

## 2021 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 29, 2021. Nineteen scientists attended from 5 countries (*S-CCME Endnote 1*). Dr. Kirstin Holsman (USA) and Dr. Xiujuan Shan (China) chaired the meeting. After review and rearrangement of some items, the agenda was adopted (*S-CCME Endnote 2*).

### AGENDA ITEM 3

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

ICES has appointed two new Chairs for SICCME, Drs. Kathy Mills (USA) and Alan Baudron (Scotland) and new leadership has infused energy into cross-regional workshops and activities.

### AGENDA ITEM 4

#### **S-CCME Phase 4 (2021–2025) Implementation Plan overview and discussion**

##### **a. Review S-CCME Phase 4 (2021–2025) Implementation Plan**

At PICES-2019, S-CCME was granted approval 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 (see <https://meetings.pices.int/publications/other/members/S-CCME-Implementation-Plan-Phase4.pdf>). 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 the 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 its parent committees (BIO, FIS, POC), asking for submission to Science Board for approval.

##### **b. Progress towards S-CCME TORs**

The group discussed Phase 4 goals and progress towards those goals including ideas for the upcoming year to address the Phase 4 goals:

1. *Help develop and align future scenarios for exploring cultural and social impacts of climate change on fisheries and fishery dependent communities.*
  - Ongoing coordination with Human Dimensions working groups to help develop and align future scenarios for exploring cultural and social impacts of climate change on fisheries and fishery dependent communities.
  - Planned informal meetings to share progress and activities, including an informal meeting in conjunction with MSEAS 2022 (COVID-19 permitting)
2. *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.*
  - IPCC AR6 WGII authorship on Oceans, North America, and polar regions chapters (Drs. Ito and Holsman from PICES)
  - UN Decade activities (members part of ICES and PICES UN decade activities)
3. *Promote innovation in coupled bio-physical-social modelling through workshops and topic sessions.*

## S-CCME – 2021

- ICES/PICES workshops
- Informal S-CCME meetings planned to share ideas, discuss upcoming topics
- VIRTUAL intersessional workshop proposed for Spring 2022
- PICES topic session proposal
- ½-day afternoon session coordination meeting to discuss S-CCME’s role in SUPREME and links to ICES; planning for coastal high resolution ocean model grid for the North Pacific, and Chukchi and Beaufort seas as part of its regular 2022 annual meeting (1 day total)

### AGENDA ITEM 5

#### Activities and events of interest in 2021

##### a. SICCME Report overview (K. Mills, ICES SICCME)

Dr. Kathy Mills (USA; new co-chair of SICCME) provided an overview of the SICCME annual report to the group, including progress towards ICES TORs and upcoming new activities of interest in 2021–2022.

##### b. Climate and Fisheries Initiative (CFI; USA)

Climate and Fisheries Initiative (CFI): Multiple S-CCME members from the US, including Drs. Hollowed and Holsman have been part of a NOAA wide effort to operationalize the delivery of climate-informed fisheries management advice and decision support tools. This Cross-NOAA effort (NMFS, OAR, NOS, NWS, NESDIS) aims to build a operational ocean modeling and decision support system, provide state-of-the-art ocean forecasts and projections, provide climate-informed ecosystem projections, risk assessments and management strategies, and reduce impacts and increase resilience of LMRs and communities. The budget that provides specific funding for CFI is currently being evaluated by the US senate

##### c. ICES Workshop on Pathways to Climate-aware Advice (WKCLIMAD)

This ICES workshop held its first online meeting during May 2021 and final full workshop, chaired by Drs. Kirstin Holsman (USA), Mark Dickey-Collas (Denmark), and Michael Rust (USA), in the fall 2021. The workshop aimed to address how the short-, medium- and long-term influences of climate change on aquaculture, fisheries, and ecosystems can be accounted for in ICES Advice. At the time of the meeting, participants had already engaged in the fall meeting preparation, providing examples of impacts of climate change on fisheries and aquaculture. A Delphi-method questionnaire was sent out asking participants to rate the magnitude and likelihood of impacts of climate change. This was used to run the workshops in September and October 2021, which explored the consequences of the impacts, who is impacted, and how ICES should develop advice and prioritize resources.

