2026 Intersessional Science Board Meeting

Report

Held online: April 27-29 (North America), April 28-30 (Asia)

(With GC decisions to SB recommendations)

Prepared by Science Board Chair, Jennifer Boldt, and the PICES Secretariat

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Agenda Item 1: Welcome, Adoption of Agenda

Science Board Chair, Jennifer Boldt, called the meeting to order, welcomed participants, and made introductions. The agenda was reviewed, and no adjustments/amendments were made before the meeting commenced.

List of Participants

Science Board	
Jennifer Boldt	Science Board Chair
Hanna Na	Science Board Vice-Chair, FUTURE Co-Chair
Steven Bograd	AP-UNDOS Co-Chair
Toru Kobari	BIO Chair
Jackie King	FIS Chair
Karen Hunter	HD Chair
Thomas Therriault	MEQ Chair
Lei Zhou	POC Chair
Kym Jacobson	MONITOR Chair
Fangfang Wan	TCODE Chair
Yury Zuenko	Representing Russia
Governing Council and F&A	
Tetsuo Fujii	PICES Chair
Nobuaki Suzuki	GC member
Koichi Hidaka	F&A member
PICES Secretariat	
Sonia Batten	Executive Secretary
Sanae Chiba	Deputy Executive Secretary
Guests	
Sukyung Kang	Former Science Board Chair
Talen Rimmer	AP-ECOP
Shion Takemura	HD Vice-chair
Chengjun Sun	S-MPP
Ying Yu	FIO, China
Yafeng Yang	MNR/FIO, China

Agenda Item 2: FUTURE-SSC Report

FUTURE SSC Co-chair, Hanna Na, presented its major activity update, highlighting key outcomes from the PICES 2025 panel discussions, including plans for the final report and guidance on the next PICES Integrated Science Program (ISP). Having completed its Phase III (2021-2025), FUTURE plans to conclude the program at PICES-2026. Drawing on the valuable lessons learned over the past 16 years, FUTURE is expected to provide recommendations for the new ISP by PICES-2026. Although there is a desire for continuity between FUTURE and the next ISP, the SSC members are unclear about their role in developing the new ISP and its timeline. SB members suggested that they meet and discuss these issues prior to PICES 2026. The delay in appointing members to WG58 on Strategic Plan Updating and Implementation is hindering progress on a series of actions responding to the Review Panel Recommendation, including the development of the new Strategic Plan and ISP. SB emphasized the importance of the voluntary engagement of FUTURE SSC and SB members to support the progress of WG58.

Agenda Item 3: SmartNet/AP-UNDOS Report

SmartNet/AP-UNDOS Co-chair Steven Bograd presented an update on major activities since PICES-2025, along with plans for 2026 and beyond. See the "SmartNet 2025 Year in Review" for the details.

Major updates included a SmartNet Networking event held online on April 13, during which representatives from the UNDOS-endorsed projects participated to showcase their activities. SmartNet plans to hold a similar event periodically to seek opportunities for collaboration between ICES/PICES and these projects, as well as among the projects themselves (see the "Network Event Report" and video). There are a total of 15 UNDOS-endorsed projects under the SmartNet umbrella as of May 2026, across collaboration areas such as the Climate Ecosystem Fisheries Nexus and Community Engagement. SmartNet has organized two workshops at PICES-2026, W5 "Breaking Barriers, Building Bridges: Communication Strategies to Advance Climate-Informed Fisheries Management", and W8 "Weaving knowledge systems to co-design transdisciplinary and actionable solutions". Other news includes the launch of the new SmartNet website on the PICES website platform and the appointment of a SmartNet Coordinator, Cheng Yang (Catherine), from China under the MOU between PICES and the Ocean Decade International Cooperation Center China (ODCC).

There was a question from one SB member about the PICES investment in SmartNet/UNDOS activities, their lasting impact, and measurable deliverables. Steven explained that one of SmartNet's goals is to develop and expand the PICES knowledge network by bringing in various projects and new partners from around the world, with a lasting legacy that these networks will be maintained. In addition, SmartNet promotes PICES science, shares knowledge and capacity, and creates opportunities for effective collaboration by leveraging the existing ICES/PICES framework and limited funds, thereby, ensuring PICES has a leadership role in UNDOS.

Agenda Item 4: Special Project Reports:

4. 1. FishPhytO: PICES/MAFF Project: Creating a phytoplankton-fishery observing program for sustaining local communities in Indonesian coastal waters

PICES Deputy Executive Secretary, Sanae Chiba, briefly updated the current status of FishPhytO on behalf of the project science team co-chairs. In November at PICES-2025, Project Science Team co-chair, Mitsutaku Makino reported that the team had been seeking alternative funding sources to sustain project activities at a minimal level, including the management of the FishGIS app and activities in Indonesia since the unexpected termination of funding from the Ministry of Agriculture, Forestry and Fisheries (MAFF) in 2023, However, the team had to complete its activities after the PICES-2025. They are preparing the Project Final Report, which will be finalized by the end of

June 2026.

Background
In December 2022, the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan offered to provide funding for a new 3-year PICES project for 2023-2026 following the Ciguatera project. The ideas of the proposal for this new project were discussed during the final Ciguatera PST meeting held in mid-March 2023 in Yokohama, Japan. However, MAFF terminated their funding support soon after the establishment of FishPhyto.

Objective
To establish, in collaboration with local fishermen and research institutes and universities, a phytoplankton-fishery observing program in coastal Indonesia by integrating the FishGIS application, developed and refined during the previous two PICES/MAFF projects (2017–2023) with existing automated technologies for detection of toxic benthic Harmful Algal Bloom (HAB) species. The longer-term goal is to provide local communities with the capacity and knowledge to sustainably manage their fisheries resources and ensure seafood safety. The project also aims to identify potential research needs for deploying the FishGIS application in PICES member countries.

4. 2. Basin Events to Coastal Impacts (BECI) Report

Chiba updated the current status and future plan of BECI on behalf of the BECI Science Director. BECI temporarily ceased its activities in April 2026, as the funds provided by the British Columbia Salmon Restoration and Innovation Fund (BCSRIF) terminated at the end of March 2026. They have applied for other funding, and the outcome will be informed in May 2026. The BECI team has archived materials until they secure funding from this and other sources. PICES Executive Secretary Sonia Batten added that while BECI's pilot phase deliverables were completed, continuation of the program would depend on the availability of regular funds. BECI activities can easily be picked up and continued if funding is in place within the next 6 months; however, if long-term funding is not in place within 1 year, it will become more difficult.

(Background) By 2025, BECI was actively networking with major North Pacific RFMOs: NPAFC Science Committee, NPFC Science Committee and Commission, PSC Committee for Scientific Cooperation, and WCPFC Northern Committee, engaged PICES Science Committee and multiple Expert Groups. They also conducted targeted outreach to scientists, NGOs and fisheries stakeholders through conferences and meetings, including BC Salmon Recovery Conference, American Fisheries Society, and Wild Salmon Connections. The key deliverables include: Science Plan detailing seven strategic use cases for knowledge network implementation; Indigenous Engagement Plan and Strategy, and a semi-function North Pacific Ocean Knowledge Network proof-of-concept, which was showcased throughout the PICES 2025

Recognizing that BECI's approaches are well aligned with the External Review Recommendation, GC requested SG-ERRR to consider the adoption of portions of BECI within PICES. Specifically to determine and recommend mechanisms to include BECI outputs within PICES frameworks, and to also discuss and recommend potential appropriate funding strategies to do so (GC 2025/A/3). SG-ERRR thought that a potential scenario might be a hybrid funding model with several contributors and PICES countries supporting the portions most relevant to PICES.

Agenda Item 5: PICES 2026 Update and 2027 Planning

5. 1. PICES 2026 General Schedule

Date: Oct 24 - 31, 2026
Theme: Actionable Science for a Changing Ocean
Venue and Location: Vancouver Island Conference Centre (VICC), Nanaimo, Canada
*Abstract submission opened on March 15 and will be closed on June 15

Pre-meeting timeline (tentative)	
– June 15	Confirmation of Invited speakers, Abstract submission & Financial support application
July - August	Confirmation of speakers, Finalization of Sessions / Workshop schedule
mid – late September	**Online** EG Business meetings to prepare Activity Reports & Requests for SB-2026
early – mid October	**Online** Committee/FUTURE business meeting to review EGs Activity Reports & Requests for SB-2026
Mid-Nov Mid-Late Nov Early Dec	PICES-2027 S/WS proposal submission deadline Committee members to review proposals through an online form SB to meet to select S/WS, GC to meet to approve S/WS

PICES-2026			
Oct 24 (Sat)	Day	4 Parallel Workshops	in-person EG business meetings (up to 4) (hybrid)
	Evening		Committee Business Meetings x 3 or 4 (hybrid)
Oct 25 (Sun)	Day	4 Parallel Workshops	in-person EG business meetings (up to 4) (hybrid)
	Evening		Committee Business Meetings x 3 or 4 (hybrid)
Oct 26 (Mon)	AM	Opening Ceremony Keynote speech ZP and SEED awards talks Additional plenary talks etc. (TBD)	
	PM	4 Parallel Sessions	SB Meeting Day 1 (hybrid)
	Evening	Welcome reception	
Oct 27 (Tue)	Day	4 Parallel Sessions	• in-person EG business meetings (1-2 per day) • F&A meeting (0.5 day) on Nov 11 and/or 12 (hybrid). • AP-ECOP events - Introduction to PICES - Mentor-Mentee program
	Evening	Sports event (TBD)	
Oct 28 (Wed)	Day	4 Parallel Sessions	
	Evening	Poster Session	
Oct 29 (Thu)	Day	4 Parallel Sessions	
	5 PM	Closing Session	
	Evening	Chair's reception	
Oct 30 (Fri)			SB Meeting Day 2 (hybrid), GC Meeting Day 1 (hybrid)
Oct 31 (Sat)	Day		GC Meeting Day 2 (hybrid)

Note:

- *SB Day 1 meeting will be held on Monday afternoon in parallel to Topic Sessions*
- *W12 "Practical Artificial Intelligence (AI) for Ocean Science in the North Pacific" was cancelled by the convenors.*
- *AP-ECOP is planning 1 or 2 off-site events (see Agenda 11: EG request with funding implication)*
- *W8 "Weaving knowledge systems to co-design transdisciplinary and actionable solutions" may be suggested by the meeting organizers to be held from Monday to Thursday, rather than the weekend, so that representatives of the local indigenous communities can easily attend at this workshop and other meeting events during the week.*

SB reviewed the basic schedule of PICES-2026. Concerning the program at the opening session in the morning of October 26, SB recommended that there be a plenary update (a presentation) from GC, SG-ERRR, or WG-SPLAN to provide PICES members with an update on the directions of the new strategic plan and Integrated Science Program (ISP). SB also requested Secretariat to inform all PICES members of the timeline for major events and assignments associated with PICES-2026 and PICES-2027, including pre-PICES-2026 online meetings, session/workshop proposal submission/review.

Responding to SB's recommendation, GC will review the program of the opening session, progress made by WG-SPLAN and SG-ERRR and consider the duration, format and contents of the presentation at the IGC meeting in September 2026.

5. 2. PICES 2026 In-person Business Meeting Request

SB reviewed the proposed in-person business meetings from Expert Groups (EGs) and recommended them for GC approval (see the table). Secretariat will work with the local organizer and the venue to secure rooms for all the requested business meetings.

GC approved the EG business meetings as proposed (GC2026/S/1)

**It is recommended that all EGs hold at least one online business meeting before PICES-2026 to discuss requests/proposals for SB/GC approval. EGs can additionally request an in-person meeting during PICES-2026. Note that all Committees will also have an in-person business meeting during PICES-2026*

**The schedule of the business meeting will be identified after the duration and timeslots of all sessions and workshops are identified in July-August. All Committees will also have an in-person business meeting during PICES-2026.*

EG	Duration (day)	Note
FUTURE	1.0	
SG-NPESR4	1.0	
AP-ARC	0.5	May need only 2 hours
AP-CREAMS	1.0	
AP-ECOP	0.5	
AP-NPCOOS	0.5	
AP-SciCom	0.5	May need only 1.5 to 2 hours
AP-UNDOS	0.5	
S-MBM	0.5	
S-HAB	0.5	
WG49	1.0	
WG51	0.5	

WG53	1.0	Would like to split the meeting into 2 evenings to accommodate the diverse array of time zones and commitments during PICES 2026 **(post note) After IGC meeting, they have requested 1.0 day meeting on Friday Oct 30 (venue: TBD)*
WG54	0.5	
WG55	0.5	
WG56	0.5	
WG57	0.5	
WG58	?	
S-MPP	0.5	
AP-NIS	1.0	
total	12.5	

5. 3. Engagement of First Nations representatives

W8 "*Weaving knowledge systems to co-design transdisciplinary and actionable solutions*" plans to invite speakers from the local indigenous community. Given that Indigenous Knowledge (IK) engagement is one of the growing focus areas in ocean science, not only within PICES but also at a global scale, the Local Organizers are considering the possibility of engaging First Nations representatives in PICES-2026 on multiple levels, including invitation to the Opening Session. One idea is to encourage them to participate in some relevant topic sessions and other events during PICES-2026, in addition to W8 (noting that this does not necessarily imply inviting them as invited speakers, and that no discussion on budgetary requirements has been made at this moment). This was to inform SB members of the idea and seek any feedback on the plan.

5. 4. New protocol for the ECOP Presentation Awardees selection

At SB-2025, given the increasing number of ECOP presentations at recent Annual Meetings (approximately 40%), some SB members noted that the judging duty for the ECOP presentation award was becoming burdensome for Committee members. Others also raised concerns that the majority of awardees were absent from the award presentation ceremony during the closing session. The SB agreed to request Secretariat to modify the online registration system so that only presenters who apply for the award would be eligible to be judged. Secretariat confirmed that the online registration system for PICES-2026 had been amended accordingly.

At past meetings (up to PICES-2025), Committees were assigned to judge workshop poster presentations (not workshop oral presentations). Starting at PICES 2026, SB agreed that only session presentations would be eligible for awards. SB agreed to keep the other judging protocols unchanged.

(Revised protocol)

- Each Committee (7 Committees plus AP-UNDOS/SmartNet and FUTURE) can select one best oral and one best poster presentation from the sessions they sponsored.
- When a session is sponsored by multiple Committees, Secretariat allocates it to a specific committee to judge so that the overall number of presentations assigned becomes relatively even among the Committees.
- Each Committee assigns its members to be the judges for specific session(s) during its business meeting.
- Committee chairs to report their decisions to the Secretariat in advance of the closing session.

5. 5. PICES-2027 Planning

PICES-2027 will be held in Qingdao, China (Date: TBC but potentially in mid-September).

PICES-2027 Session/Workshop Selection Schedule (tentative)

Oct 2026: Session/Workshop Proposal application open
Mid-Nov: Session/Workshop Proposal application closes (2 weeks after PICES-2026)
Mid-late Nov: Committee members to review/rank the proposals through online form
Early Dec: SB to hold a virtual meeting to select the Sessions/Workshops
Mid Dec: GC to approve the SB recommendation.

New Protocol for Session/Workshop Selection

(GC Decision 2023/S/14) Council approved a new process for the session and workshop planning of PICES Annual Meeting whereby the Session and Workshop proposal deadline be set two weeks after the end of the annual meeting. Committees will work inter-sessionally/by correspondence to review, rank and report to SB by the end of November. SB will review and provide to GC in early December for approval before year-end.

Agenda Item 6: External Review Recommendation Responses

6. 1. SG-ERRR Update

Secretariat and a member of the Study Group on External Review Report Recommendations (SG-ERRR), Batten, reported the progress in the five areas of Review Report Recommendations (2024): Role, Organizational structure, Integrative Science Program, Administration and Capacity Development.

Summary of progress for 5 areas: completed (green), in progress (yellow) or not yet addressed (red).

