# 2023 Report of the Section on *Climate Change Effects on Marine Ecosystems*

Co-Chairs: Dr. Kirstin Holsman (USA), Dr. Xiujuan Shan (China), Dr. Kathy Mills (ICES/SICCME, USA), Dr. Alan Baudron (Scotland, ICES/SICCME)

The 2023 annual meeting of the Section on Climate Change Effects on Marine Ecosystems (S-CCME) was held online on September 18, 2023. The meeting was chaired by Drs. Kirstin Holsman (USA) and Xiujuan Shan (China) and attended by approximately 25 participants representing Canada, China, Japan, Korea, Russia, the United States, and ICES.

AGENDA ITEM 1

## b. Adoption of agenda

The agenda was adopted by all members (*S-CCME Endnote 2*).

## c. Business items

Dr. Holsman opened the meeting with a welcome, reviewed the meeting agenda and brief introductions were made to help orient new members and observers to the group.

One new member was appointed to S-CCME, Dr. Dongwha Sohn (Korea). The group welcomed the new members and thanked past members.The group discussed the need for additional Canada members to represent higher trophic and or socioeconomic modeling.

## d. S-CCME Phase IV (2021–2025) Implementation Plan overview

Dr. Holsman provided an overview of recent accomplishments under Phase IV (2021–2025) of the S-CCME Implementation Plan, noting strong progress on collaborative synthesis, model intercomparisons, and integration of S-CCME science into international programs including the UN Decade of Ocean Science for Sustainable Development (UNDOS).

## e. Discussion: potential joint sessions or workshops for 2024

S-CCME members discussed potential workshops or sessions to propose for the upcoming 2024 Annual Science meeting. Drafts were shared with members for feedback and endorsement.

## f. Upcoming meetings and workshops PICES

Dr. Holsman provided a brief overview of upcoming workshops and sessions at the upcoming meetings for ICES and PICES.

## g. Requests/proposals to our parent committees and then SB, which includes:

Science Board requests were discussed and formal proposals were submitted for 2024 annual meeting workshops and sessions. Members also noted a request for Science Board ongoing support for maintaining coordination with ICES through annual workshops, strengthening UN Decade collaborations, and supporting final synthesis efforts under Phase IV.

AGENDA ITEM 2

## S-CCME Activities and Events of Interest in 2022-2023

Dr. Holsman provided an overview of S-CCME's activities since the 2022 report period. She highlighted the Section's leadership at the Fifth International Symposium on the Effects of Climate Change on the World's Oceans

(ECCWO5), held in Bergen, Norway, in June 2023. S-CCME co-organized several sessions and workshops addressing the impacts of climate change on marine ecosystems, modeling approaches, and adaptation strategies. The meeting also reviewed collaborations with ICES SICCME, participation in UN Decade programs, and progress toward the synthesis of CMIP6-based ecosystem projections.

Dr. Kathy Mills and Dr. Alan Baudron provided an update on activities within the ICES Strategic Initiative on Climate Change effects on Marine Ecosystems (SICCME). They emphasized ongoing coordination between ICES and PICES to align terms of reference, promote joint workshops, and enhance data synthesis. Discussion followed on ways to improve communication between ICES Expert Groups and PICES Science Panels and to expand shared outputs, including regional synthesis reports and advice products.

AGENDA ITEM 3

## Updates on S-CCME relevant activities and events

Members also discussed coordination with other organizations and initiatives, including the UN Decade of Ocean Science programs SUPREME, ONCE, and SMARTNET, as well as collaborations with the PICES Section on Human Dimensions. These partnerships aim to strengthen interdisciplinary integration of social-ecological perspectives into climate impact assessments.
Participants reviewed recent scientific achievements and ongoing synthesis efforts. Highlights included:

- Organization of workshops and sessions at ECCWO5, ICES ASC, and PICES-2023 focusing on climate-driven ecosystem change and adaptation.
- Advancement of ensemble modeling and comparative projections using CMIP6 data and IPCC AR6 scenarios.
- Development of the FishSCORE initiative to assess fisheries and community resilience to climate change.
- Contributions to the WKCLIMAD workshop, supporting the integration of climate projections into fisheries advice. Strengthened data-sharing and open-science practices across ICES and PICES modeling communities.

S-CCME continued to emphasize support for Early Career Ocean Professionals (ECOPs). ECOP members, including Drs. Minje Choi and Seokjin Yoon (Korea), contributed to S-CCME workshops, national projects, and communications activities. The Section discussed opportunities for expanded ECOP participation in upcoming sessions and joint training initiatives, including UNDOS-related programs and data synthesis workshops.