##### d. FishMIP

A FishMip Workshop on regional model comparisons was held September 28 and 29, 2021 and multiple workshops in 2022 are in the planning stages. These workshops will address FishMIP Phase 2 goals including:

- Advance model improvement through model benchmarking (ISIMIP 3a)
- Explore historical reconstructions of fishing effort as well as future fishing pathways (ISIMIP 3b).

##### e. IPCC WG II AR6 Lead Authors’ Fourth Meeting

The final Lead Authors Meeting, held virtually March 1–7, 2021, and hosted by Guatemala, was attended by S-CCME/SICCME members and authors from ICES/PICES SICCME/S-CCME community contributing to the report which includes Drs. Holsman (lead author – ‘North America’ and ‘Polar Regions’), Shin-ichi Ito and Mette Skern-Mauritzen (lead author – ‘Ocean and coastal ecosystems and their services’), Christian Möllmann (lead author – ‘Europe’), and John Pinnegar (lead author – ‘Small Islands’). This report is the most SICCME-relevant of the three main reports produced by the IPCC. Several stages of AR6 meetings and preparations were extended due to COVID-19. Final Government distribution of the report will take place October 2021 and public distribution will be on February 28, 2022.

**f. FUTURE program (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems)**

Expert groups are to fill in the Product Matrix and map S-CCME products to the Science Program Objectives. There will be a planning meeting in 2023 and ongoing coordination with UN Decade programs through SG-UNDOS, SMARTNET, and SUPREME.

**g. Joint PICES/ICES Working Group 43 on *Small Pelagic Fish (WGSPF)***

Co-chaired by Drs. Akinori Takasuka (Japan/PICES), Ignacio Catalán (Spain/ICES), Myron Peck (Netherlands/ICES) and Ryan Rykaczewski (USA/PICES), this Working Group aims to advance understanding how drivers (environmental and/or anthropogenic) impact the population dynamics of SPF, perform comparative analyses, and coordinate research. The group is also planning a symposium for 2022 (see Agenda Item 6f).

**h. Joint PICES/ICES Working Group 45 on *Impacts of Warming on Growth Rates and Fisheries Yields (WGGRAFY)***

Co-chaired by Drs. Tara Marshall (UK/ICES), Paul Spencer (USA/PICES), Alan Baudron (UK/ICES), Shin-ichi Ito (Japan/PICES) and John Morrongiello (Australia) was established August 2020 and had its first series of online meetings during 2020 and 2021. The group brings together worldwide scientific expertise to assess the impact of warming on fish growth, and the implications for fisheries yield, on a global scale. Work on evaluating and developing statistical growth models has been initiated and is starting to show results. Analyses of long-term growth patterns across the North Sea and North Pacific ecosystems have found significant temporal trends in size at age across 15 species. Work on the assessment and forecasting of impacts of warming and temperature-dependent growth on commercial fisheries yields has also made good progress, while efforts to source additional global length-at-age datasets have yielded success in Japan and SE Australia.

**i. Working Group 44 on an *Integrated Ecosystem Assessment for the Northern Bering and Chukchi Seas***

This Working Group is co-chaired by Dr. Elizabeth A. Logerwell (USA) and Dr. Yury I. Zuenko (Russia) and is the result of Workshop W17 on “*Scoping an IEA of the Northern Bering-Chukchi Seas Large Marine Ecosystem (LME)*”, held October 16, 2019 at PICES-2019. The workshop was chaired by Drs. Libby Logerwell (USA), Kirstin Holsman (USA), Raychelle Daniel (USA, The Pew Charitable Trusts) and Yutaka Watanuki (Japan). The participants of the workshop unanimously agreed to pursue a new Working Group to conduct an Integrated Ecosystem Assessment of the Northern Bering Sea – Chukchi Sea (NBS-CS) LME which would:

- Provide detailed assessment of the Pacific Arctic gateway, and would be a complement to the Atlantic gateways IEAs supported through ICES, all of which are linked through the PICES Central Arctic Ocean WG;
- Provide detailed information that will inform understanding of connectivity of climate and ocean processes, species movements, shelf foodweb dynamics, fishing, trade, subsistence and food security, and human activities beyond the focal scope of WG 39/WGICA but of critical importance to the CAO;
- Be informed by the findings of WG 39/WGICA beyond the scope of the new WG but of increasing importance, especially for the NBS where multiple Pacific stocks are increasingly redistributing poleward under warming conditions.