1. Role

Recommendation 1.1 Revision of Strategic Plan. A Working Group (WG58) was convened at PICES-2025 to update the Strategic Plan and implement the revision. Member appointments are still awaited. SG had drafted a letter template to be circulated within each member government by GC members, to solicit national priorities and needs from PICES to help frame the new Strategic Plan, but the government responses are slow.

Recommendation 1.2 Mission revision. Completed (see website link)

Recommendation 1.3 NPESR redesign. SG-NPESR4 was convened at PICES-2025 to scope the format and process of NPESR4 (see 6.2. SG-NPESR4 update)

Recommendation 1.4 PICES as a primary data provider. The SG has only considered this as part of its review of the BECI project to date.

2. Organizational Structure

Recommendations under this area have not yet been addressed as it depends on the revised strategic plan and next Integrative Science Program.

3. Integrative Science Program

Recommendations 3.1, 3.2 and 3.3 under this area have not yet been addressed because FUTURE is not yet finished.

4. Administration

Recommendation 4.1: Explore novel methods of supporting the Secretariat. An initial discussion was held at the F&A Committee meeting at PICES-2025 but did not produce any possible solutions.

Recommendation 4.2 Revise and shorten the annual meeting and submission dates for session proposals. Completed – PICES-2026 will be the shortest annual meeting to-date. A review should still be done following the meeting to make sure the changes are working well.

Recommendation 4.3 Timeliness of member nominations to expert groups. The SG requested that the Secretariat provide some options that could be discussed at IGC.

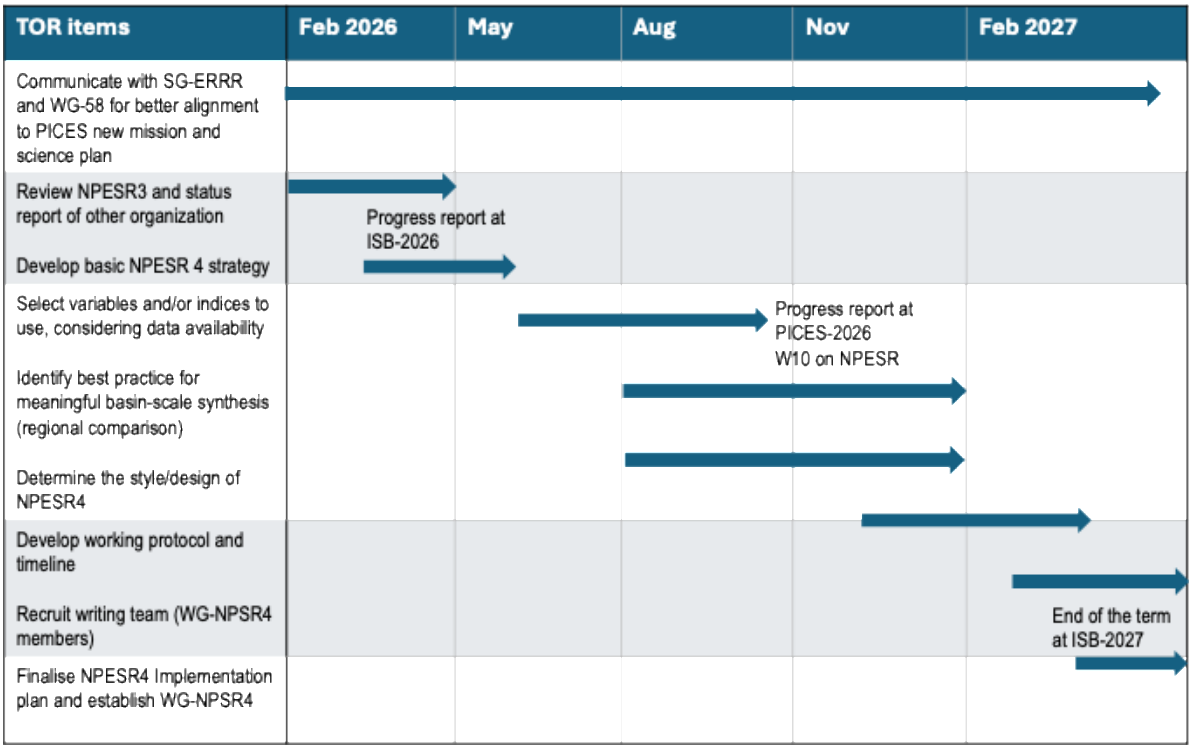
5. Capacity Development

This area has not yet been a focus for the SG-ERRR although some portions have been considered as part of the review of the BECI project to date (below).

6. 2. SG-NPESR4 Update

Secretariat and a member of the Study Group on the 4th North Pacific Marine Ecosystem Status Report (SG-NPESR4), Chiba updated the activities and plan of the SG. SG-NPESR4 was established at PICES-2025. In response to the Review Report Recommendation (2024), the SG is to scope the format and process of NPESR4 to provide meaningful information to users across PICES communities and beyond. SG held two online Meetings in January and March, 2026, and 3rd meeting was scheduled on May 14/15. Jeanette Gann (USA) was selected as the SG Chair. They requested a 0.5 yr extension to ISB-2027 (see Agenda Item12.3).

SG-NPESR4 Timeline (ver. Mar 2026)



SG have discussed the basic strategy and design of NPESR4, to most adequately manage the structure, style, and temporal coverage so that it is most useful for the PICES community, including decision makers. Potential options on its Temporal Coverage, Structure and Style were suggested, and SG asked for input from SG-ERRR on these options (see details below). SG also considers surveying these options among the wider PICES community (potentially a simple survey to identify basic consensus on spatial extent, temporal extent, and variables).

Options on Temporal Coverage (and Timing of Publication):

- Which year should the NPESR4 be published? => *realistically 2029-2030*
- How many years should the NPESR4 cover? => *after NPESR3 (2017-)*
- Do you agree to produce both a conventional NPESR-style report covering > 5 years, and an annual (or biennial) snapshot report, if feasible?

The typical NPESR structure and format were to analyze 5-year periods within 19 regions to assess the status of the ecosystem for a variety of variables across the N. Pacific. NPESR3 went longer than normal, with target coverage between 2009 and 2016. SG leaned towards two (or more) products with different target temporal coverage: one for longer time coverage (2017 -) and the other for a snapshot report (annual – biennial) with a semi-automated input/output system (assuming that additional resources and a platform, similar to the BECI dashboard, are available). The need to balance short-term and long-term events in the report was discussed.

Options on Structure and Style:

- Regional Reports: Do you agree to make them more concise with a consistent style across the regions, by using the standard template and page limit? => *generally agreed*
- Which is more useful for users: Regional Reports vs. Thematic Reports?

SG generally agreed to have the report consist of a strong synthesis report and regional reports for 19 PICES regions with a standardized, concise format. SG also agreed that some Regions may be merged depending on data availability and/or redundancy (if merging the regions is oceanographically meaningful). It was suggested to make an inventory of (with the help of BECI, MONITOR, and Secretariat) time-series over PICES regions to identify areas of information gaps. That will help identify regions that may be able to be merged due to a lack of data or redundancy. The NPSESR4 synthesis report should address the global context and policy relevance as seen in other ecosystem status reports. Being inspired by other ecosystem status reports, some members proposed Thematic Reports, replacing Regional Reports, e.g. Irish Ocean Climate and Ecosystem Status Report.

Others:
In addition to the above, SG wants to identify the needs for multiple products tailored for different audiences (PICES members, managers/decision-makers, etc). Overall, we see potentially two tracks for NPESR4: 1. Proceed with the modification of NPESR 4 in a more traditional sense, and continue to discuss options for future products, and 2. Proceed with initiating drastic structural changes to NPESR 4 now.

W10: "From Indicators to Integration: Building a Standardized Multinational North Pacific Ecosystem Status Reporting Framework" at PICES-2026 will provide the PICES community to participate in the NPESR4 development process.

Agenda Item 7: PICES Awards Selection

The Award Selection Committee (consisting of SB members and PICES Chair) reviewed and selected PICES-2026 Awardees. There was no new POMA nomination; however, given the POMA Nomination and Selection rules, nominations from last year will be considered. SB also discussed the need for more effective advertising of award nominations. The awardees will be recognized during the awards ceremony at the opening ceremony of PICES-2026. Information on the awardees is confidential until PICES-2026.

Agenda Item 8: PICES AI Guideline

With the rapid progress of AI innovation and its widespread use in scientific outputs, scientific organizations and academia are urged to establish ethical standards and guidelines for AI use. However, the PICES community has not yet had an opportunity to officially discuss this high-priority topic. SB members discussed the need to develop guidelines for AI use in PICES products. SB agreed that PICES should develop and issue a concise statement to ensure transparency in the use of AI in its official publications (e.g., Scientific and Technical Reports) and other products, but left further discussion on appropriate methods for effectively developing and implementing these guidelines for a later stage.

Example – ICES Approach:
ICES released the AI Guidelines "*ICES (2025). Preliminary Artificial Intelligence (AI) Guidance for ICES Staff and Community. ICES General and Science Guidelines. Report https://doi.org/10.17895/ices.pub.30315979*". It gives guidance on : Use in text, images and audiovisual; Coding and software; Privacy & Security; Transparency; Transparency label. They held a Workshop on "Applying AI in ICES Introduction" in October, 2025, also see Session G "Rethinking Marine AI: Limitations, failures, and future directions" at ICES ASC 2026.

Agenda Item 9: Scientific and Technical Mid-Year Reports

SB, FUTURE and Committees reported the scientific achievements and progress on TORs of the respective Children Expert Groups since PICES 2025. The details of each EG report will be published online as a part of the "PICES-2026 Annual Report" after PICES-2026.

Agenda Item 10: PICES Data Reporting Protocol

TCODE Chair Fangfang Wan demonstrated the EG Data Reporting Protocol using the data repository hub Zenodo, which had been developed by WG52 (on Data Management) and TCODE. SB reviewed and discussed the proposed Protocol. SB recommended that GC approve the proposed Protocol. TCODE and the Secretariat will guide EGs to report their data products following the Protocol.

GC approved the proposed protocol. GC instructs the Secretariat, in conjunction with TCODE, to prepare a guide for all PICES expert groups in the use of the data reporting protocol to report their data products (GC2026/S/6)

Background: WG52 and TCODE have been working on the development of a data reporting protocol for PICES EGs using an online data repository hub, Zenodo. WG52 completed the transfer of old PICES data, which were previously stored in the TINRO server, to Zenodo, and TCODE developed the protocol and guideline for EG to submit the data (or website links of the existing data repositories) produced through their activities. Since PICES does not have resources to develop and maintain its own data center, TCODE recommends that PICES use this

repository system as the best practice for PICES data to be findable and accessible among the PICES community and beyond. TCODE requests SB to recommend the proposed Data Reporting Protocol for PICES EGs, Projects, and any scientific data-producing bodies within PICES, for adoption. Upon GC approval of this protocol, TCODE and Secretariat will identify the operational methods for guiding all EGs to submit their data following the Zenodo user manual.

PICES Data Reporting Protocol - How to Publish Data from PICES Expert Groups

Publishing your expert group's data ensures transparency, accessibility, and long-term preservation of PICES knowledge. All datasets produced through your group's activities should be archived through the PICES Data Catalog. Please ensure that data and/or metadata are published before the disbandment of your group, under the responsibility of the Expert Group Co-chairs, following the protocol.

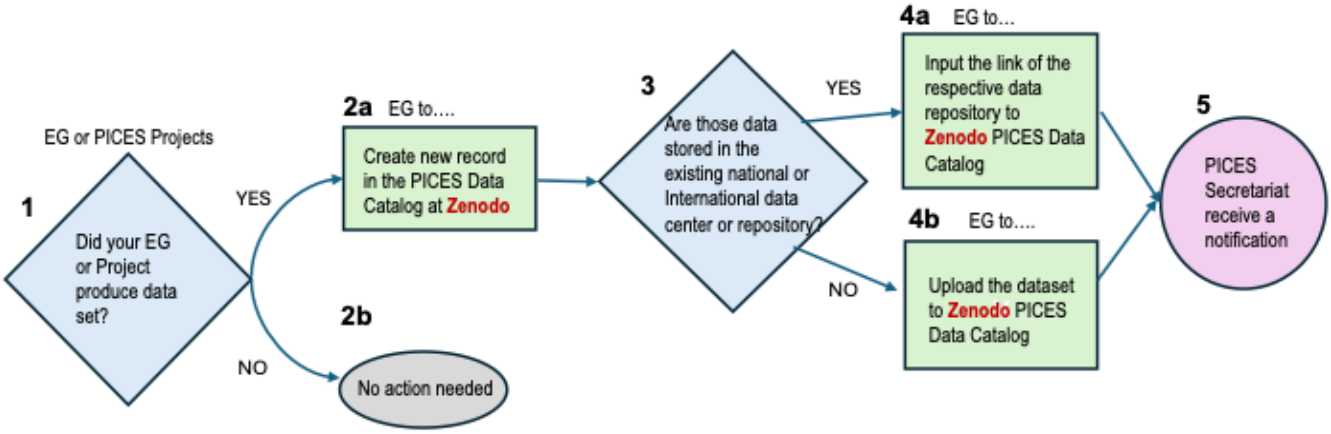


Figure PICES data reporting flow diagram
Each Expert Group (Section, Advisory Panel, Working Group and Study Group) should use this diagram to help manage data for archiving of all PICES data and metadata. For Working Groups and Study Groups with a specific activity term, data reporting should be completed before or upon the submission of their Final Reports (or final products for Study Groups) to Secretariat.

Box 1. "Have your EG produced data? : Yes or No
(if Yes) **Box 2a**. EG to create a new record in the PICES Data Catalogue at Zenodo, then go to **Box 3**.
(if No) **Box 2b**. No further action required.

Box 3. "The data are already stored in the existing national/regional or international data center or repository? : Yes or No.
(if Yes) **Box 4a**. EG to input the website link of the respective data repository to Zenodo PICES Data Catalog (follow the instructions of **Steps 2, 3 and 4**, of "How to upload your data to Zenodo" below), then go to **Box 5**
(if No) **Box 4b**. EG to upload the data and/or metadata to the Zenodo PICES Data Catalog (follow the instructions of **Steps 1, 2, 3 and 4**, of "How to upload your data to Zenodo" below), then go to **Box 5**

Box 5. EG to report to the biannual SB meetings when they complete the Zenodo input. Secretariat to follow the reporting.

Zenodo Manual - How to upload your data to Zenodo

** This manual is under development. TCODE and Secretariat will confirm the procedure.*

Step 1 — Finalise and Prepare the Dataset

- Ensure your dataset is **clean, complete**, and well-documented.
- Include a **README** file and a **data dictionary** (recommended columns: *table name, variable name, description, method, and units*).
- Use **open formats** (e.g., CSV, NetCDF, GeoJSON) and clear, descriptive file names.
- Compress multiple files into a ZIP if needed.
- Verify that sensitive or restricted data are excluded.

Step 2 — Create Account or Log in to Zenodo

- Visit Zenodo.org and **sign up** or **log in**.

Step 3 — Upload Your Dataset or an existing link to the Dataset

1. Go to the PICES Data Catalog Community on Zenodo
2. Click **"New Upload."**
3. Add a **clear title** and **description** for your dataset.
4. Select the **PICES Community Collection** as the destination.
5. If your data are already published in a domestic or international data repository,
    a. Add the link to the repository (and existing DOI) in the "**Related identifiers**" box.
    b. Do NOT click the "Get a DOI now!" button
    c. Click **"Publish to community."**

    If your data are not published any data repository,
    a. **Upload** all relevant data files (dataset, README, data dictionary, supplementary documentation).
    b. Fill in Zenodo's metadata fields thoroughly:
        i. **Creators:** Add all your co-authors AND add PICES as the hosting institution
        ii. **Publisher** must be "North Pacific Marine Science Organization (PICES)"
    c. Review all information carefully.
    d. Click **"Publish to community."** Zenodo automatically assigns a **DOI**.
6. The **PICES Secretariat** receives a notification and adds your dataset to the **PICES Data Catalogue**.

