REPORT OF THE

2023 INTERIM MEETING OF THE

SCIENTIFIC COORDINATING GROUP (SCG)

TO THE AGREEMENT TO PREVENT UNREGULATED

HIGH SEAS FISHERIES IN THE

CENTRAL ARCTIC OCEAN (CAOFA)

Held virtually
29-30 November 2023

Chairperson: Dr. John L. Bengtson

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Agenda item 1: Call to order and introduction by the Chairperson

1. The 2023 interim meeting of the Scientific Coordinating Group (SCG) to the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOFA) was opened and chaired by the SCG Chair John L. Bengtson of the United States. The meeting was held virtually on 29 and 30 November 2023.

2. The Chair welcomed participants and thanked them for their work to prepare for the interim SCG meeting.

Agenda item 2: Welcoming remarks by the Vice-chairperson and hosts

3. The SCG Vice-chair, Sebastián Rodríguez Alfaro of the European Union, welcomed meeting participants. He noted that this interim meeting will address the outcomes of the intersessional working groups to help the next in-person SCG meeting planned for April 2024 to complete its work. He encouraged participants to work together to provide clear and robust advice to the CAOFA Conference of the Parties (COP), particularly to the forthcoming meeting of the COP's Exploratory Fishing Working Group.

4. The virtual meeting's host, Lauren Fields (USA), welcomed the participants.

Agenda item 3: Adoption of the agenda and appointment of rapporteurs

5. The Chair outlined the main points of the provisional agenda and asked SCG participants if they wished to suggest any revisions.

6. China noted that meeting documents circulated in advance of the meeting had not met the deadlines stipulated in the SCG's Rules of Procedure. China further noted the lack of information available on Agenda Items 6 and 7. The Chair provided clarification on both issues, agreeing that it was regrettable that timelines were compressed and that information flow was not optimal. He expressed optimism that these issues can be improved in the future through the joint efforts of all members of the SCG and its working groups.

7. The agenda for the 2023 interim meeting of the Scientific Coordinating Group (SCG) was adopted (CAOFA-2023-SCG interim-01) and is provided in Appendix 1. A list of the working materials and documents presented to the SCG (CAOFA-2023-SCG interim-02) is provided in Appendix 2.

8. The Vice-chair was appointed as rapporteur to assist the Chair in preparing a report of the meeting.

Agenda item 4: Opening remarks by Delegations

9. A total of 49 persons participated online in the interim meeting of the SCG including members from nine Parties to the Agreement and representatives of three observer organizations.

10. Consistent with the SCG's Rules of Procedure, observer status was approved prior to the meeting for the following three organizations to attend meetings of the SCG and its working groups during the 2023/2024 meeting cycle:
    - World Wildlife Fund (WWF) Arctic Programme
    - International Council for the Exploration of the Sea (ICES)
    - United Kingdom

11. The Heads of Delegations and representatives of observer organizations delivered opening remarks.

12. A list of participants (CAOFA-2023- SCG interim-03) is provided in Appendix 3.

Agenda item 5: Exploratory Fishing Questions Working Group (EFQ-WG)

Reports of working group meetings

13. Two virtual meetings of the SCG's Exploratory Fishing Questions Working Group (EFQ-WG) were held in 2023 (19 September 2023 and 22 November 2023). The principal task of those meetings was to develop answers to exploratory fishing questions that the COP had identified as being of highest priority.

14. The Chair introduced the draft answers considered at the second meeting of the EFQ-WG meeting. The four high priority exploratory fishing questions for which draft answers were developed are:
    Question 2 -- What ecosystem information is currently available or needed to establish conservation and management measures for exploratory fishing in order to minimize its ecosystem effects?

Question 14 -- How will the Parties ensure that exploratory fishing is duly limited in duration, scope and scale to minimize impacts on fish stocks and ecosystems?
Question 15 -- What measures should be considered for avoiding, minimizing or mitigating impacts of exploratory fishing on the Agreement Area and adjacent areas including on Arctic Indigenous peoples and local communities whose livelihood depends on Arctic ecosystems?
Question 17 -- Please identify which questions in [the full list of questions in Table 1] need to be answered and what additional information is needed prior to authorizing exploratory fishing to avoid, minimize or mitigate ecosystems impacts and otherwise meet the requirements of the Agreement.

15. The EFQ-WG had agreed in general to nearly all of the draft answers it had developed and discussed at its November 2023 meeting except for some text in questions 15 and 17 that could not be agreed to by consensus before the meeting concluded. That residual text was left in "square-brackets" in the document that was forwarded to the SCG for its consideration at its interim meeting.

16. The SCG reviewed the EFQ-WG's draft answers, seeking consensus on those unresolved (square-bracketed) passages so that the full document could be adopted by the SCG and then be provided to the COP's EF-WG in December 2023. Unfortunately, although consensus was reached by the SCG on the majority of the EFQ-WG's draft answers (including agreeing on some of the previously unresolved text), due to time constraints, the SCG was unable to reach agreement on a few remaining sections of the EFQ-WG's draft answers.

17. Therefore, it was agreed that the square-bracketed text would be left in the draft to be forwarded to the COP's EF-WG in December 2023 and that the SCG's EFQ-WG would seek to reach consensus on these passages in the final version to be submitted to the SCG and the COP for consideration at their forthcoming meetings in 2024.

18. The SCG adopted the draft exploratory fishing answers in general except for the remaining square-bracketed text. That document is attached as Appendix 4 and was subsequently forwarded to the COP's Exploratory Fishing Working Group (EF-WG) for consideration at its meeting in December 2023.

19. The difficulty that arose in seeking consensus on some of the draft exploratory fishing answers prompted the SCG to discuss various options for reflecting differing perspectives in documents intended to be adopted by consensus. There was general agreement that a protocol should be established that could be used to reflect differing summary views when adopting reporting text. However, there was insufficient time at this meeting to develop and agree on a specific format for presenting such summary perspectives when consensus cannot be reached. This topic will be addressed further at the next SCG meeting in April 2024.

20. During the coming months, the EFQ-WG agreed to continue developing answers to all 21 of the exploratory questions (including consensus text for the currently unresolved text for two of the four priority questions). The working group will seek to complete its work in time to

have its draft answers reviewed and adopted by the SCG at its meeting in April 2024, and to be submitted subsequently to the COP in time for consideration at its next meeting in June 2024.

