

Arctic

Council is invited to take note of the information on developments in the Arctic, and specifically to:

- *Note the slightly modified proposal, following talks with NOAA, and following the proposal that Council adopted in 2017, outlining areas that ICES could contribute to the FiSCAO scientific discussions, for a joint ICES/PICES/NOAA pilot study on data hosting and sharing protocols based on existing survey data. This proposal will also be discussed with and presented at the PICES Governing Council meeting in October.*
- *Note the establishment of the Provisional Scientific Coordinating Group (PSCG), under the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, and consider how to ensure cooperation/coordination with ICES member country delegations appointed by each Signatory, which may include scientists and experts.*
- *Consider the importance of the continued participation of ICES (and PICES) in the scientific contribution to the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, as outlined in the joint ICES/PICES document contained in Attachment 1.*
- *Consider the opportunity for ICES and PICES to participate and contribute to the Arctic Science Ministerial to take place in 2020, in Japan and co-hosted by Iceland, the latter in their capacity as Arctic Council Chair.*
- *Note the developments to cater for a coherent communication of evidence about the potential for expansion of boreal fish stocks outside their classical stock distribution area, through Ecosystem Overviews covering waters adjacent to the Central Arctic Ocean.*

Arctic Research – in an Arctic of increasing political importance

Since our inception, ICES work has covered Arctic areas, with one of the longest standing Working Group being the Arctic Fisheries Working Group (AFWG).

All five (5) Arctic Coastal States, as well as all eight (8) Arctic Council Countries are members of ICES, and through the cooperation with especially PICES the cooperation in the Arctic extends beyond the 20 ICES member countries.

With rapid transformation expected or already occurring in Arctic ecosystems as a consequence of climate change, it is important to deal with Arctic, sub-Arctic, and adjacent seas in a coherent and coordinated manner. From data acquisition, data and information products to assessment products.

And it is important for ICES to consider how to include non-member countries in scientific advisory processes, to contribute to the required legitimacy for products.

A main aim of ICES has been to ensure that our Arctic involvement adds value within our existing remit, avoids duplication of effort, and recognizes Arctic (marine) experts as a limited resource.

Cooperation with other IGOs and Arctic Initiatives/organizations

One way to ensure broadening of cooperation with other member countries and involvement of new experts is through cooperation with intergovernmental organizations (IGO) and Arctic initiatives/organizations.

This is also necessary as the Arctic spans many sector ministries and many organizations are involved.

At national level, the Arctic is dealt with by many different sector ministries (dealing with environment, climate, fisheries, transport, research, etc.) and this requires sharing of information, and coordination of work.

Below is a description of organization with whom ICES engages, or has established formal cooperation with, through f.i. acquiring observer status.

Arctic Council

ICES obtained observer status in the Arctic Council in May 2017. The observer status gives access to meetings, and codifies our cooperation with the Arctic Council working groups, mainly;

- AMAP; ICES being the data depository for the Contaminants and Biological Effects dataset used in AMAP assessment, and also working to develop hazardous substances assessment tool, generating on demand a dataset product from the ICES databases, as already developed for other clients (OSPAR)
- PAME; being part of the joint ICES-PICES-PAME group on Integrated Ecosystem Assessment for the Central Arctic Ocean (WGICA), and which is expected to publish a trilateral [Cooperative Research Report](#) (CRR) report by the end of the year. The report will contribute to the Central Arctic Ocean ecosystem overview, planned for 2020 and the Viewpoint on fish production potential in Central Arctic Ocean. As these two products are advisory products, they will need to follow the advisory process in ICES and it is important to ensure that this involves also countries beyond the ICES member countries, as well as indigenous people, represented in for example the Inuit Circumpolar Council (ICC).
- Joint symposia, e.g. the Second International Science and Policy Conference on Implementation of the Ecosystem Approach to Management in the Arctic: Integrating information at different scales in the framework of EA implementation was held 25-27 June. A Joint PICES, PAME, ICES, NOAA event. And the upcoming International Symposium on Plastics in the Arctic and Sub-Arctic Region, 21–23 April 2020, in Iceland, together with a group of co-sponsors, including PICES.

