

## Report of the Fishery Science Committee

The meetings of the Fishery Science Committee (FIS) were held on Sunday, October 28 (18:00–20:00) and Wednesday, October 31, (14:00–18:00), 2018 in Yokohama, Japan. FIS Chair Dr. Xianshi Jin and Dr. Jacquelynne King were elected as the Chair and Vice-Chair, respectively, of FIS at PICES-2017. Dr. Jin called the meeting to order and welcomed members and observers (*FIS Endnote 1*). All members in attendance introduced themselves and absent members were noted. The draft agenda was reviewed by the participants and was adopted without revisions (*FIS Endnote 2*). Dr. King was appointed rapporteur.

### AGENDA ITEM 3

#### Changes to FIS membership

- Dr. Nobuaki Suzuki (Japan) is a new member, replacing Dr. Tetsuichiro Funamoto;
- Dr. Sukyung Kang (Korea) is a new member, replacing Prof. Chang-Ik Zhang;
- Dr. Zhoujun Ma (China) is a new member, replacing Dr. Jiahua Cheng;
- Dr. Steven Lindley (USA) is a new member, replacing Dr. John Field.

### AGENDA ITEM 4

#### Volunteers for Award Committees for PICES-2018

- Best Presentation Award to an early career scientist in a FIS-sponsored Topic Session  
Judges: Dr. Gordon Kruse and Dr. Steven Lindley
- Best Poster Award to an early career scientist in a FIS-sponsored Topic Session/Workshop  
Dr. Libby Logerwell and Dr. Naoki Tojo

### AGENDA ITEM 5

#### Annual review of FIS activities

##### 1. PICES-2018 FIS Paper/Topic Sessions and Workshops

FIS sponsored/co-sponsored:

- A ½-day FIS contributed Paper Session;
- A ¾-day Topic Session (S2): *Fish production through food web dynamics in the boundary current systems*;
- A ½-day Topic Session (S12): *Applying ecosystem considerations in science advice for managing highly migratory species*;
- A ½-day Workshop (W2): *PICES contribution to Central Arctic Ocean (CAO) ecosystem assessment (Second)*;
- A ½-day Workshop (W4): *Synthesizing projected climate change impacts in the North Pacific*.

##### 2. Expert groups reporting to FIS

###### a) S-CCME: Joint PICES/ICES Section on *Climate Change Effects of Marine Ecosystems*

Dr. Jackie King (Co-Chair/ PICES, S-CCME) presented the 2018 activities, with planned and proposed activities for 2019.

- S-CCME is addressing several key activities outlined in its Phase 3 Implementation Plan;
- S-CCME held a ½-day Workshop (W4) on “*Synthesizing projected climate change impacts in the North Pacific*” followed by a ½-day meeting.
- S-CCME requests:
  - Additional Russian member(s) (FIS or BIO) to complement Russian member from POC;
  - A ½-day meeting at PICES-2019.

- b) WG 34: Joint PICES/ICS Working Group on *Ocean Conditions and the Distribution and Productivity of Highly Migratory Fish*
- WG members had presentations at the PICES/ICES/IOC/FAO 4th Symposium on “*The effects of climate change on the world’s oceans*” (ECCWO-4; June 4–8, 2018; Washington, DC, USA);
  - WG 34 sponsored a ½-day Topic Session (S12) on “*Applying ecosystem considerations in science advice for managing highly migratory species*” at PICES-2018.

The ISC is considering holding an international symposium in 2020, and is requesting that WG 34 be extended to be active for its occurrence. The international symposium would focus on inclusion of oceanographic variables in stock assessment of highly migratory species. Science Board A 1-year extension, to 2019, has already been recommended by Science Board and approved by Governing Council. FIS Committee members mentioned that a second extension would not likely be approved, and pointed out that an international symposium and co-sponsorship from PICES does not require a WG to be active.

WG 34 is interested in having the Inter-american Tropical Tuna Commission (IATTC) involved in PICES. Dr. Carolina Minte-Vera, representing IATTC, was a co-convenor for S12 at PICES-2018, and a poster introducing IATTC activities was presented at the Poster Session. Perhaps in the future, a Study Group will be proposed to develop a framework between PICES and IATTC.