The Section discussed plans for 2024 and 2025, which include continued implementation of Phase IV objectives and preparation for the transition to Phase V. Planned activities include:

- Organizing joint ICES–PICES sessions on climate impacts and adaptation at upcoming annual meetings.
- Advancing synthesis and modeling work linking CMIP6 and AR6 projections to ecosystem outcomes.
- Expanding collaboration with UNDOS programs (SUPREME, SMARTNET, ONCE) and PICES Working Groups.
- Increasing ECOP engagement through mentorship and leadership opportunities.
- Finalizing and publishing synthesis products under the current Implementation Plan.

AGENDA ITEM 4

## National Reports and Updates

Representatives from member nations provided updates on national and regional research related to S-CCME objectives:

- Canada: (presented by Dr. Holsman on behalf of Canadian members) reported continued support under the Aquatic Climate Change Adaptation Services Program (ACCASP) and progress in vulnerability assessments and modeling.
- China: (Dr. Shan) summarized regional ocean modeling efforts and contributions to the UN Decade program SMARTNET, highlighting engagement with FishSCORE and IPCC activities.

- Japan: provided updates on biogeochemical and ecosystem modeling projects contributing to cross-basin comparisons.
- Korea: reported ongoing vulnerability studies and early-career scientist involvement in S-CCME activities.
- Russia: shared results from comparative ecosystem studies in the North Pacific and Arctic sectors.
- United States: (Dr. Holsman) summarized progress in NOAA's Climate, Ecosystem, and Fisheries Initiative (CEFI) and regional projects such as ACLIM and GOACLIM, which integrate ecosystem modeling and management advice.

AGENDA ITEM 5

## Adjourn

Dr. Holsman thanked all participants for their contributions and emphasized the continued importance of interdisciplinary collaboration and synthesis as S-CCME approaches the completion of Phase IV (2021–2025). The meeting concluded with agreement to hold the next business meeting in 2024 in conjunction with the PICES Annual Meeting in Honolulu, USA.

*S-CCME Endnote 1*

## Members in attendance

Canada:
- Angelica Peña (BIO, S-CCME)

China:
- Guimei Liu
- Chuanxin Qin
- Xiujuan Shan (FIS, S-CCME)
- Jinhui Wang (BIO, S-CCME, WG-47)
- Xuelei Zhang (S-CCME, S-MBM)

Japan:
- Shin-ichi Ito (AP-ECOP, POC, S-CCME, WG-45)
- Takuya Nakanowatari
- Motomitsu Takahashi (BIO, S-CCME, WG-43)

Korea:
- Chung Il Lee
- Sukgeun Jung (FIS, S-CCME)
- Dr. Dongwha Sohn new member
- Sukyung Kang (FIS, FUTURE-SSC, S-CCME, SB Chair-Elect, SG-UNDOS, WG-43)

US:
- Elliott Hazen
- Kirstin Holsman
- Kathy Mills (ICES SICCME co-chair, FishScore)

## Members unable to attend

US:
- Anne Hollowed
- Alan Haynie (ICES)
- Cisco Werner
- Franz Mueter
- Phoebe Woodworth-Jefcoats (AP-SciCom, S-CCME)

Russia
- Yury Zuenko (CREAMS-AP, POC, S-CCME, WG-44)

Korea
- Chung Il Lee

Observers
- Dr. Steven Bograd (USA)

*S-CCME Endnote 2*

**Agenda**

## 1. Business Items (16:00-16:30)

| | | |
|---|---|---|
| a. | Introductions and welcome | |
| b. | Adoption of Agenda | |
| c. | Business items (e.g., nomination of new members) | |
| d. | S-CCME Phase IV (2021-2025) Implementation Plan Overview | Holsman |
| e. | Discussion: potential joint sessions or workshops for 2024 | Holsman |
| | 1) PICES SC 2024 | Holsman |
| | 2) ICES ASC 2024 | Mills |
| f. | Upcoming meetings and workshops PICES | Holsman |
| g. | Requests/proposals to our parent committees and then SB, which includes:<br>● Travel support fund,<br>● change in members/chairs/TORs,<br>● an extension of the term (only WG),<br>● planning of capacity development event,<br>● new EG idea, etc (see the attached EG Report/Requests Form for SB about the instruction of each item) | Holsman |

## 2. S-CCME Activities and Events of Interest in 2022-2023 16:30 - 16:45

| | | |
|---|---|---|
| a. | ICES 2023 ASC & SICCME | Mills |
| b. | PICES 2022 SC, S-CCME | Holsman |
| c. | The 5th International Symposium The Effects of Climate Change on the World's Oceans on 17-21 April 2023 in Bergen, Norway | Holsman & Mills |
| d. | NEMOW & FishMIP | Hazen/Holsman |
| e. | WKCLIMAD (ICES) | Holsman |
| f. | Upcoming:<br>● WFC in Seattle in 2024<br>● Other? | Holsman |