Agenda Item 11: EG Proposals with Funding

SB reviewed and ranked the priority of the funding requests shown below based on their relevance and importance to PICES Science. SB recommended that GC approve the requests, considering the priority scores given by SB (High: 3 - Low: 1). SB Score criteria **3**: highly recommended, **2**: recommended, **1**: recommended only if budget is available, **0**: not recommended.

GC approved the proposals below with financial support requests, and requested the Executive Secretary to consider the Science Board rankings and available budget (GC2026/S/2)

11. 1. Travel support request

Travel funding support for PICES scientists to convene or attend international meetings, etc. Priority is given to ECOPs as PICES has a limited amount of Trust Fund for travel support for ECOPs.

HD, AP-UNDOS			
Conference title / Date / Location	Recipient name / contact	Amount and rational of fund requested	SB evaluation
ICES/PICES Workshop on Indigenous Knowledge engagement (WKIK) East coast Canada Late 2026 or Early 2027, (TBC)	1-2 Scientists to co-convene the workshops, potentially from HD and/or AP-UNDOS but not limited.	Up to CA$ 5000 for two co-convenors (not exclude ECOPs) IK is one of the resent common priority areas for both ICES and PICES. ICES requests PICES co-sponsor the workshop (see the draft Joint workshop plan).	Recommended Score: 1.7
EG: WG49 (FUTURE)			
Conference title / Date / Location	Recipient name / contact	Amount and rational of fund requested	SB evaluation
ICES/PICES Joint Session at DITTO Summit 2026. Yokohama, Japan Nov 11-13, 2026	1-2 Scientists including ECOP(s) from WG49	Up to CA$ 5000 for two convenors and/or speakers. ICES and PICES WG49 plans to hold a Joint Session on integrating socio-ecological data in the context of the ocean's digital twins at DITTO Summit.	Recommended Score: 1.6

Potential PICES co-sponsorship of ICES Workshop on Indigenous Knowledge
(prepared by ICES HD Group and PICES Secretariat, April 14, 2026)

ICES is proposing a Workshop on Indigenous Knowledge and have approached PICES about potential involvement/co-sponsorship. PICES has some experience to contribute, but also can gain as we are in a similar situation to ICES with respect to appropriate integration of indigenous and traditional knowledge in the organization's activities. At this time, they are tentatively planning for late 2026 or early 2027 and possibly in Canada (likely Atlantic side). Expected outcomes (as provided by ICES) are indicated below. The request to Science Board is for consideration of the preferred level, and mechanism, for PICES engagement. PICES Human Dimensions Committee is possibly the most appropriate Committee to engage too. SB could recommend that

PICES support the travel of 1-2 PICES participants (lower engagement) or co-convene the workshop (higher engagement) if there is interest.

Expected outcomes of the workshop(s)

- Improved **shared understanding**: Participants have a clearer understanding of Indigenous Knowledge (IK) systems, and explore meaningful ways of dialogue across diverse knowledge systems.
- **Increased reflexive practice**: Participants demonstrate greater awareness of their own assumptions, values, and disciplinary positions, and how these influence knowledge production and decision-making.
- **Stronger ethical and governance awareness**: Participants recognize the ethical dimensions of engaging with IK, including power sharing, trust, data sovereignty, and the role of community liaisons and governance structures.
- Enhanced **respect for IK within ICES contexts**: Even participants not directly working with IK show increased respect and understanding of its relevance to science and advisory processes.
- Practical **examples and pathways forward**: Participants identify concrete examples, approaches, or principles that can inform future ICES activities, workshops, or advisory processes.
- Strengthened **networks and relationships**: New or strengthened connections form between scientists, Indigenous Knowledge holders, and boundary spanners.
- **Foundation for continued engagement**: Outputs from webinars and the workshop inform future learning activities, guidance, or collaborations, helping to sustain momentum beyond the event.

11. 2. PICES-2026 Side Event proposal

EG: AP-ECOP (FUTURE)			
Date/Location	Event summary	Amount and rational of fund requested	SB evaluation
Visiting a Science Institute in Vancouver Island Options A. Ocean Networks Canada (Victoria) (1 day) B. Bamfield Marine Science Centre (Bamfield)(1 day) C. Deep Bay Marine Field Station (Deep Bay)(0.5 day) Date (TBD, before or after the PICES-2026)	Similar to the JAMSTEC visiting at PICES-2025. Expect up to 25 ECOP participants. The co-chairs are communicating with the hosts to identify availability and activity planning. Transportation for the participants is needed. Full description will be submitted after ISB.	**Option A&B**: c.a. CA$ 2000 for a full-day bus charter for transporting 20-25 participants between Nanaimo - Victoria or Nanaimo - Bamfield. **Option C**: c.a. CA$1500 for a half-day bus charter transporting 20-25 participants between Nanaimo - Deep Bay. CA$125 quoted for a one-hour tour of the marine station.	Recommended Score: 2.5 SB supports C. Deep Bay plan over the other options, encouraged them to seek additional funding support from the visiting institute etc.
Beach clean-up or alternative activities in local Nanaimo (0.5 day) Date (TBD)	Similar to the events at PICES-2024 and 2025. AP is discussing the options. Full description will be submitted after ISB.	No or very moderate support, e.g. for trash collecting bags.	Recommended Score: 2.7

** AP-ECOP plans to hold two on-site events: "Introduction to PICES" and "Mentor-Mentee program" during the PICES-2026. GC previously approved these events as regular events during the PICES Annual Meeting, and no request for SB recommendation and GC approval is needed.*

Agenda Item 12: EG Proposals without Funding Implications

12. 1. Membership Needs/Changes

SB acknowledged the membership requests of EGs and urged the national delegates to consider the appointment of new members at an appropriate time.

GC considers the establishment of a possible protocol to accelerate the process, for potential adoption at the September IGC meeting. To address the Review Panel Recommendation 4.3: Timeliness of member nominations to expert groups, SG-ERRR requested that the Secretariat provide some options that could be discussed at IGC (see Agenda Item 6.1)

EG	Country	Names	Affiliation	e-mail
Carry over requests from PICES-2025				
TCODE	Russia	1-2 members	N/A	
FIS	Russia	1-2 members		
AP-UNDOS	Russia	Evgenia Kostianaia (IOC)	IOC ECOP leader in UNDOS	e.kostianaia@unesco.org
AP-ARC	Russia	Yury I. Zuenko	TINRO	zuenko_yury@hotmail.com
AP-ARC	Russia	Kirill Kivva		kirill.kivva@gmail.com
AP-NIS	Russia	1 member with molecular expertise in NIS/at-risk species detection (emerging topic w/ past interest from NOWPAP)		N/A
AP-NIS	USA	2 members to replace Federal government members who step down		N/A
AP-SciCom	Russia	1 – 2 members		N/A
AP-SciCom	USA	Matt Koller		mkolle01@gmail.com
S-CCME	Russia	1-2 members. Potential candidate to suggest Russia: Kiril Kivva & Andrey Krovnin		kirill.kivva@gmail.com
SG-NPERS4	China	1-2 members		N/A
SG-NPERS4	Russia	1-2 members		N/A
TCODE	Russia	1-2 members		N/A
WG54	USA	Mark Benfield		mbenfie@lsu.edu
WG54	USA	Jeffrey Ellen		jeffrey.s.ellen.civ@us.navy.mil
WG54	Japan	Satoshi Kitajima		kitaji@affrc.go.jp
WG54	China	Fang Zhang		zhangfang@qdio.ac.cn
WG54	China	Xumin Cheng		chengxm@sz.tsinghua.edu.cn
WG54	China	Haiyong Zheng		zhenghaiyong@ouc.edu.cn
WG54	Russia	1-2 members		N/A
WG54	China	Zesen Zhang (ECOP)		zhang-zs23@mails.tsinghua.edu.cn
WG55	China	Guang Gao		guang.gao@xmu.edu.cn
WG55	USA	Claudine Hauri		chauri@alaska.edu
WG55	Japan	Tsuneo Ono	FRA	ono_tsuneo65@fra.go.jp
WG55	China	Fei Chai		fchai@xmu.edu.cn

WG55	Canada	1-2 members		N/A
WG55	Russia	Anna Kurnosova	TINRO	anna.kurnosova@tinro.vniro.ru
WG56	USA	Christina Conrath	NOAA	christina.conrath@noaa.gov
WG56	Russia	Alexei Orlov		orlov.am@ocean.ru
WG56	Japan	Kota Sawada	FRA	sawada_kota27@fra.go.jp
WG56	Japan	Satoi Arai	FRA	arai_satoi36@fra.go.jp
WG56	Canada	Cherisse Du Preez	DFO	cherisse.dupreez@dfo-mpo.gc.ca
WG56	Canada	Tetjana Ross	DFO	tetjana.ross@dfo-mpo.gc.ca
WG56	Canada	Devon Warawa	DFO/PICES	devon.warawa@pices.int
WG56	USA	Emily Palmer (ECOP)		palmered@hawaii.edu
WG56	USA	Jhen Hsu	U Hawaii	jhene.hsu@gmail.com
WG56	Canada	Chris Rooper	DFO	mailto:chris.rooper@dfo-mpo.gc.ca
WG56	China	1-2 Chinese members		N/A
WG57	Japan	Takeyoshi Nagai		tnagai@kaiyodai.ac.jp
WG57	Russia	Takaya Uchida		takachanbo@gmail.com
New requests at ISB-2026				
HD	Canada	Raphael Roman		raph.genf@gmail.com
POC	China	Jianing Wang		(already sent request to Chinese delegates)
AP-ECOP	Russia	Maria Lebedeva	V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch of the Russian Academy of Sciences	lebedevamasha671@gmail.com
AP-ECOP	Russia	Sofia Khudyakova	V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch of the Russian Academy of Sciences	khydyakova.s@gmail.com
AP-ECOP	Secretariat	Yoho Saito	(Intern)	intern@pices.int
AP-ARC	USA	Henry P. Huntington		hhuntington@oceanconservancy.org
AP-ARC	USA	Eduard Zdor		ezdor@alaska.edu
WG56	Japan	Hiromi Kayama Watanabe	JAMSTEC	hwatanabe@jamstec.go.jp
WG57	Russia	Dmitry Vadimovich Stepanov	V.I. Il'ichev Pacific Oceanological Institute Vladivostok	stepnovster@gmail.com
WG57	Japan	Yoshikazu Sasai	JAMSTEC	ysasai@jamstec.go.jp
WG57	Korea	Hajoon Song	Yonsei U	hajsong@yonsei.ac.kr
WG57	Canada	Jinyu Sheng	Dalhousie U	Jinyu.Sheng@Dal.Ca
SG-NPSER4	USA	Mariela K Brooks	NOAA	mariela.brooks@noaa.gov
Members stepping down at ISB-2026				
AP-NIS	USA	John Darling	EPA	

AP-NIS	USA	Joseph Krieger	GLERL NOAA	
BIO	Canada	Janelle Curtis	DFO	
POC	China	Fan Wang		(already sent request to Chinese delegates)
AP-ECOP	Secretariat	Saeseul Kim		

12. 2. Change of EG Chairs

SB recommended that GC approve the changes of these EG co-chairs.

GC approved the appointment of the above (GC2026/S/3).

EG (Rep Parent)	Current Chair to replace	New Chair Name/Country/Organization	SB evaluation
AP-ECOP (FUTURE)	Raphael K. Roman	Talen Kaile Lunde Rimmer, Canada, West Coast Kelp.	recommended
S-CC (POC)	Alexander Kozyr	Samantha Siedlecki, USA, University of Connecticut	recommended

Note: Selection and approval of EG Chairs (PICES Rules and Procedures: Rule 17)

12. 3. Extension of Term

SB recommended that GC approve the extension of these EGs' terms.

GC approved the extensions of the following. As for WG49, GC confirm that no opportunity for an additional extension will be granted after PICES-2027 (GC2026/S/4).

EG (Reporting Committee)	Duration	Rationale	SB evaluation
WG49 (FUTURE)	1 year to PICES-2027	WG49's new framework evaluation, developed to address TORs through a systematic review, has taken considerable time, and an extension is needed to synthesize and communicate the results.	recommended
SG-NPESR4	Half year to ISB/IGC-2027	Due to the delay of membership appointments, SG could start its activity only after Jan 2026, half year later since its establishment.	recommended

12. 4. Change of TORs/Action Plan

12. 4. 1. TCODE New Action Plan

With the progress in PICES data management strategy, including the new PICES Data Management Policy, and the establishment of the PICES Open Data Excellence Award (PODA) in the past few years, TCODE revised its Action Plan. The new Action Plan will be posted on the PICES website after ISB. (**see Appendix 1**)

12. 4. 2. Changes in TORs - SG-NPESR4

SB recommended that GC approve the proposed change of TORs.

GC approved the proposed changes for SG-NPESR4 ToR as indicated below (GC2026/S/5).

Original TOR	Description and Rationale of Changes
TOR 1 Review "lessons learned" from NPESR 3 process and ecosystem status reports of other organizations.	(divided into 2 items) TOR 1 Review "lessons learned" from NPESR 3 process TOR 2 Review ecosystem status reports of other organizations.
TOR 3.1 Select natural and social science variables and/or indices, taking into account the availability of qualified data and user needs, and previous PICES expert group final reports on this subject (e.g., WG28 and WG36).	TOR 4.1 Select natural and social science variables and/or indices, taking into account the availability of qualified data and user needs, and previous PICES expert group final reports on this subject (e.g., WG28 and WG36) in collaboration with MONITOR.
TOR 4 Report on progress to SB-2025 (PICES-2025) and ISB-2026 to receive feedback from PICES community	TOR 5 Report on progress to ISB/IGC-2026 and PICES-2026.
TOR 5 Develop the NPESR4 implementation plan and establish WG-NPESR4 at SB-2026 (PICES-2026)	TOR 6 Develop the NPESR4 implementation plan and establish WG-NPESR4 at ISB-2027.

12. 4. 3. Revised S-CCME: Climate Change Effects on Marine Ecosystems Phase 5 Implementation Plan -

At PICES-2025, S-CCME developed the Phase V Implementation Plan with the guidance of its parent Committees (FIS, BIO, POC) and SB reviewed and recommended that GC approve the new Implementation Plan. *GC approved it as provided but recommended that the newly adopted PICES Mission Statement and language reflecting PICES move towards actionable science, are reflected in the Plan table* (GC2025/S/10). S-CCME submitted the revised Implementation plan (**see Appendix 2**) and SB recommended that GC endorse it.

GC approved the revised S-CCME Implementation Plan as provided, which now includes language related to supporting the delivery of actionable advice, to better reflect PICES new Mission Statement (GC2026/S/5).

12. 4. 4. New Action Plan - AP-CREAMS

AP-CREAMS submitted their revised Action Plan to MONITOR (see Background information below) with their responses to all SB comments before **ISB-2026**. However, MONITOR has not reached a consensus on endorsing the revision. SB considered MONITOR's approval crucial before seeking its recommendation and has deferred its decision. SB urged MONITOR and AP-CREAMS to hold an online meeting to discuss and resolve the outstanding issues and to submit the revised version to SB as soon as possible.

GC noted the SB decision above and expected to receive the revision at the IGC meeting in September 2026.

Background
At **SB-2024**, AP-CREAMS proposed the revision of its ToRs to expand its target area toward the wider western North Pacific. SB recognised the importance of understanding the interaction of physical, chemical and biological processes between the East Asian marginal seas, AP's core study area, and the wider western North Pacific regions, and recommended their proposals. However, GC requested a clearer rationale for the region the AP intends to expand in the revised AP Action Plan, and deferred the decision to ISB/IGC-2025 or later. GC agreed that the fixed term of AP will be removed when the new Action Plan has been reviewed and approved.

In response to the GC decision (**2024/S/21**), AP-CREAMS submitted the revised Action Plan (**see Appendix 3**) to **ISB-2025**. SB reviewed the Action Plan and agreed that it needed editing by SB members and its reporting parent Committee, MONITOR, before reporting to GC. AP-CREAMS has been revising its new Action Plan with the guidance of MONITOR, but they could not complete the revision (MONITOR had not endorsed it) by **SB-2025**, and the SB decision was deferred to **ISB-2026**.