**j. Joint DFO-NMFS Climate change working groups**

Collaborative working groups have been established to help facilitate climate change research and results across Canada and the US. These include three regional working groups:

Working Group	NMFS lead	DFO lead
Atlantic	Vincent Saba	Nancy Shackell & Blair Greenan
Pacific	Bridget Ferris & Lisa Crozier	Brendan Connors
Arctic	Janet Duffy-Anderson & Kirstin Holsman	Andrea Niemi

The working groups also include national steering committees:

Fisheries and Oceans Canada:

- Keith Lennon, Director, Ocean Science, Ottawa (Steering Committee Co-Chair)
- Alain Vézina, Regional Director, Science, Maritime Region
- Andrew Thomson, Regional Director, Science, Pacific Region
- Lianne Postma, Regional Director, Science, Ontario and Prairies Region
- Rob Young, Science Advisor, Arctic Region

NOAA National Marine Fisheries Service:

- Evan Howell, Director, Office of S&T (Steering Committee Co-Chair)
- Jon Hare, Director, NEFSC (Woods Hole, MA)
- Kevin Werner, Director, NWFSC (Seattle, WA)
- Robert Foy, Director, AFSC (Seattle, WA)

#### k. UN-Decade programs

Multiple UN Decade programs are underway and of interest and relevance for S-CCME members. These include SG-UNDOS/SMARTNET, SUPREME, IPOD and UNDOS Fish SCORE (Fisheries Strategies for Changing Oceans and Resilient Ecosystems). Briefings on each of these was provided during the S-CCME meeting to facilitate and coordinate S-CCME activities with UN Decade programs.

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

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

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

#### m. Working Group on Integrative Physical-biological and Ecosystem Modelling (WGIPEM)

WGIPEM has completed its most recent 3-year terms of reference period. Highlights of this period include the initiation of a special issue in the journal *Marine Ecological Progress Series* to be published in Autumn 2021 focussing on dynamic modelling. Two joint publications were also developed. The Working Group will also host Theme Session O (Impacts of human pressures on ecosystem components assessed by dynamic modelling) at this year's ASC. Updated TORs for the period 2022–2024 have been approved, with Drs. Solfrid Sætre Hjøllø (Norway), Sonja van Leeuwen (Netherlands) and Ute Daewel (Germany) as Chairs. The next meeting is planned for March/April 2022, at the Royal Belgian Institute of Natural Sciences, Brussels.

#### n. Working Group on Seasonal-to-Decadal Predictions of Marine Ecosystems (WGS2D)

Chaired by Dr. Mark Payne (Denmark), WGS2D completed its terms of reference at the end of 2020. Highlights of this first period include the successful development and regular production of forecasts of blue whiting spawning distribution and the recruitment of North Sea Sand eel stocks, as well as several scientific manuscripts detailing these forecasts. The Working Group will also host a networking session

on ecological forecasting at this year's ASC. However, the Chair of the group, Dr. Payne, is leaving marine science for a new position and is unable to continue, and while the group's work has been positively received and supported by the ICES community, a replacement chair has not been found. It therefore appears unlikely that this group will be renewed.

**o. September 2020: Kick-off meeting of EU H2020 FutureMARES**

FutureMARES is a large (32 partner, 15 nations) 4-year programme advancing knowledge on climate change impacts to marine and transitional waters and the effectiveness of nature-based solutions to safeguard/enhance ecosystem services. FutureMARES has three overarching case studies: Habitat Restoration (*e.g.*, seagrasses, shellfish), Habitat Conservation (*e.g.*, MPAs, charismatic megafauna), and Sustainable Harvesting (*e.g.*, ecosystem-based fisheries, IMTA). Projections of climate impacts, including the effectiveness of scenarios of NBS will be made for 7 regional European marine ecosystems contributing to SICCME activities. FutureMARES is coordinated by Dr. Myron Peck. Dr. John Pinnegar and several other members of SICCME are involved in the programme.