## 3. Updates on S-CCME relevant activities and events 16:45 -17:00

| | | |
|---|---|---|
| a. | IPCC WG II AR7 | Ito |
| b. | PICES FUTURE Science Program | Hazen/Holsman |
| c. | UN Decade of Ocean Science Activities | |
| | ● SG-UNDOS & SMARTNET | Hazen |
| | ● SUPREME | Hazen |
| | ● UNDOS Fish SCORE (Fisheries Strategies for Changing Oceans and Resilient Ecosystems) | Mills |
| | ● UN Decade Program: Ocean Negative Carbon Emission | Zhang |
| | ● UN Decade Program: Ocean to climate Seamless Forecasting System | Zhang |
| | ● UN Decade Network: Decade Collaborative Centre on Ocean-Climate Nexus/Coordination Amongst Partners in P. R. China (DCC-OCC) | Zhang |
| d. | WG45: WGGRAFY Joint PICES/ICES Working Group on Impacts of Warming on Growth Rates and Fisheries Yields | Holsman/Spencer |
| e. | Other | |

**BREAK 17:00 - 17:20**

## 4. National Reports and Updates 17:20 - 17:50

| | | |
|---|---|---|
| a. | US: EcoCast, Future Seas, ACLIM & GOA-CLIM, NCA5, NMFS-DFO CC workinggroups, CEFI, RAPs, MOMS6 | Hollowed, Haynie, Werner, Hazen, Mueter, Holsman, Mills, Woodworth-Jefcoats |
| b. | Canada | Peña |
| c. | Japan | Ito, Nakanowatari, Takahashi |
| d. | Korea | Lee, Jung, Kang, Sohn |
| e. | China | Liu,Qin,Shan, Wang, Zhang |
| f. | Russia | Zuenko |

## 5. Wrap up 17:50-18:00

*S-CCME Endnote 3*

**S-CCME Activities identified in the Implementation Plan for Phase 4, 2021-2025.**

### *S-CCME Goals:*

- Define, coordinate and integrate the research activities needed to understand, assess and project climate change impacts on marine ecosystems;
- Plan strategies for sustaining the delivery of ecosystem goods and services, and when possible predictions should include quantifying estimations of uncertainty;
- 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;
- Build global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.

### *Phase 4 S-CCME activities will continue Phase 1-3 initiatives:*

1. 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.
2. evaluation and comparison of ecosystem projections and outcomes based on CIMP6 projections and IPCC AR6 results released in 2021. [Decade relevant]
3. 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. Particular focus will be placed on research activities to define and quantify the vulnerability of marine ecosystems and key living marine resources to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use. This will be used to assess research gaps. [Decade relevant]
4. convene dedicated S-CCME topic sessions for PICES and ICES Annual meetings. [Decade relevant]
5. provide a forum for the assessment and synthesis of existing projections of climate change impacts on marine ecosystems through joint theme or topic session 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]
6. encourage an integration with the PICES Section on Human Dimensions and the ICES Strategic Initiative on Human Dimensions through joint theme or topic sessions and workshops.

7. 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.

### *In Phase 4 S-CCME will be advancing on the following activities:*

8. help develop and align future scenarios for exploring cultural and social impacts of climate change on fisheries and fishery dependent communities. This would include developing social science metric jointly with PICES Section on Human Dimension and ICES Strategic Initiative on Human Dimensions. [Decade relevant]
9. encourage and integrate S-CCME Science with and between external climate assessment organizations and provide knowledge to the scientific communities, national and global advisory bodies such as the IPCC and IPBES on the impacts of climate change on marine ecosystems.
10. promote innovation in coupled bio-physical-social modelling through workshops and topic sessions. This activity would address things such as: exploration of methodologies in the role of watersheds to ocean coupling and land-sea margins; uptake of nutrients and chemistry; advancements in regional ocean modelling; bias corrections; ensemble modelling scenarios and uncertainty. [Decade relevant]
11. engage Early Career Ocean Professionals in PICES and ICES and continue to increase communication with Early Career Ocean Professionals to contribute to a predictable ocean where society has the capacity to understand current and future ocean conditions [Decade relevant]
12. coordinate or support training programs for scientists involved in providing strategic advice on climate change effects on marine ecosystems. Courses of interest to S-CCME:
    a. technical courses for applied research (e.g. geospatial modeling, Size spectral models, EwE, Atlantis). [Decade relevant]
    b. training for communicating climate impacts to the general public, NGOs and decision makers. This training could include a focus on communication of uncertainty. [Decade relevant]
13. develop and maintain an internal and external S-CCME communication strategy by:
    a. maintaining PICES website: metadata, archiving outputs, links to data delivery sites such as ClimeFish;
    b. Co-chairs working with members to maintain relevant information on publications and presentations;
    c. encouraging members to contribute research products to a distributed database. S-CCME could establish protocols and data management policy for contributions to the shared database (explore FishMIP protocols, and Sea Around Us database).