

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

The Section on *Climate Change Effects on Marine Ecosystems* (S-CCME) held its meeting from 9:00 to 17:00 h on September 24, 2018 in Vladivostok, Russia. Thirteen members and observers from five member countries attended (*S-CCME Endnote 1*). Dr. Anne B. Hollowed chaired the meeting.

### AGENDA ITEM 1

#### **Introductions and new members**

Dr. Anne Hollowed reviewed changes in S-CCME membership. Dr. Hollowed's term as Co-Chair ends in 2017. Dr. Jacquelynn King (Canada) will replace her as S-CCME Co-Chair.

The group discussed two issues related to membership. First, there is a need to identify a S-CCME member who can serve as a liaison with the FishMIP modeling group. Fish-MIP's goals and objectives are similar to S-CCME and thus coordination between the two groups will become more important in the future. Second, there is a need to invite global modelers to join S-CCME. This issue was raised during the March Phase 3 planning meeting (March 2017). POC has agreed to work with S-CCME on this issue. This concept remains a high priority for the group.

### AGENDA ITEM 2

#### **Past accomplishments**

S-CCME activities are contributing to the overall goals and objectives of S-CCME, as well as to the PICES and ICES Science Plans. Dr. Hollowed reported on the outcome of the 1-day Phase 3 planning workshop that was held in Victoria, British Columbia, Canada on March 5, 2017. She reviewed the key elements of the proposed 3-year plan for 2018–2020. The next phase will add:

- Training,
- Considerations of data storage and data exchange,
- Emphasis on comparative analysis,
- Synthesis and a greater emphasis on communication and outreach.

She noted that ICES has already approved the continuation of S-CCME. The S-CCME 2018–2020 plan contains slight modifications (additions) to the S-CCME mission in light of the success of previous activities identifying and aligning (to the fullest extent possible) climate change research activities in regional nodes across the northern hemisphere and elsewhere.

#### **Activities 2016/17**

1. November 2016 – **Climate change and fisheries and aquaculture stakeholder engagement workshop**. The Hague (Netherlands) hosted by Wageningen Economic Research (LEI). This event was part of the EU H2020 Project CERES (Climate change and European Aquatic Resources), involving many (European) S-CCME members (including Myron Peck, John Pinnegar).
2. December 2016: **ICES/PICES Workshop on Understanding the Impacts and Consequences of Ocean Acidification for Commercial Species and End-users** (WKACIDUSE), at ICES Headquarters, Copenhagen. Chaired by Silvana Birchenough (UK/ICES), Catriona Clemmesen-Bockelmann (BioAcid, Germany) and Tsuneo Ono (Japan/PICES). S-CCME was represented by John Pinnegar (UK/ICES). See [PICES Press 25\(2\): 27–28](#).
3. December 2016: **Scoping Meeting for the IPCC Special Report on Climate Change, the Oceans, and the Cryosphere**, at Monaco. Manuel Barange (Italy), and Shin-ichi Ito (Japan/PICES) attended from S-CCME.