21. Looking forward, the Chair stated that it will only be possible for the EFQ-WG and SCG to finish developing answers to the exploratory fishing questions if members participate in the process of developing documents through correspondence. It is not realistic to expect that major re-drafting of text developed intersessionally can be completed successfully during the relatively brief virtual and in-person meetings of the SCG and its working groups. Those meetings should focus on final, minor editorial revisions intended to lead to adoption of documents.

22. The Chair encouraged delegations to actively participate and provide their input to document development during intersessional work periods when draft text and revisions of draft documents are being solicited by correspondence.

23. The SCG requested its EFQ-WG to strive to complete its answers to the remaining questions by February 2024 if possible so that these responses can be considered for adoption at the SCG's meeting in April 2024.

SCG recommendations to the COP

24. No specific recommendations concerning the EFQ-WG were made at this interim meeting. Recommendations to the COP related to the EFQ-WG will be included in the report of the SCG's April 2024 meeting.

Agenda item 6: Mapping and Monitoring Working Group (MM-WG)

Report of the MM-WG Working Group

25. The Co-chair of the MM-WG, Kevin Hedges (Canada) reported on the working group's 15 September 2023 meeting, in which delegations from 8 of the 10 CAOFA Parties participated. The main focus of that meeting and subsequent work was to develop an implementation plan for the Joint Program of Research and Monitoring (JPSRM) and to establish writing teams to draft the various sections of the implementation plan.

26. Dr. Hedges noted that since the September meeting, some delegations had identified experts for the drafting teams but others had not yet appointed any experts. Therefore, very little progress in drafting text had taken place.

27. To assist the MM-WG in moving forward, a timetable for drafting, reviewing, revising, and adopting the JPSRM implementation Plan was presented and agreed to by the SCG (Table 1).

Table 1. Proposed next steps and timetable for drafting, reviewing, revising, and adopting the JPSRM implementation plan *(originally agreed on 30 November 2023; updated 11 January 2024).*

Step	Deadline	Time	Who	Action	Product
1	22 Dec 23	3 weeks	Delegations and/or self-forming drafting teams	Develop draft text for one or more of the seven topical "drafting teams/themes" and then submit to the Co-chairs of the MM-WG	Individual paragraphs on different topics and plan sections that can be combined into a first draft
2	5 Jan 24	2 weeks	Editorial team (MM-WG and SCG leaders)	Combine delegations' draft text for each topic into a 1st draft comprising all ten sections described in JPSRM implementation outline and then ***circulate 1st draft to MM-WG***	**1st draft** of JPSRM implementation plan
3	10 Jan 24	1 meeting	MM-WG	Meet to discuss 1st draft, identify gaps to be addressed (assign tasks), establish "focus teams" as needed to address potential non-consensus 1st draft text, and refine timeline	Agreed assignments and timetable for plan development
4	7 Feb 24	4 weeks	Delegations and "focus teams"	Review and suggest edits to 1st draft and submit revised text to editorial team	Suggested revisions for incorporation into 2nd draft
5	14 Feb 24	1 week	Editorial team (MM-WG and SCG leaders)	Incorporate suggested 1st draft revisions into and ***circulate second draft to MM-WG*** (establish "focus teams" to resolve potential non-consensus text)	**2nd draft** of JPSRM implementation plan
6	6 Mar 24	3 weeks	Delegations and "focus teams"	Review and suggest edits to the 2nd draft, focus teams resolve incompatible text, and ***submit revised text to editorial team***	Suggested revisions for incorporation into third draft
7	13 Mar 24	1 week	Editorial team (MM-WG and SCG leaders)	Incorporate suggested 2nd draft revisions and ***circulate 3rd draft to MM-WG***	**3rd draft** of JPSRM implementation plan
8	20 Mar 24	1 week	Delegations	Review and prepare for final MM-WG meeting prior to SCG review	Prepare to finalize plan at virtual MM-WG meeting
9	20 Mar 24	1 meeting	MM-WG	Meet to finalize a 4th draft for SCG review (open to SCG participants) and ***submit it to editorial team***	**MM-WG finalized (4th draft) JPSRM implementation plan**
10	22 Mar 24	2 days	Editorial team (MM-WG and SCG leaders)	Incorporate final changes into 4th draft agreed to by MM-WG and ***submit it to SCG*** for review prior to its in-person meeting in April	Clean version of 4th draft for SCG review
11	8 Apr 24	2.5 weeks	SCG	Review and prepare to make final suggested revisions at SCG meeting	Preparations to finalize plan at in-person SCG meeting
12	8-11 Apr 24	1 meeting	SCG	Meet to adopt JPSRM implementation plan and then ***submit it to COP*** for review and approval	**SCG-adopted JPSRM implementation plan**

28. Clarification was provided on the format and approximate length (5-10 pages) of the documents' sections and the best ways for delegations to participate in the next stages of drafting the JPSRM implementation plan.

29. Both the SCG Chair and MM-WG Co-chair requested Members to participate actively in the writing teams by contributing to the first round of draft text to the MM-WG Co-chairs by 22nd December 2023. That would enable a combined first draft to be made available for review in early January 2024.

30. There is already some available text agreed from previous discussions, so the MM-WG is not starting from scratch.

31. To meet COP document submission deadlines, the SCG needs to adopt a provisional JPSRM implementation plan at its meeting, scheduled in early April 2024.

32. Members were requested to inform the MM-WG Co-chairs of the sections for which they will be providing preliminary draft text prior to the 22 December 2023 deadline.

SCG recommendations to the COP

33. No specific recommendations concerning the MM-WG were made at this interim meeting. Recommendations to the COP related to the MM-WG will be included in the report of the SCG's April 2024 meeting.

Agenda item 7: Data Sharing Protocol Working Group (DSP-WG)

Report of the Working Group

34. On behalf of the two Co-chairs of the DSP-WG, Robert Foy (USA) and Lizong Wu (China), the SCG Chair provided a brief update on the work by the DSP-WG. The adoption and integration of the working group's Data Sharing Protocol into the JPSRM Framework earlier in 2023 represented a major accomplishment by the working group.