GC Decision 2024/S/21. *AP-CREAMS revision. GC requested more detailed information on the rationale behind the proposed change, therefore it was determined that their term (with current ToRs) be extended for half a year, to enable them to submit a revised proposal to include: A rationale for the changes suggested including necessary revisions to the Action Plan, suggested membership needs (they may require additional USA members in an expanded area, for example) and a map using PICES eco-regions. This is to be presented at the next Intersessional Science Board meeting. It is expected that the fixed term will be removed when the proposal has been reviewed.*

Agenda Item 13. New Expert Group proposals

SB reviewed and evaluated the proposal of a Working Group on Physical and Biogeochemical Connectivity in the North Pacific (WG-Connect), and recommended that GC approve it as a new Expert Group.

GC approved the creation of PICES WG59 on Physical and Biogeochemical Connectivity in the North Pacific (WG-Connect) with Terms of Reference as provided (GC2026/S/6). GC requests that, effective with the PICES-2026, the WG lead proponent identify a maximum of 4 members per country to ensure the geographical balance of membership and efficient member appointment.

Name of EG	Proposed Parent Committee	Goals	SB evaluation
WG on Physical and Biogeochemical Connectivity in the North Pacific. WG-Connect (full proposal)	POC BIO	This WG, built on the PICES 2025 workshop *"Basin-scale processes linking western and eastern Pacific dynamics and biogeochemistry,"* emphasizes linkages among physical and biogeochemical processes across the North Pacific.	Recommended
WG on Bridging zooplankton production and assessment and management fisheries resources in changing oceans – WG-BZF	BIO	This WG aims to bridge gaps between zooplankton ecology and fisheries assessment by fostering communication among oceanographers, modelers, and managers.	*Information only. Draft proposal was submitted to SB-2025, but seek approval at SB/GC 2026.*

Proposal of WG on Physical and Biogeochemical Connectivity in the North Pacific.

Title and Acronym of the Group	
WG on Physical and Biogeochemical Connectivity in the North Pacific. WG-Connect	
Term (WG and SG only) From .... To....	**Proposed Parent Committee(s)** **Recommended to have no more than 2 committees*
From IGC 2026 to IGC 2029	POC and BIO
Co-Chairs (Name, Country, Affiliation, Email address) *	
Charles Hannah, Canada, DFO, Charles.Hannah@dfo-mpo.gc.ca Takeshi Doi , Japan, JAMSTEC, Takeshi.Doi@jamstec.go.jp	
Motivation, Goals and Objectives (max. 300 words) **clarify scientific justification, societal outcomes, etc.*	

This Working Group focuses on **basin-scale connectivity across the North Pacific Ocean**, emphasizing linkages among physical and biogeochemical processes. Many physical, biogeochemical, and ecosystem events observed in one region of the North Pacific are driven by processes originating elsewhere in the basin. The central objective of the Working Group is to identify biogeochemical properties for which these connections can be traced from large-scale drivers to regional responses, and to quantify the associated pathways, timescales, and impacts.

The Working Group builds on the PICES 2025 workshop *"Basin-scale processes linking western and eastern Pacific dynamics and biogeochemistry,"* which highlighted the importance of viewing the North Pacific as a connected system rather than a set of isolated regional domains. The WG will advance integrative analyses that explicitly link processes operating across the western and eastern North Pacific.

One focal topic will be **subsurface oxygen**, with the goal of evaluating whether the increasing occurrence of hypoxia events in the eastern North Pacific is linked to changes in ventilation and water-mass formation in the northwest Pacific. A second focus will be **oceanic Rossby waves**, which originate in the eastern Pacific and propagate westward, with the potential to alter upper-ocean structure and primary productivity in the western Pacific. Additional cross-basin physical and biogeochemical processes will be identified and investigated as the WG progresses.

The North Pacific Ocean is undergoing rapid physical and biogeochemical change, with potentially significant consequences for marine ecosystems. Processes spanning the full basin and crossing national boundaries are difficult to observe and predict, yet essential for understanding emerging ecosystem responses. Key outputs of

this Working Group will include improved understanding of basin-scale connectivity, assessment of its relevance for seasonal to longer-term biogeochemical forecasting, and development of a network of PICES scientists trained to recognize regional events linked to remote basin-scale drivers.

Relevance to the PICES Strategic Plan (max. 150 words)

The new PICES Strategic Plan will emphasize 'actionable science.' This WG will address 'actionable science' by facilitating advances in ocean prediction, particularly for processes having strong ecosystem impacts. Forecasts of biogeochemical variables on seasonal and longer time scales are maturing and becoming operational. Consider the scenario of a forecast that subsurface oxygen will be lower than normal off the west coast of North America and local or regional drivers are not anomalous. Is the forecast trustworthy? The work here will provide estimates of magnitude and time-scales expected if the decline is due to reduced ventilation in the NW Pacific. This can be used to provide an estimate of confidence in the forecast.
By quantifying the variability and the time-scales for the lag between driver and response, there will be a basis for assessing the reliability of forecasts in cases where the response is not driven by local or regional causes.

Linkage(s) to Previous PICES Expert Groups Activities (if any)

POC: this WG will build on the work of Manu Di Lorenzo (former POC chair) and others who investigated the North Pacific Ocean's overall system response to large-scale forcing (e.g. ENSO). The WG will look at different forcing mechanisms but with a renewed focus on connections across the North Pacific.
FIS and BIO: the WG will improve understanding of the drivers of biogeochemical change (e.g. deoxygenation) which impact the distribution of key fish species and sustainability of harvest strategies.
WG-49 (climate extreme events): this work will help clarify the role of climate change in episodic hypoxia in the eastern Pacific
WG 40 addressed climate and ecosystem predictability. At the time of their work forecasting at sub-seasonal to decadal timescales was largely focussed on physical variables; biogeochemical forecasting was still in the early stages of development. This WG will revisit and update their recommendations.
S-CCME – this work will clarify mechanisms by which climate change affects marine ecosystems in the North Pacific.
S-CC – WG will work closely with S-CC members to assess local and basin scale drivers of ocean acidification and deoxygenation**.**
S-MBM –some bird and mammal species show basin-scale covariance, e.g., in the western and eastern Pacific. MBM can benefit from research into underlying mechanisms of connectivity.

Linkage(s) to Other Organizations and Programs (if any)

CLIVAR – The CLIVAR Pacific Region Panel has developed a working group on "Tropical Pacific BGC-Physical interactions", aimed at elucidating the impact of physical climate variations on biogeochemical quantities, especially oxygen. The activities of the CLIVAR Panel, although focused in the tropics, can help understand the physical processes most impactful for oxygen levels and distribution. In addition, CLIVAR expertise in many aspects of climate variability and change in the North Pacific can provide a foundational physical understanding of the underlying processes.

Terms of References

1. Identify physical and biogeochemical processes where a driver on one side of the North Pacific leads to a response on the other side. This can include changes in the Arctic regions that provide connectivity across the North Pacific Ocean.
2. For selected processes, describe the pathways, timescales, and impacts of basin-scale connectivity. An initial focus will be on processes driving subsurface oxygen transport in the subpolar gyre.

3. Document how improved understanding of basin-scale processes can be used to interpret and assess the reliability of seasonal and longer forecasts.
4. Identify cases where model based forecasts of biogeochemical variables on annual and longer time scales would support actionable ecosystem risk assessment, early warning, and management advice.
5. Prepare manuscripts for publication describing results from this work.
6. Submit a final report to PICES.

Timeline and Expected Deliverables
** include information on the respective TOR(s) to be addressed.*

Year 1 (Spring 2027)

- Identify processes that provide physical and biogeochemical connectivity across the North Pacific. Potential topics include a) quantifying the link between ventilation in the NW Pacific and subsurface oxygen in the NE Pacific (Canadian and US continental shelves); b) whether heaving pycnoclines caused by westward propagating oceanic Rossby waves in the North Pacific play a significant role in variability of primary productivity, and c) if changes in micro- and macro-nutrient inputs play an important role in the oxygen budget through changes in export of biogenic material from the surface to intermediate layers. ToR 1.
- Draft literature review of the oxygen inputs to the subpolar North Pacific (location, magnitude, variability), produce a draft oxygen budget for the intermediate waters of the North Pacific subpolar gyre, and develop an analysis of changes in key parameters of the surface density field in the subpolar gyre such as winter mixed layer depth and surface density with a focus on their potential to affect subsurface oxygen. ToR 2.
- Develop plan for model-based analyses of the ventilation, transport, export, and consumption of oxygen in the intermediate layers of the subpolar gyre. ToR 2.
- Develop plans and identify deliverables for other physical and biogeochemical processes. ToR 2.
- Identify members of other PICES Expert Groups interested in identifying pathways to incorporate findings of the WG into forecast models for the biogeochemical state of the North Pacific. ToR 4.

Year 2 (Spring 2028)

- Modelling study on the impact of oceanic Rossby waves on primary productivity in the North Pacific. Do Rossby waves affect productivity in the western North Pacific, and do they inject iron into the euphotic zone in the central North Pacific? ToR 2.
- Quantify estimate of the time scale for oxygen transport from the northwest Pacific ventilation areas to the west coast of North America. ToR 2.
- Refine deliverables for other processes defined in Year 1. ToR 2.
- Assessment of the importance of these processes for seasonal and longer time scale forecasting of the biogeochemical state of the North Pacific Ocean. ToR 3.
- Identify and task manuscripts that will be written by WG members. ToR 5
- Determine (based on results completed) whether a virtual special issue should be pursued. Tor 5.

Year 3 (Spring 2029)

- Document (either via internal reports or journal peer-reviewed manuscripts) the identified key processes across the North Pacific from drivers to responses (events) and provide estimates of the magnitude of the variability and the timescale from driver to response. ToR 2.
- Document (and provide metrics if possible) how improved understanding of basin-scale processes can be used to interpret and assess the reliability of seasonal and longer forecasts. ToR 3.
- Identify pathways to advance the incorporation of identified cross-basin physical and biogeochemical linkages into seasonal to multi-year prediction systems, with the objective of improving the skill, reliability, and interpretability of forecasts of the North Pacific biogeochemical state. ToR 3 and 4.

- In collaboration with other PICES Expert Group members, identify potential use cases where enhanced forecasting on time scales longer than seasonal could usefully inform marine management applications. ToR 4.
- List of manuscripts submitted and those in preparation stage. ToR 5
- Complete and submit a final report to PICES. ToR 6.

Data Management Plan (if applicable)
**see PICES Data Management Policy,*

The WG does not expect to generate new data. Synthesis products generated will be archived in an accessible location. The WG will conform to PICES Data Management Policies as well as adhere to broader FAIR principles.

Suggested Members
** try to include experts from all PICES member countries (usually up to 3 members from each country). Contact Secretariat (sanae.chiba@pices.int) in advance if that is difficult.*
** recruitment of some ECOP (definition) members are highly encouraged.*
**Once the proposal was approved by SB and GC, suggested Co-chairs and members will officially be appointed by respective PICES National Delegate.*

Name	Country	ECOP? (Y or N)	Email Address
Charles Hannah	Canada	N	Charles.Hannah@dfo-mpo.gc.ca
Jim Christian	Canada	N	James.Christian@dfo.mpo.gc.ca
Fei Chai	China	N	fchai@xmu.edu.cn
Chuanjun Du	China	N	cjdu@hainanu.edu.cn
Sung Yong Kim	Korea	N	syongkim@kaist.ac.kr
Myung-Sook Park	Korea	N	mspark@kiost.ac.kr
Anna Kurnosova	Russia	Y	anna.vazhova@gmail.com
Yury Zuenko	Russia	N	zuenko_yury@hotmail.com
Shoshiro Minobe	Japan	N	minobe@sci.hokudai.ac.jp
Tsuneo Ono	Japan	N	ono_tsuneo65@fra.go.jp
Jun Nishioka	Japan	N	nishioka@lowtem.hokudai.ac.jp
Takuya Nakanowatani	Japan	N	nakanowatari_takuya71@fra.go.jp
Takeshi Doi	Japan	N	takeshi.doi@jamstec.go.jp
Mercedes Pozo Buil	USA	Y	mpozobui@ucsc.edu
Steve Bograd	USA	N	sbograd@ucsc.edu
Cisco Werner	USA	N	cisco.werner@gmail.com
Allison Cluett	USA	Y	acluett@ucsc.edu
Bo Qiu	USA	N	bo@soest.hawaii.edu
Yumi Abe	USA	Y	YumiAbe@gatech.edu
Sam Mogen	USA	Y	samuel.mogen@colorado.edu
Antonietta Capotondi (CLIVAR)	USA	N	antonietta.capotondi@noaa.gov
Patrick O'Hara (S-MBM)	Canada	N	Patrick.OHara@ec.gc.ca
William Sydeman (S-MBM)	USA	N	wsydeman@faralloninstitute.org

Any other information

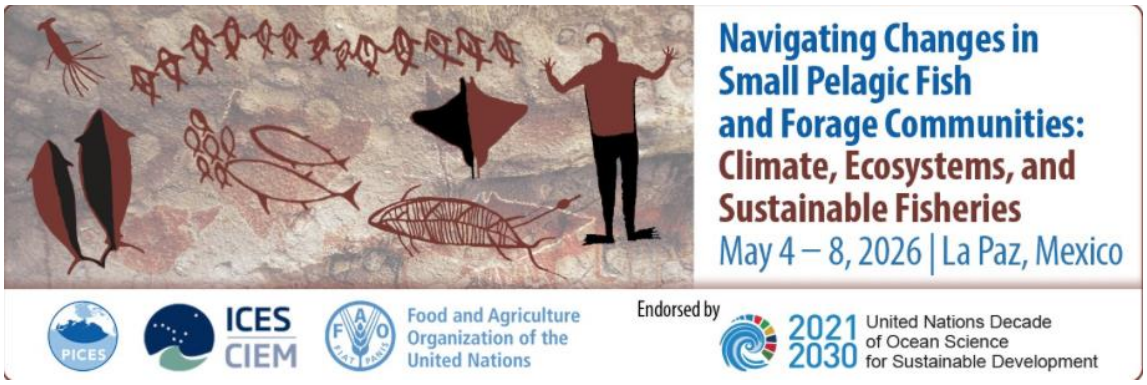
Agenda Item 14: PICES Sponsored Conference/Symposia

Chiba updated information on organized and/or sponsored by PICES and PICES partner organisations from 2026 to 2029. SB reviewed the information and acknowledged the events.

1. International Symposium on Small Pelagic Fish, May 2026, Mexico
2. NPAFC Workshop, May, 2026, Canada
3. ICES ASC 2026, September, 2026, France.
4. Global Symposium on Fisheries Management in an Ecosystem Context, May, 2027, Malaysia
5. 5th Early Career Scientists Conference, 2027, China
6. ECCWO6, late 2029, South Africa

14. 1. ICES/PICES/FAO International Symposium on Small Pelagic Fish (SPF) 2026 Navigating Changes in Small Pelagic Fish and Forage Communities: Climate, Ecosystems, and Sustainable Fisheries

- Date/Location: 4-8 May 2026. La Paz, Mexico
- Primary Organizers: FAO, ICES and PICES
- Local Organizers: CICIMAR, CIBNOR, CICESE, Baja Aqua Farms
- WG53 convene a 2-day post-conference business meeting
- S-CCME convene a 1-day pre-conference workshop



14. 2. NPAFC Workshop – Interactions Between Salmon, Ecosystems and Climate: From Mechanisms to Predictive

- Date/Location: May 16-17, 2026, Vancouver, Canada
- PICES sponsors the event

14. 3. ICES ASC 2026

- Date: Sept 15-18 September, Brest, France
- PICES co-convening Sessions
  Session E: Causes and consequences of extreme temperature events (S-CCME co-chairs are co-convenors)

14. 4. Global Symposium on Fisheries Management in an Ecosystem Context (FIMEC)

- Date & location: May 10-13, 2027, Penang, Malaysia
- Primary Sponsors**:** PICES, ICES, FAO, NOAA Fisheries
- Local Sponsors: WorldFish etc.
- Expected participant size: approx. 500
- Topic Sessions are being identified by Program Committee
- PICES members involvement:
    - Sonia Batten (Convening Committee)
    - Sukyung Kang (Program Committee)

14. 5. 5th ICES/PICES Early Career Scientists Conference (ECS) 2027

ICES and PICES have alternated to take the role of the main organisers of ECS. As the 4th ECS was organized by ICES and held in Newfoundland, Canada, PICES will host the 5th ECS in an Asian nation in 2027. China has confirmed to host the conference (date and location: TBC). ECOPs from ICES and PICES are appointed to serve as the conference SSC.