- Joint answers to requests on the process and procedure for involving also non-ICES member countries in scientific and advisory work in the Arctic, where ICES is involved.

Meeting of Scientific Experts on Fish Stocks in the Central Arctic Ocean – FiSCAO

The FiSCAO meetings are providing the scientific input to the recently concluded Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean. A sixth meeting is expected in February 2020 in ISPRA, arranged by EC though there is some uncertainty if this meeting will follow-on or be a restart of the process, now including all signatories to the agreement. ICES has participated in earlier meetings, and presented proposals agreed by Council.

To demonstrate the joint cooperation between the two organizations, ICES and PICES Secretariats have agreed to represent each other at the meetings, and whenever possible present joint proposals.

ICES and PICES Secretariats are also in discussions, in cooperation with NOAA to follow up on the recommendation from the Fifth FiSCAO meeting; *Conduct joint NOAA/ICES/PICES pilot study on data hosting and sharing protocols using the fish distribution dataset developed during the 4th FiSCAO meeting.*

Up until now both General Secretary and the Head of Data and Information have made efforts with various representatives from PICES (PICES chair and T-CODE chair), and more specifically with the US delegation to FiSCAO and their colleagues in NOAA. During the ASC, a meeting took place between Anne Christine Brusendorff, Bill Karp, Neil Holdsworth and Cisco Werner (NOAA), to discuss the stalled progress in the pilot case recommended for ICES/PICES and NOAA to carry out during the 5th FiSCAO meeting, where the former ACOM Chair, Eskild Kirkegaard participated.

Neil Holdsworth relayed the discussion he had had with Candace Nachman and Chris Lunsford (both from NOAA fisheries), where there seemed to be little desire to work further with the proposed pilot dataset and bibliography as they had served their purpose, and were now more than 2 years out of date. During the meeting with Cisco Werner the following components for a slightly revisited pilot case were discussed;

Pilot study revisited

The pilot should be limited in scope as this would rely on existing resources/activities, but at the same time capture the commonality between the ICES/PICES contracting parties, and NOAA in regards to monitoring, data acquisition and protocols in the area of fisheries, with particular regard to the Arctic and Central Arctic Ocean. There are 3 aspects in which this could be developed:

1. Data standards and protocols in relation to existing survey data, particularly acoustic surveys¹; Canada, Iceland and Norway have plans to deliver survey data either under the Advice MoU's/Science priorities, and this might be beneficial for the US to consider;
2. Survey protocols standardization ([SISPS](#)) – common monitoring standards for both Fish and Ecosystem surveys.
3. Data sharing and governance Frameworks. Potential international data portal/agreement on data sharing protocols between ICES/PICES/NOAA.

It is important to state that the above three components follow the spirit of the [proposal](#) that ICES Council adopted in 2017, outlining areas that ICES could contribute to the FiSCAO scientific discussions, and also that ICES/PICES/NOAA are suggesting to conduct a pilot study – and thus not a fully-fledged implementation project. For ICES, the ICES Data Centre, WGFAST (Acoustics), Steering Group on Ecosystem Observations, WGAF (Arctic Fisheries) and the Data and Information Group (DIG) would all have a role in such a pilot.

The revisited pilot case, is supported by the Coordination Group, and the aim is to discuss this with PICES at their meeting in October.

Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean

The first meeting of Signatories to the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, took place in Ottawa, May 2019. Neither PICES nor ICES were invited. At the meeting the Provisional Scientific Coordinating Group was established, and its Terms of Reference adopted, see below:

1. The Provisional Scientific Coordinating Group (PSCG) is established on an interim basis to provide scientific support and advice to the Signatories on matters related to implementing the Agreement, develop reports and advice for the biennial meetings of the Signatories, and provide support for the scientific work called for under the Agreement.
2. The PSCG is to consist of delegations appointed by each Signatory, which may include scientists and experts, as the respective Signatory deems appropriate.
3. Functions of the PSCG are:
 - a. Develop interim Rules of Procedure for the PSCG.
 - b. Develop the Joint Program of Scientific Research and Monitoring (JPSRM), and, in the interim, coordinate scientific activities by the Signatories in a manner consistent with Article 4 of the Agreement.
 - c. Develop the data sharing protocol as called for in Article 4 in the Agreement.

¹ See <http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx> and [WGFAST](#)

- d. Identify processes and mechanisms to incorporate indigenous and local knowledge, through the inclusion of representatives of Arctic communities, including Arctic indigenous peoples, in the work of the PSCG.
- e. Provide scientific advice for the development of conservation and management measures for exploratory fishing, and other interim measures, as requested by the Signatories.
- f. Develop quantitative indicators based, inter alia, on data collected during the mapping phase.
- g. Facilitate the possible exchange of samples.
- h. Promote cooperation by the scientific experts of the Signatories with relevant scientific and technical organizations, bodies, and programs.
- i. Other functions as may be assigned.

PICES Cooperation

ICES and PICES continue to cooperate closely, both through joint groups, events and with regular meetings between the ICES General Secretary and the PICES Executive Secretary.

An ICES/PICES contribution to the agreement to prevent unregulated high seas fisheries in the Central Arctic Ocean was developed and circulated to ICES Council (Attachment 1) as well as PICES Governing Council.

Arctic Science Ministerial

The 2nd Arctic Science Ministerial (ASM2) meeting, took place in Berlin, 25-26 October 2018, co-arranged by Finland (in their capacity as Arctic Council Chair), Germany and EU.

The ASM2 focused on three themes where an improved and better-coordinated international scientific effort can provide clear opportunities to advance the understanding of the impact of rapid Arctic changes and to respond to major societal challenges in the Arctic and globally.

Theme 1; strengthening, integrating and sustaining arctic observations, facilitating access to arctic data, and sharing arctic research infrastructure

Theme 2; understanding regional and global dynamics of arctic change

Theme 3; assessing vulnerability and building resilience of arctic environments and societies.

The ASM3 is scheduled to take place in 2020 and will be held in Japan and co-hosted by Iceland, the latter in their capacity as Arctic Council Chair. This could be an opportunity for ICES and PICES to plan and aim to find a way to input to the Arctic Science ministerial meeting in Japan 2020.

The North East Atlantic Fisheries Commission (NEAFC) According to Article 14, § 1 of the Convention on Future Multilateral Cooperation in North-East Atlantic Fisheries ICES provides information and advice, to ensure optimal performance of NEAFC when carrying out its functions. NEAFC has competence to adopt conservation and management measures in part of the high seas portion of the central Arctic Ocean, thus coordination and cooperation is needed between NEAFC and the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.

Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOF Agreement)

An ICES/PICES contribution

In October 2018, the governments of Canada, China, Denmark, Iceland, Japan, Norway, the Russian Federation, the Republic of Korea, the US, and the EU signed an agreement to prevent unregulated commercial fishing on the high seas of the central Arctic Ocean.

This document presents a description of the potential contribution by the International Council for the Exploration of the Sea (ICES) and the North Pacific Marine Science Organization (PICES) to the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean

In summary:

- Established intergovernmental platforms for science cooperation – including in the Arctic
- Extended scientific network spanning more than 50 countries, 700 institutes, and a pool of more than 5000 experts
- Ongoing cooperation in the Central Arctic Ocean and long-standing Arctic related work and products
- Mechanisms that allow participation by observers and stakeholders
- Extensive experience coordinating joint monitoring programs
- Willingness to further develop approaches for inclusion of indigenous and local knowledge
- ICES Data Centre provides data services to a range of organizations (e.g. AMAP, HELCOM, OSPAR), and an ICES/PICES/USA (NOAA) data management/sharing pilot study for the Central Arctic Ocean as recommended by the 5th FISCAO meeting. The data, data tools, and data products are available online and adhere to a [data policy](#) committed to open data and the FAIR principles
- Leading body for scientific advice on fisheries in the North Atlantic
- Established secretariat infrastructures to support scientific cooperation and dissemination: expert groups, meetings, symposia, products/publications, quality control and assurance, including peer review procedures

Both ICES and PICES have existing capacity and well-developed institutional infrastructure to support continued work in the Arctic. This is made possible through a legally binding convention and commitments from member countries, recognizing the importance of scientific research and coordination of effort. This is evident through the individual and joint work of our two organizations, as well as in their cooperation with other partners working in the Arctic. ICES was granted observer status by the Arctic Council in 2017 and the UN General Assembly in 2018. The text below provides detailed information about the structure and work of ICES and PICES.

Participating in ICES/ PICES work, including stakeholders and observers

ICES and PICES expert groups provide an international platform for scientists to meet, cooperate, and exchange knowledge on specific scientific issues of common interest, jointly agreed by Member State representatives. Participation within ICES groups is open to all experts, and not restricted to participants from Member Countries who have ratified the legal convention. Within PICES, appointments to expert groups are made by the national delegates and restricted to scientists from the six Contracting Parties. A procedure for *ex-officio* membership to bring experts from countries beyond the PICES Member Countries into their expert groups also exists. Typically, these experts represent collaborating organizations. While specific rules on participation aim to protect the impartial scientific focus (natural, economic, social), the groups remain transparent and open for observers and stakeholders, therefore allowing experts from all countries to participate. ICES and PICES expert groups have time-limited terms (renewable).

Ensuring the inclusion of indigenous and local knowledge and providing opportunities for the participation of Arctic communities, including Arctic indigenous people

The inclusion of indigenous and local knowledge is integral to an ecosystem approach. ICES has been working towards co-production of knowledge through its evolving Integrated Ecosystem Assessment (IEA) framework. An ICES/PAME workshop entitled 'Ecosystem Approach guidelines and Integrated Ecosystem Assessment in the Arctic' was recently held at NOAA Alaska Fisheries Science Center, Seattle, US. Following an ecosystem approach, the workshop included indigenous perspectives, not only to avoid risks to human life and to secure resources important for indigenous peoples and their cultures but also to support the scientific basis for management in rapidly changing Arctic ecosystems.

More effort is needed to ensure indigenous knowledge is included and opportunities for meaningful participation of Arctic communities, including Arctic indigenous people, are provided.

ICES, PICES, the Arctic Council, NOAA, and IMR will co-convene the Second International Science and Policy Conference on Implementation of the Ecosystem Approach to Management in the Arctic: *Integrating information at different scales in the framework of EA* in Bergen, Norway, 25–27 June 2019. The conference will see participation from Arctic communities, and include local and traditional knowledge (LTK) as an important source of information for scale integration and ecosystem approach implementation.

Building on ICES/PICES cooperation for the development of the Joint Program of Scientific Research and Monitoring (JPSRM), under Article 4 of the CAOFA Agreement

Cooperation between our two organizations goes back more than two decades and codified [in a Memorandum of Understanding](#) in 1998.

