although at annual meetings Convention parties have been requested to inform other parties before conducting any trial fishing (one month notice before 2002, two weeks' notice, thereafter). The last reported trial fishing occurred in 2008. Article XI of the Convention text establishes requirements for fishing in the Convention Area when the AHL is not zero or for trial fishing. There are no requirements for evaluations or assessments of conditions before conducting trial fishing, but Convention parties have provided reports of their trial fishing at the annual meeting following the trial fishery.

2.3 Commission for the Conservation of Antarctic Marine Living Resources

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was established by international convention in 1982, in response to increasing commercial interest in Antarctic krill resources, and a history of overexploitation of several other marine resources (e.g., cetaceans, toothfish, icefish) in the Southern Ocean. CCAMLR is an international commission with 25 members, and 11 additional countries that have acceded to the Convention. The Commission establishes a set of

conservation measures, based on the best available scientific information, that determine the use of marine living resources in the Antarctic.

Large scale fishing for finfish did not begin in the Southern Oceans until the late 1960s, and by the late 1970s, some species of finfish had been severely overfished in some areas. There were also large, but variable, catches of krill from the late 1970s through the early 1980s, when the Soviet fleet was disbanded following the breakup of the former USSR. By the mid-1980s, CCAMLR had implemented long-term prohibitions on directed fishing for several species in several Subareas of the Convention. In the 1980s and 1990s, fishing focused on krill, Patagonian toothfish, mackerel icefish, squid, and crab. New harvesting technology and markets has resulted in growing interest in exploratory fisheries targeting Antarctic toothfish and a renewed interest in krill fishing. In addition to fisheries managed by CCMLR, illegal, unregulated, and unreported (IUU) fishing also takes large quantities of toothfish.

The Convention on the Conservation of Antarctic Marine Living Resources is an international treaty that was adopted at the Conference on the Conservation of Antarctic Marine Living Resources, which met at Canberra, Australia in 1980. The Convention consists of 33 articles, an annex relating to an arbitration tribunal, and a statement by the Chairman of the CCAMLR regarding application of the Convention to the waters adjacent to islands within the area over which State sovereignty is recognized by all Contracting Parties. The Convention also describes its relationship to the Antarctic Treaty, its area of application, the institution structure of the organization with a focus on the Commission and its Scientific Committee, and considerations with respect to international cooperation.

The Convention applies to all Antarctic populations of finfish, mollusks, crustacean and seabirds (together, Antarctic marine living resources [AMLRs]) found south of the Antarctic Convergence (the Convention Area). Whales and seals are specifically excluded from the Convention because they are managed under the International Convention for the Regulation of Whaling (IWC) and the Convention for the Conservation of Antarctic Seals.

CCAMLR's Secretariat is located in Hobart, Tasmania, Australia. The Secretariat supports the regular meetings and daily functions of the Commission and Scientific Committee. The CCAMLR Strategic Plan details the vision, mission, and goals for the Secretariat, along with the roles and responsibilities for the Secretariat. The CCAMLR Vision states that CCMLR would be "Globally recognised as a best-practice model for the provision of technical, administrative, scientific and logistical support to an intergovernmental marine conservation and management organisation."

The text of the Convention on the Conservation of Antarctic Marine Living Resources contains 33 Articles that establish the mechanisms for the Commission to recommend, promote, decide upon, and coordinate the measures and scientific studies needed to ensure the conservation of AMLRs. Specifically, Article II establishes the conservation objective for the Convention and establishes that the term 'conservation' includes rational use. Article II states that any harvesting and associated activities in the Convention Area shall be conducted in accordance with the provisions of the Convention and with the following principles of conservation:

- a) prevention of decrease in the size of any harvested population to levels below those which ensure its stable recruitment;
- b) maintenance of the ecological relationships between harvested, dependent and related populations of AMLRs and the restoration of depleted population to the levels defined in subparagraph (a); and
- c) prevention of changes or minimization of the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impacts of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with the aim of making possible the sustained conservation of Antarctic marine living resources.

Article XIV of the Convention text established the Scientific Committee as a consultative body to the Commission, and Article XV identifies the activities that the Scientific Committee will undertake to provide a forum for consultation and cooperation concerning the collection, study and exchange of information with respect to the marine living resources to which the Convention applies. Among other responsibilities, Article XV directs the Scientific Committee to regularly assess the status and trends of the populations of AMLRs, analyze data concerning the direct and indirect effects of harvesting on the AMLRs, assess effects of proposed changes to the methods or levels of harvest and proposed conservation measures, and formulate proposals for the conduct of international and national programs of research into AMLRs.

At each meeting of the Commission, Conservation Measures that support the conservation of AMLRs are developed and reviewed. If approved, Conservation Measures are implemented during subsequent fishing seasons. Current Conservation Measures are published in the annual *Schedule of Conservation Measures in Force*. Some Conservation Measures apply to a specific time period (e.g., fishing season), while others remain in force at all times.