14. 6. ECCWO6: 6th International Symposium on the Effects of Climate Change on the World's Ocean

PICES and co-organizers, IOC, ICES and FAO, have sought opportunities to hold ECCWO6 in South Africa and communicated with potential local organizers at the University of Cape Town. The first online organizers meeting was held in February, and they agreed on the potential timing of the conference in late 2029 as requested by the local organizer.

14. 7. ICES/PICES 8th Zooplankton Production Symposium

PICES and ICES alternate the lead of this symposium series, and ICES will lead the 8th meeting. The potential location and time are, Quebec City, Canada, in May or June 2029. A PICES scientist was requested to serve as a Symposium Organizing Committee member, and BIO is in discussion on the selection. Science Board endorsed a PICES member to serve as an Organizing Committee member of ZPS8.

Agenda Item 15: Capacity Development Events

Chiba updated information on Capacity Building Events proposed and/or organized by PICES EGs and PICES partner organizations, upcoming from 2026 to 2027. SB reviewed the information and acknowledged the events.

15. 1. PICES Events

2026 PICES Summer School on "*Ocean Biologging*" organized by AP-NPCOOS

- Date: September 14-18, 2026
- Application deadline: May 15
- Location: Hokkaido University, Hakodate, Hokkaido, Japan
- Sponsor: PICES, Hokkaido University, FRA, Nagasaki University, MEXT Japan

AP-NPCOOS requested PICES fund CA$ 21000, mainly for travel support of up to 15 students (approved at GC-2025)

15. 2. Events of PICES Partner Organization

15. 2. 1. SCOR Capacity Development

Sanae Chiba, PICES Deputy Executive Secretary: SCOR CD Committee member (July 2021~)
Core Programmes:

- Visiting Scholars Programme
  Funds for scientists from any country to provide a short training/lecture course at an institution in the developing countries.
  2026 Scholarship awardees were announced
  (submission deadline for 2027 application: December 2026)
- Fellowship Programme (with POGO)
- Travel support for Conference (proposal must be submitted by Organization)
  To support ECOPs from developing countries
  Funded: US$ 6K for participants of SPF2026 (May 2026)

15. 2. 2. CLce2Clouds-BEPSII-CATCH sea-ice SCHOOL (completed)

- Date and Location: Feb 28-Mar 9, 2026, Hokkaido, Japan
- Organizers: CLce2Clouds, BEPSII, CATCH

AP-ARC requested the travel support of a few ECOPs from PICES countries (approved at GC-2025)

15. 2. 3. SOLAS Summer School 2026 (completed)

- Date: March 9-27, 2026, Tamandare, Brazil
- Venue: CEPENE: a marine research centre in the Northeast of Brazil
- Sponsors: SCOR, Futurearth, WCRP etc.
- Organizing Committee

SOLAS IPO requested PICES funding support. PICES supported the travel of a few ECOPs from PICES countries.

Agenda Item 16: Publication update

16. 1. Peer-Reviewed Journal Papers (published)

The respective parent committees confirmed that the publications listed were the outcomes of their children Expert Groups' activities. SB endorsed the committees' evaluations and recommended that GC approve these publications to be posted on the PICES website. SB suggests that PICES add a statement to the manual for New Chairs that reminds EGs to acknowledge PICES EGs in products (e.g., manuscripts). They will include a generalized example of an acknowledgement.

GC approved the following peer-reviewed publications to be added to the PICES website (GC2026/S/6).

EG (Rep. CMT)	Citation	Comment	SB evaluation
S-HAB (MEQ)	Anderson et al., 2025. Controlling harmful algal blooms (HABs) in marine waters: Review of current status and future prospects, Harmful Algae, Volume 150, 2025,102989,ISSN 1568-9883, https://doi.org/10.1016/j.hal.2025.102989.		Recommended
WG53 (FIS)	Quezada-Escalona, F.J., Tommasi, D., Kaplan, I.C. et al. 2025. Socio-economic impacts and responses of the fishing industry and fishery managers to changes in small pelagic fish distribution and abundance. Rev Fish Biol Fisheries. 35: 1063–1093. https://doi.org/10.1007/s11160-025-09949-4 Wildermuth RP, Tommasi D, Kaplan IC, Bograd SJ, Hinchliffe C, Hunsicker ME, Jacox MG, Koenigstein S, Kuriyama P, Muhling B, Pozo Buil M, Thompson A. In press. Revealing climate impacts on recruitment drivers of small pelagic fish through Dynamic Factor Analysis. Mar Ecol Prog Ser 787: meps15152 https://doi.org/10.3354/meps15152 Lin Y., Z. Yu, S. I. Ahmed, X. Wang, T. Higuchi, I. Yabe, M. K. Wong, S. Itoh, E. Tsutsumi, H. Saito, K. Komatsu, A. Tsuda, Y. Kawaguchi, E. Oka, H. Obata, Y. Minegishi, H. Fukuda, J. Inoue, S. Hyodo, S. Ito*. 2026. Opposite latitudinal biodiversity gradient in the open ocean generated by transition zones: Insights from fish distribution in the Northwest Pacific. Progress in Oceanography. 243, 103685. https://doi.org/10.1016/j.pocean.2026.103685 [LINK] Yu Z., M. K. Wong, J. Inoue, Y. Lin, I. Yabe, T. Higuchi, S. Hyodo, S. Itoh, Y. Nishibe, H. Obata, S. Ito. 2026. Environmental DNA of small pelagic fish in the deep ocean. Progress in Oceanography. 241, 103625. https://doi.org/10.1016/j.pocean.2025.103625 Ahmed S. I.*, Z. Yu, T. Higuchi, J. Inoue, M. K. Wong, X. Wang, Y. Lin, S. Itoh, K. Komatsu, E. Tsutsumi, H. Fukuda, S. Hyodo, J. Morrongiello, E. M. Bendif, S. Ito*. 2026. Patterns in marine surface fish biodiversity and community composition detected by different eDNA metabarcoding sampling methods. Journal of Oceanography. 82: 35-57. https://doi.org/10.1007/s10872-025-00771-x Yoshikawa C., N. O. Ogawa, R. N. F. Ishikawa, M. Yoneda, R. Yukami, S. Ito, N. Ohkouchi. 2025. Nitrogen and carbon isotopic		Recommended

	relationships in the diet and eye lenses of chub mackerel revealed in a laboratory rearing experiment. Progress in Earth and Planetary Science. 12, 57. https://doi.org/10.1186/s40645-025-00731-5 Iguchi, N., Kitajima, S., Takahashi, M., Takahashi, T. 2026. Spatial variation in the diet of larval sardine *Sardinops melanostictus* in the Sea of Japan. Fisheries Science. 92: 385-401. Peck M, Catalan I, Rykaczewski R, Takasuka A, Garrido S, Asch R, Baker M, Bowlin N, Boldt J, Brodeur R, Hansen C, Lluch-Cota S, Huret M, Juanes F, Kaplan I, Koenigstein S, Moyano M, Sanchez R, Rooper C, Sohn D, Takahashi M, Tommasi D; Wildermuth R. 2026. Advancing ecological understanding and sustainable management of small pelagic fish. Fish and Fisheries. 27(4): 850-864. https://doi.org/10.1111/faf.70086 Kaplan IC, Hazen EL, Koenigstein S Lezama-Ochoa N Hill M, Hernvann P-Y, Liu OR, Gomes DGE, Vásquez SI, Luján C, Green S, Baker MR, Oliveros-Ramos R, Rovellini A, Asch RG, Muhling B. 2026. The devil's in the details when using correlative and mechanistic species distribution models to inform multispecies and ecosystem models. Can. J. Fish. Aquat. Sci. 83: 1-27. Fu C, Boldt JL, Rooper CN, Cleary JS, Doniol-Valcroze T, Hourston, RAS, McMillan CJ, Sastri AR, Tucker S. 2026. A Comprehensive Analysis of Physical, Biological, and Fishery-related Drivers Shaping Pacific Herring Population Dynamics. Mar. Ecol. Prog. Ser. 788: meps15167		
WG55 (POC)	Fujii, M., T. Ono, M. Yamada, M. Ooue, T. Ito, J.-H. Yang, Y. Horiuchi, H. Oiwane, M. Wakita, and S. Wada. 2025. Seawater carbonate chemistry and biodiversity of shallow-water CO_2 seeps on Himeshima Island and Showa Iwojima Island, Japan [dataset]. PANGAEA, doi: 10.1594/PANGAEA.988343.	Data product. Data Doi registered in Jan 2026.	Recommended
WG57 (POC)	Feng, Z., Zhang, Z., Zhang, J., Zhang, W., Yuan, M., Jing, Z., et al. 2026. Implementation and evaluation of a new parameterization of submesoscale vertical flux in a mesoscale-resolving model in the North Pacific. Ocean Modelling. 102655. https://doi.org/10.1016/j.ocemod.2025.102655		Recommended
WG43 (disbanded) (FIS)	Peck M, Catalan I, Rykaczewski R, Takasuka A, Garrido S, Asch R, Baker M, Bowlin N, Boldt J, Brodeur R, Hansen C, Lluch-Cota S, Huret M, Juanes F, Kaplan I, Koenigstein S, Moyano M, Sanchez R, Rooper C, Sohn D, Takahashi M, Tommasi D; Wildermuth R. 2026. Advancing ecological understanding and sustainable management of small pelagic fish. Fish and Fisheries. 27(4): 850-864. https://doi.org/10.1111/faf.70086	Synthesis paper on SPF2022, Lisbon.	Recommended
S-CCME (FIS)	Lin Z., S. Ito, A. Baudron, C. Stawitz, T. Tomiyama, K. Fujiwara, P. D. Spencer, J. Mor-rongiello. In press. A state-space approach reveals that competition drives variation in fish body weight, with influences from environmental conditions and fishing pressure., Progress Oceanography. https://doi.org/10.1016/j.pocean.2025.103582 Ahmed S. I., Z. Yu, T. Higuchi, J. Inoue, M. K. Wong, X. Wang, Y. Lin, S. Itoh, K. Komatsu, E. Tsutsumi, H. Fukuda, Susumu Hyodo, J. Morrongiello, E. M. Bendif, S. Ito. 2025. Patterns in marine surface	Addressing ToR1: Coordinate & integrate research activities & ToR3: Identifying vulnerability and sustainability of marine ecosystem	Recommended

	fish biodiversity and community composition detected by different eDNA metabarcoding sampling methods. Journal of Oceanography. https://doi.org/10.1007/s10872-025-00771-x		

16. 2. PICES Official Publication

SB acknowledged that the listed reports and articles, which were already published in the PICES Official Publications, were the outcome of the respective expert group activities.

EG (Rep CMT)	Type of publication & Title	Note
AP-ECOP (FUTURE)	Matsubara, H., Tanaka, K., Roman, R., Ikenoue, T., Takagi, S., Hirokawa, T., Lin, Y., Amano, S. (2026). ECOP-led side events at PICES 2025: Yokohama Marine Park Visit and Tour to JAMSTEC. PICES Press 34(1), 59-61.	
AP-ECOP (FUTURE)	Kim, M., Roman, R., Matsubara, H., Lachance, H. (2026). Early Career Ocean Professional Engagement Opportunities During PICES Annual Meetings: Reflections from 2022–2025. *PICES Press 34(1), 62-66.*	
S-CC (POC)	Ono, T., Kozyr, A., Christian, J.,Lee, K. (2026) Building Framework for Cross-Community Conversation Between Natural Carbon Cycles and Marine Carbon Dioxide Removal at PICES-2025. *PICES Press 34(1), 27-33*	
WG51 (HD)	Takemura, S., Foden, J., Raphael Roman, R., K., (2026) PICES-2025 Topic Session 15 The Rise of Bibliometric Analyses to Address Sustainability Solutions Through a Human Dimension Lens. *PICES Press 34(1), 55-56*	

16. 3. Other Publication

EG (Rep CMT)	Type of publication & Title	Note
AP-ARC (SB)	S. 2026. Joint ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean(WGICA; outputs from 2025 meeting). ICES Scientific Reports. 8:25. 17 pp. https://link.edgepilot.com/s/3d3a2de9/hpB1Zd9XiEC0GpI3GUFTmw?u=https://doi.org/10.17895/ices.pub.31898674	

16. 4. EG Final Report in Progress

Chiba reported the EG Final Reports in progress in various stages (1. In preparation, 2. Being reviewed by the parent Committee, 3. submitted to Secretariat, 4. previously approved by SB and nearly completed). SB acknowledged the progress, and the respective parent committees were committed to ensuring the completion of the reports without delay.

EG	Type of publication & Title	Stages	comments
WG47 (BIO)	PICES Scientific Report	4. Final formatting by Secretariat	Approved at PICES-2025 and WG disbanded
WG48 (BIO)	A peer reviewed review paper titled “A primer for underwater plankton	3. Submitted to the Journal of Plankton Research (under	WG48 accomplishments & PICES contribution are

	imaging systems" on Annual Reviews in Marine Science.	review). Manuscript submitted to parent Committee and Secretariat.	acknowledged in the paper.
WG50 (POC)	PICES Scientific Report	1. In preparation	Submission due: PICES-2026

Note on the Protocol of WG Final Report Submission and the Timing of Disbandment of WG.
(agreed at ISB-2022)

- WGs are due to submit their final reports to the Parent Committees at the end of the term. Science Board members wish to gently remind EGs that final reports are expected – particularly for those groups where GC has already extended their terms in order to complete their reports.
- The format of the final report will typically be a PICES Science / Technical Report (PICES Rule), but also be in various formats such as Peer-reviewed Journal Special Issue, Peer-reviewed Journal Review Paper, etc.
- Definition: WG disbands upon the submission of its Final Report to Secretariat after review and approval of Parent Committee(s).
  PICES Rule of Procedure 13: A WG shall be disbanded either after preparation of its final report or as determined by the SB, for inadequate progress in achieving its tasks.

Agenda Item 17: Other Issues

Science Board Decision-Making Process.
SB discussed its decision-making protocols, specifically whether SB recommendations should be determined by majority vote or consensus. Batten confirmed that the PICES Rules of Procedure define detailed voting rules for GC as the PICES decision-making body; SB's role is to provide recommendations for GC decisions and may determine its own effective voting process. SB supported the previously utilized and conventional majority vote for the ISB-2026 and future meetings to ensure consistency in SB decision-making.

Report from the HD Committee
Human Dimensions Committee Chair Karen Hunter reported that the committee was developing new strategies to effectively achieve its key tasks, including the formation of country-specific nodes (including non-HD committee members) to help scope respective priorities and support integration across disciplines.

EG Fact Sheets
AP-SciCom noted challenges in encouraging PICES EGs to produce their Fact Sheets. Although they provided a template and are offering support, only a few EGs have developed and posted them on the PICES website. Some SB members questioned the purpose of the Fact Sheets, and Secretariat clarified that they are intended to inform wider communities, including non-science experts, about PICES activities and scientific outcomes, as well as to enhance communications among EGs. Secretariat asked Science Board members to encourage children EGs under their committees to develop their Fact Sheets. AP-SciCom and Secretariat continue to seek measures to include Fact Sheet production as part of the regular responsibilities of EGs. The Secretariat is going to place a link to the Fact Sheet template on the PICES Fact Sheet webpage (in addition to the existing link on the AP-SciCom webpage) to make it easier to find.