Since then a number of joint activities have resulted, including:

- A joint strategic initiative on Climate Change Impacts on Marine Ecosystems (SICCME; established 2010) to coordinate northern hemisphere efforts to understand, estimate, and predict the impacts of climate change on marine ecosystems. This has been supported by various workshops on climate models and Arctic sea ice, as well as symposia, including the four international ICES/PICES/IOC/FAO Symposia on the effects of climate change on the world's oceans (2010, 2012, 2015, 2018)
- Joint scientific symposia (often with other partners) on important marine science issues, including:
 - o ESSAS Symposium on "Moving in, out, and across the Subarctic and Arctic - shifting boundaries of water, ice, flora, fauna, people, and institutions" (2017)
 - o Drivers of Dynamics of Small Pelagic Fish Resources (2017)
 - o Understanding Marine Socio-Ecological Systems (2016)
 - o A sequence of International Symposia on Zooplankton Production (most recent 2016)
 - o Ecological Basis of Risk Analysis for Marine Ecosystems (2014)
 - o Forage Fish Interactions: Creating the tools for ecosystem-based management of marine resources (2014)
- A series of capacity building Early Career Scientist conferences (2007, 2013, 2017)
- Joint working groups, including the latest on on climate change and biologically-driven ocean carbon sequestration (since 2017)
- A multitude of co-sponsored theme sessions/topic sessions at each other's Annual Science Conference/Annual meeting (beginning in 2005)

2016 ICES/PICES/Arctic Council PAME Working Group cooperation

A joint working group on Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean ([WGICA](#)) was established in 2016, with a three-year Terms of Reference (2016–2018). The group has recently renewed its mandate and has been given Terms of Reference for an additional three years (2019–2021). The joint nature of the group is reflected in the leadership and is chaired by experts from Norway, USA, and Japan.

The establishment of the group has been endorsed by the three organizations; PICES through their Governing Council; PAME through their working group meetings and via information to the chair of the Arctic Council; and ICES through their Science Committee and governing council.

A joint report based on the work of WGICA will be published at the end of 2019. The report will be peer-reviewed and contain a thorough review and compilation of information on the CAO ecosystem.

Looking forward, the next report from WGICA will provide information on status and trends, including impacts of climate change, pollution (including pathways and effects of contaminants), and other relevant human pressures. This information will be condensed into an ecosystem overview to provide a description of the ecosystems, identify the main human pressures, and explain how these affect key ecosystem components. Ecosystem overviews have become an important tool to facilitate communication with managers and stakeholders. [Ecosystem overviews](#) for seven ICES ecoregions have been developed; Baltic Sea, Barents Sea, Bay of Biscay and the Iberian Coast, Celtic Seas, Greater North Sea, Icelandic Waters, Norwegian Sea.

More ecosystem overviews are in development: the Oceanic Northeast Atlantic and Azores region will be covered in 2019, and the Central Arctic Ocean and Greenland Sea overviews will be developed in 2020.

Building on ICES role as a scientific advisor for the development of conservation and management measures for exploratory fishing, and other interim measures, under Article 3 of the CAOF Agreement

The process of developing ICES scientific advice ensures separation between the promulgation of scientific advice and the evidence base needed for managers, and the actual decision-making process. The scientific advice developed in response to these requests is peer reviewed and open to participants from outside ICES member countries.

ICES acts as scientific advisor for a number of intergovernmental organizations, under regional seas conventions and Regional Fisheries Management Conventions/EU, as well as Member Countries. A full list of our cooperation partners is available [online](#). In the case of the North East Atlantic Fisheries Organization (NEAFC), ICES role as scientific advice provider is specified in their convention text.

Under consideration is working with NAFO to develop ecosystem overviews in West Greenland waters. In addition, following the great amount of scientific evidence presented at the first scientific researcher's conference in Arkhangelsk, under the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, it has been suggested that the Russian Federation considers developing ecosystem overviews for Russian waters adjacent to the Central Arctic Ocean.

This would deliver an almost complete overview of the adjacent sea areas to the Central Arctic Ocean from the North Atlantic gateway and offer a suggested format for inclusion of adjacent sea areas from the North Pacific gateway.

It would provide an opportunity to communicate compiled evidence, including about the potential for expansion of Boreal fish stocks outside their traditional stock area. The expansion in fish distribution due to environmental and hydrographic conditions is already documented and ICES have used the 100-year scenarios by the Intergovernmental Panel on Climate Change on greenhouse gas emissions and global warming to show how this is reflected in the oceans at 200 m depth.