- WG 34 requests:
  - Proposal for a 1-day Topic Session on “*Application of EBFM in the 21st century: Progress and challenges in pelagic systems*” at PICES-2019
  - A ½-day meeting at PICES-2019

- c) New Study Group on *Impacts of Mariculture on Coastal Ecosystems* (SG-IMCE)

A proposal for a new Study Group on *The Impacts of Mariculture on Coastal Ecosystems* (**FIS Endnote 3**) was presented by Dr. Xianhong Meng. This expert group was first proposed at PICES-2017. Science Board supported such a group in principle but found the terms of reference too broad and asked the proponents to look at the recommendations in the reports of the Working Group on *Mariculture in the 21<sup>st</sup> Century* (WG 18) and the Working Group on *Environmental Interactions of Marine Aquaculture* (WG 24) when revising the TOR. The proposal was reviewed again by Science Board at ISB-2018, and it was recommended that the study group proponents work with FIS, MEQ, HD and FUTURE to further narrow the TOR to look at only one or two issues. The FIS Committee considers that the revised TOR are in line with the recommendations made by WG 24.

**Decision:** FIS Committee accepts the revised Terms of Reference of the Study Group and supports its establishment.

FIS noted that ICES has several mariculture-related expert groups it would be beneficial to have an ICES *ex-officio* member added to the study group. Dr. Mike Rust is Chair of the ICES Steering Group which covers:

- Environmental interactions of aquaculture,
- Scenario planning for aquaculture,
- Ecological carrying capacity in aquaculture.

**Decision:** FIS Committee supports the appointment of Mike Rust as *ex-officio* to SG-IMCE

- d) Pacific Transitional Areas Symposium, La Paz, Baja California Sur, Mexico April 24-26, 2018. Topic Session (S5) on “*Biodiversity changes in Pacific transitional areas*” was convened by Drs. Xianshi Jin (China), Thomas Therriault (Canada), and Rubén Rodríguez Sánchez (México).

## AGENDA ITEM 6

**Relations with other organizations and programs**

## a. International Pacific Halibut Commission (IPHC)

FIS Committee members received and reviewed an updated Memorandum of Understanding (MoU) between the International Pacific Halibut Commission and PICES. Drs. David Wilson, Executive Director and Dr. Josef Planas, Branch Manager of IPHC presented an overview of the revised MoU. The original MoU was signed in 2002, but had fallen into disuse and now PICES and IPHC are interested in re-establishing a connection. The IPHC has ecosystem datasets that would be of interest to PICES. Some collaborative activities might include making datasets available to WG 35 (WG-NPESR3) including oceanographic data that could show the climate and oceanographic impacts on distribution and migration of Pacific halibut. The FIS Committee noted that the MoU is in line with other relationships that PICES has with other similar organizations, and it would be beneficial for PICES to renew it.

**Decision:** FIS Committee supports the renewal of the MoU between PICES and IPHC.

## b. Fisheries experts of the Central Arctic Ocean (FisCAO)

The Fisheries experts of the Central Arctic Ocean are an *ad hoc* expert group concerned about unregulated fishing in the Arctic Ocean. There is now a signed agreement for a fishing moratorium in the Arctic until it can be determined if sustainable fishing is possible. Currently the group is trying to determine what type of monitoring will take place, and is calling for a synthesis of information and for recommendations on monitoring. There is no formal request for engagement, but it would be of benefit to have a FIS Committee primary point of contact for any requests from FisCAO. Dr. Libby Logerwell is involved in Arctic research.

**Decision:** Dr. Libby Logerwell is assigned as a FIS Committee contact to FisCAO.

## c. Arctic Council Ecosystem Assessment expert group

Dr. Logerwell presented a proposal for a Study Group on *IEA of the Northern Bering-Chukchi Seas (FIS Endnote 4)*, in cooperation with the Arctic Council and ICES. This area will provide early and strong signals of climate change and would offer PICES scientists the opportunity for research activities.

**Decision:** FIS Committee supports the formation of the SG.

## AGENDA ITEM 7

**Selection of Best ECS presentations for FIS-sponsored sessions**

1. Dr. Ayako Suda (National Research Institute of Fisheries Science, FRA, Japan) was awarded the Best Oral Presentation for her report on “*Development of male-specific DNA markers in the Pacific bluefin tuna (Thunnus orientalis): Potential applications for sex ratio control in aquaculture and contribution to tuna resource management*” in FIS Topic Session (S12) on “*Applying ecosystem considerations in science advice for managing highly migratory species*”.
2. Mr. Koji Fujita (Hiroshima University, Japan) was awarded the Best Poster award for his poster on “*Influence of submarine groundwater discharge on feeding and growth of fish*” in the General Poster Session [FIS judges were responsible for judging fish-related topics in this session.].