35. The DSP-WG has also been developing a web site and data sharing platform to be hosted by the United States.

36. The SCG Chair provided further information and some clarifications on the structure and security access for members, including the challenge of finding a common electronic platform that is equally accessible to all Parties.

37. The web site is reportedly almost ready and instructions are expected to be provided shortly on how to get access to the web site.

Transition to the Data Management Working Group (DM-WG)

38. The DSP-WG completed its data sharing protocol, which was adopted and incorporated into the JPSRM Framework in 2023. Therefore, the DSP-WG is scheduled to terminate its work on 31 December 2023 as it transitions into a new phase of work as the SCG's Data Management Working Group (DM-WG). Starting on 1 January 2024, the DSP-WG will be replaced by the new Data Management Working Group (DM-WG).

39. China suggested that, at least during the transition period from the DSP-WG to the DM-WG, there continue to be two Co-chairs of the new DM-WG. China offered that a representative from the China delegation would be willing to serve as a Co-chair of the DM-WG, as Lizong Wu has done previously for the DSP-WG.

40. China also requested clarification on the coordination, rules, and responsibilities of CAOFA data storage and management.

41. The SCG Chair described the differences between the procedures for data sharing and management and the web site/data portal. These activities are related but they address two different issues. The data sharing protocol was adopted by the SCG in March 2023 as part of the JPSRM Framework, which was endorsed by the COP in June 2023.

42. Regarding CAOFA data management, in the absence of a formal CAOFA Secretariat, the Data sharing and data management working groups have been requested to take on those roles temporarily until different arrangements can be made in the future.

SCG recommendations to the COP

43. No specific recommendations concerning the DSP-WG were made at this interim meeting. Recommendations to the COP related to the DSP-WG will be included in the report of the SCG's April 2024 meeting.

Agenda Item 8: Future work of the SCG

Next meeting of the SCG

44. At its June, 2023, meeting, the COP approved plans for two SCG meetings to be held during the intersessional period: one virtual (fourth quarter 2023) and one in-person meeting in early 2024. The virtual meeting was held on 29-30 November 2023 and was considered to be the "2023 interim meeting of the SCG."

45. The in-person meeting will be the second formal meeting of the SCG (SCG2) and will be held from 8-11 April 2024. This four-day meeting is open to SCG members, additional participants as designated by their delegations, and approved observer organizations. The

meeting will be held in person, but for those who cannot travel to the meeting venue, video/audio connections will be available to facilitate participation online.

46. The SCG2 meeting will be hosted by Canada, but, due to logistical reasons, will be held at a physical venue in the United States. As of 30 November, the venue had not yet been finalized. Details on the venue are expected to become available by January 2024.

47. This longer 4-day schedule was chosen based on the SCG1 experience with its first full meeting (SCG1), which was scheduled for only three days. Three days did not provide sufficient time to develop and adopt a report of the meeting prior to adjournment as encouraged by the SCG's Rules of Procedure. The SCG2 meeting (April 2024) has been scheduled over a 4-day period with the goal of adopting a meeting report prior to the conclusion of the meeting.

Priority tasks and work plan

48. The Chair noted that any documents that the SCG intends to submit to the COP for consideration at its June 2024 meeting need to be submitted to the COP no later than 3 May 2024 (i.e., 35 days prior to the COP meeting). Therefore, documents such as the JPSRM Implementation Plan and Answers to the Exploratory Fishing Questions need to be completed by the working groups and submitted to the SCG for adoption at its meeting scheduled for 8-11 April 2024.

49. It was also noted that a draft 2024/2025 calendar of activities by the SCG and its working groups should be ready for COP consideration in June 2024 meeting. The SCG Chair will draft this calendar to be circulated for comments. If agreed to by the SCG at its April 2024 meeting, the provisional calendar will be included the report of SCG2 meeting, for consideration by the COP in June 2024.

50. The USA noted the benefits of making such a calendar widely accessible in the future through the CAOFA web site.

SCG recommendations to the COP

51. No specific recommendations concerning future work of the SCG were made at this interim meeting. Recommendations to the COP related to the SCG's future work will be included in the report of the SCG's April 2024 meeting.

Agenda item 9: Other business

52. No other business was raised.

Agenda item 10: Report of the meeting

53. Because of time constraints, it was not possible to prepare and adopt a meeting report prior the adjournment. Therefore, the SCG Chair and Vice-chair, with assistance from the working group Co-chairs, will prepare a draft report including the meeting's main points of discussion.

54. The draft report was distributed to meeting participants for review and comment, and was adopted by correspondence.

Agenda item 11: Meeting closure

55. In closing the 2023 interim meeting of the SCG, the Chair thanked all meeting participants for their contributions and willingness to work together on the important issues addressed in this meeting.

56. The Chair offered special thanks to Vice-chair Sebastian Rodriguez for serving as the meeting's rapporteur.

57. On behalf of the SCG, the Vice-chair extended thanks to Chair John Bengtson for leading the SCG through a successful meeting.

58. The Interim Meeting of the CAOFA Scientific Coordinating Group was adjourned on Thursday 30 November 2023, at 17:05 UTC.

INTERIM MEETING OF THE
SCIENTIFIC COORDINATING GROUP (SCG) TO THE
AGREEMENT TO PREVENT UNREGULATED HIGH SEAS FISHERIES
IN THE CENTRAL ARCTIC OCEAN (CAOFA)

29-30 November 2023
Held virtually
Chairperson: Dr. John L. Bengtson

FINAL AGENDA (CAOFA-2023-SCG interim-01)

1. Call to order and introduction by Chairperson

2. Welcoming remarks by Vice-Chairperson and hosts

3. Adoption of agenda and appointment of rapporteurs

4. Opening remarks by Delegations

5. Exploratory Fishing Questions Working Group (EFQ-WG)
   a. Reports of Working Group (1st and 2nd meetings)
   b. Provisional report on Answers to High Priority Exploratory Fishing Questions
   c. SCG recommendations to Conference of Parties (COP)

6. Mapping and Monitoring Working Group (MM-WG)
   a. Report of Working Group
   b. JPSRM implementation plan
   c. SCG recommendations to COP

7. Data Sharing Protocol Working Group (DSP-WG)
   a. Report of Working Group
   b. Transition to Data Management Working Group (DM-WG)
   c. SCG recommendations to COP