- End of document -

Appendix 1

TCODE Revised Action Plan

Technical Committee on Data Exchange
Action Plan (2025--)

Mission

The mission of the PICES Technical Committee on Data Exchange (TCODE) includes the following:

- Identify the data sharing and management needs of PICES and PICES members;
- Develop strategic plans to meet these requirements;
- Review PICES Zenodo entries and ensure they are consistent with PICES activities;
- Recommend the establishment of expert groups to Science Board to address the specific functions of TCODE;
- Review the progress of tasks assigned within TCODE (see TCODE workplan), and provide Annual Reports to Science Board on the work of TCODE;
- Review and rank annual nominations for PODA and POMA awards;
- Advise the PICES Secretariat on its data exchange activities; and
- Review and update PICES data management policy as needed (latest update-2024 here).

Strategy of TCODE

To implement its mission, TCODE will address each of the five specific goals to advance and apply scientific knowledge of PICES strategy. Specific actions and tasks within each of these goals are as follows:

Goal 1: Foster collaboration among scientists within PICES and with other multinational organizations

Action 1 Establish dialogue with the various bodies of the international, national and local organizations, commissions and programmes involved in Marine Data and Information Management issues

Task 1.1 Maintain dialogue with PICES-ICES UN Decade working group, ICES DIG and SmartNet activities

Task 1.2 Maintain dialogue with relevant programmes, sub-commissions, sub-projects of UNESCO/IOC, such as IODE (ODIS, OTGA), NOWPAP, NEAR- GOOS, IOOS, CIOOS, and ODINWESTPAC

Task 1.3 Establish dialogue with organizations such as UNESCO/IOC and ICES to support the UN Decade of Ocean Science, in particular, its societal outcome of "Transparent and accessible ocean"

Task 1.4 Review and evaluate proposals submitted to SCOR and ICES to establish new working groups

Task 1.5 Keep contact with other Committees, Programs and WGs of PICES

Goal 2: Understand the status and trends of international marine data centers and information sites

Action 2 Propose topic sessions and workshops at upcoming annual meetings, and intersessional meetings and symposia

Task 2.1 Support topic sessions and workshops at upcoming annual meetings, and intersessional meetings and symposia

Task 2.2 Advise the Secretariat and expert groups on data exchange activities

Goal 3: Advance methods and tools

Action 3 Provide support for the use of shared information technologies.

Task 3.1 Review and update PICES data management policy

Task 3.2 Work with PICES expert groups and PICES Secretariat to update and maintain PICES data inventory and PICES Zenodo catalogue

Task 3.3 Provide guidance to PICES expert groups regarding PICES data management policy, data inventory, and Zenodo submission protocols

Goal 4: Provide relevant scientific information pertinent to North Pacific ecosystems that is timely and broadly accessible

Action 4 Support preparation of the North Pacific Ecosystem Status Report (NPESR)

Task 4.1 Assisting in the development of PICES North Pacific database activities via BECI group

Goal 5: Engage with early career scientists to sustain a vibrant and cutting-edge PICES scientific community

Action 5 Promote training and education activities with local, regional and international organizations

Task 5.1 Support or develop joint training and education activities with regional and international organizations, programmes, projects, such as IOC/OTGA

Legend:

BECI:Basin-scale Events to Coastal Impacts
CIOOS: Canadian Integrated Ocean Observing system
DINRAC: Data and Information Network Regional Activity Center
ICES: Intergovernmental Council for the Exploration of the Sea
IOC: Intergovernmental Oceanographic Commission
IODE: Intergovernmental Oceanographic Data and Information Exchange
IOOS: Integrated Ocean Observing System
NEAR-GOOS: North-East Asian Regional Global Ocean Observing System
NOWPAP: Northwest Pacific Action Plan
NPESR: North Pacific Ecosystem Status Report
ODINWESTPAC: Ocean Data and Information Network of the Western Pacific
OTGA: Ocean Teacher Global Academy
PODA: PICSE Ocean Data Excellence Award
POMA: PICES Ocean Monitoring Service Award
SCOR: Scientific Committee on Ocean Research
UNESCO: United Nations Education Scientific and Cultural Organization

Appendix 2

Revised S-CCME Phase 5 Implementation Plan

Implementation Plan for Phase 5 (2025-2030)
PICES-ICES Section on
Climate Change Effects on Marine Ecosystems

S-CCME/SICCME Vision

PICES and ICES will become the leading international organizations providing science and advice related to the effects of climate change and variability on marine resources and ecosystems.

PICES and ICES will develop the scientific basis for evaluating the vulnerability, status and sustainability of marine systems under changing climate conditions. Collaborative research within PICES and ICES will facilitate the development, maintenance and evolution of a network of regional interdisciplinary research teams. The network of S-CCME teams will share research approaches on a global scale to foster laboratory, field and modelling activities that will provide data and understanding at the spatial and temporal scales needed to monitor, assess and project climate change impacts on marine ecosystems.

S-CCME's (updated) Goals:

1. **Identify, coordinate, and integrate the research activities** needed to understand, assess and project climate change impacts on marine ecosystems to support delivery of actionable advice.
2. **Review various strategies for sustaining the delivery of ecosystem goods and services** based on predictions that quantify estimates of uncertainty;
3. **Advance efforts to define and quantify the vulnerability and sustainability of marine ecosystems to climate change,** including the cumulative impacts and synergetic effects of climate and marine resource use;
4. **Support global ocean prediction frameworks**, through international collaborations and research, building on ICES and PICES monitoring programs.

UNDOS Alignment

PICES and ICES continue to be well positioned to be leading organizations participating in the UN Decade of Ocean Science for Sustainable Development ("Decade" 2021-2030). The Decade is intended to provide a common framework for international collaboration on ocean scientific research and innovative technologies in support of ocean sustainability. The Decade will contribute to the UN 2030 Agenda for Sustainable Development by fostering international cooperation aligned with 7 main societal goals:

1. A clean ocean where sources of pollution are identified and removed;
2. A healthy and resilient ocean where marine ecosystems are mapped and protected;
3. A predictable ocean where society has the capacity to understand current and future ocean conditions;
4. A safe ocean where people are protected from ocean hazards;
5. A sustainably harvested ocean ensuring the provision of food supply;
6. A transparent ocean with open access to data, information and technologies;
7. An inspiring and engaging ocean - where society understands and values the ocean in relation to human wellbeing and sustainable development.

The goals of S-CCME align well with all the Decade objectives, particularly a predictable ocean. PICES and ICES intend to participate in the Decade through actions, and S-CCME can support these through coordination and collaboration (e.g., through SmartNet).

5 Year Implementation Plan Activities & Milestones

Since the inception of S-CCME in 2011, there have been significant advancements in the tools and methods used to understand and respond to climate-driven changes to marine ecosystems and fisheries. Increasingly, these tools and information form the basis for implementing climate-informed fisheries and ecosystem management. Integration of EBM tools and ocean forecast and prediction models forms the foundation of expert advice and decision making that helps support vibrant coastal communities, ecosystems and economies. S-CCME/SICCME are well positioned to coordinate and streamline advice and tools towards operational implementation and help advance scenario planning and decision making with the best available science and information.

Support an interdisciplinary community of practice for exchange of information

S-CCME will collaborate with ICES and PICES working groups and advisory bodies to define the future direction of the joint Section/Initiative, emphasizing sustained coordination of climate change research, integration of climate information into advice products, participation in the UN Decade of Ocean Science for Sustainable Development (UNDOS), and empowerment of early-career scientists within the community of practice. In particular, S-CCME will identify focal sub-areas and points of contact for integration across sub-groups within ICES and PICES. These focal areas may include themes such as climate-informed Ecosystem Based Management, climate-linked spatial modeling, scenario and adaptation planning, tipping point analyses, risk assessments, and ensemble approaches.

Communicate and advance understanding

Through information-sharing networks, regular meetings, and interdisciplinary workshops, S-CCME will advance understanding of climate impacts and adaptation in marine ecosystems. Joint ICES–PICES theme sessions and workshops will provide a forum for scientific exchange and dissemination to the broader research and policy communities. In Phase V we aim to hold annual business meetings as well as 10-12 (roughly monthly) meetings of the chairs and sub-group leads and a semi-annual Spring working meeting to identify and advance products, tools, and frameworks to support actionable climate-informed EBM advice. At each annual business meeting, S-CCME members participating in UNDOS activities will share relevant projects and discuss ways in which S-CCME does or can support UNDOS efforts.

Synthesize and share knowledge with relevant bodies

S-CCME will co-develop open-science resources, including code packages and data templates, to enable transparent and reproducible synthesis of climate-related information. Regional summaries and synthesis products will be coordinated with ICES and PICES communities and submitted to regional, national and international assessments (e.g., IPCC AR7, IPBES) and advisory processes.

Recurring Annual Activities (All Goals)

Annual Cycle	Purpose	Outputs

Monthly S-CCME Leads Meetings	Coordination, monitoring, and communication among S-CCME/ SICCME and deliverable leads.	Quarterly updates and shared action logs.
Spring Working Meeting	Planning, training, and synthesis around annual deliverable themes.	Workshop report, refined deliverable plans, "State of Progress" summary.
Business Meeting (Sept/Oct)	Annual review, alignment with ICES/PICES committees, and approval of next-year priorities.	S-CCME Annual Report, coordination and communication across regions, updated implementation schedule.
Final Year (2030)	Phase V Symposium replaces Spring Meeting or is in coordination with the fall Business Meeting.	S-CCME Legacy Report, synthesis outputs, and Phase VI plan.

Cross-Cutting Metrics (All Goals)

- **Governance:** Regular meetings, participation rates, and timely reporting.
- **Science Outputs:** Frameworks, inventories, publications, and synthesis contributions.
- **Advice Outputs:** Uptake of frameworks and products in ICES/PICES and member nation processes.
- **Capacity Building:** Number and diversity of member nations and early-career scientists engaged.
- **International Alignment:** Documented contributions to UNDOS, IPCC, and national and regional climate initiatives.
- **Open Science and Communication:** Inventories, shared data, code, and communication products.

Milestones and Progress Metrics (2026–2030)

Goal	Key Activities	Milestones	Progress indicators
Goal 1: Identify, coordinate, and integrate the research activities needed to understand, assess and project climate change impacts on marine ecosystems.	Coordinate interdisciplinary research on marine ecosystem responses to climate change. Facilitate information exchange across ICES and PICES expert groups and regional initiatives. Support early-career scientist engagement in integrated climate–ecosystem research.	**Monthly Theme Leads Meetings:** Maintain monthly coordination between S-CCME co-chairs, ICES SICCME leads, and theme group leads to track progress and emerging science priorities. **Annual Spring Workshop:** Focus on defining and refining interdisciplinary research priorities and deliverable themes (e.g., EBM, stock assessments, oceanographic projections). **Annual Business Meeting (Sept/Oct):** Review coordination outcomes, finalize annual report, and align next year's priorities with PICES and ICES committees.	10–12 coordination meetings held annually with bi-annual summaries. Annual workshop report and progress statement included in S-CCME annual report. Increased cross-membership and collaboration across ICES and PICES expert groups.
Goal 2: Review various strategies for sustaining the delivery of ecosystem goods and services based on predictions that quantify estimates of uncertainty.	Review state of the art tools and methods that integrate climate projections into ecosystem-based management (EBM). Lead deliverable theme groups producing operational templates and guidance for management uptake. Collaborate with ICES and PICES advisory bodies and working groups to align outputs with management and	**Deliverable Themes Established (2026):** Launch working groups for climate-informed EBM, Ecosystem Overview templates, and climate-ready stock assessments. **Annual Spring Workshop:** Review and refine deliverable progress and ensure connection to management applications.	At least three active deliverable theme groups by 2026. At least one guidance document, template, or synthesis paper per theme by 2030. Documented use of S-CCME deliverables in ICES and PICES advice processes.

	regional priorities, supporting delivery of actionable advice.	**Annual Business Meeting:** Evaluate EBM implementation outcomes and integration into advice frameworks.	
Goal 3: Advance efforts to define and quantify the vulnerability and sustainability of marine ecosystems to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use.	Advance regional and thematic synthesis to identify vulnerabilities under climate scenarios. Facilitate integration of physical, biological, and human dimensions through coordination among scenario and risk modeling. Engage in regional international assessments (UNDOS, IPCC AR7, IPBES) to communicate findings around ecosystem impacts and changes as well as effective adaptation and mitigation approaches.	**Annual Spring Workshop:** Feature focused sessions on vulnerability assessment methods and applications. **Annual Business Meeting:** Synthesize progress toward IPCC AR7 inputs and regional synthesis products. **Deliverable Themes:** Develop standardized "Climate Assessment Framework" for ICES/PICES regions.	Contributions submitted to IPCC AR7 and UNDOS projects. Regional climate assessment frameworks (and where applicable, climate summaries) completed and shared with PICES/ICES committees. Published synthesis products (e.g., fact sheets, special issues) highlighting regional vulnerability trends.
Goal 4: Support global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.	Advance coupled physical– biological modeling, AI-based forecasting, and open-science tool development. Promote international collaborations linking PICES/ICES to UNDOS networks and SmartNet initiatives. Support the creation of reproducible code and data-sharing frameworks.	**Deliverable Themes:** Launch theme groups focused on coordination among ICES and PICES groups working on oceanographic and AI modeling and marine CDR (carbon dioxide removal). **Annual Spring Workshop:** Report progress on predictive modeling deliverables and cross-regional synthesis. **Final Symposium (2030):** Present S-CCME Phase V outcomes, including predictive framework prototypes and global stocktake contributions.	Open-access modeling and synthesis tool inventory launched by 2028. At least one PICES/ICES-endorsed synthesis of predictive frameworks completed. S-CCME Phase 5 Report or special volume published and endorsed by both organizations.

Appendix A: Background

In the spring of 2011, PICES and ICES agreed to move forward on the Science Plan for a PICES-ICES Section on Climate Change effects on Marine Ecosystems (S-CCME IP). This project is known within ICES as the Strategic Initiative on Climate Change Impacts on Marine Ecosystems (SICCME). As stated in the Science Plan the goal of S-CCME was to:

1. Define the research activities needed to understand, assess and project climate change impacts on marine ecosystems with sufficient spatial and temporal resolution to plan strategies for sustaining the delivery of ecosystem goods and services and the preservation of biodiversity. When possible projections should quantify estimations of uncertainty.

2. Define and quantify the vulnerability of marine ecosystems to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use.

3. Build global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.

The PICES and ICES co-chairs published an initial Science Plan and a 2012-2014 Implementation Plan (IP) for this initiative (Hollowed et al, 2013: Appendix 4, S-CCME IP). A phased implementation approach was proposed, and at the PICES Annual Meeting in 2019, S-CMME requested that IP Phase durations be extended to 5 years; this request was approved by the Governing Council. Within the IP, both organizations recognized that while the specific activities of S-CCME may change overtime three activities of the S-CCME IP were expected to be continuous:

1. Synthesis of existing knowledge,
2. Advancement of new science and methodology, and
3. Communication of research findings.

Phase 2 (2015-2017) IP included:

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic sessions and workshops;
- Update and improve forecasts with IPCC AR5 scenarios;
- Convene an international symposium in 2016;
- Develop regional synthesis reports;
- Initiate inter-sessional training for projecting climate change impacts on marine ecosystems;
- Continue collaboration with global climate change research community.

Phase 3 (2018-2020) IP included:

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic Sessions and workshops;
- Update and improve predictions with IPCC AR6 scenarios;
- Develop regional synthesis reports;
- Convene an international symposium in 2018.

Phase 4 (2021-2025) IP included those of phases 1-3 as well as :

- Provide forums for communication and coordination between national climate research nodes modeling teams. A key element of this process will be to propose investigator meetings during the PICES and ICES annual meetings.

