

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

The Section on *Climate Change Effects on Marine Ecosystems* (S-CCME) held a virtual meeting on September 21, 2020. Eighteen scientists from seven countries attended (*S-CCME Endnote 1*). Dr. Jackie King chaired the meeting. The meeting agenda was reviewed and adopted without revision (*S-CCME Endnote 2*).

### AGENDA ITEM 3

#### **Membership and election of new Co-Chair**

Dr. Jackie King (Canada) stepped down as PICES Co-Chair after completing one term. S-CCME expressed its gratitude for her leadership, and is grateful of her continued membership. Candidates for Co-Chair were solicited by email prior to the meeting, and additional interest was solicited from the floor. S-CCME elected Dr. Kirstin Holsman (USA) as PICES Co-Chair.

It was noted that S-CCME does not have participation from Russia, and requests for appointment of a member from Russia were made through the BIO, FIS and POC parent Committees.

### AGENDA ITEM 4

#### **Activities in 2020**

##### a. IPCC WG II AR6 Lead Authors' Third Meeting (January 26–February 1, 2020, Faro, Portugal)

The meeting was attended by several S-CCME members: John Pinnegar (ICES, UK: lead author – Small Islands chapter); Kirstin Holsman (PICES, USA: lead author – North America chapter); Shin-ichi Ito (PICES, Japan: lead author – “Ocean and coastal ecosystems and their services” chapter), Christian Möllmann (ICES, Germany: lead author – Europe chapter). IPCC has issued a confirmed extension for the cut-off date to November 6, 2020 for submitted papers to be considered for Chapter inclusion. However, the Second Order Draft will need to be submitted to the IPCC Technical Support Unit by November 6, 2020 so if there are papers in preparation with anticipation of submission it is best to contact the Lead Authors now.

##### b. PICES/ICES Working Group 45: *Impacts of Warming on Growth Rates and Fisheries Yields*, Kick-off meeting (September 7–10, 2020)

The Working Group is co-chaired by S-CCME member Shin-ichi Ito (Japan). The WG held a successful first meeting in early September 7–10, 2020. The group developed a 6-month Implementation Plan for the 4 main Terms of Reference:

1. Assess the capacity of statistical models to incorporate temperature-dependency of growth, and compare their predictions of growth variation across specific warming scenarios and locations;
2. Analyze long-term growth patterns across multiple large marine ecosystems that are experiencing different trends in temperature, including the direct comparison of empirical length at age data for specific species across their range, and the application of a common modelling approach;
3. Assess the impacts of warming on past yield per recruit of commercial fisheries, and forecast trends in future yield under plausible warming scenarios.
4. Identify options for expanding scientific community access to global length-at-age data that are routinely collected by fisheries agencies worldwide.

Members collated metadata on long-term datasets for fish size-at-age for 121 stocks, with future additions. The WG is still waiting for PICES membership to be finalized. The WG requests a meeting at PICES-2021.

c. New EU H2020 Project of FutureMARES, Kick-off meeting (September 2020)

ICES SICCME member, Myron Peck (Germany), is leading a new FutureMARES project funded by EU 2020: “*Inter-relations between climate change, biodiversity and ecosystem services*”. It is a 4-year, 32-partner, 15-nation project. The project will use three case studies [Habitat Restoration (*e.g.*, seagrasses, shellfish); Habitat Conservation (*e.g.*, MPAs, charismatic megafauna); Sustainable Harvesting (*e.g.*, ecosystem-based fisheries, IMTA)] to advance knowledge on climate change impacts to marine and transitional waters, and the effectiveness of nature-based solutions. The project held its first meeting in September 2020.

AGENDA ITEM 5

**Activities and events of interest in 2021**

a. IPCC WG II AR6 Lead Authors’ Fourth Meeting (March 1–7, 2021: Location TBC) and Final Government Distribution (May 28–July 23, 2021)

Will be attended by S-CCME members Christian Möllmann (ICES, Germany: lead author – ‘Europe’), John Pinnegar (ICES, UK: lead author – ‘Small Islands’); Kirstin Holsman (PICES, USA: lead author – ‘North America’); Shin-ichi Ito (PICES, Japan: lead author – ‘Ocean and coastal ecosystems and their services’). Several stages of AR6 meetings and preparations have already been extended, so it is anticipated that they dates will also be extended.

b. MSEAS 2021 “*Managing for sustainable use of the Earth’s marine and coastal systems*” (May 25–29, 2021: Yokohama, Japan)