Conservation Measure 21-02 (2016) addresses exploratory fisheries in the Convention Area. Exploratory Fisheries are defined as:

- i. a fishery that was previously defined as a “new fishery” by Conservation Measure 21-01²;
- ii. an exploratory fishery shall continue to be classified as such until sufficient information is available:
 - a. to evaluate distribution, abundance and demography of the target species, leading to an estimate of the fishery’s potential yield;
 - b. to review the fishery’s potential impacts on dependent and related species;
 - c. to allow the Scientific Committee to formulate and provide advice to the Commission on appropriate harvest catch levels, as well as effort levels and fishing gear, where appropriate.

Both new fisheries and exploratory fisheries share similar requirements, the remaining discussion will focus on exploratory fisheries. While fisheries are considered exploratory fisheries, the Scientific Committee will develop (and update annually) a Data Collection Plan for the fishery that identifies the data needs and describe any operational research actions necessary to obtain the relevant data to enable an assessment of the stock to be made. The Data Collection Plan should include:

- i. a description of the catch, effort and related biological, ecological and environmental data required to undertake the evaluations described in paragraph 1(ii) [above], and the date by which such data are to be reported annually to CCAMLR;
- ii. a plan for directing fishing effort during the exploratory phase to permit the acquisition of relevant data to evaluate the fishery potential and the ecological relationships among harvested, dependent and related populations and the likelihood of adverse impacts;
- iii. where appropriate, a plan for the acquisition of any other research data by fishing vessels, including activities that may require the cooperative activities of scientific observers and the vessel, as may be required for the Scientific Committee to evaluate the fishery potential and the ecological relationships among harvested, dependent and related populations and the likelihood of adverse impacts;

² Conservation Measure 21-01 defines a new fishery as a fishery on a species using a particular fishing method in a statistical area of division for which information on distribution, abundance, demography, potential yield and stock identity from comprehensive research/surveys or exploratory fishing have not been submitted to CCAMLR; or catch and effort data have never been submitted to CCAMLR; or catch and effort data from the two most recent season in which fishing occurred have not been submitted to CCAMLR.

- iv. an evaluation of the timescales involved in determining the responses of harvested, dependent and related populations to fishing activities.

The Commission will annually establish a precautionary catch limit at a level that will provide the information specified in the Data Collection Plan and required to undertake the evaluations described in paragraph 1(ii) [above].

Any Commission Member that proposes to participate in an exploratory fishery is required to submit notice to the Secretariat that identifies the vessels that will participate and contains a Fishery Operations Plan for the fishing season. The Fishery Operations Plan will be reviewed by several standing Working Groups, the Scientific Committee, and the Commission. Fishery Operations Plans are required to provide, as possible:

- a) the nature of the exploratory fishery, including target species, methods of fishing, proposed region, and maximum catch levels proposed for the forthcoming season;
- b) specification and full description of the types of fishing gear to be used;
- c) biological information on the target species from comprehensive research/survey cruises, such as distribution, abundance, demographic data, and information on stock identity;
- d) details of dependent and related species and the likelihood of their being affected by the proposed fishery;
- e) information from other fisheries in the region, or similar fisheries elsewhere, that may assist in the evaluation of potential yield;
- f) if the proposed fishery will be undertaken using bottom trawl gear, information on the known and anticipated impacts of this gear on vulnerable marine ecosystems, including benthos and benthic communities.

There are also specific information requirements for participation in exploratory fisheries for *Dissostichus* (toothfish) species in certain statistical areas. Once notice to the Secretariat is complete, including the Fishery Operation Plan and review and evaluation by the Scientific Committee and the Standing Committee on Implementation and Compliance, the Commission will annually consider adoption of relevant conservation measures for each exploratory fishery.

Also relevant to the development of exploratory fisheries in the CCAMLR Area is Conservation Measure 24-01, concerning the application of conservation measures to scientific research. According to discussions with Commission staff, Conservation Measure 24-01 could be considered as “minimum requirements” for conducting scientific research (including exploratory fisheries) in data-poor areas. Conservation Measure 24-01 requires Members taking more than 50 tonnes (metric ton) of finfish or more than 0.1% of a given catch limit for non-fish to develop a Research Plan at least six months in advance of the planned starting date for the research. Conservation Measure 24-01 contains a template that identifies the necessary format and required components of a completed Research Plan. Table 1 lists the information requirements for each category in the required Research Plan.

Appendix A contains a completed Research Plan submitted to CCMLR by the Delegations of Australia, France, Japan, Republic of Korea, and Spain, and provided by CCMLR staff.

Table 1. Requirements for Research Plans for scientific research in CCAMLR Areas.

