

## 2024 Intersessional Governing Council Report and Decisions

Governing Council (hereafter GC or Council) met online from 17:00-19:15 on May 27 (PDT) under the Chairmanship of Enrique Curchitser.

Decisions taken by Council are indicated in **bold** text below.

IGC Agenda Item 1. Welcome and opening remarks. All member countries were represented at the meeting (IGC Endnote 1).

IGC Agenda Item 2. Adoption of agenda and meeting procedures. An additional item was added under Other Business and the modified agenda (IGC Endnote 2) was approved.

IGC Agenda Item 3. Update on report from PICES External Review Panel.

Council reviewed the report provided by the External Review Panel (ERP) and discussed the projected timeline for the final report and recommendations to be received by Council. The expectation is that the report will be received first by Council in July/August, before being shared with the wider PICES community at the annual meeting. China suggested that the ERP may revise the report based on feedback from Council before submitting the final version. It was suggested by Canada that Council should also plan to communicate their timeline for next steps, so as not to leave the community with a gap in information on how the recommendations will be addressed. The PICES-2024 closing panel, where the recommendations will be presented, should also consider how to capture some of the community responses. Council determined that a specific, short, on-line meeting be set up, likely in September, to discuss the report and provide feedback to the ERP.

Action: Executive Secretary to set up an online meeting with Council once the report from the ERP has been received.

IGC Agenda Item 4. Update and Discussion on Budgetary Issues.

The Executive Secretary updated Council on the status of the two factors influencing the PICES financial situation in 2024. The status of unpaid and late annual fees was presented, together with the expected costs for the hosting of PICES-2024, and income identified to date to support these costs. The Reserve Fund is expected to be depleted by the end of 2024 as a result of these two factors.

Korea described the current situation as unprecedented and encouraged other Governing Council members to request their governments to consider making voluntary contributions to help resolve the situation. China queried whether early payment of fees (as typically made by China) is helpful in this, hopefully temporary, situation and the Executive Secretary confirmed that it is helpful in managing cash-flow through the year to have the fees in early, although it will not change the end of year account status.

The Chair encouraged all parties to come up to date on all financial contributions, especially during this difficult fiscal year for the organization.

IGC Agenda Item 5. Update on preparations for PICES-2024.

The Executive Secretary updated Council on the preparations for PICES-2024 and the aspects of the meeting that have been booked. Council then discussed the Closing session Panel on the Future of PICES. The USA suggested including more Panel members who are outside PICES, more “stakeholders” from other organizations and communities that may receive PICES science products and so aim for a better balance of people inside and outside of PICES. Canada concurred with adding more people who are an audience for PICES information, and to make sure that there is sufficient opportunity to receive feedback on the ERP recommendations. USA also wanted a higher representation of ECOP in the Panel as it will be “their decade” the Panel will be discussing. China expressed its support for the idea of a forward look for PICES next decade. Canada also suggested waiting a little while until the report from the ERP has been released in order to better plan the session, and the Deputy Executive Secretary confirmed that Science Board also expressed a desire to see the report first and would have a virtual meeting later in the summer to discuss. The Chair suggested that he and the Executive Secretary would discuss after the IGC meeting on a way for SB and GC to work closely on this planning and would follow up with GC members for specific ideas for Panel members. Japan noted that GC members can join SB discussions and should therefore plan to join SB’s discussion later in the summer.

Council were not in favour of seeking a professional facilitator/moderator, believing instead that sufficient expertise already exists within the PICES family. The Executive Secretary requested that any thoughts on individuals to approach, or other ideas regarding the session, should be sent to her and she would compile a list.

GC Agenda Item 6. Report and Recommendations of Science Board.

The Deputy Executive Secretary presented the Intersessional Science Board meeting report. The following Decisions were taken by Council following discussion at the IGC.

**GC Decision 2024/S/1. Additional events at PICES-2024.**

- i. Council approved additional expert group business meetings at PICES-2024 as recommended by Science Board:**

<b>Expert Group</b>	<b>BM duration (days)</b>	S-CCME	0.5
FUTURE	0.5	S-HAB	0.5
AP-CREAMS	0.5	S-MBM	0.5
AP-ECOP	0.5	SG-GREEN	0.5
AP-NIS	1.0	WG45	0.5
AP-UNDOS	0.5	WG ONCE-CN	1.0*
AP-NPCOOS	1.0	WG47	0.5
<b>Expert Group</b>	<b>BM duration (days)</b>	WG49	1.0

FishPhyto 1.0 WG SPF 1.0\*  
 (\*upon approval of new WG)

- ii. **Council approved the ECOP Mentorship program orientation event, similar to that held at PICES-2023, to be held in two 2-hour sections during the week.**

**GC Decision 2024/S/2. New expert groups. Council approved the establishment of the following expert groups with terms of reference as provided.**

- i. **Advisory Panel on Advisory Panel on the Arctic Ocean and the Pacific Gateways (AP-ARC). Rationale and terms of reference provided in IGC Endnote 3.**
- ii. **Working Group on Sustainable Pelagic Forage Communities (WG53 or WG-SPF). Rationale and terms of reference provided in IGC Endnote 4.**

**GC Decision 2024/S/3. Changes to existing expert groups.**

- i. **Council approved the extension of SG-GREEN to PICES 2024 to enable them to complete their terms of reference but noted this was the final extension.**
- ii. **Council approved changes to co-Chairs of AP-CREAMS from Joji Ishizaka to Jing Zhang (Japan) and Jae Hak Lee to SungHyun Nam (Korea).**
- iii. **Council approved the addition of Kathryn Berry (BECI project) as an *ex officio* member of AP-UNDOS.**