S-CCME member Alan Haynie (PICES, USA) serves on the Symposium’s Scientific Steering Committee. The MSEAS 2020 meeting was postponed until May 2021; all sessions and workshops will be carried over.

c. Science for Nature and People Partnership (SNAPP): Climate Resilient Fisheries Working Group

Several S-CCME PICES and ICES members, Anne Hollowed (PICES); William Cheung (ICES); Myron Peck (ICES), Manuel Barange (ICES), will begin work on a new SNAPP initiative. The project goals include:

1. Identify key features of climate-resilient fisheries and apply them to fishery management systems;
2. Develop a decision-making support tool to help managers identify resilience capacity and needs;
3. Work with leaders of fishery management organizations to tailor results and products for global, national, and regional applications.

d. 2021 ICES Annual Science Conference Theme Sessions (September 2021: Copenhagen, Denmark)

The 2020 ICES ASC has been postponed to 2021, and all theme sessions and workshops have been carried over. Several theme sessions have been submitted for consideration that are sponsored by SICCME. These include:

1. Taking stock on ocean acidification research for provision of future efforts (Silvana Birchenough *et al.*);
2. Impacts of human pressures on ecosystem components assessed by dynamic modelling (Solfrid Sætre Hjøllø *et al.*);
3. The use of traits in management and conservation of marine ecosystems (Esther Deborah Beukhof *et al.*);
4. Past, present and future of marine plankton assemblages and communities (Dafne Eerkes-Medrano *et al.*);
5. Improvements and challenges in spatial fisheries management (Santiago Cerviño *et al.*);

6. Connecting economic, social science, and interdisciplinary research and management advice (Alan Haynie);
7. ICES in a net-zero emission world (A Local/Remote Network Session) (Bill Karp and Bill Turrell);
8. Marine ecological forecasts – what do we need? (Mark Payne and Sevrine Sailley).

e. 2021 PICES Annual Meeting

S-CCME requests 1- day meeting at PICES-2021.

AGENDA ITEM 6

**New proposals for PICES-2021**

None.

AGENDA ITEM 7

**PICES updates**

Not discussed.

AGENDA ITEM 8

**S-CCME Phase 4 (2021–2025) Implementation Plan**

At PICES-2019, S-CCME was approved by Governing Council to move from a 3-year phase approach to a 5-year phase approach. S-CCME members reviewed and finalized the Phase 4 (2021–2025) Implementation Plan (*S-CCME Endnote 3*). The IP continues Phase 3 initiatives, namely: 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; global synthesis of climate change impacts on marine ecosystems for sustaining the delivery of ecosystem goods and services; develop regional synthesis reports; contribute to 5th International Symposium on “*Effects of climate change on the World’s oceans*” in 2023. The IP will advance the following activities: synthesize SEES climate change modelling efforts to inform Climate-Resilient Development Pathways across UN Sustainable Development Goals; explore cultural and social impacts of climate change on fisheries and communities; support training for scientists, including Early Career Ocean Professionals through workshops and training programs, develop a S-CCME Communication Strategy (internal and external). S-CCME solicited endorsement from parent Committees, asking for submission to Science Board for their approval.

AGENDA ITEM 9

**National projects of interest**

The members attending the S-CCME meeting agreed to postpone the roundtable updates on relevant national climate change research projects. A virtual meeting will be convened later in 2020 to permit for adequate time and member participation.

***S-CCME Endnote 1***

**S-CCME participation list**

Members

Jackie King (Canada, Co-Chair/PICES)  
Mark Payne (Denmark, Co-Chair/ICES)  
Alan Haynie (USA)  
Anne B. Hollowed (USA)  
Kirstin Holsman (USA)  
Shin-ichi Ito (Japan)  
Sukgeun Jung (Korea)  
Sukyung Kang (Korea)  
Hiroshi Kuroda (Japan)  
Franz Mueter (USA)  
Angelica Peña (Canada)  
Gao Shan (China)  
Motomitsu Takahashi (Japan)  
Phoebe Woodworth-Jefcoats (USA)  
Xuelei Zhang (China)

PICES members unable to attend

China: Guimei Liu, Chuanxin Qin, Xiujuan Shan,  
Jinhui Wang  
Korea: Chung Il Lee  
Russia: Yury I. Zuenko  
USA: Cisco Werner

Observers

Harold (Hal) Batchelder (Deputy Executive Secretary)  
Sonia Batten (Executive Secretary)  
Jingjing Zheng (China)