Category	Information
1. Main objective	<ul style="list-style-type: none"> a) Objectives for the research and why it is a priority for CCAMLR b) Detailed description of how the proposed research will meet the objectives, including annual research goals (where applicable) c) Rationale for research, including relevant existing information on the target species from this region, and information from other fisheries in the region or similar fisheries elsewhere.
2. Fishery Operations	<ul style="list-style-type: none"> a) Fishing Member b) Vessel to be used, including name, owner, vessel type, port of registration, radio call sign, overall length and tonnage, equipment used for determining position, fishing capacity, fishing processing and storage capacity c) Target species d) Fishing or acoustic gear to be used: trawl type, mesh shape and size, longline type, other sampling gear, type of acoustic gear and frequency e) Fishing regions and geographical boundaries f) Estimated dates of entering and leaving CAMLR Convention Area
3. Survey design, data collection and analysis	<ul style="list-style-type: none"> a) Research survey/fishing design (description and rationale): spatial arrangements or maps of stations/hauls, stratification according to e.g., depth or fish density, calibration/standardization of sampling gear, proposed number and duration of stations/hauls, tagging rates and other performance metrics, other requirements b) Data collection: types and sample size or quantities of catch, effort and related biological, ecological and environmental data (e.g., sample size by location/haul) with minimum observer sampling requirements c) Method for data analysis to achieve the objective in 1(a) d) How and when will the data meet the objectives of the research (e.g., lead to a robust estimate of stock status and precautionary catch limits)? Include evidence that the proposed methods are highly likely to be successful.
4. Proposed catch limits	<ul style="list-style-type: none"> a) Proposed catch limits and justification. (Note that the catch limits should be at a level not substantially above that necessary to obtain the information specified in the Research Plans and required to meet the objectives of the proposed research). b) Evaluation of the impact of the proposed catch on stock status, including: rationale that proposed catch limits are consistent with Article II of the Convention, evaluation of timescales involved in determining the responses of harvested, dependent and related populations to fishing activities, information on estimated removals, including IUU fishing activities, where available. c) Details of dependent and related species and the likelihood of their being affected by the proposed fishery.
5. Research capability	<ul style="list-style-type: none"> a) Name and address of the chief scientists, research institute or authority responsible for planning and coordinating the research b) Number of scientists and crew to be on board the vessel c) Is there opportunity for inviting scientists from other Members? If so, indicate a number of such scientists d) Commitment that the proposed fishing vessels and nominated research providers have the resources and capability to fulfil all obligations of the proposed Research Plan.
6. Reporting for evaluation and review	<ul style="list-style-type: none"> a) List of dates by which specific actions will be completed and reported to CCAMLR. If the research is a stand-alone survey, Members shall commit to providing a progress report to WG-FSA and/or WG-EMM for review and comment and a final report within 12 months of completion of the research to the Scientific Committee. b) If research is multi-annual, Members shall commit to providing annual research reviews to be submitted to WG-FSA and/or WG-EMM, including review of progress towards meeting research objectives and associated proposed timelines in initial proposal, and proposals for adjustments to the research proposal if required.

2.4 North-East Atlantic Fisheries Commission

The North East Atlantic Fisheries Commission (NEAFC) is the Regional Fisheries Management Organization for the North East Atlantic, from the southern tip of Greenland to the Barents Sea, and south to Portugal. The objective of the NEAFC is to ensure the long-term conservation and optimum utilization of the fishery resources of the Convention Area, providing sustainable economic, environmental, and social benefits. Contracting parties to the Convention are those that have signed the Convention on Multilateral Cooperation in North East Atlantic Fisheries and include Denmark (in respect to the Faroe Islands and Greenland), the European Union, Iceland, Norway, and the Russian Federation. Within the NEAFC regulatory fishing area, fishing vessels must abide by current management measures and the NEAFC Scheme of Control and Enforcement. A number of basic texts, including the text of the NEAFC Convention, are available on the Commission's website (www.neafc.org/basictexts). Among the basic texts are the NEAFC Approach to Conservation and Management of Deep-Sea Species, and Procedures and Standards for the Permanent Committee on Management and Science (PECMAS) Consideration of Proposals for Exploratory Fishing Pursuant to Recommendation 19, which detail how NEAFC addresses exploratory fisheries.

In 2014, the Commission adopted Recommendation 19: Protection of VME's in NEAFC Regulatory Areas. This recommendation defines exploratory fisheries as "all commercial bottom fishing activities outside area closures and existing bottom fishing areas, or if there are significant changes to the conduct and technology of bottom fishing activities within existing bottom fishing areas". Article 6 of Recommendation 19 specifically addresses exploratory bottom fishing, and Article 7 addresses the assessment of proposed exploratory bottom fisheries.