8. Future work of the SCG
   a. Next meeting of SCG (dates and venue)
   b. Priority tasks and work plan
      1) Implementation plan for JPSRM
      2) Provisional schedule
   c. SCG recommendations to COP

9. Other business

10. Report of meeting

11. Meeting closure

LIST OF DOCUMENTS (CAOFA-2023-SCG interim-02)
CAOFA- 2023-SCG interim meeting

CAOFA-2023-SCG interim-01	Final provisional agenda
CAOFA-2023-SCG interim-02	List of documents
CAOFA-2023-SCG interim-03	List of participants
CAOFA-2023-SCG interim-04	2nd draft answers to exploratory fishing questions (referred for SCG consideration by EFQ-WG)
CAOFA-2023-SCG interim-05	3rd draft answers to exploratory fishing questions (revised by SCG)

Appendix 3

List of participants – 2023 interim meeting of the Scientific Coordinating Group (SCG) Held virtually, 29-30 November 2023 (CAOFA-2023-SCG interim-03)

Party	Name	Institutional Affiliation	Email
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DRAFT PROVISIONAL ANSWERS TO THE TOP FOUR EXPLORATORY FISHING QUESTIONS

(CAOFA-2023-SCG interim-05)

Exploratory Fishing Questions Working Group
Scientific Coordinating Group
Central Arctic Ocean Fisheries Agreement

Version: 1 December 2023

[Note: This provisional draft was developed and agreed to in general by the EFQ-WG on 22 November 2023 except for some passages that were flagged with square-bracketed, yellow-highlighted text. The SCG subsequently reviewed the document and succeeded in reconciling some of the square-bracketed text. However, the SCG was unable to reach consensus on all square-bracketed text in the time available at its meeting on 29-30 November 2023. Therefore, with the exception of the square-bracketed text, the SCG agreed in general to the following provisional answers to the top four questions pertaining to exploratory fishing in the CAOFA Agreement area. These provisional answers are being provided to the COP's Exploratory Fishing Working Group (EF-WG) at this time with the hope that the answers may be useful to the EF-WG's deliberations regarding draft conservation and management measures. – J.L. Bengtson, SCG Chairperson]

The CAOFA Scientific Coordinating Group (SCG) was asked by the Central Arctic Ocean Fisheries Agreement (CAOFA) Conference of the Parties (COP) to develop answers to a series of 21 "Scientific and Indigenous Knowledge Questions for the SCG on Exploratory Fishing under Article 5 of the CAOFA" concerning issues that should be addressed in relation to the possibility of conducting exploratory fishing in the CAOFA Agreement Area. To support this task, at its June 2023 meeting, the COP established the Exploratory Fishing Questions Working Group (EFQ-WG) under the SCG to develop answers to these questions, to inform the COP's development of exploratory fishing measures, and to identify information on this topic available now and needed in the future. In particular, the COP requested preliminary answers to the questions it identified as being of highest priority (i.e., at least the top four priorities) for its use in developing draft conservation measures prior to its June 2024 meeting. This document presents preliminary answers to those four high priority questions.

Question 2 -- What ecosystem information is currently available or needed to establish conservation and management measures for exploratory fishing in order to minimize its ecosystem effects?

Despite many sectors of the Central Arctic Ocean (CAO) and surrounding seas being remote and often inaccessible, there is a fair amount of information available in some areas that may be relevant to the possibility of exploratory fishing in the Agreement Area. For example:
Baseline data on fish collections and oceanographic conditions were summarized during the 4th and 5th meetings of the Scientific Experts on Fish Stocks in the Central Arctic Ocean (FiSCAO) and updated during the 1st meeting of the Provisional Scientific Coordinating Group (PSCG).

However, gaps in ecosystem information still exist and will need to be identified during the implementation of the Joint Program of Scientific Research and Monitoring (JPSRM).
Data and reports covering a broad array of relevant topics are available from external groups active in the Arctic including:

- Circumpolar Biodiversity Monitoring Program (CBMP- Marine);
- ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean (WGICA);
- ICES Ecosystem Overview Report on the Central Arctic Ocean Ecoregion (December 2022);
- Joint Russian-Norwegian Working Group on Arctic Fisheries in the Barents Sea in the Atlantic gateway since 2022;
- Distributed Biological Observatory (DBO) in the Pacific gateway since 2010;
- Joint PICES/ICES Working Group on the Integrated Ecosystem Assessment for the Northern Bering Sea - Chukchi Sea;
- U.S. surveys of fish, marine mammals, and other ecosystem components in the Bering, Chukchi, and Beaufort seas;
- Canadian surveys of fish, marine mammals, and other ecosystem components in the Beaufort Sea (dating back to 1980's) and Baffin Bay;
- North Pacific Research Board's Arctic Program;
- NOAA-DFO Arctic collaboration;
- Pacific Arctic Group (collaborative Arctic marine science by Canada, China, Japan, Korea, Russia, United States);
- International Arctic Buoy Programme (IABP);
- Annual Russian-Norwegian Barents Sea survey (BESS);
- Joint Iceland-Greenland capelin and ecosystem survey in Iceland Sea and Greenland Sea on the western side of the Atlantic Gateway; and
- Korea-Arctic Ocean Warming and Response of Ecosystem (K-AWARE) expeditions since 2016.

Published literature and results of recent Arctic research expeditions are available, including:

- International MOSAiC expedition, 2019-2020;

- CHINARE Arctic expeditions, 2019-2021;
- Several Synoptic Arctic Survey (SAS) expeditions, 2020-2022;
- Joint Ocean Ice Study (JOIS) surveys;
- The INTAROS project that established a Pan-Arctic collaboration between organizations, programs, and projects involved in developing Arctic observing systems (iAOS), 2017-2022; and
- Arctic Challenge for Sustainability II (ArCS II), 2020-2025.