The following Decisions were taken by correspondence after the Intersessional Governing Council meeting was completed:

**GC Decision 2024/S/4. Renewal of the Memorandum of understanding between PICES and the International Pacific Halibut Commission (IPHC). Council approved the renewal of the updated MoU, for five years from the date of signing, to extend as approved by the IPHC and provided in IGC Endnote 5.**

**GC Decision 2024/S/5. Travel Support Requests. Council approved the following travel support requests from the PICES Trust Fund for PICES Early Career Ocean Professionals to attend events organised by PICES strategic partners in the next few months, as recommended and ranked by Science Board.**

- **IMBeR IMBIZO 7, 22-24 Sept 2024, Morocco. Up to \$6,000 to support 2-3 eligible ECOP**
- **SOLAS Open Science Conference, 10-14 November, Goa, India. Up to \$6,000 to support 2-3 eligible ECOP**

- APN Proposal Development Training Workshop, Uva, Fiji, 26-30 August 2024, upto \$3,000 to support participation of 1-2 eligible ECOP.

**GC Decision 2024/S/6. The PICES/ICES/FAO International Symposium on Small Pelagic Fish (SPF) 2026: *Navigating Changes in Small Pelagic Fish and Forage Communities: Climate, Ecosystems, and Sustainable Fisheries.***

- Council confirmed the PICES co-convenors of SPF-2026 as Chris Rooper (Canada) and Motomitsu Takahashi (Japan) upon their appointment to the new WG53 by their respective national delegates.**
- Council approved a financial contribution to the Symposium from PICES in line with previous support (~\$15,000) to be divided between travel support for PICES ECOP from the Trust Fund and from the General Fund towards other costs of the Symposium.**

**GC Decision 2024/S/7. Publications.**

- The following publications are to be published in primary journals as the results of expert group/Special Project activities (parent committee is indicated in parentheses):**
  - WG45 (FIS) Lin Z., S. Ito, (2024), Fish weight reduction in response to intra- and interspecies competition under climate change. *Fish and Fisheries*, 25, 455-470. doi:10.1111/faf.12818**
  - WG46 (POC, BIO) Jiao, N., Luo, T., Chen, Q., Zhao, Z., Xiao, X., Liu, J., ... & Robinson, C. (2024). The microbial carbon pump and climate change. *Nature Reviews Microbiology*, 1-12. doi: 10.1038/s41579-024-01018-0.**
  - WG43 (FIS, HD) Journal Special Issues (2)**
    - Marine Ecology Progress Series (MEPS) "Small Pelagic Fish: New Research Frontiers". The complete Theme Section will be published in May or early June 2024**
    - Canadian Journal of Fisheries and Aquatic Sciences (CJFAS) "Small Pelagic Fish: New Frontiers in Science for Sustainable Management". The complete issue will be published in May 2024**
  - SeaTurtle (BIO) Jang S-J, Jo K, Jang S, Nishizawa H, Kim M, Balazs G, Im J, Suk HY, Kim B-Y and Kim T (2024) Connectivity between sea turtles off Jeju Island on the Korean Peninsula, and other populations in the western Pacific. *Front. Mar. Sci.* 11:1281897. doi: 10.3389/fmars.2024.1281897**
- The following reports are accepted as the final products of the respective expert groups:**
  - PICES Scientific Report (#TBD). Final Report of Joint PICES/ICES/PAME Working Group on an Integrated Ecosystem Assessment for the Central Arctic Ocean (WG39)**
  - Final Report of Study Group on the Arctic Ocean and the Pacific Gateways (SG-ARC)**

c. **Final report of WG43 as the Special Issues indicated in 2024/S/7/i/c**

**Postponed Decisions**

Decisions on the following items were postponed until Governing Council next meets intersessionally (nominally in September) to allow GC more time to review the details.

1. **PICES New Data Management Policy.** The Chair requested delegates to review the draft policy provided and to be prepared to discuss when GC next meets.
2. **New Data Sharing Award.** Russia indicated its appreciation for the PICES Community suggesting such an award. Canada suggested that the award could be announced as part of the new Data Management Policy (when approved, see above). The USA suggested that Council also consider incorporating the name of the Igor Shevchenko into the award when it is formalised. Council to review the award criteria and language and to discuss when GC next meets.
3. **Working Group ONCE-CN.** Council concurred with SB that the proposed WG is important and interesting but that there are some missing pieces of information and would like to see a revised version before approval.

**GC Endnote 1****Delegation list of participants for the 2024 Intersessional Governing Council meeting**

<u>Canada</u>  Andrew Thomson Bernard Vigneault	<u>Russian Federation</u>  Oleg Katugin (Alternate) Vladimir Radchenko (Advisor)
<u>Japan</u>  Katsutoshi Ishikawa Tetsuo Fujii Yutaka Hiroe (Advisor, F&A member) Tatsuki Oshima (Advisor, F&A member) Hitomi Kawahara (Advisor)	<u>USA</u>  Cisco Werner Jack Barth Kristen Koch (Advisor, F&A Chair) Amanda Williams (Advisor, F&A member) Hannah Lachance (Advisor)
<u>People's Republic of China</u>  Fangli Qiao Zheng Rui (Advisor) Zheng Wei (Advisor)	<u>Other</u>  Enrique Curchitser (PICES Chair) Chul Park (PICES Past Chair) Sonia Batten (Executive Secretary) Sanae Chiba (Deputy Executive Secretary)
<u>Republic of Korea</u> Se-Jong Ju Jiin Kim (Advisor, F&A member) Jun Hyung Kim (Advisor, F&A member) Joongho Moon (Advisor) Ungul Yi (Advisor)	