Article 6 includes 8 paragraphs that address requirements to which Contracting Parties must adhere to consider exploratory fishing in NEAFC Convention waters. Requirements include:

1. Obtaining and distributing relevant data to allow PECMAS and ICES to conduct a preliminary risk assessment of the risk of SAI to VMEs.
2. Preparing and Notice of Intent to undertake exploratory bottom fishing at least six months prior to the proposed start of fishing. The Notice of Intent must contain:
 - a. Harvesting plan that outlines target species, proposed dates and areas and the types of bottom fishing gear to be used. Area and effort restrictions shall be considered to ensure that fishing occurs on a gradual basis in a limited geographic area;
 - b. Mitigation plan, including measures to prevent SAI to VMEs that may be encountered during the fishery;
 - c. Catch monitoring plan, including reporting/recording of all species caught;
 - d. A sufficient system for recording/reporting of catch, detailed to conduct an assessment of activity, if required;
 - e. Fine-scale data collection plan on the distribution of intended tows and sets, to the extent practicable on a tow-by-tow and set-by-set basis;
 - f. Plans for monitoring of bottom fishing activities using gear monitoring technology, including cameras if practicable, and
 - g. Monitoring data obtained pursuant to paragraph 1 of the article.
3. The Notice of Intent, along with the accompanying information shall be forwarded by the Secretary to all Contracting Parties as well as to PECMAS for review. The relevant Contracting Party shall also provide an assessment of the proposed exploratory bottom fishing in accordance with Article 7 of the Recommendation.

4. Exploratory bottom fishing shall only commence after having been assessed by PECMAS and approved by the Convention.
5. Preference shall be given by the relevant Contracting Party to exploratory bottom fishing using fishing gear and methods with the least bottom contact, in well-mapped areas and at times when impacts are likely to have the least adverse impacts on organisms other than the target species.
6. The relevant Contracting Party shall ensure that vessels flying its flag and conducting exploratory bottom fishing have a scientific observer on board. Observers shall collect data in accordance with the VME Data Collection Protocol as set out in Annex 3³.
7. The relevant Contracting Party shall provide a report of the results of such activities to the Secretary for circulation to ICES and to all other Contracting Parties. It shall ensure that the data, which derives from exploratory bottom fishing, will be made available to ICES.
8. The Commission shall review the assessments undertaken in accordance with Article 7 and the results of the fishing protocols implemented by the participating fleets. The Commission may decide to authorize new bottom fishing activities based upon the results of exploratory bottom fishing conducted in the previous two years. Areas where such new bottom fishing activities are authorized shall be defined as “existing bottom fishing areas” pursuant to Article 4.

Article 7 includes 4 paragraphs that address how proposed exploratory fishing activities are assessed before they are approved. Specifically, each Contracting Party must submit a preliminary assessment of known and anticipated impacts of the proposed activity. Once received, the Secretary will forward the assessment to all Contracting Parties and to PECMAS. PECMAS will conduct an evaluation of the assessment, taking into account the risks of SAI to VMEs, and any advice provided by ICES. When the evaluation is completed, PECMAS will provide advice to the Commission as to whether the proposed exploratory bottom fishing activity should be approved or would have SAI on VMEs. If SAI is expected, PECMAS will provide advice on mitigation measures to prevent such impacts. The Commission will then, within 30 days, provide or withhold approval for the proposed exploratory fishing activities.

The Permanent Committee on Management and Science, in 2015, published their procedures and standards for consideration of proposals for exploratory fishing pursuant to NEAFC Recommendation 19. The procedures ensure that the required evaluation and recommendation to the Commission can take place within three months of the Notice of Intent and accommodate the request for comments from ICES. Initially, the chairman of PECMAS will determine if the submitted documentation is complete. To be considered complete, the documentation must contain:

- a) Harvesting plan that outlines target species, proposed dates and areas and the type of bottom fishing gear to be used;
- b) Mitigation plan, including measures to prevent SAI to VMEs that may be encountered during the fishery;
- c) Catch monitoring plan, including recording/reporting of all species caught;

³ VME Data Collection Protocol

Observers on fishing vessels in the Regulatory Area who are deployed pursuant to Article 6.6 of this Recommendation shall:

- a) Monitor any set for evidence of presence of VMEs and identify coral, sponges, and other organisms to the lowest level;
- b) Record on data sheets the following information for identification of VMEs: vessel name, gear type, date, position (latitude/longitude), depth, species code, trip-number, set-number, and name of the observer on data sheets, if possible;
- c) Collect, if required, representative samples from the entire catch (biological samples shall be collected and frozen when requested by the scientific authority in a Contracting Party); and
- d) Provide samples to the scientific authority of a Contracting Party at the end of the fishing trip.