- Evaluate and compare ecosystem projections and outcomes based on CMIP6 projections and IPCC AR6 results released in 2021.
- Continue to expand core research activities, including laboratory and field activities, needed to advance the global synthesis of climate change impacts on marine ecosystems for sustaining the delivery of ecosystem goods and services, and define and quantify the vulnerability of marine ecosystems and key living marine resources to climate change. [Decade relevant]
- Convene dedicated S-CCME topic sessions for PICES and ICES Annual meetings. [Decade relevant]
- Provide a forum for the assessment and synthesis of existing projections of climate change impacts on marine ecosystems through joint theme or topic sessions and workshops at international symposia including the 5th Effects of Climate Change on the World's Oceans Symposium (tentatively scheduled for June 2023 in Bergen, Norway). [Decade relevant]
- Encourage integration with the PICES Human Dimensions Committee and the ICES Strategic Initiative on Human Dimensions through joint theme or topic sessions and workshops.
- Publish regional summaries in a timely manner to allow their consideration by the relevant IPCC Assessment Reports. This effort will facilitate international collaboration and will provide a vehicle to communicate our current knowledge to stakeholders and the broader scientific community.

Appendix 3

AP-CREAMS Revised Action Plan

Revised AP-CREAMS Action Plan with Rationale for extension of AP-CREAMS focus area and revision of Terms of Reference (2025-07-21)

1. AP-CREAMS tasks and their implementation

The AP-CREAMS (Advisory Panel on *Circulation Research in the East Asian Marginal Seas*) was established in October 2005 with the following tasks:

1. To initiate and coordinate studies on hydrography, circulation, and biology, as well as on variability of oceanographic and biological properties in the PICES area of the East Asian Marginal Seas;
2. To estimate climate-scale and long-term changes in abiotic and biotic environments of this region;
3. To facilitate the establishment of permanent observation and data exchange networks in this region;
4. To convene workshops/sessions to evaluate and compare the results of national and international research programs.

Primarily the activity of the AP-CREAMS is focused on the Northeast Asian marginal seas, which are sensitive to climate change and anthropogenic impacts, where intensive national activities take place, and where a strong need for international coordination and collaboration to study the variability of hydrodynamics, biogeochemistry, ecosystems, fisheries, and influence of human activities at multiple scales in the area exists.

Research activities among PICES member countries in the region of the Northeast Asian marginal seas have a permanent character and need ongoing coordination, as the interests of different countries tightly overlap. Some ideas on further development of international surveys and observation networks have already been discussed by AP-CREAMS though specific details, such as joint standard sections, format of data exchange, operational information on planned and ongoing cruises, extension of the target area, *etc*. are not yet developed.

Meetings of the AP-CREAMS are organized 2-3 times each year with exchange of results of international and national activities and plans. Results of the joint research in the CREAMS area have been published in leading scientific literature. AP-CREAMS is continuing the preparation of publications on the state of the regional ecosystem, namely on the PICES Scientific Report “Oceanography of the Yellow and East China Seas”, and regional chapters (Areas 19 and 21) for the North Pacific Ecosystem Status Report-3.

During the most recent period (2023-2024) the AP convened the following workshops and scientific sessions:

- a workshop on “Changing social-ecological-environmental system of the North East Asian Marginal Seas: New challenges for integrative marine science” during PICES-2023 in Seattle, USA;
- CREAMS 30th Anniversary & CSK-II Joint-Workshop « International collaboration for science of East Asian Marginal Seas in a changing climate: circulation, biogeochemistry, and socio-economic research», July 25-26, 2024, Seoul, Korea;
- scientific session “Past, Present and Future of CREAMS program: 30 years of international research in North East Asian Marginal Seas” at PICES-2024 in Honolulu, USA;

- proposal of scientific session on “Changing Asian Marginal Seas: from marine science to societal needs, current challenges for integrative science and UN Ocean Decade is accepted for PICES-2025 in Yokohama, Japan.

AP-CREAMS maintains close contacts with leading regional international organizations, such as IOC/WESTPAC, UNEP/NOWPAP (CEARAC), IMBeR and others. Their representatives participate in the AP meetings and other activities. Information on their current programs and proposals for collaboration is provided and discussed at the AP meetings.

2. Revision of AP-CREAMS AP Terms of References

During recent years, in addition to the primary tasks, AP-CREAMS started activity in new directions, as a contribution to PICES/FUTURE and in response to their request:

i) to pursue an integrative approach, to include multiple disciplines beyond the physics and chemistry to cover the whole social-ecological-environmental-system framework developed by FUTURE,
ii) to extend geographic coverage to include all North-East Asian Marginal Seas beyond the EAST-I and EAST-II regions, and
iii) to prioritize involvement of ECOPs in its activity.

Correspondingly, the AP members drafted new terms of reference, as below (changes are highlighted in italics):

1. To coordinate programs to study marine ecosystems and their variability *in the East Asian Marginal seas and their interaction with the western North Pacific in a light of global change;*
2. To facilitate the establishment of permanent observation and data exchange networks in this region;
3. To convene workshops/sessions/*mentoring and build knowledge networks* to advance, evaluate and compare results from the program *and its linkages to broader PICES activities;*
4. *Develop recommendations for PICES to better collaborate within PICES, and with indigenous and international initiatives relevant to the Asian marginal seas;*
5. To enhance capacity building, knowledge dissemination, and cooperation with other international marine organizations/programs in the region *with relevant expertise (e.g., IOC/WESTPAC, NOWPAP, NEAR-GOOS etc.)*;
6. *To provide more opportunities for ECOPs to join.*

3. Justification of the AP-CREAMS focus area

To understand the processes in the Asian Marginal seas and their impact on adjacent areas of the Pacific it is important to consider the wider area, to account for physical-biological connectivity across the western North Pacific and to evaluate potential climate impacts across a broader PICES domain with a focus on its marginal seas. In addition to Northeast Asian marginal seas the proposed extension would cover the Okhotsk Sea, western part of the Northwestern Pacific and western part of the Bering Sea, including regions 16, 17, 18, 22 and narrow northwestern part of region 23 (Fig. 1). This extension is also timely because of increasing human activity along new maritime routes in the Arctic and their gateways which

must pass the Northeast Asian marginal seas and currently developing new international research programs like Cooperative Study of Kuroshio-2 (CSK-2) by IOC/WESTPAC, when branches of the Kuroshio impacting marine ecosystems in the broader western Pacific areas including the marginal seas. However, the AP will keep its balance among and primary focus on the initial marginal seas to not dilute the specificity of CREAMS.

The extension will:

1. provide more opportunities for the PICES community to be involved in the AP-CREAMS activity (e.g., bringing more attention to the workshops/sessions/mentorships the AP-CREAMS convenes),
2. enhance capacity of the AP-CREAMS to better coordinate programs to study the marine ecosystem, its variability in the core areas (19, 20, and 21) as well as the influence, exchange and interactions of ecosystem components between the core area and the extended areas. The extension will also facilitate the establishment of permanent observation and data exchange networks in a larger western North Pacific and its marginal seas, and disseminate more knowledge on the extended area.

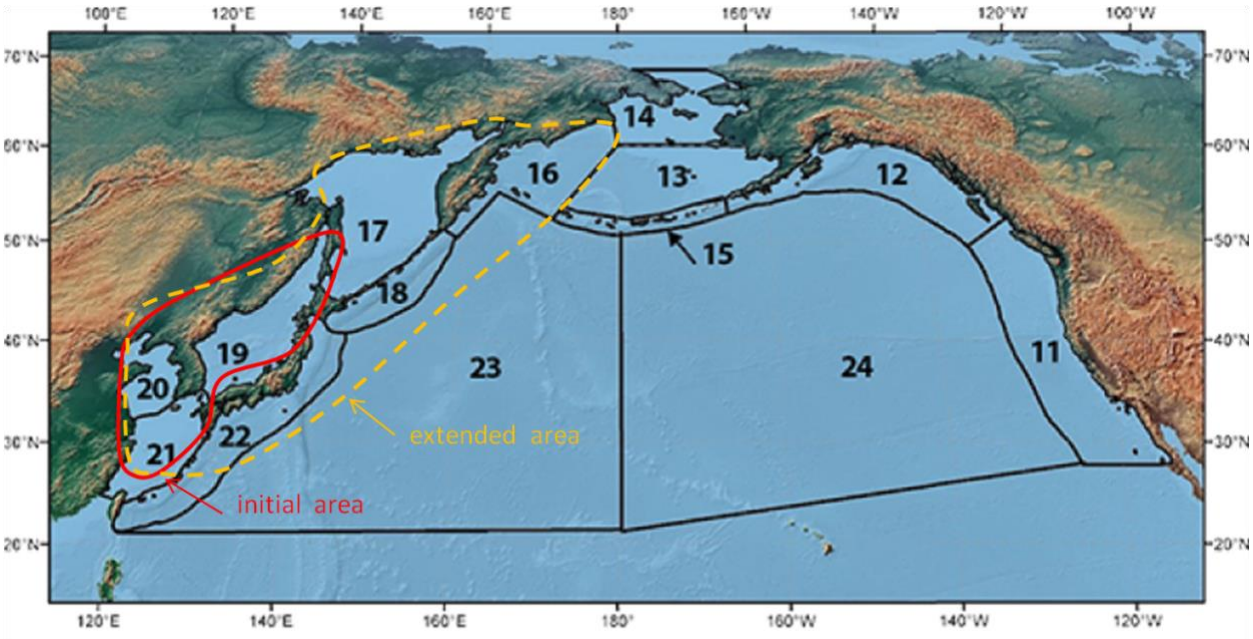


Figure 1. AP-CREAMS initial focus area (red line) and proposals of its extension (yellow dashed line) overlapped on PICES NPESR regions map

Considering the goals of PICES, the extension will:

1. better promote and coordinate marine research in the western North Pacific marginal seas (not limited to the core areas 19-21 but also the extended areas),
2. advance more scientific knowledge about the ocean environment, global weather and climate change, living resources and their ecosystems, and the impact of human activities, focused on the western North Pacific marginal seas, and better promote the collection and rapid exchange of scientific information on more issues

The extension will not overlap in spatial extent with other existing PICES EGs AP-ARC and AP-NPCOOS because of AP-CREAMS will focus on the areas off the coast (not near the

coast, thus be separated from focus of AP-NPCOOS) and mid-latitude Asian marginal seas (not Pacific Arctic and its Gateway and thus be separated from focus of AP-ARC).

Below we present a few cases for better understanding that science/knowledge for the core areas of AP-CREAMS (19, 20, and 21) is linked to that for the extended areas (16, 17, 18, and 22).

Case 1. Interannual variability of winter sea levels induced by local wind stress: Interannual variations of sea level averaged over the core area (Areas 19, 20, and 21) are significantly affected by sea surface wind patterns, particularly on the extended area (Area 17). See Figure 2 below originating from Han et al. (2020).

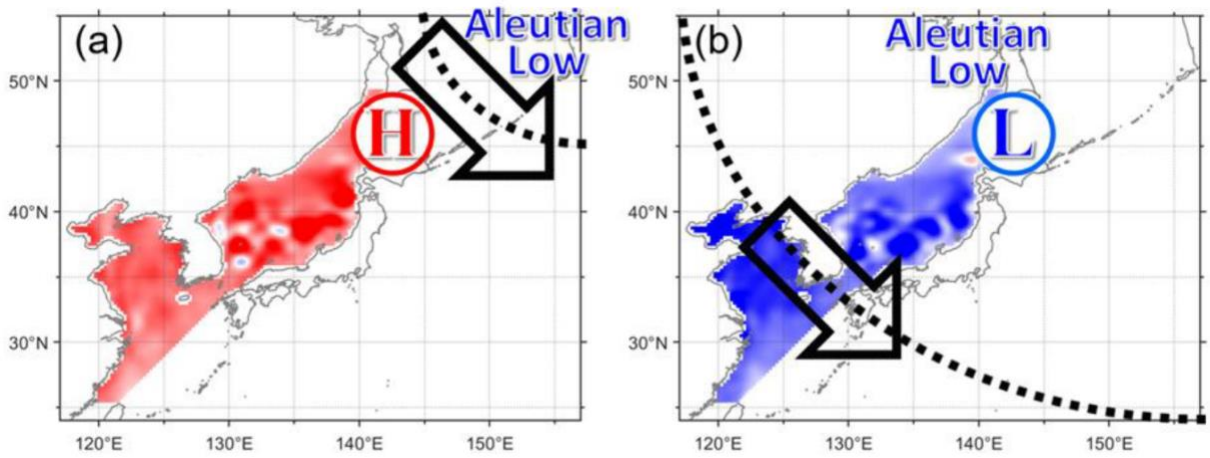


Figure 2. Schematic diagrams accounting for the winter NorthEast Asian Marginal Seas (NEAMS, Areas 19, 20, and 21) mean sea level anomalies. (a) A stronger winter monsoon with northwesterly wind or southeastward wind stress (black arrows) and associated atmospheric pressure gradients (black dotted lines) in the southern Sea of Okhotsk (Area 17); e.g., the northeastward retreat of the Aleutian Low obstructs the outflow transport from the Area 19 into the Pacific by Ekman dynamics to yield a higher (red) NEAMS sea level during Period H (period of positive NEAMS mean sea level anomaly). (b) In contrast, a stronger winter monsoon in the southern Area 19 obstructs the inflow transport from the Pacific to the Area 21 and to the Area 19 to yield a lower (blue) NEAMS sea level during Period L (period of negative NEAMS mean sea level anomaly). Source: Han et al. (2020)

Case 2. Hydrographic structure and material concentrations, and their variability within and beyond the Area 19 linked to processes outside the core area (extended area): Hydrographic structure and material (e.g., ^{134}Cs) concentrations, and their natural and human-induced variations in the core area (Area 19) are significantly affected by those in the extended areas (Areas 17, 18, and 22) as well as the other core areas (Areas 20 and 21) via the current systems shown in Figures 3 and 4 originating from Yasuda (2003) and Inoue et al. (2023).