**IGC Endnote 2**

**Adopted Agenda**

1. Welcome and Introductions
2. Adoption of agenda and meeting procedures
3. Update on report from PICES External Review Panel
4. Update and discussion on budgetary issues
5. Update on preparations for PICES-2024
  - Discussion on “PICES in the Next Decade” session/panel at PICES-2024
6. Report and recommendations of the Science Board
7. Any other business
  - 7.1 Reminders

**IGC Endnote 3**

**Proposal for  
PICES Advisory Panel on the Arctic Ocean and the Pacific Gateways  
(AP-ARC)**

**Acronym:** AP-ARC

**Potential Parent Committee:** Science Board (SB)

**Term:** May 2024 - TBD

**Background**

The Central Arctic Ocean (CAO), that is in between the North Pacific and North Atlantic, is in rapid transition, in interaction with and impacting these waters. It has become more accessible to a range of activities. For example, rapid loss of sea ice cover has opened up the CAO for potential fishing opportunities. In this context, the agreement to Prevent Unregulated High Seas Fisheries in the CAO has been signed and entered into force which will necessitate joint research and monitoring. The Pacific gateway to the CAO, i.e., the Northern Bering Sea-Chukchi Sea (NBS-CS) is also experiencing unprecedented warming and loss of sea ice as a result of climate change. Declines of seasonal sea ice and warming temperatures have been more prominent in the northern Bering and Chukchi seas than in the European Arctic. Continuous and abrupt changes in climate conditions in this Arctic gateway are clearly reshaping the system and its food-webs, and enlarging opportunities for commercial activities (shipping, oil and gas development and fishing), with uncertain and potentially wide-spread cumulative impacts.

PICES took on responsibilities in the CAO issues when it joined the WGICA (Joint PICES/ICES/PAME Working Group on an Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean (CAO)) by establishing WG39 in 2017. In 2019, PICES also established WG44 (Joint PICES/ICES Working Group on Integrated Ecosystem Assessment for the Northern Bering Sea - Chukchi Sea) in efforts to understand the Arctic system and its impacts to the sub-Arctic and mid-latitude North Pacific. An integrated ecosystem assessment (IEA) is a useful approach that is shared by these two Working Groups, and which is particularly relevant as substantial science and policy needs are emerging to ensure a sustainable Arctic. However, developing such an IEA is a substantial task. This renders a coordinated IEA of the CAO and NBS-CS as a priority task. In addition, it is of particular significance to developing future approaches for The United Nations Decade of Ocean Science for Sustainable Development in the Arctic Ocean (UNDOS-Arctic), where science for resilience and sustainability is more important than anywhere else in the world oceans. Despite this continuing significance and unfinished commitment to WGICA and also WGIEANBS-CS, WG 39 ended their term with the closure of PICES 2022 and WG 44 ended their term with the closure of the PICES 2023 Annual Meeting. Subsequently, a new Study Group was established by PICES on the Arctic Ocean and the Pacific Gateways (SG-ARC) to develop a new EG on the Arctic Ocean and the Pacific Gateways. In this context, we propose PICES establish an AP-ARC to coordinate and integrate PICES scientific activities on the Arctic issues and to further advance the understanding of the Arctic system and linkages and impacts to the North Pacific.

**Proposed Terms of Reference (ToRs)**

1. Provide information and scientific expertise to the Science Board, and other scientific and technical committees (as needed), on the key physical, biogeochemical, ecological and societal effects of climate change and other anthropogenic-driven changes in the Pacific Arctic and its Gateways, with



focus on how these changes are relevant for both the Arctic and mid-latitude marine environments and ecosystems in the PICES region;

2. Convene workshops/sessions and build knowledge networks, to discuss and exchange information on the strong influence of the Pacific Arctic including its Gateways on the Arctic and mid-latitude Oceans and its linkages to broader PICES activities;
3. Represent and coordinate responses of PICES concerning the Arctic Ocean and the connected waters in cooperation with PICES internal partners, institutions and organizations and other international organizations, including WGICA (Joint PICES/ICES/PAME Working Group on an Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean (CAO)), WGIEANBS-CS (Joint PICES/ICES Working Group on Integrated Ecosystem Assessment for the Northern Bering Sea - Chukchi Sea);
4. Develop and support trans-disciplinary and collaborative approaches using co-production methods and inclusive of Indigenous knowledge systems to consider existing and future anthropogenically driven pressures, such as increased marine traffic, harmful algal blooms, non-indigenous species, noise, contamination, litter, and microplastics in the Pacific Arctic and its Gateways in alignment with PICES activities;
5. Develop recommendations for PICES to better collaborate within PICES, and with Indigenous and international initiatives relevant to the Arctic Ocean including Arctic Council (and its WGs: AMAP, CAFF, PAME and SDWG), CAOFA, ESSAS, IASC, ICES, ICC, PAG, UNCCC, and UNDOS-Arctic;

#### **Potential Theme of Report/Workshop/Symposium**

- Review and prospect of national flag research on the Arctic Ocean and Pacific gateways
- Knowledge exchange session: Coordinate subject matter experts on the climate and anthropogenic-driven impacts and linkages across the Arctic Ocean, the Pacific Arctic including its Gateways, and mid-latitude ecosystem in PICES
- Coordinate observing and monitoring networks within the Arctic Ocean and Pacific gateways.
- Monitoring of Arctic Ocean and Pacific gateways using research ice breakers and other means
- Development of research plans for International Polar Year 2032/2033
- Improved coordination across scale and discipline in transboundary and transnational Arctic science
- Present and future pressures and human activities in the Arctic Ocean and Pacific Gateways