- d) Sufficient system for recording/reporting of catch, with sufficient detail to conduct an assessment of activity, if required;
- e) Fine-scale data collection plan on the distribution of intended tows and sets, to the extent practicable on a tow-by-tow and set-by-set basis;
- f) Data collection plan to facilitate the identification of VMEs in the areas fished;
- g) Plans for monitoring of bottom fishing activities using gear monitoring technology, including cameras if practicable; and
- h) Monitoring data.

If PECMAS finds that any of the required elements are missing or described in a manner that does not allow evaluation, then the proposal would not be approved. Once the documentation is complete, the information will be sent to all PECMAS and to ICES, if necessary, for evaluation. Specifically, PECMAS will request comments from ICES to address the adequacy of the preliminary assessment, the level of precaution adopted, any significant gaps in the information on VMEs in the area, and the likely efficacy of mitigation measures proposed by the Contracting Parties. Any comments from ICES will be immediately sent to the Contracting Parties, who will then conduct an evaluation considering ICES' comments.

The Contracting Parties' preliminary assessment must include:

- a) Type(s) of fishing conducted or contemplated, including vessels and gear types, fishing areas, target and potential bycatch species, fishing effort levels and duration of fishing (harvesting plan);
- 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) Identification, description and evaluation of the occurrence, character, scale and duration of likely impacts, including cumulative impacts of the proposed fishery on VMEs in the fishing area;
- e) Data and methods used to identify, describe and assess the impacts of the activity, the identification of gaps in knowledge, and an evaluation of uncertainties in the information presented in the assessment;
- f) Risk assessment of likely impacts by the fishing operations to determine which impacts on VMEs are likely to be significant adverse impacts; and
- g) Mitigation and management measures to be used to prevent significant adverse impacts on VMEs and the measures to be used to monitor effects of the fishing operations.

If PECMAS determines that the submitted assessment is incomplete or is insufficiently rigorous and balanced to assess the risk of significant adverse impacts, then the proposal shall not be approved.

The evaluation from the Contracting Parties will be forwarded to the PECMAS chairman and members for their evaluation. Within 6 weeks, the PECMAS chairman and members will respond with their opinion of whether the proposed activities should be approved or declined. If possible, the assessment of the proposed activities will be reviewed at a PECMAS meeting. If members do not respond within the six-week deadline, it will be interpreted that the exploratory fishing is unlikely to have SAIs on VMEs (a positive response is necessary to indicate that the proposed activities are likely to have SAI). The PECMAS chairman will summarize all evaluations and formulate a response to the Commission that includes any different views on the recommendations (recommendations need not be unanimous), within three months of the submission of the Notice of Intent.

2.5 Northwest Atlantic Fisheries Organization

The Northwest Atlantic Fisheries Organization (NAFO) is an intergovernmental organization with a mandate to provide scientific advice and management of fisheries in the northwestern part of the Atlantic

Ocean. The Convention Area includes a large portion of the Atlantic Ocean, including the 200 nmi zones of Coastal States jurisdiction (USA, Canada, St. Pierre et Miquelon, and Greenland). Management by NAFO, however, applies only to the areas straddling and outside the EEZs. The NAFO co-manages pelagic redfish I Subarea 2 and Div. 1F-3K (off Greenland) with the Northeast Atlantic Fisheries Commission.

The overall objective of NAFO is to contribute through consultation and cooperation to the optimum utilization, rational management, and conservation of the fishery resources of the Convention Area. The NAFO mandate includes most fishery resources in the Northwest Atlantic, except salmon, tuna/marlin, whales, and sedentary species (e.g., shellfish).

NAFO succeeded the International Convention for the Northwest Atlantic Fisheries after the United Nations and its member states negotiated the Third Convention of the Law of the Sea that allowed nations to declare an Exclusive Economic Zone, with national jurisdiction over fisheries with 200 nm of national boundaries.

Management measures of NAFO include Total Allowable Catch (TAC), and quotas for regulated stocks, as well as restrictions for bycatch, minimum fish size, area, and time. NAFO also requires that fishing vessels record and communicate their catches and fishing efforts and requires each vessel in the NAFO area to carry an independent observer on board, and to carry and use a satellite monitoring device (VMS) that automatically and continuously reports the position of the vessel. NAFO Conservation and Enforcement Measures are updated every year.

The 2017 NAFO Conservation and Enforcement Measures include 8 chapters and 4 annexes. Chapter II concerns the protection of VMEs in the regulatory area, including the description, assessment, and evaluation of exploratory bottom fishing activities. Annex I.E includes templates for the conduct of exploratory bottom fishing activities. Exploratory bottom fishing is defined as bottom fishing activities conducted outside of the footprint, or within the footprint with significant changes to the conduct or in the technology used in the fishery.