AGENDA ITEM 8

**Rankings of Topic Sessions and Workshops for PICES-2019**

FIS gave highest priority for the following:

1. Topic Sessions:

- Proposal 12 - *Incorporating climate variability and change into fisheries management advice*;
- Proposal 18 - *Application of EBFM in the 21st century: progress and challenges in pelagic systems*;
- Proposal 5 - *Trends in ocean and coastal ecosystems and their services and its future*;
- Proposal 16 - *The impacts of mariculture on coastal ecosystems*.

The FIS Committee saw some overlap, and requested that the two proposals be combined by building on proposal 12, with the inclusion of Dr. Barbara Muhling (USA, WG 34) as a Co-Convenor. An expansion on the description should include use of ecological models as operating systems in MSE systems. The FIS Committee considered the description for proposal 5 was too vague and needed to be improved with specifics. FIS would rank it higher with an improved description, as it had the potential to be a good session. The FIS Committee expected proposal 16 would consist of presentations from the members of the proposed Study Group, and suggested that these might be part of the group's business meeting.

2. Workshops (due to the large number of proposals, the FIS Committee gave highest priorities to those that could be undertaken solely by PICES):

- W13 - *Potential food competition between top predators and fisheries in the North Pacific* (FIS felt this would be of high interest to all PICES member countries.);
- W8 - *PICES contribution to Central Arctic Ocean (CAO) ecosystem assessment (Third)* and W19 - *Scoping an IEA of the Northern Bering-Chukchi Seas LME* (the two proposals have similarities and should be combined. W8 will report on the results of IEA, and W19 is scoping a new IEA of another area, so there can be a good opportunity to transfer expertise.);
- W2 - *The Pacific halibut: Integrating biological research, fisheries science and management across the North Pacific (FIS Endnote 5)* This would be a good start to the updated MoU and re-establishing the relationship between PICES and IPHC. Discussion could identify suitable future collaborations. The workshop is also considering contributed papers to a special publication. FIS Committee was concerned that this focused on single species, and so could be expanded to include comparable flatfishes and predator-prey interactions. However, since Pacific halibut is a keystone species, the Committee felt it was okay to retain the title and focus in description—but just add mention of comparable flatfishes and interactions.)
- W17 - *Developing a collaborative, integrated ecosystem survey program to determine climate/ocean mechanisms affecting the productivity and distribution of Salmon and associated pelagic fishes across the North Pacific Ocean*.

AGENDA ITEM 9

**Proposals for new meetings/workshops/conferences with PICES as a co-sponsor**

Second International Science and Policy Conference on Implementation of the Ecosystem Approach to Management in the Arctic

May–June 2019, Bergen, Norway

Co-sponsors: Arctic Council, PAME, AMAP, CAFF, SDWG, ICES

The conference has a strong focus on local indigenous knowledge and community input along with impacts. Broadly, the Arctic includes the Barent Sea where there is significant fishing. In the Pacific Arctic there is concern regarding subsistence level fishing and marine mammal exploitation. The request is for a) a PICES member for the planning group and b) funding for an invited speaker or Early Career Scientist.

**Decision:** FIS Committee recommends PICES support for this conference.

## AGENDA ITEM 10

**Other business**

None.

***FIS Endnote 1*****FIS participation list**Members

Anya Dunham (Canada)  
 Xianshi Jin (China, Chair)  
 Sukyung Kang (Korea)  
 Jacquelynne (Jackie) King (Canada, Vice-Chair)  
 Gordon Kruse (USA)  
 Steven Lindley (USA)  
 Elizabeth A. Logerwell (USA)  
 Mikhail A. Stepanenko (Russia)  
 Nobuaki Suzuki (Japan)  
 Naoki Tojo (Japan)

Observers

Zhengguo Ciu (China)  
 Xianhong Meng (China)  
 Josef Planas (IPHC)  
 David Wilson (IPHC)  
 others

Members unable to attend

China: Jie Kong, Zhoujun Ma  
 Japan: Masahito Hirota  
 Korea: Jaebong Lee, Sukgeun Jung  
 Russia: Elena P. Dulepova, Alexander I. Glubokov

***FIS Endnote 2*****FIS meeting agenda**

*Sunday, September 24, 18:00–20:00*

1. Introductions and adoption of agenda
2. Nomination of a rapporteur
3. Changes to FIS membership
4. Volunteers for ECS Award for PICES-2018
5. Annual review of FIS activities