#### **Proposed Co-chairs** (Two from west and two from east)

Sei-Ichi Saitoh (SG-ARC, WG39) (Japan) - [ssaitoh@arc.hokudai.ac.jp](mailto:ssaitoh@arc.hokudai.ac.jp)

Hyoung Chul Shin (SG-ARC, WG39) (Korea) - [hcshin@kopri.re.kr](mailto:hcshin@kopri.re.kr)

Nadja Stefanie Steiner (WG44) (Canada) - [nadja.steiner@dfo-mpo.gc.ca](mailto:nadja.steiner@dfo-mpo.gc.ca)

Sarah Wise (WG44) (USA) - [Sarah.Wise@noaa.gov](mailto:Sarah.Wise@noaa.gov)

#### **Proposed Membership**

Andrea Niemi (WG44) (Canada)

Nadja Stefanie Steiner (WG44) (Canada)

Zhongyong Gao (CC-S, SG-ARC, WG39, WG44) (China)  
Guangshui Na (FUTURE-SSC, MEQ, SB, SG-ARC, WG35, WG39) (China)  
Fang Zhang (SG-ARC, WG39) (China)

Hyoungh Chul Shin (SG-ARC, WG39) (Korea)  
Hyoungh Sul La (SG-ARC, WG44) (Korea)

Sei-Ichi Saitoh (SG-ARC, WG39) (Japan)  
Fujio Ohnishi (SG-ARC, WG39) (Japan)  
Takafumi Hirata (SG-ARC, WG44) (Japan)  
Shigeto Nishino (WG44) (Japan)

Yury I. Zuenko (CREAMS-AP, POC, S-CCME, SG-UNDOS, WG35, WG40, WG44) (Russia)  
Kirill Kivva (WG44) (Russia)

Zack Oyafuso (SG-ARC)(USA)  
Sarah Wise (WG44) (USA)  
Elizabeth A. Logerwell (FIS, WG44) (USA)  
Lisa B. Eisner (MONITOR, WG44) (USA)  
David L. Fluharty (SG-ARC, WG39) (USA)  
\*This membership is tentative and subject to changes.

## References

Skjoldal, H. R. (Ed.). 2022. Ecosystem assessment of the Central Arctic Ocean: Description of the ecosystem. ICES Cooperative Research Reports Vol. 355. 341 pp.  
<https://doi.org/10.17895/ices.pub.20191787>

## IGC Endnote 4

**Working Group Title:** Working Group on Sustainable Pelagic Forage Communities (WGSPF)

**Proposed Reporting Committees:** BIO, FIS, HD

**Term (normally 3 years):** June 2024-October 2027

### Linkage(s) to Previous PICES and ICES Expert Groups or Activities

- [PICES Working Group 3 on Dynamics of Small Pelagics in Coastal Ecosystems](#) (1992–1995)
- [ICES Working Group on Cephalopod Fisheries and Life History](#) (WGCEPH; 1994–now)
- [PICES Working Group 14 on Micronekton of the North Pacific](#) (1997–2004)
- [PICES Working Group 23 on Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim](#) (2007–2011)
- [PICES Section/ICES Strategic Initiative on Climate Change Effects on Marine Ecosystems](#) (S-CCME; 2011–now)
- [ICES/PICES Symposium on “Forage Fish Interactions: Creating the Tools for Ecosystem-based Management of Marine Resources”](#) (Nantes, France, November 12–14, 2012)
- [PICES/ICES Symposium on “Drivers of Dynamics of Small Pelagic Fish Resources”](#) (Victoria, Canada, March 6–11, 2017)
- [PICES/ICES Working Group 43 on Small Pelagic Fish](#) (2019–2023)
- [PICES/ICES Symposium on “Small Pelagic Fish: New Frontiers in Science and Sustainable Management”](#) (Lisbon, Portugal, November 7–11, 2022)

### Linkage(s) to Other Organizations and Programs

- [GLOBEC Regional Program on Small Pelagic Fish and Climate Change](#) (SPACC; 1994–2009)
- [FAO General Fisheries Commission for the Mediterranean](#) (GFCM): Working Group on Stock Assessment of Small Pelagic Species
- [North Pacific Fisheries Commission](#) (NPFC): Technical Working Group on Pacific Saury Stock Assessment (TWG PSSA) and Technical Working Group on Chub Mackerel Stock Assessment (TWG CMSA)
- The mandate of this joint ICES/PICES activity is relevant to the objectives of [the UN Decade of Ocean Science for Sustainable Development](#) (e.g., Challenge 2 – **Protect and restore ecosystems and biodiversity**, **Challenge 3 – Sustainably feed the global population**, and **Challenge 4 – Develop a sustainable and equitable ocean economy**) and [UN Strategic Development Goals](#) (e.g., SDG 2 – Zero Hunger, SDG 12 – Responsible Consumption and Production, and SDG 14 – Life Below Water)

### Linkage/Contributions to the PICES and ICES Strategic Plans

Forage species and communities typically exhibit high variability, part of which is associated with drivers including climate change, changing ecosystem structure, and fishing pressure. To understand their dynamics, a whole-ecosystem approach is required that includes knowledge about oceanography, biological and human interactions. The activities of the proposed joint working group will contribute primarily to the first three of the six goals identified in [the PICES Strategic Plan](#): (1) Foster collaboration among scientists within PICES and with other multinational organizations; (2) Understand the status and trends, vulnerability, and resilience of marine ecosystems; and (3) Understand and quantify how marine ecosystems respond to natural forcing and human activities. Goals 2 and 3 are similar to the two research themes in [the PICES FUTURE \(Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems\) integrative scientific program](#).