Any contracting parties whose vessels wish to engage in exploratory bottom fishing must abide by the Exploratory Protocol established by NAFO. The Exploratory Protocol requires CPs to submit a Notice of Intent and an assessment of the known and anticipated impacts of the bottom fishing activity to the Executive Secretary no less than two weeks before the regularly scheduled (June) meeting of the Scientific Council. The NOI must contain:

- a) Harvesting plan that outlines target species, dates and areas, anticipated effort, proposed gear types, and IMO number of participating vessels;
- b) Mitigation plan including measures to prevent significant adverse impacts to vulnerable marine ecosystems that may be encountered during the fishery;
- c) Catch monitoring plan that includes recording/reporting of all species caught, 100% satellite tracking and 100% observer coverage; and
- d) Data collection plan to facilitate identification of VMEs and species in the area fished.

Annex I.E also contains a template for a complete NOI.

When the completed NOI and Assessment is received by the Executive Secretary, the NAFO will request the Scientific Council to undertake an independent analysis of the preliminary assessment submitted, taking into account the risks of SAIs to VMEs. The Scientific Council should consider any available additional information, including information from other fisheries in the region or similar fisheries elsewhere in their analysis. When the analysis is complete, the Scientific Council and Joint Fisheries Commission-Scientific Council Working Group will provide advice to the NAFO on possible adverse impacts to VMEs and on mitigation measures to prevent them.

The NAFO may allow, prohibit, or restrict bottom fishing activities, taking into account the advice and recommendations provided by the Scientific Council and Joint Fishing Commission-Scientific Council Working Group. Restrictions may include specific mitigation measures for bottom fishing activities, allowing, prohibiting, or restricting bottom fishing with certain gear types, or changes in gear design or deployment, and any other relevant requirements or restrictions necessary to prevent SAIs to VMEs.

2.6 European Union Common Fisheries Policy

The European Union (EU) manages fisheries to ensure that fishing and aquaculture are environmentally, economically, and socially sustainable and that they provide a source of healthy food for EU citizens. Its goal is to foster a dynamic fishing industry and ensure a fair standard of living for fishing communities. Fisheries are managed via a Common Fisheries Policy (CFP) that is a set of rules for managing European fishing fleets and for conserving fish stocks. Designed to manage a common resource, the CFP provides all European fishing fleets equal access to EU waters and fishing grounds and allows fishermen to compete fairly. The CFP was first introduced in the 1970s and went through successive updates, the most recent of which took effect on 1 January 2014.

The European Union defines exploratory fishing as “the use of various types of fish-searching equipment and fishing gear to ascertain what kind of fish are present in an area, and in which quantities, so as to obtain some idea of the magnitude of the stocks in this area and of the economic viability of their commercial exploitation”. The EU’s Common Fisheries Policy (CFP) does not allow for exploratory fishing within EU waters, nor in the Arctic region. The EU also prohibits vessels from Member countries from conducting exploratory fishing in the waters of countries outside of EU, unless exploratory fishing is approved in the agreed protocol with the country concerned. Examples of protocols that allow exploratory fishing include:

- Fisheries Partnership with Greenland: joint ventures may be authorized that allow for exploratory fishing with the favorable opinion of the Parties under the Joint Committee.
- Mauritania: for fishing categories not covered by the Protocol in force, and for exploratory fishing, licenses may be granted to Community Vessels by the Ministry. However, the granting of these licenses remains dependent on a favorable opinion from the two parties.
- Guinea Bissau: for fishing categories not covered by the Protocol in force, and for exploratory fishing, the Ministry may grant fishing authorizations to Community vessels. However, the granting of these licenses remains dependent on a favorable opinion from the two parties.

According to EU Directorate-General for Maritime Affairs and Fisheries staff, although these provisions for exploratory fishing exist, they are rarely used in practice.

In contrast, scientific research carried out by fishing operations is authorized under the CFP, and in EU waters, provided that they are conducted solely for the purpose of scientific investigations which are carried out with the permission and under the authority of the Member State or Member States concerned, and of which the Commission and the Member State or Member States in whose waters the research is carried out have been informed in advance (i.e., terms of reference and results of the research is agreed and monitored, including scientific peer review). Marine organisms caught for this purpose may be sold directly for purposes other than human consumption.

2.7 ICES and PICES

Although ICES and PICES are not RFMOs and do not, themselves, authorize exploratory fisheries, a brief discussion is included here because both organizations provide advice to RFMOs to ensure fishery sustainability, and when exploratory fisheries are considered.

2.7.1 ICES

The International Council for the Exploration of the Sea (ICES) is an intergovernmental science organization that provides scientific advice to member nations and affiliates on a range of issues relating to marine policies and management, including marine environmental policies, and management of marine living resources, including fisheries policy. ICES advice is based on peer-reviewed expert group reports, and is prepared by an advice drafting group, and approved by the ICES Advisory Committee.