4. March 2017: At the **International Symposium on “Drivers of dynamics of small pelagic fish resources”** S-CCME contributed to two workshops: **Workshop 4** “Modeling migratory fish behavior and distribution” convened by Shin-ichi Ito (S-CCME, Japan) and Enrique Curchitser (USA) and **Workshop 5** “Recent advances in the life stage ecophysiology of small pelagic fish: Linking laboratory, field and modeling studies” convened by S-CCME members Myron Peck (Germany/ICES), Kirstin Holsman (USA/PICES), Shin-ichi Ito (Japan/PICES) and Laure Pecquerie (France). See [PICES Press 25\(2\)](#), pp. 18–19 and pp. 20–21.
5. March 2017: **Phase 3 planning workshop** in Victoria, British Columbia (*S-CCME Endnote 3*)
6. March 2017: Galway, Ireland. S-CCME members met at the **CERES Annual Meeting to review progress on future scenarios for EU fisheries as well as vulnerability assessments**. CERES is coordinated by S-CCME member Myron Peck (Germany/ICES) with many other S-CCME members, including John Pinnegar (UK/ICES) and Mark Payne (Denmark/ICES). Anne Hollowed (USA/PICES) attended as member of the Research Advisory Board (RAB).
7. May 2017: **Scoping meeting for the Sixth Assessment Report (AR6)** took place in from May 1–5, 2017 in Addis Ababa, Ethiopia. The draft outlines approved in September 2017. Anne Hollowed gave a “setting the stage” presentation titled “*A summary of our current understanding of the implications of climate change and ocean acidification on marine ecosystems, their goods and services, and anticipated advancements for AR6*”. She also co-chaired the WGII breakout session on “*Natural and managed ecosystems: values and benefits*” which addressed two chapters: Terrestrial and freshwater ecosystems including biodiversity and Marine ecosystems including biodiversity. Chapter outlines were approved by the IPCC in September 2017.
8. May 2017: Anne Hollowed and Franz Mueter co-chaired the **Lowell Wakefield Symposium, Impacts of a Changing Environment on the Dynamics of High-latitude Fish and Fisheries** (May 9–12, 2017, Anchorage, Alaska). S-CCME was represented on the scientific steering committee by Franz Mueter (University of Alaska Fairbanks), Anne Hollowed (NOAA, USA); Mark Payne (DTU Aqua) and Trond Kristiansen (Norwegian Institute for Water Research). PICES co-sponsored the event by supporting travel for Aleksey Somov, TINRO-Center (Russia) who gave an oral presentation on “*Changes in the western Bering Sea upper epipelagic nekton communities in the early 21st century*”.
9. June 2017: **ESSAS Open Science Meeting on Subarctic and Arctic Science, Tromsø, Norway** (June 11–15, 2017). The title of the OSM was “*Moving in, out and across the Subarctic and Arctic marine ecosystems: shifting boundaries of water, ice, flora, fauna, people and institutions*”. The Ecosystem Studies of Subarctic and Arctic Seas (ESSAS) is a regional program of the Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) project. Its objectives are to understand how climate variability and climate change affect the marine ecosystems of Subarctic and Arctic seas and their sustainability, and in turn, how changes in these marine ecosystems affect humans. Approximately 180 scientists participated in the meeting. S-CCME was represented on the SSC by Ken Drinkwater (Norway/ICES), Alan Haynie (USA/PICES), Shin-ichi Ito (Japan/PICES), and Franz Mueter (USA/PICES).
10. June 2017: First announcement of the **4<sup>th</sup> International Symposium “The effects of climate change on the world’s oceans”** (June 4-8, 2018, Washington, DC, USA) was posted on the PICES and ICES websites.
11. June 2017: S-CCME Co-Chairs were invited to participate in a Planning Meeting to prepare an **FAO Fisheries and Aquaculture Technical Paper** on “*Climate change implications for fisheries and aquaculture. Overview of current knowledge and responses*”. The first lead author meeting was held in Rome, Italy. John Pinnegar (UK/ICES) and Myron Peck (Germany/ICES) will be drafting the section on “North Atlantic and Atlantic-Arctic Fisheries”, Kirstin Holsman (USA/PICES), Anne Hollowed (USA/PICES), Shin-ichi Ito (Japan/PICES) will be drafting the section on “North Pacific and Pacific-Arctic Fisheries”. Ian Perry (Canada), Jacquelynne King (Canada), Mikhail Stepanenko (Russia), Xiujuan Shan (China), Sukgeun Jung (Korea) agreed to serve as national reviewers for the latter section.
12. July 2017: **WKSICCME-CVA** S-CCME held an **intersessional workshop on “Regional climate change vulnerability assessment for the large marine ecosystems of the northern hemisphere”**

- (WKSICCME-CVA) assessment for the large marine ecosystems of the northern hemisphere (WKSICCME-CVA) at ICES Headquarters, Copenhagen. The meeting was co-chaired by Myron Peck (Germany/ICES); Kathy Mills (USA); Elliott Hazen (USA/PICES). The workshop was specially requested by the ICES Secretariat as an activity of S-CCME. The main goals were to: (1) Compare and contrast various vulnerability assessment approaches used for fisheries and aquaculture; (2) Discuss opportunities for comparative studies in different Large Marine Ecosystems (LMEs); (3) discuss best practices for extending vulnerability assessments; (4) Draft short statements on climate change impacts for regional ecosystem overviews.
13. August 2017: S-CCME Co-Chairs were invited by the **European Defense Fund (EDF)** to participate in a workshop on “*Climate-related impacts on fisheries governance*” hosted at ICES Headquarters in Copenhagen. Myron Peck (Germany/ICES) attended the meeting on behalf of S-CCME.
  14. September 2017: The **S-CCME open science session** on “*Physical, economic and societal impacts of climate change: testing common scenarios for future impact*” was held on September 19 during the ICES Annual Science Conference. The meeting was convened by Myron Peck (Germany/ICES), John Pinnegar (UK/ICES), Anne Hollowed (USA/PICES), Shin-ichi Ito (Japan/PICES). Approximately 40 scientists participated in the meeting. The session provided an opportunity to discuss the S-CCME Phase 3 (2018–2020) Implementation Plan.
  15. September 2017: **ICES ASC 2017** (September 18–21, 2017, Fort Lauderdale, USA). Theme session A. “*Projected impacts of climate change on marine ecosystems, wild captured and cultured fisheries, and fishery dependent communities*” Conveners: Jon Hare (USA), John Pinnegar (UK/ICES), Myron Peck (Germany/ICES), Shin-ichi Ito (Japan/PICES).
  16. September 2017: **PICES-2017** (September 22–October 1, 2017, Vladivostok, Russia). Topic Session (S6) “*Can short-term forecasts inform long-term climate projections and visa-versa?*” [later merged with “*Interannual variability in marine ecosystems*” and renamed as “*Interannual variability in marine ecosystems and its coupling with climate projections*”].