The activities of this joint Working Group also align with at least five of the seven science priorities set in [the ICES Strategic Plan](#), including: (1) Ecosystem science, (2) Impacts of human activities, (3) Observation and exploration, (4) Seafood production and (5) Conservation and management science.

### **Motivation and Goals/Objectives**

Forage species are critical ecosystem components, occupying mid-trophic levels with the potential to impact most commercially important piscivorous fish species, marine birds and mammals. Additionally, directed commercial fishing on forage species accounts for more than 30% by weight of the total landings of fisheries globally. These landings are used both for human consumption and as protein for aquaculture and agriculture operations around the world. Many forage species are also culturally important and support local and indigenous communities.

Examples of forage species and community members to be considered by the working group include small, schooling, low- or mid-trophic level, pelagic fishes that are planktivorous throughout their life history (*e.g.*, herring, anchovy, sardine), mesopelagic fishes (*e.g.*, myctophids), euphausiids, and squids. Forage species are difficult to manage sustainably. Historical populations have often oscillated through “boom and bust” cyclical dynamics attributed to both bottom-up processes (*e.g.*, regime shifts or changes in marine productivity due to climate variability) that are amplified by top-down impacts (*e.g.*, natural mortality due to increasing predators or overfishing). As a group, forage taxa have relatively short life spans, potential for high recruitment, compensatory mortality, and density-dependent dynamics, are sensitive to both climatic and anthropogenic impacts and may exhibit rapid responses to changing conditions. Climatic and anthropogenic impacts are likely to change marine and estuarine systems and their forage communities in unanticipated ways, which will require adaptive and flexible management systems to maintain both sustainable fisheries and the ecosystem services that forage species provide.

From 2019-2023, a joint ICES-PICES working group on Small Pelagic Fish (WGSPF/WG 43) focused on establishing a multidisciplinary and global community of researchers to compare and contrast ecosystem-level approaches to determining the cause of fluctuations in populations of forage species and synthesize mechanisms linking climate and ecosystem variability and the population dynamics. The Working Group then connected these dynamics to socio-ecological systems and best practices in ecosystem-based fisheries management. These efforts culminated in an international symposium on “Small Pelagic Fish: New Frontiers in Science and Sustainable Management” (November 7–11, 2022, Lisbon, Portugal), two peer-reviewed publications (a Special Issue in *Canadian Journal of Fisheries and Aquatic Sciences* and a Theme Section in *Marine Ecology Progress Series*) containing 28 original research papers, and a perspectives manuscript anticipated to be submitted to either *Reviews in Fish Biology and Fisheries* or *Progress in Oceanography*.

The synthesis of the WGSPF/WG 43 noted several areas of emerging technologies and methods that can be used to better manage and adapt to changing forage dynamics. These include innovative technologies such as genetics, acoustics, underwater imagery, predator-inferred distributions, and isotopes, as well as novel and emerging analysis techniques such as artificial intelligence, management strategy evaluation, social network modeling, and simulation testing methods. In particular, international collaboration on the development of novel technologies to survey and monitor forage fish populations, simulation testing of management in the face of climate changes, and inclusion of climate and other anthropogenic drivers into management would be useful on a global scale to develop strategies that could lead to robust and sustainable ecosystem approaches to management of forage species. To that end, we are proposing to build on and expand the work of WGSPF, with the establishment of a new joint ICES-PICES working group with a three-year term beginning in mid-2024 that will address the following terms of reference.

## Terms of Reference

1. Foster international and interdisciplinary collaboration to establish similar study frameworks and comparative analyses of forage species, their ecology, and fisheries.
2. Assess recent progress on understanding fluctuations of forage species (abundance, distribution, diversity, and characteristics) and their impacts on the structure and function of ecosystems, particularly upper trophic levels including marine birds and mammals.
3. Identify, prioritize, and recommend research most needed to advance our knowledge and capacity to forecast ecosystem responses to changes in forage species.
4. Recommend strategies for studying and monitoring socio-ecological systems to improve ecosystem-based management for the sustainable harvest of forage species.
5. Describe how climate change and other anthropogenic factors impact forage species and examine how these factors will affect economies, nutrition of human communities, aquaculture, fishery portfolios, and/or transboundary management among countries with different levels of development in fisheries, and recommend options for adaptation.
6. Organize a joint ICES/PICES/FAO symposium on forage species that builds upon the Small Pelagic Fish symposia held in 2017 (March 6–11, 2017, Victoria, Canada) and 2022 (November 7–11, 2022, Lisbon, Portugal). The symposium, tentatively scheduled for 2026, will showcase integrative analyses of this Working Group. Working Group members will also propose and convene topic sessions and/or workshops at the PICES Annual Meetings and ICES Annual Science Conferences, as well as at FAO-sponsored meetings focused on key questions and recent advances in the dynamics of forage species in ecosystems and the impact of forage species on higher trophic levels.
7. Complete the required PICES Scientific Report at the conclusion of the Working Group to summarize and disseminate the findings.

## Deliverables

A tentative timeline for deliverables is outlined below. The timeline with more specific deliverables will be developed during revisions to the terms of reference that will occur during the first meeting for the WG.