The ICES advisory process is a multi-step process established to ensure that the advice is based on the best available science and data, is considered legitimate by both authorities and stakeholders, and is relevant and operational in relation to the policy in question. The steps in the ICES process are:

- A request for advice is received from a client
- Data are collected by expert groups, which then make assessments and draft a first scientific/technical response to the request
- Expert group reports are peer-reviewed by independent experts
- In cases of stock assessments where the benchmark (established assessment method to be used) has been agreed upon, the reviewing is carried out within the expert group and then followed by an advice drafting group
- The expert group report together with the review is used in the advice drafting group
- Draft advice prepared by the advice drafting group is discussed and finally approved by the Advisory Committee
- The advice is delivered to the client.

Client organizations, like the North-East Atlantic Fisheries Commission and the Northwest Atlantic Fisheries Organization will use the advice from ICES when authorizing or evaluating exploratory fisheries in their jurisdictional waters.

2.7.2 PICES

The North Pacific Marine Science Organization (PICES) is an intergovernmental scientific organization whose purpose is to promote and coordinate marine research in the North Pacific and adjacent seas, advance scientific knowledge about the ocean environment, global weather and climate change, living resources and their ecosystems, and the impact of human activities, and promote the collection and rapid exchange of scientific information on these issues.

PICES hosts a number of standing committees that work on PICES activities, as necessary. The Fishery Science Committee (FIS) area of responsibility is to promote and coordinate fisheries science and interdisciplinary research in the northern North Pacific, including biology and ecology of living resources, particularly those that are subject to harvest or have the potential to be harvested. Focus is on the relationship between human factors and climate on the fluctuations of these resources.

3 Summary of Exploratory Fishing Provisions

3.1 Definitions of exploratory fisheries

Although each of these RFMOs defines exploratory fisheries in a slightly different way, they all generally refer to fisheries for which data are not available to ensure the ecological sustainability of fishery targets, or to assess the potential impacts of commercial fisheries on fish stocks. In some cases, fisheries that would occur outside of established fishing areas are considered exploratory, at least until data are collected by which to evaluate the impacts of fishing on the previously unexploited habitats. The CCAMLR differentiates between new and exploratory fisheries. Fisheries for which some data may exist, but not enough to adequately ensure the sustainability of the fishery or evaluate the potential impacts of the fishery on fish stocks or VMEs are considered exploratory fisheries, while potential fisheries for

which no data exist or for which data have not been available for a number of years, are considered new fisheries. Under these definitions, fisheries in either the Arctic FMP Area, or the Central Arctic would be considered new fisheries (CCAMLR) or exploratory fisheries because few data are available to evaluate the potential impacts of fishing on target species or VMEs or other habitats.

3.2 Management measures for exploratory fisheries

In all cases where management measures are prescribed for exploratory fisheries, the RFMOs adhere to the precautionary principal, and require the collection of relevant data to be able to assess the impacts of the exploratory fishery on target and other fish stocks, VMEs, and other habitats before continuing to authorize or expand exploratory fisheries or allowing development of commercial fisheries.

Advance notice of the intent of parties to RFMO agreements is generally required before exploratory or test fisheries are authorized. Advance notice requirements vary from two weeks to six months before the commencement of fishing. Several RFMOs publish specific information that is required before exploratory fisheries are considered. In most cases, these requirements include descriptions of the catch, effort, and related biological, ecological, and environmental data required to undertake the evaluation of exploratory fishing; harvest plans that identify the target species, proposed dates and area, and types of fishing gear to be used; mitigation plans to prevent SAIs to VMEs; catch monitoring plans, including recording and reporting requirements; data collection plan; and observer monitoring plans.

Some RFMOs such as NPFC, CCAMLR, NEAFC, and NAFO publish requirements for research plans for scientific or exploratory fisheries in their convention areas. In the CCAMLR case, CCAMLR staff indicated that the published guidelines are considered minimum data requirements for assessment of the exploratory fishing notice. Research plans are designed to ensure that sufficient data are collected to evaluate the potential impacts, and sustainability of fishing in the area, and are used by scientific review bodies (either supporting body of the RFMO or external scientific organization) to provide advice about whether exploratory fishing can continue, whether changes are necessary to allow continuation, or whether commercial fisheries could be developed.

It is likely that should exploratory or other fisheries develop in the Arctic FMP area or Central Arctic Ocean, advanced notice and research, fishing, and monitoring plans would be required. Any of the requirements for research plans summarized in this paper could serve as models for Arctic FMP or Central Arctic Ocean exploratory fishing, but some additions would likely be necessary to meet the Council's Ecosystem Approach Vision Statement. The Council's Ecosystem Approach Vision Statement identifies the Council's stewardship responsibility to preserve robust fishing communities, recreational fisheries, and a subsistence way of life. None of the research or monitoring requirements summarized above specifically reference the potential impacts of exploratory fishing on fishing communities, recreational fisheries, or subsistence resources or the access of local people to those subsistence resources. The Council would likely wish to add specific sections to ensure that those stewardship responsibilities are addressed.