### AGENDA ITEM 3

#### **Future plans**

1. October 2017: **First Lead Author meeting for the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate**, Nadi, Fiji. Two S-CCME members were selected to participate. Anne Hollowed (USA/PICES) was selected as a lead author. Chapter 3, Polar Regions (50 pages), and Manuel Barange (Italy/ICES) was selected as a Review Editor for Chapter 5, Changing ocean, marine ecosystems, and dependent communities (65 pages).
2. June 4–8, 2018: **4<sup>th</sup> International Symposium on “The effects of climate change on the world’s oceans”** will be held in Washington DC, USA. Co-sponsors: PICES, ICES, IOC and FAO. Shin-Ichi Ito, Japan (PICES – S-CCME), Manuel Barange (FAO, S-CCME), Veronique Garcon (CNRS, France), and Jason Link (NOAA, USA) are serving as symposium conveners. S-CCME is represented on the SSC by Anne Hollowed (USA, Chair), Myron Peck (Germany), John Pinnegar (UK), Angelica Peña (Canada) and Kirstin Holsman (USA).
3. June 9, 2018: S-CCME proposed a ½-day ICES/PICES Workshop on “*Political, economic, social, technological, legal and environmental scenarios used in climate change scenarios*” in Washington, DC to align future scenarios used in various climate programs. This workshop would be associated with the Climate Change symposium (but not conducted in parallel to sessions or workshops). The workshop will provide an opportunity to collect information from project PIs prior to the meeting and have an informed discussion on assumptions/differences, *etc.* There could be a community paper as a product.

## S-CCME – 2017

### 4. ICES ASC 2018

- S-CCME requested support for one speaker to attend the ICES Theme Session on “*The Nordic Seas and the Arctic – Climatic variability and its impact on marine ecosystems, fisheries and policy making*”;
- S-CCME requested support for one speaker to attend the ICES Theme Session on “*Future-oriented Seafood Markets: Economic dimensions, ecological compatibility and social aspects of fisheries and aquacultures*”.

### 5. PICES-2018

- S-CCME proposed a 1-day workshop on “*Synthesizing projected climate change impacts in the North Pacific*” PICES-2018 (**S-CCME Endnote 4**). This workshop will finalize Phase II of the S-CCME Implementation Plan.
- S-CCME requests a ½-day meeting (if workshop proposal is accepted); otherwise a 1-day business meeting.

## AGENDA ITEM 4

### Modeling nodes

Not discussed.

### S-CCME Endnote 1

#### S-CCME participation list

##### Members

Anne B. Hollowed (USA, Co-Chair)  
Sukgeun Jung (Korea)  
Suam Kim (Korea)  
Jacquelynnne (Jackie) King (Canada)  
Xiujuan Shan (China)  
Xuele Zhang (China)  
Jinhui Wang (China)

##### Observers

Elliott Hazen (USA)  
Jilong Li (China)  
Carmel Lowe (Canada)  
Lian Peng (China)  
Sei-Ichi Saitoh (Japan)  
Feng Zhou (China)

##### Members unable to attend

Canada: Angelica Peña  
China: YiPing Bai, Guimei Liu, Chuanxin Qin, Jing Yu  
Japan: Shin-ichi Ito, Hiroshi Kuroda, Motomitsu Takahashi  
Korea: Sukyung Kang  
Russia: Yury I. Zuenko  
USA: Alan Haynie, Kirstin Holsman, Franz Mueter, Cisco Werner, Phoebe Woodworth-Jefcoats