### Year 1

- To foster collaboration among the international, scientific and fisheries management community around forage species research (TOR#1). Task Forces and Activities that were generated by the expired WG 43 will be reviewed and adjusted to best meet the TORs for the proposed Working. Some activities will be added and activities that are no longer relevant will be deleted.
- Convene a one-day topic session titled: *“Advances in observational, analytical, and modeling tools that lead to better observations and improved understanding of small pelagic fish”* at the 2024 PICES Annual Meeting in Honolulu, USA (TOR#3).
- Hold at least one in-person or hybrid meeting during Year 1 (TOR#1).

### Year 2

- A series of manuscripts synthesizing existing knowledge on (1) spatial variability across life history stages of forage species, (2) best practices for coupling spatial distribution models with ecosystem models, (3) fleet and management response to spatiotemporal variability of forage species, and related socio-economic impacts, (4) inter- and intra-specific responses to environmental drivers, and (5) cross-system comparisons of internal and external forcing regulating growth is expected to be submitted to peer-reviewed journals (TOR#2). Targeted journals for these manuscript(s) include *Fish and Fisheries*, *Advances in Marine Biology*, *Marine Ecology Progress Series* or *ICES Journal of Marine Science*.

- Convene a joint ICES/PICES/FAO symposium on forage species that builds upon the 2017 and 2022 Small Pelagic Fish symposia. This symposium is tentatively scheduled for the spring 2026 in La Paz, Mexico (TOR#6).
- Propose and convene topic sessions at the PICES Annual Meeting and ICES Annual Science Conferences, as well as at FAO-sponsored meetings focused on key questions and recent advances in the dynamics of forage species in ecosystems and the impact of forage species on higher trophic levels (TOR#1, TOR#2, and TOR#3).
- Hold at least one in person or hybrid meeting during Year 2 (TOR#1).

### Year 3

- Generate a manuscript (or a series of manuscripts) that synthesizes key research gaps and questions that are needed to forecast ecosystem responses to changes in forage communities (TOR#3) and recommend approaches that will be robust to climate change and other anthropogenic factors (TOR#5) to improve ecosystem-based management of forage species (TOR#4).
- Publish studies emerging from the 2026 international symposium in special issues of scientific journals (with potential venues including *Marine Ecology Progress Series*, *Canadian Journal of Fisheries and Aquatic Sciences*, or *Deep-Sea Research Part II*). The timeline for completion of these volumes is tentatively 1–1.5 years following the symposium. This may be a suitable venue for publication of synthesis manuscript(s) highlighted in TOR#3, TOR#4, and TOR#5.
- Hold at least one in person or hybrid meeting during Year 3 (TOR#1) and complete the required PICES Scientific Report (TOR#7).

### **Proposed Co-Chairs:**

Rebecca Asch (ICES, USA)  
 Susana Garrido (ICES, Portugal)  
 Chris Rooper (PICES, Canada)  
 Motomitsu Takahashi (PICES, Japan)

### **Proposed Membership:**

#### Canada

Jennifer Boldt (Fisheries and Oceans Canada; [Jennifer.Boldt@dfo-mpo.gc.ca](mailto:Jennifer.Boldt@dfo-mpo.gc.ca))  
*SPF ecology, ecosystem-based fisheries management, fisheries and the environment*  
 Jaclyn Cleary (Fisheries and Oceans Canada; [Jaclyn.Cleary@dfo-mpo.gc.ca](mailto:Jaclyn.Cleary@dfo-mpo.gc.ca))  
*management strategy evaluation, stock assessment, SPF fisheries, First Nations fisheries/collaborations*  
 Brian Hunt (University of British Columbia; [b.hunt@oceans.ubc.ca](mailto:b.hunt@oceans.ubc.ca))  
*diet studies, Pacific salmon, predation, pelagic ecosystem function*  
 Francis Juanes (University of Victoria; [juanes@uvic.ca](mailto:juanes@uvic.ca))  
*predation studies, fisheries acoustics, fish behavior*  
 Hannah Murphy (Fisheries and Oceans Canada; [hannah.murphy@dfo-mpo.gc.ca](mailto:hannah.murphy@dfo-mpo.gc.ca))  
*SPF early life history, spawning behavior distribution and phenology*  
 Chris Rooper (Fisheries and Oceans Canada; [chris.rooper@dfo-mpo.gc.ca](mailto:chris.rooper@dfo-mpo.gc.ca))  
*species distribution models, surveys and methods for small pelagics*

#### China

Yue Jin (Yellow Sea Fisheries Res. Inst., Chinese Academy of Fishery Sciences; [jinyue@ysfri.ac.cn](mailto:jinyue@ysfri.ac.cn))  
*fish biology and ecology, such as age and growth, feeding ecology, migration, and habitat suitability*  
 Shuyang Ma (Ocean University of China, [mashuyang1992@163.com](mailto:mashuyang1992@163.com))  
*fisheries oceanography, climate change, SPF recruitment, statistical modeling*  
 Yongjun Tian (Ocean University of China; [yjtian@ouc.edu.cn](mailto:yjtian@ouc.edu.cn))

*fisheries oceanography, SPF recruitment, ecosystem dynamics, climate impacts*  
 Wei Yu (Shanghai Ocean University; [wyu@shou.edu.cn](mailto:wyu@shou.edu.cn))  
*fisheries oceanography, climate change, species distribution model, squid fisheries*  
 Hui Zhang (Institute of Oceanology, Chinese Academy of Sciences; [zhanghui@qdio.ac.cn](mailto:zhanghui@qdio.ac.cn))  
*fish biodiversity, ichthyoplankton, fish eDNA, fish community, fishery assessment, fish variation*  
 Kui Zhang (South China Sea Fisheries Res. Inst., Chinese Academy of Fishery Sciences; [zhangkui@scsfri.ac.cn](mailto:zhangkui@scsfri.ac.cn))  
*SPF fish biology and fisheries, stock assessment, climate change*