This makes it possible both to use the predicted species distribution to analyze and validate methods to assess vulnerability of fish stocks to climate change and to analyze when fishing activities can take place without impact on spawning areas.

Working together, we will be able to gain important information on which species are most likely to be impacted, both in the North Atlantic and North Pacific.

This information will contribute to the ecosystem overviews, which aim to provide an overview of all information relevant to the Central Arctic Ocean. As well as the ongoing work in ICES to produce a scientific peer-reviewed paper on “Future fish production in Arctic waters”.

Building on ICES role as a Data Centre – in cooperation with various strategic partners – for the development of data sharing protocols, under Article 4 of the CAO Agreement

ICES Data Centre supports our science. Together with our expert groups, it enables us to respond to requests from member countries or other intergovernmental organizations, on scientific issues of relevance to decision-makers.

[ICES Data Centre](#) has more than 300 million measurements to explore and download, ranging from biological, hydro-chemical, oceanographic and fisheries data. Our community collects and analyzes this information, contributing to the evidence that underpins ICES advice. ICES data policy regulates the access to data, with the underlying principle of open data and an adherence to the FAIR principles (Findable, Accessible, Interoperable, Reusable), acknowledging the need to exclude some data from unrestricted access due to sensitivity, such as sensitive location information (e.g. vulnerable marine ecosystems).

The datasets cover several Arctic areas and are based on cooperation with Arctic partners. Reports and products produced on the basis of these datasets address Arctic areas, such as the reports on [Ocean Climate](#) and [plankton](#).

DATRAS is an online database of trawl surveys with access to standard data products. It has been developed to collate and document survey data, assure data quality, standardize data formats and calculations, and ease data handling and availability. With the possibility of instant remote access, DATRAS data are used for stock assessments and fish community studies by both ICES community and public users. This database currently covers the Northeast Atlantic, Baltic Sea, North Sea, Irish Sea, and Bay of Biscay and contains more than 50 years of data.

Recognizing the importance of data in the development of scientific evidence the US (NOAA), ICES and PICES have jointly offered to undertake a data management/sharing pilot study, as recommended by the fifth meeting of Scientific Experts on Fish Stocks in the Central Arctic Ocean (5th FISCAO meeting).

Areas Beyond National Jurisdiction (ABNJ)

Of the more than 150 expert groups and workshops that address many diverse marine ecosystem issues, more than one fifth of ICES groups address issues that overlap with ABNJ. In PICES, 26 out of 28 expert groups address issues that overlap with ABNJ.

We draw upon our network of scientists to provide advice on biodiversity and sustainable exploitation in ABNJ to both the North-East Atlantic Fisheries Commission (NEAFC) and the OSPAR Commission.

Examples of this include:

- Annual advice to NEAFC on the harvesting of 35–50 fish stocks in the Northeast Atlantic in ABNJ, in recent years increased due to the uptake of methods for providing fisheries advice for stocks with reduced available data (data limited).
- Annual advice to NEAFC on seabed ecosystems, such as cold-water coral reefs and cold-water seeps that require protection from fishing activities that might damage them. Currently, in the Northeast Atlantic ABNJ there are 13 closures to bottom fishing that have been supported by ICES advice. These closures are protecting vulnerable marine ecosystems (VMEs) on the Mid-Atlantic Ridge around certain seamounts and on offshore banks to the west of Scotland. ICES maintains a database of more than 40,000 records, spanning more than 60 years, of VME indicators and habitats (covering deep water areas inside and outside national jurisdiction)
- Advice to OSPAR on habitat sensitivity, reviewed proposals for listing of habitats and species as Threatened or Declining, which deep water habitats are essential for fish species, reviewed bycatch issues within fisheries, reviewed marine protected area (MPA) and Ecologically or Biologically Significant Marine Areas (EBSA) proposals.

Together, ICES and PICES are exploring how to work together on ABNJ issues.