Examples of relevant data found in species assessments for major marine species groups (e.g., fish, marine mammals, seabirds) conducted by national programs also exist (e.g., the recent pan-regional Arctic Cod assessment). Valuable information summaries are also available in reports from the Arctic Council's Arctic Monitoring and Assessment Programme (AMAP) and CAFF Circumpolar Biodiversity Monitoring Program (CBMP-Marine), including climate updates, ocean acidification reports, and reports on upper and lower trophic species and other ecosystem components. IPCC climate reports include the AR6, but also the focused SROCC report on the Cryosphere. Fisheries and Oceans Canada recently published a biophysical and ecological overview of the Tuvaijuittuq Marine Protected Area, which encompasses part of the marginal CAO where multiyear sea ice is expected to persist longer than elsewhere in the Arctic. There is also abundant oceanographic information in certain sectors of the CAO, but past conditions (as well as other ecological linkages) are likely to change rapidly and significantly in response to a changing climate.

Also of interest is the joint IPBES-IPCC workshop report on climate change and biodiversity, which includes a specific case study on the Arctic – mapping Climate Change impacts on Arctic Inuit quality of life onto the IPBES conceptual framework.

In Canada, Government of Nunavut Fisheries and Sealing has published Nunavut Coastal Resource Inventories for several communities, which involved Inuit Qaujimajatuqangit (IQ) documentation through interviews with community members. This is relevant because it could serve as an example of methodologies and adjacent baseline data in an Arctic context where Inuit communities are involved. Additional data may be made available from the Fisheries Joint Management Committee (co-management organization of the Inuvialuit Settlement Region) and the North Slope Borough Department of Wildlife Management.

There are also examples of predictive (e.g., modelling) and expert-driven assessments on potentially important areas (e.g., biologically significant areas, important habitats, and potentially vulnerable marine ecosystems) in the CAO. Examples include published maps produced using criteria-based approach, available data and modelling (BEPSII Arctic Policy Brief (zenodo.org), Steiner et al. 2021, Stevenson et al. 2019).

The IPBES-IPCC workshop report on climate change and biodiversity includes a specific case study on the Arctic and mapped climate change impacts on Arctic Inuit quality of life onto the

IPBES conceptual framework. This kind of approach could be considered with Arctic Indigenous peoples to further identify linkages and information needed in this context but also serve to respond to question 15.

The sources of information noted above offer a good starting point for understanding Arctic marine ecosystems and assessing potential impacts from exploratory fishing. But there remains a great need to collect and evaluate a wide range of new information to establish effective, and precautionary, conservation and management measures for any proposed exploratory fishing in the CAOFA Agreement Area.

Ecosystem information needed:

- Ecosystem information for the review of the fishery's potential impact on dependent and related species and habitats (i.e., functional dependencies between species and between species and habitats, species interactions, etc.);

- There is a notable absence of information on vulnerable marine ecosystems (VMEs) and vulnerable marine indicators, both in the distribution of habitat-forming species, such as structurally complex sponges and corals, as well as their interactions with the wider ecosystem. Bottom contact gear (e.g., bottom contact trawling) can cause significant damage and destructions where sensitive benthic habitats occur;

- Relatively little is known about the abundance, distribution, and ecology of important, vulnerable, and dependent species, including subsistence-harvested species, within, adjacent to, or ecologically linked to the Agreement area. Furthermore, the likelihoods of these species becoming bycatch to exploratory fishing or surviving encounters with differing fishing gear types remain largely unknown;

- Knowledge of the distribution and abundance/biomass and their trends, life cycles, population structures, and the vulnerability of different life stages, of likely exploratory fishing target species is also notably lacking. The absence of information on spawning and fish juvenile stages are key concerns for ensuring that exploratory fishing does not cause excessive ecological damage;

- Close-kin analysis of proposed target species should be determined, as there may be several stocks of fishing targets, with some being more sensitive to fishing pressures than others. Lastly, species movements into and out of the CAOFA Area need to be determined in the context of climate change. Many of these species will likely follow their thermal optimum and prey distribution poleward during the summer and southward during the winter ice season, potentially changing spatial and temporal patterns as well as ecological linkages; and

- An understanding of food-webs including any critical links between prey considered to be of possible commercial interest and its predators, and Arctic Indigenous people who rely on these resources, to ensure negative impacts to higher trophic levels are limited.

Question 14 -- How will the Parties ensure that exploratory fishing is duly limited in duration,

scope and scale to minimize impacts on fish stocks and ecosystems?

This question seems related to policy as well as science. The SCG and its EFQ-WG can best provide information on what is known about the fish stocks, dependent species, and other ecosystem components (as in Question 2). Based on that current knowledge and the kind of measures proposed, some estimates of impacts can be provided with varying degrees of certainty. Given the absence of scientific certainty on the fish stocks and sensitive marine habitats (benthic, in particular), a precautionary approach should be followed in the development of the measures.

As a starting point, existing measures established by other organizations should be reviewed and evaluated for their relevance to CAOFA. In 2022, the COP received an assessment of measures from several regional fisheries management organizations (RFMOs). In addition, the North Pacific Fishery Management Council (NPFMC) also conducted a review of measures of several RFMOs (Exploratory fishing RFMO (npfmc.org)).

While the measures under CAOFA pertain to exploratory fishing, there are also measures that could be considered with respect to the impacts to marine ecosystems. For example, there are a number of measures that have been highlighted in existing reports such as the IPBES-IPCC workshop report on climate change and biodiversity. The report indicates the need to identify if measures take into account climate change and biodiversity. The report is global, but includes some components that are applicable, such as limitations to ship travel and speed during species-relevant times or on migratory routes (e.g., seasonal use of habitats or migration by marine mammals and seabirds).

In the spirit of CAOFA's ecosystem approach to resource management, planning for exploratory fishing should recognize that fishing is only one of many potential stressors to Arctic marine ecosystems. Increased shipping, mineral extraction, and perturbations being caused by climate change may all contribute to potential cumulative impacts on Arctic marine living resources and ecosystems. Planning should also recognize that fauna distributions are likely to change as sea-ice and ocean conditions change in the coming decades. CAOFA measures should include provisions to review regulations if fish stocks move north into the CAO, and in light of potential changes to the distributions of other vulnerable non-target species.

Safeguards should be put in place to ensure any exploratory fishing is limited in duration, scope and scale prior to the commencement of the fishery, with a clear strategy, authorized by the COP. Although some of the following points pertain to practical and policy issues rather than solely science and Indigenous Knowledge, they are included here because they may provide a helpful context to the COP when developing conservation and management measures for exploratory fishing.