**p. August 9, 2021: Launch of IPCC AR6 WGI report**

August 9, 2021 marked the launch of IPCC AR6 WGI report titled "The Physical Science basis". This report preceded the WKII report and was focussed primarily on the earth system and climate science, and therefore has relatively limited input from the ICES community (which is typically involved in WGII). The basic message of this report (that human activities are changing the planet's climate) remains largely unchanged, but there is an ever increasing amount of detail and attribution provided. Notable from a marine perspective was the inclusion of a detailed section on Marine Heatwaves, which was not previously seen in the main IPCC reports.

**q. September 2021: ICES Annual Science Conference**

Several theme sessions were held in the online format are of relevance to SICCME (and which cite the Strategic Initiative). These include: [K] Taking stock on ocean acidification research for provision of future efforts (Silvana Birchenough *et al.*); [O] Impacts of human pressures on ecosystem components assessed by dynamic modelling (Solfrid Sætre Hjøllø *et al.*); [D] Past, present and future of marine plankton assemblages and communities (Dafne Eerkes-Medrano *et al.*); [E] Connecting economic, social science, and interdisciplinary research and management advice (Alan Haynie). In addition, a Networking Session entitled "Marine Ecological Forecasts – what do we need?" (Mark Payne and Sevrine Sailley) was also held.

AGENDA ITEM 6

**National projects of interest**

**a. Multiple US activities of interest to S-CCME**

- **5th US National Climate Assessment:** The NCA5 has launched and multiple members of the S-CCME and PICES community are participating. Drs. Mills and Holsman are authors on the Ocean chapter (Dr. Mills is the lead author for that chapter). The national assessment is conducted every four years and reviews and synthesizes the state of science on effects of climate change on oceans and marine resources, risks and responses, uncertainties. The NCA5 timeline is as follows:
  - October 15: Zero order draft
  - January/February 2022: Stakeholder engagement and input
  - Spring 2022: First draft
  - Summer 2022-2023: Reviews and subsequent drafts
  - Fall 2023: Final report
- **US NOAA Fisheries Climate Science Strategy (NCSS):** Started in 2015 this 5 year synthesis of existing Regional Action Plans to be published in Dec 2015. Updated plans under development for 2022–2024.

- Fisheries Integrated Modeling System (FIMS) is a next generation framework for stock assessment models. To be completed in the next few years.
- In 2021 OAR launched a collaborative effort in 2021 between the Geophysical Fluid Dynamics Laboratory, the Pacific Marine Environmental Laboratory and academia (UW and UAK) to facilitate the transition from Regional Ocean Modeling System to Modular Ocean Model (MOM6) framework.
- NOS - West Coast Operational Forecast System (WCOFS) short-term forecasts.
- Climate and Fisheries Initiative (CFI) (see CFI overview above)

**b. Integrated REsearch Program for Advancing Climate Models (TOUGOU project; Japan)**

This project aims to further develop climate models and to reflect the knowledge gained through them in the adaptation plans of actual regions in coordination with socioeconomic scenarios. More information can be found at <http://www.jamstec.go.jp/tougou/eng/>.

**c. Aquatic Climate Change Adaptation Science Program (Canada)**

The Aquatic Climate Change Adaptation Science Program (ACCASP) includes research and monitoring activities necessary to identify climate change impacts and vulnerabilities, improve ocean forecasting and develop adaptation information and tools. The latest round of funding supported 22 projects across Canada.