***S-CCME Endnote 2***

**S-CCME meeting agenda**

1. Introductions
2. Adoption of agenda
3. Election of new PICES S-CCME Co-Chair
4. Reports S-CCME activities and events of interest in 2020
  - a. Report from ICES SICCMME (Payne)
  - b. IPCC WG II AR6 Lead Authors' Third Meeting (26 January – 1 February: Faro, Portugal) (Holsman/Ito)
  - c. Joint PICES/ICES Working Group on *Impacts of Warming on Growth Rates and Fisheries Yields* (Hollowed)
5. S-CCME activities and events of interest in 2021
  - a. IPCC WG II AR6 (Ito/Holsman)
    - Lead Authors' Fourth Meeting (March 1–7, 2021: Location, TBC)
    - Final Government Distribution (May 28–July 23, 2021)
  - b. MSEAS 2021 “*Managing for sustainable use of the Earth's marine and coastal systems*”; Postponed from May 2020 to May 2021 (Haynie)
  - c. Science for Nature and People Partnership (SNAPP): Climate Resilient Fisheries Working Group (Hollowed)
  - d. 2021 ICES Annual Science Conference Theme Sessions (September 2021)
  - e. 2021 PICES Annual Meeting and Expert Groups (All)
6. Placeholder for any new proposals – otherwise proposals from 2020 will be applied to 2021 Annual Meeting
7. PICES updates
  - a. FUTURE Science Program (King)
  - b. UN Decade of Ocean Science (King)
8. S-CCME Phase 4 (2021-2025) Implementation Plan
  - a. Governing Council approved our request to extend the period of each IP from 3 years to 5 years. Review draft IP for review and finalize for submission to Science Board (All)
  - b. Proposal for ICES/PICES S-CCME forum (Payne)
9. National projects of interest
  - a. Roundtable for updates on relevant national climate change research projects – postponed for follow-up meeting later in 2020 (All)

**S-CCME Endnote 3**

## Implementation Plan for Phase 4 (2021–2025) PICES/ICES Section on Climate Change Effects on Marine Ecosystems

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### 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 that 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.*

### Background

In the spring of 2011, PICES and ICES agreed to move forward on the Science Plan for an 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 effects on Marine Ecosystems (SICCME). As stated in the Science Plan the goal of S-CCME will be 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 within the IP and 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.

## S-CCME – 2020

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.

At the PICES Annual Meeting in 2019, S-CCME requested that IP Phase durations be extended to 5 years; this request was approved by Governing Council. Phase 4 IP for S-CCME will cover activities from 2021-2025.

PICES and ICES are 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, although at this time it not known if that participation will be at the level of programmes, projects, or activities. In anticipation of PICES and ICES participation, S-CCME activities that are related to the Decade, and would support broader participation, are indicated below.

**Phase 4 (2021–2025)** Phase 4 S-CCME activities will continue Phase 1–3 initiatives:

- 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. [Decade relevant]
- 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]
- 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.

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

- Synthesize current social-ecological climate change modelling efforts (S-CCME regional nodes) to inform climate-resilient development pathways through analyses that include emergent trends in climate projections, adaptation measures, residual risk and synergies across UN Sustainable Development Goals. [Decade relevant]
- 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 the PICES Human Dimensions Committee and the ICES Strategic Initiative on Human Dimensions. [Decade relevant]
- Encourage and integrate S-CCME Science with and between external climate assessment organizations, for example IMBER, 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.
- 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]
- 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]
- 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:
  - Technical courses for applied research (*e.g.*, geospatial models, size spectral models, EwE, Atlantis). [Decade relevant]
  - Training for communicating climate impacts to the general public, NGOs and decision makers. This training should include a focus on communication of uncertainty. [Decade relevant]
- Develop and maintain an internal and external S-CCME communication strategy by:
  - Working with SICCME to develop a joint forum for members to exchange information and establish a means of communication. Leadership for this forum could come from ICES/PICES Early Career Ocean Professionals.
  - Maintaining PICES website: links to data repositories and delivery sites such as ClimeFish, links to other coordinating regional and global programmes, such as ESSAS, CLIOTOP and IMBeR;
  - Co-chairs working with members to maintain relevant information on publications and presentations;
  - Coordinate with TCODE to identify data management policy for contributions to shared databases;
  - Establish appropriate S-CCME protocols to facilitate comparative studies and synthesis of climate change effects. This could include consultation with other similar projects, *e.g.*, FishMIP.