#### Japan

Sachihiko Itoh (Atmosphere and Ocean Research Institute, University of Tokyo; [itohsach@aori.u-tokyo.ac.jp](mailto:itohsach@aori.u-tokyo.ac.jp))  
*physical oceanography, biological oceanography, transport modelling*  
 Hiroomi Miyamoto (Fisheries Resources Institute, FRA; [miyamoto\\_hiroomi47@fra.go.jp](mailto:miyamoto_hiroomi47@fra.go.jp))  
*biological oceanography, zooplankton biology, environmental analysis*  
 Tatsuya Sakamoto (Kyoto University; [tatsfish@gmail.com](mailto:tatsfish@gmail.com))  
*fisheries oceanography, population dynamics, early life biology, migration analysis*  
 Motomitsu Takahashi (Fisheries Resources Institute, FRA; [takahamt@fra.affrc.go.jp](mailto:takahamt@fra.affrc.go.jp))  
*fisheries oceanography, population dynamics, early life biology*  
 Akinori Takasuka (University of Tokyo; [atakasuka@mail.ecc.u-tokyo.ac.jp](mailto:atakasuka@mail.ecc.u-tokyo.ac.jp))  
*fisheries oceanography, population dynamics, early life biology, reproductive biology*  
 Mikio Watai (Fisheries Resources Institute, FRA; [watai\\_miko40@fra.go.jp](mailto:watai_miko40@fra.go.jp))  
*fisheries oceanography, fishery-independent surveys, early life biology, reproductive biology*

#### Korea

Hae Young Choi (National Institute of Fisheries Science; [chy2021@korea.kr](mailto:chy2021@korea.kr))  
*genetic science*  
 Minje Choi (National Institute of Fisheries Science; [cmj543@korea.kr](mailto:cmj543@korea.kr))  
*social science/human dimensions*  
 Hwansung Ji (National Institute of Fisheries Science; [nise9@korea.kr](mailto:nise9@korea.kr))  
*ichthyoplankton*  
 Heejong KANG (National Institute of Fisheries Science; [kanghj87@korea.kr](mailto:kanghj87@korea.kr))  
*stock assessment*  
 Dongwha Sohn (Pusan National University; [sohndongwha@pusan.ac.kr](mailto:sohndongwha@pusan.ac.kr))  
*fisheries oceanography, modeling*

#### Russia

Dmitry Antonenko (Pacific Branch (TINRO), VNIRO; [dmitrii.antonenko@tinro.vniro.ru](mailto:dmitrii.antonenko@tinro.vniro.ru))  
*stock dynamics, distribution, and biology of common pelagic fish in the North Pacific*  
 Nikita Dederer (Pacific Branch (TINRO), VNIRO; [nikita.dederer@tinro.vniro.ru](mailto:nikita.dederer@tinro.vniro.ru))  
*Pacific salmon, pelagic fish stock dynamics, pelagic ecosystem interactions*  
 Vladimir Radchenko (Pacific Branch (TINRO), VNIRO; [vladimir.radchenko@tinro.vniro.ru](mailto:vladimir.radchenko@tinro.vniro.ru))  
*North Pacific pelagic ecosystems, Pacific salmon, conservation biology, and fisheries management*

#### USA

Matthew Baker (North Pacific Research Board; [Matthew.Baker@nprb.org](mailto:Matthew.Baker@nprb.org))  
*SPF ecology and distributions, arctic ecosystems, surveys and integrated modeling projects*  
 Noelle Bowlin (NOAA Southwest Fisheries Science Center; [noelle.bowlin@noaa.gov](mailto:noelle.bowlin@noaa.gov))  
*CalCOFI, surveys and methods for small pelagics, larval ecology, plankton ecology*  
 Richard Brodeur (Oregon State University; [ricbrodeur1@gmail.com](mailto:ricbrodeur1@gmail.com))  
*SPF diets and trophic interactions, SPF and jellyfish ecology, survey methodology*  
 Tim Essington (University of Washington; [essing@uw.edu](mailto:essing@uw.edu))

*SPF modeling and population dynamics, diets and trophic modeling, management strategy evaluation, global role of SPF for predators and fisheries*

Isaac Kaplan (NOAA Northwest Fisheries Science Center; [isaac.kaplan@noaa.gov](mailto:isaac.kaplan@noaa.gov))

*ecosystem modeling, trophic modeling, management strategy evaluation*

Barbara Muhling (NOAA Southwest Fisheries Science Center; [barbara.muhling@noaa.gov](mailto:barbara.muhling@noaa.gov))

*species distribution modeling of SPF and their highly migratory predators, climate change*

Ryan Rykaczewski (NOAA Pacific Islands Fisheries Science Center; [ryan.rykaczewski@noaa.gov](mailto:ryan.rykaczewski@noaa.gov))

*fisheries oceanography, climate change, SPF ecology and population dynamics global ecosystems*

Margaret Siple (NOAA Alaska Fisheries Science center; [margaret.siple@noaa.gov](mailto:margaret.siple@noaa.gov))

*SPF management strategy evaluation, survey methodology*

Desiree Tommasi (NOAA Southwest Fisheries Science Center; [desiree.tommasi@noaa.gov](mailto:desiree.tommasi@noaa.gov))

*stock assessment of SPF and their predators, transboundary management, management strategy*