Vessels conducting exploratory fishing must operate in accordance with measures established by the COP regarding:

- Season duration, based on life cycle analysis of the target species, possible likely bycatch, and higher trophic predators. The duration should also be limited and holistically determined by the tasks of CAOFA, accounting for the needs of the ecosystem, such as

dependent predators, as well as historical and current fishing and harvesting periods for Arctic Indigenous peoples and local communities. Moreover, ice cover will naturally preclude some fishing activity for part of the year;

- Scope based on exploratory fishery targets for a single species, whilst accounting for wider ecosystem impacts, using pre-approved gear type that would avoid, minimize, or mitigate potential impacts of exploratory fishing on benthic communities;

- Scale, which would be determined with limited, highly precautionary catch limits and/or effort restrictions. Subsequent expansion would only be permitted if high-quality, time series data indicate incremental expansion of scale can be supported by the ecosystem. The fish-catching capacity of the exploratory fishing must be limited (number of vessels operating, their size, and the volume of catch they are able to process); and

- Commitment to ethical exploratory fishing for the collection of scientific data, whereby participating (named licensed) vessels must be restricted to specific vessels that have no IUU violations (both vessel and skipper) and are willing to support scientific data collection.

Spatial restrictions should be clearly laid out, where vulnerable ecosystems and species have been identified. Vessels should be tracked through mandatory, continuous operation of AIS and VMS. Monitoring by the Parties requires 100% scientific observer coverage to ensure compliance (both through REM and in-person observers).

Question 15 -- What measures should be considered for avoiding, minimizing or mitigating impacts of exploratory fishing on the Agreement Area and adjacent areas including on Arctic Indigenous peoples and local communities whose livelihood depends on Arctic ecosystems?

[Measures that should be considered for avoiding or minimizing exploratory fishing impacts in the Agreement Area and adjacent marine areas include implementing restrictions on the allowable fishing effort while stock status and demography remain unknown, to ensure fishing occurs in a precautionary manner as new relevant information is gathered and evaluated.]

[Mitigation plans should be developed that include guidance to minimize or prevent significant impacts to vulnerable marine ecosystems (VMEs) unexpectedly encountered during exploratory fishing (e.g., minimum distance to move fishing locations if a VME indicator species is caught, vessel speed restrictions in the presence of whales). Catch monitoring plans should also be implemented to provide data for regular assessment of the catch for target and non-target species.]

There are a variety of measures that will need proper consideration to avoid, minimize, and mitigate the impacts of exploratory fishing in the Agreement Area. New measures shall be introduced and all existing measures are subject to regular revisions where appropriate when knowledge accumulates. Two key phases of an exploratory fishing event are a preparatory, scientific planning phase followed by a scientific data collection phase.

Scientific planning phase: Before any exploratory fishing begins, comprehensive, preparatory

ecosystem analyses should be conducted to better understand:

- Where areas of ecological vulnerability might be;
- Gear interactions with endangered, threatened, and protected (ETP) species, subsistence harvest species, and various habitat types; and
- Appropriate predetermined temporal limits to the exploratory fishing plan.

[Importantly, Arctic Indigenous peoples should be involved in the process when the Parties are developing "exploratory fishing plans."] [Importantly, both scientific knowledge and Indigenous Knowledge should be included in the process when the Parties are developing "exploratory fishing plans."] Those plans should specify the limits and directives to the fishing activity (e.g., bycatch reporting, scientific research needs and protocols), data collation/sharing/analysis arrangements, and wider environmental goals and management processes. Research to support the development of measures to minimize, avoid, mitigate the impacts of exploratory fisheries should follow appropriate principles with due consultation with Arctic Indigenous peoples (e.g., the Inuit Tapiriit Kanatami's National Inuit Strategy on Research, and the Inuit Circumpolar Council's Protocols for Equitable and Ethical Engagement) right from the beginning of the planning process.

Scientific data collection phase: Once the agreed spatial and temporal limits and scientific arrangements are in place from the "scientific planning" phase, the data collection phase can be implemented in cases when the "scientific planning" phase deems the risk of impacts from fishing to be acceptable. The early parts of this phase would inform the "exploratory fishing management plan" regarding when ecosystem interactions would necessitate changing fishing behavior. For example:

- Move-on rules agreed for encounters with VME indicator species; and
- A closure of the exploratory fishing if bycatch with sensitive species exceeds stipulated limits.

Vessels participating in exploratory fishing should assist in collecting scientific data that contribute to CAOFA's Joint Program of Scientific Research and Monitoring (JPSRM). Exploratory fishing vessels could play an important role in addressing key scientific questions as part of the JPSRM. Protocols for data gathered during exploratory fishing must be transparent and be consistent with the data processing, sharing, distribution, and reporting protocols approved by CAOFA Parties as part of its Joint Program of Scientific Research and Monitoring (JPSRM).

Specific conservation and management measures to be considered that are likely to assist in avoiding, minimizing, or mitigating potential adverse impacts of exploratory fishing might include:

- Mitigation plans should be developed that include guidance to minimize or prevent impacts to vulnerable marine ecosystems (VMEs) unexpectedly encountered during exploratory fishing (e.g., move-on rules, vessel speed restrictions in the presence of whales);

- Catch monitoring plans should be required for all exploratory fishing efforts for target and non-target species, and a regulatory mechanism should be in place to allow further restrictions or measures to be implemented based on the results of monitoring data assessments;

- One-hundred percent scientific observer coverage with daily reporting of catch and other relevant information requirement throughout the exploratory fishing phase both to collect scientific information and to ensure compliance;

- In the data collection phase of the exploratory fishery, while stock status and demography remain unknown, strict fishing restrictions (catch, effort, capacity) should be implemented to adhere to a precautionary approach during a period when additional scientific information is being gathered to allow a fuller understanding of the potential impacts of commercial fisheries in the Agreement Area and avoid a "race to fish" scenario, which might result in unexpected harm to marine species and ecosystems;

- Area restrictions associated with minimizing impact on encounters with VMEs, significant bycatches of non-target or ETP species, such as area closures and move-on restrictions in the given area;

- Exploratory fishing plans to include best practice gear use and mitigation measures, such as pinniped exclusion devices and seabird mitigation methods;

- Any vessel seeking to conduct exploratory fishing in the Agreement Area should need to operate under a specific license with conditions regulating fishing operations and requiring assistance with scientific protocols, with this license to be reviewed annually;

- Vessels should be tracked through mandatory, continuous operation of AIS and VMS;

- License(s) should only be available to vessels with a proven history of no IUU activity; and

- Failure to comply with the exploratory fishing plan should result in vessels being penalized and/or the fishing plan terminated.