**d. Activities of interest from Korea**

- **Development of an Integrated Forecasting System in Korean waters (2018-2022):** This project aims to provide scientific advice on the implications of climate change on the distribution, recruitment, growth, interaction of fisheries resources using downscaled future oceanographic conditions and the mechanistic understanding of fish responses to changing environmental conditions.
- **Development of ocean mid-range prediction system (OMIDAS) for the sea around Korea** will aid in development of ocean mid-term prediction system for the Northwest Pacific, understand effects of initial fields on prediction performance, and help identify seasonal difference in prediction performance.

**e. Activities of interest from China**

- The National Key Research and Development Program of China from Ministry of Science and Technology; Covered a series of projects,
  - Integrated Observation, data assimilation and big data platform construction and application;
  - Study on climate change facts, key process and dynamics mechanism;
  - Development, prediction and estimation of earth system model;
  - Climate change impacts and risk assessment;
  - Mitigation and adaptation to climate change and sustainable transformation research;
  - Monitoring, early warning and prevention of major natural disasters;
  - Research on the comprehensive assessment mode of the economic impact of climate change.
  - Carbon sink and climate change
- Ministry of Natural resources has approved the first national assessment report on ocean and climate change;

AGENDA ITEM 7

**Planned activities in 2021/2022**

**a. IPCC AR6 WGII and WGIII reports**

- Government review of WGII impacts and adaptation in Fall 2021, for release on Feb. 28, 2022.
- Government review of WGIII mitigation in early 2022, for release on April 4, 2022.

**b. Joint NMTT-ICES Workshop launching the Nordic Climate Change Forum for Fisheries and Aquaculture (December 9–10, 2021, Helsingør, Denmark)**

The workshop aims to provide an opportunity for fisheries and aquaculture stakeholders, scientists, and policy-makers to discuss, exchange ideas, and identify practical steps the fisheries and aquaculture sectors can adopt to reduce its contribution to climate change.

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

S-CCME member, Dr. Alan Haynie (PICES, USA), serves on the Symposium)ide an opportunity for fisheries aMSEAS was originally scheduled for 2020, but was postponed to 2021, and again to the summer of 2022, due to COVID-19; all sessions and workshops will be carried over.

**d. OSM 2022: ME10 Evaluating changing ocean conditions for marine social-ecological systems including applications for fisheries, aquaculture, and ecosystem-based management (February 27 –March 4, 2022, Honolulu, HI, USA)**

This session will be held virtually at the upcoming Ocean Sciences Meeting and is being organized by Drs. Julie Kellner, Kirstin Holsman, and Paula Fratantoni. This session will showcase investigations of the impacts of changing ocean conditions on marine communities across a range of spatial and temporal scales using a variety of experimental, observational, and modeling techniques. Presentations that discuss novel approaches and tools for evaluating climate processes that influence population dynamics and ecology, community diversity and assembly, food web complexity, and biogeography across a broad spectrum of trophic guilds (*e.g.*, microbes to megafauna) and habitats (intertidal to deep sea) are strongly encouraged. Especially welcome are studies that evaluate climate impacts on coupled social-ecological systems and explore adaptation efficacy and climate-informed approaches for managing fisheries, aquaculture, and ecosystem structure and dynamics, including research that provides input to help guide sustainable ecosystem-based management of ocean resources.

**e. ICES 4th Decadal Variability of the North Atlantic and its Marine Ecosystems: 2010-2019. (April 26–28 2022, Bergen, Norway)**

This symposium is part of a series of decadal symposiums organized by ICES, where researchers gather to review the variability of North Atlantic environmental conditions and marine ecosystems over the past decade. Researchers aim to understand the relationship between ecosystem components and how they influence the distribution, abundance and productivity of living marine resources. In addition, researchers will review recent advances in sub-decadal forecasts of ecosystem change.

**f. Symposium on Capelin—The canary in predicting effects of climate on the Arctic marine environment (October 10–15, 2022, Bergen, Norway)**

This symposium seeks to determine how the link between capelin migration and environmental change can help identify realistic timescales for tipping points and major disruptions in the Arctic marine environment.