*evaluation, seasonal forecasting, Pacific-wide analyses*

Robert Wildermuth (NOAA Southwest Fisheries Science Center; [robert.wildermuth@noaa.gov](mailto:robert.wildermuth@noaa.gov))

*SPF recruitment forecasting, management strategy evaluation, ecosystem modeling and stock assessment*

North Pacific Fisheries Commission (NPFC) – ex-officio membership

Toshihide Kitakado (Tokyo University of Marine Science and Technology; [kitakado@kaiyodai.ac.jp](mailto:kitakado@kaiyodai.ac.jp))

*fisheries management, population analysis, stock assessment methods*

Kazuhiro Oshima (Fisheries Resources Institute, FRA; [oshima\\_kazuhiro28@fra.go.jp](mailto:oshima_kazuhiro28@fra.go.jp))

*fisheries management, population analysis, stock assessment methods*



## IGC Endnote 5

**MEMORANDUM OF UNDERSTANDING  
BETWEEN  
THE INTERNATIONAL PACIFIC HALIBUT COMMISSION AND  
THE NORTH PACIFIC MARINE SCIENCE ORGANIZATION**

The International Pacific Halibut Commission, hereinafter called “the IPHC”, and the North Pacific Marine Science Organization, hereinafter called “PICES”;

**RECOGNIZING** that the International Pacific Halibut Commission (IPHC) was established by a Convention between Canada and the United States of America to:

- a) conduct research on the biology of Pacific halibut;
- b) assess the stock structure, abundance, and biomass in the North Pacific Ocean and the Bering Sea;
- c) regulate commercial and recreational fisheries for Pacific halibut within 200 mile limits of Canada and the United States of America;
- d) publish or otherwise disseminate the results of this work; and
- e) provide scientific information and advice to the Governments for the purpose of developing the stocks of Pacific halibut to levels which will permit optimum yield from that fishery, and of maintaining stocks at those levels;

**NOTING** that in order to carry out these tasks appropriately and efficiently, the IPHC seeks, *inter alia*, to establish and maintain mutually agreed working arrangements with other international organizations which have related objectives;

**RECOGNIZING** that the North Pacific Marine Science Organization (PICES), exists to:

- a) promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned and of its living resources including, but not necessarily limited to, research with respect to the ocean environment and its interaction with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna, and ecosystems, its uses and resources, and impacts upon it from human activities; and
- b) promote the collection and exchange of information and data related to marine scientific research in the area concerned;

**NOTING** that in order to further enhance its institutional capabilities, the Organization seeks, *inter alia*, to establish and maintain mutually agreed working arrangements with other international organization that have related objectives;

**RECOGNISING** that the achievement of the objectives of the IPHC and PICES will benefit from cooperation, with a view to strengthening the science-based decision-making processes of both Parties;

**DESIRING** to put into place arrangements and procedures to promote cooperation in order to enhance North Pacific Ocean science of mutual interest;

**NOW THEREFORE** the IPHC and PICES, hereinafter call “the Parties”, have therefore agreed to the following:

**I. OBJECTIVE OF THIS MEMORANDUM OF UNDERSTANDING**

1. The objective of this Memorandum of Understanding (MoU) is to facilitate cooperation between the IPHC and PICES (the Parties) with a view to supporting efforts to enhance North Pacific Ocean science of mutual interest.

**II. AREAS OF COOPERATION**

2. Both Parties may establish and maintain consultation, cooperation and collaboration in respect of matters of common interest in the field of marine scientific research and related activities for the;
  - a) exchange of expertise, techniques and knowledge relevant to the management of Pacific halibut and/or relevant marine ecosystems;
  - b) exchange of information, documents, and publications relating to programs and project plans and to the results of activities agreed to be of mutual interest, joint or otherwise;
  - c) reciprocal participation with observer status at the relevant meetings of each organization;
  - d) investigation and exchange of information regarding science-based management approaches relevant to the Pacific halibut;
  - e) promotion of international scientific activities at the highest scientific level relevant to Pacific halibut biology and management in the North Pacific Ocean;
  - f) establishment of international consortia to address challenges facing the Pacific halibut and related species through trans-national cooperation;

**III. MODIFICATION**

3. This MoU may be modified at any time by the mutual written consent of both sides.

**IV. LEGAL STATUS**

4. Both Parties acknowledge that this MoU is not legally binding between them.

**V. HOLD HARMLESS CLAUSE**

5. Each party agrees that it will be responsible for its own acts and the results thereof and shall not be responsible for the acts of the other party thereof.

**VI. COMING INTO EFFECT AND TERMINATION**

6. This MoU will continue to operate for 5 years from the date of signing. At that stage the Parties will review the operation of the MoU and decide whether it will be renewed or modified.
  - a) Either Party may terminate this MoU by giving six (6) months prior written notice to the other Party.
  - b) This MoU will come into effect on the day of signature.

**VII. SIGNATURES**

*David T. Wilson*

14-02-2024

Signature

Date

Signature

Date

David T. Wilson, Ph.D.

Executive Director

International Pacific Halibut Commission (IPHC)

2320 West Commodore Way Suite 300 (PICES) Seattle, WA 98199-1287 USA

9860 W. Saanich Road

[secretariat@iphc.int](mailto:secretariat@iphc.int)

(206) 634-1838

Enrique N. Curchitser, Ph.D.

Chair


North Pacific Marine Science Organization

Sidney, BC V8L 4B2 Canada

[secretariat@pices.int](mailto:secretariat@pices.int)

(250) 363-6364

**SIGNATURE CERTIFICATE**

	<p><b>REFERENCE NUMBER</b> D2B42A10-D319-4FD0-AA79-C270B96A1451</p>
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