Area-based and gear restrictions should be considered for the following situations:

- Areas identified as [vulnerable], or areas that are being considered for such designations to minimize potential impacts [on sensitive habitats and species whose status is not yet well described];

- Locations known or suspected to be important for species density or diversity, either during the entire year (area-based measures) or part of the year (seasonal measures);

- Areas suspected or known to include sensitive, rare, and vulnerable habitats;

- [Areas where endangered, threatened, or protected species are known or suspected to occur]; and

- Locations that interact with Inuit harvest practices.

Arctic marine ecosystem function as well as Indigenous harvesting are intimately connected to seasonal transitions. [Protecting the locations and seasons of key life history events and Indigenous harvest events is important for managing harvested species, as well as highly valued species for Arctic Indigenous peoples and local communities.] [~~Protecting~~ Special attention should be given to the locations and seasons of key life history events and Indigenous harvest events in recognition that these species are highly valued by Arctic Indigenous peoples and local communities.] A combination of area-based and seasonal restrictions should be developed for planned exploratory fishing locations as well as for transit routes to fishing grounds by considering the following:

- Marine mammal migration routes;

- [Locations known or suspected to be hotspots for species aggregations during part of the year]; and

- Locations known or suspected to support key life history events (e.g., critical spawning/reproduction, rearing, or feeding activities) for target and non-target species (i.e., fish, marine mammals, seabirds, and other fauna).

Identifying the timing of the presence of stressors such as underwater noise, pollution, and habitat destruction associated with fishing (including, for example, gear), and removal of species in proposed exploratory fishing plans will be important to developing effective measures, by:

- Understanding where the exploratory fishing has significant adverse impacts on Arctic Indigenous peoples and local communities or the species that are culturally valued and harvested;

- Identifying which species or ecosystem components are most likely to be affected by those impacts during the time of year that exploratory fisheries are occurring; and

- Protecting key life history events for target and non-target species.

Indigenous involvement and expertise are necessary to ensure Indigenous conservation priorities and potential concerns are considered in the development of measures or restrictions. Working with Indigenous representatives (e.g., most importantly with Inuit rights-holders as well as with Inuit organizations like the Inuit *Circumpolar Council (ICC)) is important on this topic.*

Question 17 -- Please identify which questions in [the full list of questions in Table 1] need to be answered and what additional information is needed prior to authorizing exploratory fishing to avoid, minimize or mitigate ecosystems impacts and otherwise meet the requirements of the Agreement.

It would be best to address all of the questions in Table 1 in order to provide answers to the COP before exploratory fishing, framed by well-informed conservation and management measures,

commences. The report of the SCG's March 2023 meeting included an expected timeframe for when it may be possible to provide the COP with answers to the exploratory fishing questions (Table 1 from that report is appended to this document). In reviewing the questions, the SCG agreed that whereas it may be possible to develop at least preliminary answers for some of these questions in the short term, other questions are likely to require additional time, perhaps several years or more, to provide meaningful answers (e.g., as answers emerge from the results of JPSRM investigations).

Answers that require future coordinated or collaborative research efforts will require more time to be answered properly. Accessing and applying scientific knowledge, Indigenous Knowledge and local knowledge will require engagement among SCG and EFQ-WG members as well as with external scientific, Indigenous, and local organizations. While some data may currently be available, it will still take time to allow for those engagements and interactions to proceed in a productive manner. Data sharing agreements will also be needed between the COP/SCG and external scientific, Indigenous, and local organizations for collaborative work to be undertaken in the coming months and years.

Questions pertaining to potential impacts of exploratory fishing on Indigenous and local communities, VMEs, non-target and dependent species are all high priorities that need to be answered as soon as possible so that protocols to minimize adverse impacts can be developed prior to the authorization of exploratory fishing.

Although the SCG and EFQ-WG will endeavor to make progress to answer all of the remaining questions, five questions in Table 1 should be highlighted for immediate attention as feasible prior to the potential initiation of exploratory fishing. They should be answered as a matter of priority to help avoid, minimize, or mitigate potential [social and] ecological impacts associated with exploratory fishing in the CAOFA Agreement Area:

- ***Questions 4, 4a, 4b:*** ***4) What communication regarding science knowledge, Indigenous Knowledge, and local knowledge with Arctic Indigenous peoples is needed to support COP exploratory fishing decisions? 4a) How will Indigenous Knowledge and local knowledge be incorporated with national research programs and the JPSRM to develop the knowledge base for this region that contributes to decision-making regarding exploratory fishing? How will multiple knowledge systems be evaluated? and 4b) What type of Indigenous Knowledge and geographical coverage is available?***

    - These questions address issues of Indigenous Knowledge, local knowledge, and inclusion, which will require consultation with Arctic Indigenous peoples. Proper consultation for these complex issues will take time and needs to be started as soon as possible.

- ***Question 6:*** ***How do we define and identify vulnerable species and ecosystems in the context of the Central Arctic Ocean, in light of existing guidelines, including the FAO Deep-Sea Fisheries in the High Seas Guidelines?***
    - This question is focused on how CAOFA will define vulnerable species and ecosystems. This information should be prioritized as it has direct implications to

the existing priority Question 14 related to "minimizing impacts on fish stocks and ecosystems." Moreover, should Indigenous Knowledge, local knowledge, and cultural values be included in the criteria to define vulnerable species and ecosystems, which could affect the answers to Question 4 (e.g., How will Indigenous Knowledge and local knowledge be incorporated into decision making regarding Exploratory Fishing?).

- ***Question 7:*** ***What components of the CAO ecosystems are vulnerable to perturbations from fishing gear and therefore should be avoided by exploratory fishing efforts using that type of gear? Alternatively, how could impacts from such perturbations be sufficiently minimized?***

    - This is closely linked to Question 6, and could be looked at simultaneously.