**g. PICES/ICES/FAO International Symposium on “*Small pelagic fish: New frontiers in science for sustainable management*” (November 7–11, 2022, Lisbon, Portugal)**

The symposium will highlight the state-of-the-art in the following and other topics surrounding the sustainable exploitation of SPF within an ecosystem context. Climate change impacts are expected to be a recurring theme of this symposium.

**h. 5th PICES/ICES International Symposium on “*The effects of climate change on the World’s oceans*” (April 17–21, 2023, Bergen, Norway)**

The 5th International Symposium Effects of Climate Change on the World’s Ocean (ECCWO-5) brings together experts from around the world to better understand climate effects on ocean ecosystem, what

adaptation and mitigation measures could look like, and how to implement them. The symposium is continuing the successful series of ECCWO symposia over the last years.

AGENDA ITEM 8

**Funding requests**

**a. 2022 PICES Annual Meeting**

- A 1-day meeting at PICES-2022: A morning meeting as per PICES-2021 to review recent progress and activities and an afternoon coordination meeting to discuss S-CCME’s role in SUPREME and links to ICES; planning for a coastal high resolution ocean model grid for the North Pacific, and Chukchi and Beaufort seas.

**b. PICES-2022 Topic Session**

- A 1-day Topic Session on “Forecasting and projecting climate variability and change on northern hemisphere marine ecosystems using coupled next generation biophysical models”) (*S-CCME Endnote 3*).

**c. 2022 Intersessional VIRTUAL Meeting (spring)**

- S-CCME/SICCME Virtual Workshop on “*Integrated Climate Modeling to identify thresholds, limits, and tipping points in marine ecosystems: current progress and future needs*”. (Convenors: Kirstin Holsman (S-CCME), Xiujuan Shan (S-CCME), Elliott Hazen (WG 36), Kathy Mills (SICCME));
- Two ½-day meetings to review and summarize observed and projected ecosystem tipping points and thresholds in marine systems using case studies from S-CCME member projects;
- PICES logistic support requested to run Webex;
- Outcomes anticipated include publication(s) to inform upcoming climate assessments, github repository of shared code and outputs (doi through Zenodo), and workshop report.

***S-CCME Endnote 1***

**S-CCME participation list**

Members

Kirstin Holsman (USA, Co-Chair/PICES)  
Xiujuan Shan (China, Co-Chair/PICES)  
Kathy Mills (USA, Co-Chair/ICES)  
Jackie King (Canada)  
Angelica Peña (Canada)  
Chuanxin Qin (China)  
Shin-ichi Ito (Japan)  
Motomitsu Takahashi (Japan)  
Sukgeun Jung (Korea)  
Sukyung Kang (Korea)  
Chung Il Lee (Korea)  
Alan Haynie (USA)  
Anne B. Hollowed (USA)  
Franz Mueter (USA)  
Phoebe Woodworth-Jefcoats (USA)

PICES members unable to attend

China: Guimei Liu, Jinhui Wang, Xuelei Zhang  
Japan: Hiroshi Kuroda  
Russia: Yury I. Zuenko  
USA: Cisco Werner

Observers

Elliott Hazen (USA)  
Roger Griffis (USA)  
Steven Bograd (USA)  
Jonathan Reum (USA)