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

1. Introductions (new members)
2. Review of past accomplishments
  - S-CCME Implementation Plan 2018-2020
  - July meeting in Copenhagen (vulnerability assessments) (Hazen)
  - Lowell Wakefield Symposium (Hollowed)
  - ESSAS Open Science Meeting (Sei-Ichi Saitoh)
  - Open Science Session ICES (Hollowed)
  - ICES / PICES Theme Session A (Hollowed)
3. Plans for 2018-2020
  - 4<sup>th</sup> Symposium on “*The effects of climate change on the world’s oceans*” (Hollowed)
  - 2018 PICES/ICES theme session proposals for 2018 (King)
4. Updates on modeling nodes
  - Overview of European and western Atlantic projects (Hollowed)
  - COCA California Current (Hazen or Jacox)
  - ACLIM Bering Sea Research and Acceleration Transition Plan (RTAP) Operationalization of ACLIM (Hollowed)
  - GOA regional action plan - Baja to Bering (unfunded) (Hollowed)
  - Canada (King or Peña)
  - Russia (Zuenko)
  - Japan (TBD)
  - Korea (Sukyung Kang and or Chan Joo Jang)
  - China (Xiujuan Shan)
  - S-CCME contributions to IPCC scoping and author team time lines (Hollowed)
  - FAO Technical Report on Climate Change effects in marine ecosystems (Hollowed)
5. Adjourn

**S-CCME Endnote 3**

**Phase 3 planning workshop participants and agenda  
Victoria, British Columbia, Canada  
March 5, 2017**

Anne Hollowed (USA/PICES Co-Chair)  
 Cisco Werner (USA/PICES)  
 Jacquelynne King (Canada/PICES)  
 Kim Houston  
 Wojciech Wawrzynski (ICES)  
 Suam Kim (Korea/PICES)  
 Alexander Bychkov (PICES)  
 Angelica Peña (Canada/PICES)  
 Harold (Hal) Batchelder (PICES)  
 Robin Brown (PICES)  
 Myron Peck (Germany/ICES)  
 Sin-ichi Ito (Japan/PICES Co-Chair)  
 William Cheung (Canada)  
 Kirsten Holsman (USA/PICES)  
 Alan Haynie (USA/PICES)  
 Matthew Baker (USA/NPRB)  
 Romeo Saldívar-Lucio (Mexico)  
 Svein Sundby (Norway/ICES)

1. Review of existing implementation plan - accomplishments and challenges. [Implementation Plan](#)
2. Relationship of SICCM (S-CCME) to ICES and PICES strategic plans [ICES Strategic Plan](#) [PICES Strategic Plan](#)
3. Review and revise SICCM (S-CCME) Vision Statement for next 3 years
4. Create Mission Statement:
  - Planned or existing projection modeling efforts (Table). Commonalities and differences between programs?
  - Relationship to IMBER (ESSAS), FishMIP, and other international ecosystem modeling programs
  - Opportunities for connections to existing physical and human dimension working groups within ICES and PICES
  - Identifying core socioeconomic scenarios
  - Timeline for CMIP6 uptake
5. Discussion - how can ICES and PICES help in Phase 2?
  - Training options
  - Program Office
  - Data management policy and storage
  - Dedicated SICCM (S-CCME) Sessions for Annual meetings
  - Outreach - Web-presence, Effects of Climate Change on the World's Oceans Symposia; COP side meetings; workshops etc.
6. How can we help PICES and ICES?
  - Accelerating uptake of CMIP6
  - On-ramp to delivery of peer reviewed literature for use by National and International Climate Assessment Reporting
  - Delivery of policy relevant scientific advice. When? How?
7. Discussion and review of proposed revisions of SICCM (S-CCME) implementation plan
8. Proposed revisions for Phase 2, continued
9. Timelines, proposed sessions, proposed workshops

#### ***S-CCME Endnote 4***

#### **Proposal for a Workshop on “Synthesizing projected climate change impacts in the north Pacific” at PICES-2018**

Duration: 1 day

Co-sponsor: ICES

Convenors: Anne Hollowed (USA), Shin-ichi Ito (Japan), Jacquelynne King (Canada)

Suggested Invited Speakers: TBD

Scientists have endeavored to project the implications of climate change on marine ecosystems throughout the North Pacific. We expect that many researchers will complete these projections by June 2018 in anticipation of the 4th Effects of Climate Change on the World's Oceans symposium. A workshop is needed to compare and synthesize results from this international projection modeling effort. The workshop will provide a forum for discussions of: a) Projection outcomes under different modeling approaches; b) Opportunities for comparative studies looking at projected impacts on selected species or fisheries in different LMEs; c) How modeling teams addressed the uncertainty landscape including issues of scenario, parameter and model uncertainty; and d) The range of potential harvest strategies selected and their performance relative to different national value systems. We anticipate that a manuscript will be generated from this session that will be submitted to a peer reviewed journal.