- ***Question 8:*** ***How do we define non-target and dependent species? How should non-target and dependent species be considered in exploratory fishing plans?***

    - This question is focused on how CAOFA will define non-target and dependent species within the exploratory fishing plans, plans needed before fishing can be approved and carried out.

- ***Questions 9, 9a, 9b:*** ***9) In accordance with the requirements of the Agreement, including those in Article 5(1)(d)(ii) and (iii), what criteria should the CAO Parties consider when defining potential future commercial fisheries that may be the focus of exploratory fishing, for example: species, abundance, distribution, ecosystem role and interactions, cultural significance, gear, economics, etc.? 9a) What type of data and information, including scientific knowledge, Indigenous knowledge and Local Knowledge is needed or could be collected from exploratory fishing, noting that information from all 3 knowledge systems may not be collected on each exploratory fishing trip? What sort of sampling design and data collection is needed by exploratory fisheries to improve our understanding of relative abundance and distribution of target species? and 9b) What bounds should be set on types of gear used, how that gear is used and seasonal restrictions in exploratory fishing to ensure precautionary exploratory fishing activity (examples: limitations on types of gear, fishing depth, limitations on operation of gear, etc.)?***

    - Consideration of these questions will prompt answers defining the types of fishing that may be permitted and the required data collection associated with exploratory fishing. These answers will have implications to the costs (e.g., [social-]ecological impacts) and benefits (e.g., gains in knowledge) of exploratory fishing, and will support ongoing dialog with Indigenous peoples and other stakeholders.

[Table 1. (as Adopted by COP2, June 14, 2023)]

COP approved questions in order of agreed priority with estimates of approximately how long it will take the SCG to provide answers to the "Scientific and Indigenous Knowledge Questions for the SCG on Exploratory Fishing under Article 5 of the CAOFA." Time categories: 1=2 months; 2=1 year; 3=1-5 years (two time categories indicates that a partial answer will be available first, followed by a fuller answer later). [Re-ordered priority key: A=3+ parties; B=2 parties; C=1 party; D=next highest priority; E=identified by COP as a lower priority]

No.	Question	Time
2-A	What ecosystem information is currently available or needed to establish conservation and management measures for exploratory fishing in order to minimize its ecosystem effects?	2
15-A	What measures should be considered for avoiding, minimizing or mitigating impacts of exploratory fishing on the Agreement Area and adjacent areas including on Arctic Indigenous peoples and local communities whose livelihood depend on Arctic ecosystems?	2
17-A	Please identify which questions in this list need to be answered and what additional information is needed prior to authorizing exploratory fishing to avoid, minimize or mitigate ecosystems impacts and otherwise meet the requirements of the Agreement.	1
14-A	How will the Parties ensure that exploratory fishing is duly limited in duration, scope and scale to minimize impacts on fish stocks and ecosystems?	2
7-B	What components of the CAO ecosystems are vulnerable to perturbations from fishing gear and therefore should be avoided by exploratory fishing efforts using that type of gear? Alternatively, how could impacts from such perturbations be sufficiently minimized?	2
8-C	How do we define non-target and dependent species? How should non-target and dependent species be considered in exploratory fishing plans?	1, 2
1-D	Including the results of the FiSCAO meeting and the mapping phase, what baseline data currently exist for and related to the Agreement area?	1
3-D	How will the Parties collaborate to collect information on fishery-independent surveys, fishery dependent data collection, other platforms, and inclusion of Indigenous Knowledge and Local Knowledge?	1, 2
5-D	What is the estimated timeframe needed to provide existing and future data and information described in this list to conduct necessary evaluation of exploratory fishing by the SCG?	1
10-D	What parts of the Agreement area and seasons may have favorable oceanographic conditions to support potential commercially viable species and may thus be prioritized for exploratory fishing?	2, 3
13-D	How will exploratory fishing in a changing marine ecosystem affect the production and abundance of fish and invertebrates?	2, 3
4-E	What communication regarding Science Knowledge, Indigenous Knowledge and Local Knowledge with Arctic Indigenous peoples is needed to support COP exploratory fishing decisions?	1, 2
4a-E	How will Indigenous Knowledge and Local Knowledge be incorporated with national research programs and the JPSRM to develop the knowledge base for this region that contributes to decision-making regarding exploratory fishing? How will multiple knowledge systems be evaluated?	2
4b-E	What type of Indigenous Knowledge and geographical coverage is available?	2
6-E	How do we define and identify vulnerable species and ecosystems in the context of the Central Arctic Ocean, in light of existing guidelines, including the FAO Deep-Sea Fisheries in the High Seas Guidelines?	1, 2
9-E	In accordance with the requirements of the Agreement, including those in Article 5(1)(d)(ii) and (iii), what criteria should the CAO Parties consider when defining potential future commercial fisheries that may be the focus of exploratory fishing, for example: species, abundance, distribution, ecosystem role and interactions, cultural significance, gear, economics, etc.?	2
9a-E	What type of data and information, including scientific knowledge, Indigenous Knowledge and Local Knowledge is needed or could be collected from exploratory fishing, noting that information from all 3 knowledge systems may not be collected on each exploratory fishing trip? What sort of sampling design and data collection is needed by exploratory fisheries to improve our understanding of relative abundance and distribution of target species?	2
9b-E	What bounds should be set on types of gear used, how that gear is used and seasonal restrictions in exploratory fishing to ensure precautionary exploratory fishing activity (examples: limitations on types of gear, fishing depth, limitations on operation of gear, etc.)?	2
11-E	What aspects of exploratory fishing should be the focus of data collection associated with impacts to Indigenous communities and local communities, including data collection related to pollution and emissions, noise, sea ice, for the evaluation of possible impacts, including cumulative impacts, to Indigenous and local subsistence activities and marine mammal populations in the Pacific and Atlantic Gateways? How can these impacts be mitigated?	2
12-E	What specific aspects of climate change should be accounted for to minimize the impact of exploratory fishing on the ecosystems in this rapidly changing region?	2
16-E	What can we learn from the scientific committees of existing RFMOs and other relevant scientific and management bodies that could inform CAOFA SCG and COP best practices in order to avoid mistakes and shortcomings from being repeated in the CAO?	2