**S-CCME Endnote 2****S-CCME meeting agenda**

1. Introductions
2. Adoption of agenda
3. Membership and election of new Chairs
4. S-CCME Phase 4 (2021–2025) Implementation Plan overview
  - a. Review of Phase IV goals and activities
  - b. Progress towards S-CCME TORs
  - c. Discussion: potential joint sessions or workshops for 2022
5. Reports S-CCME activities and events of interest in 2021
  - a. Report from ICES SICCME
  - b. CFI Overview (USA); FACSS workshop; Opportunity for Arctic collaboration (US-Russia) and Canadian collaboration (US-Canada) on CFI (Hollowed & Griffis)
  - c. WKCLIMAD (ICES) (Holsman)
  - d. FishMIP (King/Cheung)
  - e. IPCC WG II AR6 4th Lead Author Meeting (virtual) and Final Government Draft (Ito)
  - f. FUTURE program (King)
  - g. Joint PICES/ICES Working Group 43 on *Small Pelagic Fish* (WGSPF)
  - h. WG 45: WGGAFY Joint PICES/ICES Working Group on *Impacts of Warming on Growth Rates and Fisheries Yields* (Spencer)
  - i. Working Group 44 on an *Integrated Ecosystem Assessment for the Northern Bering and Chukchi Seas*
  - j. Joint DFO-NMFS Climate change working groups
  - k. UN-Decade programs
  - l. Science for Nature and People Partnership (SNAPP): Climate Resilient Fisheries Working Group
  - m. Working Group on Integrative Physical-biological and Ecosystem Modelling (WGIPEM)
  - n. Working Group on Seasonal-to-Decadal Predictions of Marine Ecosystems (WGS2D)
  - o. Kick-off meeting of EU H2020 FutureMARES
  - p. Launch of IPCC AR6 WGI report
  - q. ICES Annual Science Conference
6. Roundtable for updates on relevant national climate change research projects of interest to S-CCME
  - a. US updates (Holsman)
    - 5th US National Climate Assessment (Mills)
    - US NOAA Fisheries Climate Science Strategy (NCSS)
    - Fisheries Integrated Modeling System (FIMS)
    - OAR/GFDL/PMEL collaboration
    - NOS–West Coast Operational Forecast System (WCOFS)
    - Climate and Fisheries Initiative (CFI)
  - b. Japan (Ito)
  - c. Canada (King)
  - d. Korea (Kang)
  - e. China (Shan)
  - f. Russia
7. S-CCME/SICCME planned activities in 2021/2022
  - a. IPCC WG II AR6
    - a. IPCC government review of WGII, WGIII final phase
    - b. IPCC WGI released & interactive Atlas available
  - b. Joint NMTT-ICES Workshop launching the Nordic Climate Change Forum for Fisheries & Aquaculture
  - c. MSEAS 2021 on “*Managing for sustainable use of the Earth’s marine and coastal systems*”; Postponed tentatively for Summer 2022 (Haynie)

## S-CCME – 2021

- d. OSM 2022: (ME10) “*Evaluating changing ocean conditions for marine social-ecological systems including applications for fisheries, aquaculture, and ecosystem-based management*” (Holsman)
  - e. ICES 4th Decadal Variability of the North Atlantic and its Marine Ecosystems
  - f. 2022 Symposium on “*Capelin—The canary in predicting effects of climate on the Arctic marine environment*”
  - g. 2022 PICES/ICES/FAO International Symposium on “*Small pelagic fish*”
  - h. The 5th PICES/ICES International Symposium “*The effects of climate change on the World’s oceans*” on April 17–21, 2023 in Bergen, Norway (All)
8. Funding requests
    - a. 2022 PICES Annual Meeting
    - b. PICES-2022 Topic Session
    - c. 2022 Intersessional VIRTUAL Meeting (spring)
  9. Other

### **S-CCME Endnote 3**

**Proposal for a Topic Session on**  
**“Forecasting and projecting climate variability and change on northern hemisphere marine ecosystems using coupled next generation biophysical models” at PICES-2022**

Co-Convenors: Xiujuan Shan (China), Kirstin Holsman (USA), Sukyung Kang (Korea), Shin-ichi Ito (Japan)

Co-sponsor: ICES

Duration: 1 day

The completion of the Intergovernmental Panel on Climate Change Sixth Assessment Reports in 2021 and 2022 provides a global update on past, current and future implications of climate change on marine ecosystems. In preparation for, and in response to, these global assessments of climate impacts and adaptation, scientists throughout the northern hemisphere have utilized coupled models to assess the implications of changing climate on marine ecosystems and fishery-dependent communities. This session seeks contributions on innovative new methods for ocean model simulations, improvements in seasonal to decadal forecasting skill, biogeochemical model enhancements, impacts and risk assessments, and evaluations of fishery adaptation strategies to short-term and long-term climate change within contrasting ocean management systems. The session will provide a forum for the exchange of emerging science, advanced methods and synthesis of climate change impacts and adaptation approaches throughout the northern hemisphere.