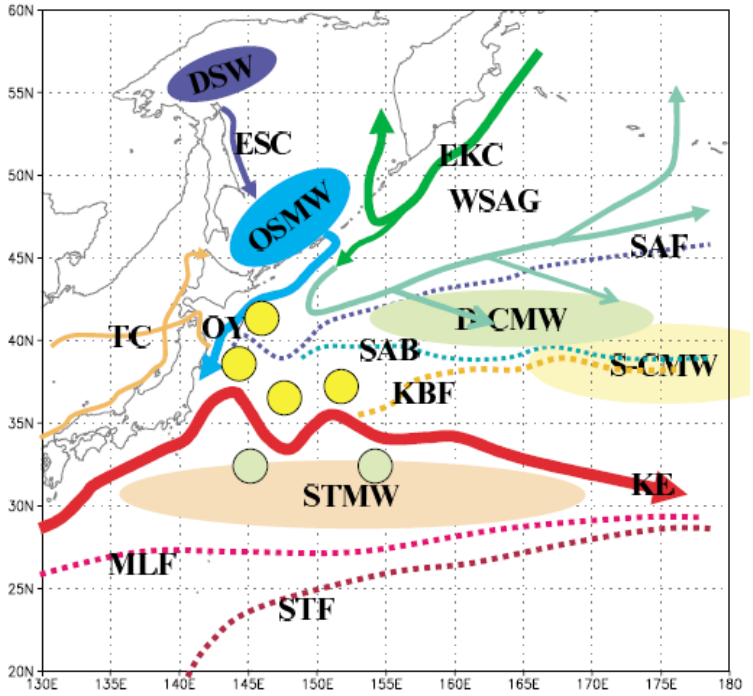


Figure 3. Schematic illustration of the near-surface current, front and water-mass structures in the Kuroshio-Oyashio transition area. EKC: East Kamchatka Current, WSAG: Western Subarctic Gyre, ESC: East Shakalin Current, OY: Oyashio, KE: Kuroshio Extension, TC: Tsushima Warm Current, SAF: Subarctic Front, SAB: Subarctic Boundary, KBF: Kuroshio Bifurcation Front, STF: Subtropical Front, MLF: Mixed Layer Front, STMW: Subtropical Mode Water, S-CMW: Shallow Central Mode Water, D-CMW: Dense Central Mode Water, DSW: Dense Shelf Water, OSMW: Okhotsk Sea Mode Water. The yellow circles denote warm-core rings and light green ones cold-core rings. Source: Yasuda (2003)

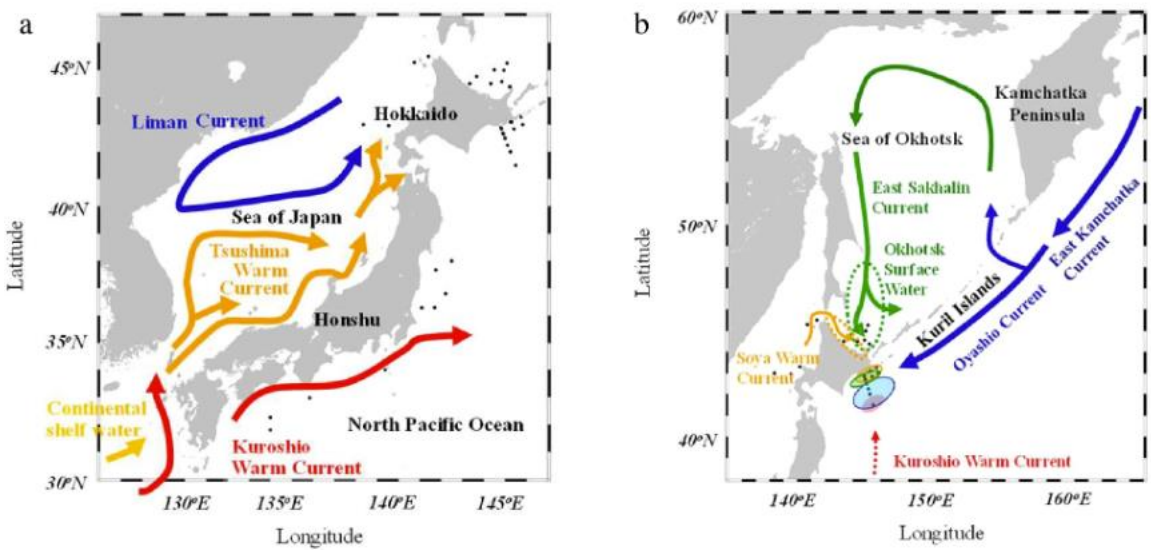


Figure 4. (a) Seawater sampling locations around the Honshu and (b) Hokkaido islands in Japan, along with the major current systems. Source: Inoue et al. (2023)

References

Han, M., Nam, S., Cho, Y. -K. *et al.* Interannual variability of winter sea levels induced by local wind stress in the northeast Asian marginal seas: 1993-2017. *J Mar Sci Eng* 8(10), 774 (2020). https://doi.org/10.3390/jmse8100774

Inoue, M., Mashita, K., Kameyama, H. *et al.* Subarctic-scale transport of ^{134}Cs to ocean surface off northeastern Japan in 2020. *Sci Rep* 13, 7524 (2023). https://doi.org/10.1038/s41598-023-34775-8

Yasuda, I. Hydrographic structure and variability in the Kuroshio-Oyashio Transition Area. *J Oceanogr.* 59, 389-402 (2003). https://doi.org/10.1023/A:1025580313836

SB comments on AP-CREAMS new ToR (May –Aug 2025)
and AP-CREAMS answers (in blue)

1. To the list of ToRs (Sanae): GC requested removal of "particularly from Asian Countries"
- Accepted, removed.

2. To the list of ToRs (Thomas): This was the initial focus but still applicable? Added new bullet below to be clear about overlap in spatial extent with AP-ARC and AP-NPCOOS
- An overlapping issue was discussed with AP-ARC and AP-NPCOOS. No problem of an overlapping.

3. To the list of ToRs (Thomas): This is redundant to the inclusive wording above.
-Accepted, corrected.

4. To Justification (Steven): Trying to articulate the scientific justification and relevance to PICES right from the start.
-Accepted, corrected.

5. To Justification (Steven): This should be coordinated with AP-ARC. In other words, AP-CREAMS co-chairs should review the TORs of AP-ARC and revise their TORs.
- There will not be an overlapping. AP-CREAMS will focus on the areas off the coast (not near the coast; separated from focus of AP-NPCOOS) and mid-latitude Asian marginal seas (not Pacific Arctic and its Gateway; separated from focus of AP-ARC). We have checked AP-ARC ToR and picked up some useful things to our new ToR. We have contacted both these APs and they expressed a support to AP-CREAMS new ToR and extension of the area.

6. To Justification (Thomas): To avoid clear overlap with AP-ARC (which has very similar mandate for some things) could the CREAMS area be change to only include 17 and keep 16 with ARC and drop 18, 22, and 23?
- There will not be serious overlapping. AP-CREAMS would like to extend its area on some minor parts of the 18, 22 1nd 23 which are connected with marginal seas (see Figure 1 in ToR).

7. To Justification (Steven): The existing cruise programs in the larger and newr domain are bisased to Russia. Any existing observational programs as a colloabroation of from PICES countries? It is hard to accept the motivation for now without any tangible outcomes or initiatives in the proposed areas.
- Not only Russia, but other AP-CREAMS core countries (Korea, China, and Japan) are interesting in the extended area to have own national programs/projects to do some scientific activities. In the case of Korea, the ice breaker *Araon* access to the extended region every summer and has tried to establish semi-permanent observation with the central Bering Sea. There are many activities in the Kuroshio Extension area by Japan and China. New international programs as CSK-2 and others which are developing in the NW Pacific are mentioned in new document attached.

8. To Justification (Steven): At the moment, the regions of 20 and 21 are relatively limted in the AP-CREAMS compared to region 19. Thus, I would suggest to focus on the regions of 20 and 21 instead of extending the regional domain.
- We are already focused on these regions. However, we need to extend the area slightly covering an interface area between primarily focused regions, adjacent seas and the open ocean. We will control that a balance among the AP-CREAMS core areas may not be influenced by the extension.

9. To Justification (Thomas): In response to GC concern I don't find the arguments here sufficient, especially since the last point is for this AP to remain focused on marginal seas!
- More arguments are provided in the updated ToR and Justification

10. To Justification (Thomas): IF the AP wants to extend beyond the marginal seas then please indicate issues of physical or biological oceanography that are essential to fully understand changes in the marginal seas directly (e.g., changing currents, timing, shifting species distributions, etc.).
- These issues are provided in the updated ToR and Justification

11. To Justification (Thomas): Finally, can CREAMS point to some specific examples where knowledge transfer either between regional seas or with the open North Pacific have hindered scientific activities of AP-CREAMS, other PICES ExG, or PICES member state National programs?
- More arguments are provided in the updated ToR and Justification

12. To Justification (Thomas): In my opinion this won't necessarily translate to increased interest and CREAMS has very useful products that may just need to be packaged differently for the broader PICES community.
- Accepted

13. To Justification (Thomas): Although part of this may be true there are other bodies in PICES already working on some of this so please provide more details why CREAMS needs to expand spatial coverage.
- More explanation on why to extend toward the Pacific is provided in new Justification. We do not duplicate the goals of other PICES bodies in these areas. One of the main role of AP-CREAMS is to organize joint cruises and joint long-term monitoring. We plan to do it in the extended area

14. General question (Sung Yong): Have you tried contacting the AP-ARC co-chairs to discuss your and their TORs? The given document states that there is no overlap, but I am not sure AP-ARC agreed with your revised statements. I want to be careful in handling this because this will be the final round to revise the Action Plan, so I would like to avoid presenting justification from a single perspective. Likewise, you should discuss your thoughts with the AP-NPCOOS co-chairs before including them.
- Yes, we have contacted both these EXs and received positive responses. We checked AP-ARC ToRs and found that there are not much overlapping, as we are looking only for western most part of their area and we are focused mostly on organizing joint observations and long-term monitoring, while AP-ARC is focused on a whole system. We have picked up some ideas of their ToRs to our modified our ToRs as was recommended by SB. AP-ARC focus on Northern Bering Sea-Chukchi Sea (NBS-CS) and AP-CREAMS revised action plan focus on western Bering Sea, so there almost no overlap between them. For AP-NPCOOS, we know they focus on the observation methods in the coastal regions of a whole PICES area and not focus on open ocean.

15. General question (Sung Yong): Another comment was that there might be unexplored or less observed regions within the current AP-CREAMS domain, i.e., regional imbalance, and it would be better to study more or make them balanced within the domain before you propose its extension. The response did not include this. Please indicate the details. adding the word 'balance' is not enough because it makes your statement contradict itself:

(1) If you admit that the regional studies are not balanced within the current domain, MONITOR (and SB/GC) would recommend that it would be better to focus on the current domain instead of expanding it
(2) If you admit that the regional studies are balanced, they would ask for the relevant proof.
- This is not absolutely necessary to keep a balance in the studies of various parts inside the primary region. Main reason of our extension is a necessity to cover adjacent ocean areas as the processes inside and outside the marginal seas are connected. We are expanding our focus area not because we already studied every part of the primary region. We have many gaps in primary region. Second reason is that the AP-CREAMS is mostly focused on joint cruises, joint observational programs, to maintain monitoring of the state of the area and its changes. Now we like to move beyond our primary borders as we plan to have more joint observations outside of primary area to join international programs developing in the ocean. However, we will keep focus on our marginal seas too.

Appendix 1

Response of AP-NPCOOS

Jackson, Jennifer (she, her / elle) (DFO/MPO)
Jennifer.Jackson@dfo-mpo.gc.ca
14.08.2025 4:36
Кому: 남성현 oceanjhpark Копия: Мне lobanov10365 yuf jzhang
Показать детали

Unclassified - Non-Classifié

Hi SungHyun:

Thank you for sending this message. Jae-Hyoung and I have discussed AP-CREAMS new ToR and we are fully supportive of the changes. These changes should also benefit AP-NPCOOS.
I suggest also informing WG-49 about these changes because they would benefit the work they are doing on subsurface marine heat waves in coastal regions.

All the best,
Jen

Jennifer Jackson, Ph.D. *(she/her)*
Physical Scientist
Institute of Ocean Sciences | Institut des sciences de la mer
Ocean Sciences Division | Division des sciences océaniques
Fisheries and Oceans Canada | Pêches et Océans Canada
P.O. Box 6000, Sidney, B.C. V8L 4B2 | C. P. 6000, Sidney, (C.-B.) V8L 4B2

Cell : 250-706-8549
email: Jennifer.Jackson@dfo-mpo.gc.ca

From: 남성현 <namsh@snu.ac.kr>
Sent: Saturday, August 9, 2025 6:55 PM
To: Jackson, Jennifer (she, her / elle) (DFO/MPO) <Jennifer.Jackson@dfo-mpo.gc.ca>; oceanjhpark@gmail.com
Cc: lobanov@poi.dvo.ru; lobanov10365@gmail.com; yuf@qdio.ac.cn; jzhang@sci.u-toyama.ac.jp
Subject: [PICES] Newly revised AP-CREAMS TORs

To Co-Chairs of PICES AP-NPCOOS (cc-ed to other Co-Chairs of PICES AP-CREAMS):

Dear Drs. Jennifer M. Jackson and Jae-Hyoung Park,

Hi. Hope things go well with you. As one of Co-chairs of PICES AP-CREAMS, I would like to ask your opinion on our terms of reference (TORs) we are revising (please check the attached file for revised Action Plan of the AP-CREAMS). The AP-CREAMS is now revising the TORs as below (changes are highlighted in italics).

1. To coordinate programs to study marine ecosystems and their variability *in the East Asian Marginal seas and their interaction with the western North Pacific in a light of global change;*
2. To facilitate the establishment of permanent observation and data exchange networks in this region;
3. To convene workshops/sessions/*mentoring and build knowledge networks* to advance, evaluate and compare results from the program *and its linkages to broader PICES activities;*
4. *Develop recommendations for PICES to better collaborate within PICES, and with indigenous and international initiatives relevant to the Asian marginal seas;*
5. To enhance capacity building, knowledge dissemination, and cooperation with other international marine organizations/programs in the region *with relevant expertise (e.g., IOC/WESTPAC, NOWPAP, NEAR-GOOS etc.)*;
6. *To provide more opportunities for ECOPs to join.*

Although the primary focus of the AP will be on the initial geographic areas (East Asian Marginal seas, PICES Areas 19, 20, and 21), we propose to extend the geographic areas of concern considering the wider areas in the Northwestern Pacific (PICES Areas 16-22). One of the comments from the PICES SB on new AP-CREAMS Action Plan were "AP-CREAMS should review the ToRs of AP-ARC and revise their TORs" and to avoid overlapping with this group. Similar comments were also applying for the AP-NPCOOS. So, we have done this.

We found that there are not much overlapping, as the AP-NPCOOS is focused on the coastal ocean observing system while the AP-CREAMS on more scientific activities targetting marginal seas mostly far off the coast, but only potentials for synergetic activities to better work for linkages between coastal ocean observing systems and scientific activities for the East Asian Marginal seas. Our justification may look clear to us, nevertheless we would like to make it clear and convince to other PICES members, particularly to SB members. Thus, it would be greatly appreciated if you check our justification (attached) and confirm that the AP-NPCOOS is fine with newly revised AP-CREAMS TORs.

Best regards,
SungHyun Nam

Deputy Vice President for Academic Affairs, Seoul National University,
Professor, School of Earth and Environmental Sciences, College of Natural Sciences,
Seoul National University, 1 Gwanakro, Gwanak-gu, Seoul 08826, Republic of Korea
Tel: +82-2-880-4138, Mobile: +82-10-4231-4956 Fax: +82-2-871-3269,
Email: namsh@snu.ac.kr (official), namsh6513@gmail.com (private)
https://orcid.org/0000-0002-3338-0105
https://scholar.google.com/citations?user=YugVB1gAAAAJ&hl=en
https://www.researchgate.net/profile/Sunghyun_Nam
http://ool.snu.ac.kr

Appendix 2

Response of AP-ARC

2025. 8. 16. 오전 1:33, Steiner, Nadja (DFO/MPO) <nadja.steiner@dfo-mpo.gc.ca> 작성:

Unclassified - Non-Classifié

Dear SungHyun Nam,
My apologies for not responding earlier, I had it on my list, but havn't gotten to it yet. I agree that the initial TORs were a bit too general, making it appear that there my be overlap, but I

think the revised TORs are much clearer in terms of differentiating the region. While there may be overlap in procedures and topic, the geographic focus makes them didtincly different and I don't see any issues.

Regarding your last TOR, I actually didn't know what ECOP referred to and had to look it up. Maybe it could be spelled out.

Best wishes

Nadja

-----Original Message-----
From: "Sei-Ichi Saitoh" <ssaitoh@arc.hokudai.ac.jp>
To: "남성현" <namsh@snu.ac.kr>;
Cc: <ssaitoh@salmon.fish.hokudai.ac.jp>; <nadja.steiner@dfo-mpo.gc.ca>; <lobanov@poi.dvo.ru>; <lobanov10365@gmail.com>; <yuf@qdio.ac.cn>; <jzhang@sci.u-toyama.ac.jp>;
Sent: 2025-08-18 (월) 17:38:56 (UTC+09:00)
Subject: Re: [PICES] Newly revised AP-CREAMS TORs

Dear SungHyun,

I apologize for my slow response.
I agree with the improvement of Ap-CREANS ToRs and support the AP-CREAMS ToRs changes.

Cheers,
Sei-Ichi

2025年8月15日(金) 12:15 남성현 <namsh@snu.ac.kr>:
Dear Prof. Saitoh and Dr. Steiner,

Hi, I would like to know whether you checked my message below or not. I have sent similar message to AP-NPCOOS and received the response with full support of the AP-CREAMS ToR changes. It would be great if you let us know your opinon on the changes.

Thank you very much in advance.

Best wishes,
SungHyun