Table 2 presents information that the Council may wish to include in advance notice or proposals for exploratory fisheries, fishing plans, data collection plans, and report and evaluation of exploratory fisheries in the Arctic Management Area. These are taken from the requirements of the six RFMOs summarized in this paper. These suggestions are not intended to be exhaustive, nor are they intended to all be required, these merely suggest a starting point from which the Council may consider the types of data and controls that they wish for exploratory fisheries in the Arctic Management Area.

Table 2. Potential requirements the Council may consider for advance notice, fishing plans, data collection plans, and reporting and evaluation of exploratory fisheries in the Arctic Management Area.

Category	Information
Notice or exploratory fishing proposal	Fishery information <ul style="list-style-type: none"> • Target species • Description of types of fishing gear • Proposed region • Maximum catch levels
	Biological information (target species) <ul style="list-style-type: none"> • Distribution • Abundance • Demographic data • Stock identity information
	Biological information (ecosystem) <ul style="list-style-type: none"> • Anticipated impacts to dependent and related species • Anticipated bycatch or PSC • Anticipated impacts to protected species
Fishing Plan	Harvesting Plan <ul style="list-style-type: none"> • Name of vessel • Location and depth of area to be fished • Fishing dates • Anticipated effort (number of trawls or sets) • Area, gear, effort restrictions • Proposed catch limits
	Mitigation Plan <ul style="list-style-type: none"> • Measures to prevent SAI to VMEs in the area • Measures to prevent impacts to fishery dependent communities or subsistence resources
	Catch Monitoring Plan <ul style="list-style-type: none"> • Recording/reporting requirements • VMS or other satellite monitoring • 100% observer coverage
Data Collection Plan	Survey Design <ul style="list-style-type: none"> • Research description and rationale – spatial arrangements of stations, sets, or hauls • Types and sample size or quantity of catch, effort and related biological, ecological, and environmental data • Description of analysis methods
Reporting and evaluation	<ul style="list-style-type: none"> • Dates activities will be completed • Dates reports will be completed and delivered • Required analyses for annual and final reports • Annual reports for multi-year exploratory fisheries, with anticipated final report date

3.3 Best practices or lessons learned

The Council motion from June 2017 requested that staff describe “best practices” or “lessons learned” that might be applied to the Central Arctic Ocean. It is reasonable to assume that each of the RFMOs referenced herein consider their requirements for fishery plans and data collection plans to be “best practice”, although none of them specifically identified them as such. None of the RFMOs’ publicly available information included “best practices” or “lessons learned”, and when contacted, few of the RFMO staff offered their own assessment. One exception was with CCAMLR; staff suggested that although the research protocols identified a good suite of data necessary to evaluate the potential impacts of fishing on target species, other dependent species, VMEs and other habitat, additional emphasis could be placed on analytical deliverables for timely and complete evaluation of those data. Should exploratory

fisheries be proposed for the Arctic FMP area, the Council could require analytical deliverables for review by the SSC or other appropriate body. The Council could also make such a recommendation to a Central Arctic Ocean RFMO (should one be developed) for exploratory fishery requirements.

4 Conclusions

There are a large number of agreements to management international fisheries around the globe, and REFMOs to implement the agreements. A number of these RFMOs specifically address exploratory or new fisheries in their management and conservation recommendations, some of which could serve as models for the North Pacific Fishery Management Council should the Council choose to amend its Fishery Management Plan for Fish Resources of the Arctic Management Area. The management and conservation recommendations could also be used as model for any future RFMO to manage fisheries in the Central Arctic Ocean.

In the six cases referenced in this paper, RFMO's require advance notice before any member party can commence exploratory fisheries. Also, in most cases, advance notice requires development of fishery and data collection plans to ensure that fisheries occur according to the precautionary principle, and that data are collected to assess the potential impacts of the fishery to VMEs and target and dependent fish stocks. Fishery plans generally require vessel and catch monitoring, and some reporting requirements. It is likely that the Council, should it choose to authorize exploratory fisheries in the Arctic FMP area, would also require development of appropriate fishery, data collection, monitoring, and reporting plans. It is also assumed that any future Central Arctic Ocean RFMO would also require appropriate fishery, data collection, monitoring, and reporting plans for any exploratory fisheries that occur in the Central Arctic Ocean.

However, although most of the RFMOs referenced in this paper identify minimum data requirements for exploratory fisheries, none of the RFMOs are required to consider impacts to fishery dependent communities or subsistence activities, as the Council is required to do by its Ecosystem Approach Vision Statement. It is assumed that if the Council chooses to take additional action to develop alternatives to amend its Arctic FMP, those considerations would be requirements of any fishery plan and data collection plan for exploratory fisheries.

5 References

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