*Wednesday, September 27, 14:00–18:00*

6. Relations with other organizations and programs and (All)
7. Selection of Best ECS presentation for FIS-sponsored sessions
8. Rankings of Topic Sessions and Workshops for PICES-2019
9. Proposals for new meetings/workshops/conferences with PICES as a co-sponsor
10. Other business

*FIS Endnote 3*

**Proposal for a new Study Group on  
Impacts of Mariculture on Coastal Ecosystems**

Reporting to: Science Board

Term: November, 2018-October, 2019

Linkage(s) to previous PICES Expert Groups or activities:

- Follows from recommendations from Working Group 24 on *Environmental Interactions on Marine Aquaculture* (<http://meetings.pices.int/publications/scientific-reports/Report44/Rep44.pdf>)

Linkage(s) to other organizations and programs:

- As part of the proposed activity, potential linkages to the new ICES activity on mariculture (<http://www.ices.dk/news-and-events/news-archive/news/Pages/Examining-the-present-and-future-of-aquaculture-.aspx>) will be explored.

Linkage/Contributions to the FUTURE program:

- A contribution to FUTURE program, particularly Research Theme 3: How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?

Motivation and Goals

Mariculture, especially large-scale mariculture, is an important factor affecting coastal ecosystems. In PICES Scientific Report No. 44, a previous PICES expert group (Working Group 24 on *Environmental Interactions on Marine Aquaculture*) provided analyses and overviews of:

- Environmental interactions of marine aquaculture;
- Marine aquaculture legislative frameworks and environmental interactions research;
- Pathogens of aquatic animals: Detection, diagnosis and risks of interactions between Wild and Farmed Population.

While this was an important contribution and a sound basis on which to proceed, there is much more research to be done to characterize the effects of pathogenic and harmful organisms derived from or associated with mariculture on coastal marine ecosystems, consistent with FUTURE Research Theme 3. The Study Group will leverage the international expertise within PICES and partner organizations “identify the impacts in coastal ecosystems that arise from regional- and large-scale mariculture”. The rather cautious “Study Group leading to a Working Group” approach was selected in response to previous challenges and recommendations from the WG 24, specifically:

- Any future marine aquaculture-related PICES expert group should be more narrowly focused to not only allow for more directed work, but also to increase the likelihood of experts from all PICES member countries being able to participate and contribute.
- As well, it is clear that active participation from all PICES member countries is key to realizing a complete analysis of sustainable marine aquaculture issues

Terms of Reference:

1. Review recent research, activities and priorities related to the effects of pathogenic and harmful organisms derived from mariculture on coastal marine ecosystems in PICES nations
2. Assess the opportunities to partner with other organizations to address the issues identified above
3. Prepare Terms of Reference for a Working Group to address the issues identified

4. Where appropriate, identify opportunities for future PICES expert groups to address issues related to the impacts of aquaculture that were not addressed in the Terms of Reference of the proposed Working Group. This is added in anticipation that the range of issues identified may exceed the capacity for a single PICES working group, in keeping with the recommendation from Working Group 24 to keep subsequent Working Groups focused on specific and tractable objectives.

Proposed membership:

China

1. Dr. Zengjie Jiang (jiangzj@ysfri.ac.cn) China, Yellow Sea Fisheries Research Institute, CAFS, China
2. Dr. Xianhong Meng, mengxianhong@ysfri.ac.cn, China, Yellow Sea Fisheries Research Institute, CAFS, China

Canada

1. Dr. Kristi Miller-Saunders (Kristi.miller@dfo-mpo.gc.ca)
2. Dr. Kyle Garver (kyle.garver@dfo-mpo.gc.ca)

Japan

1. Regional Institute in Seto Inland Sea Area or from Universities - TBD
2. TBD

Korea

1. Dr. Mi Young Cho (mycho69@korea.kr)
2. TBD

Russia

1. Dr. Igor Sukhin (igor.sukhin@tinor-center.ru)
2. Dr. Galina Gavrilova (galina.gavrilova@tinro-center.ru)

USA

1. Dr. Kevin Lafferty (lafferty@lifesci.ucsb.edu)
2. TBD

ICES *ex-officio*: Dr. Mike Rust, Chair of Aquaculture Steering Group

***FIS Endnote 4***

**Proposal for a Study Group on *IEA of the Northern Bering-Chukchi Seas***

Reporting to: Science Board

Term: November 1, 2018 – November 1, 2019

Linkages to previous PICES Expert Groups or activities:

- WG 19: *Ecosystem-based Management Science and its Application to the North Pacific*
- WG 35: *North Pacific Ecosystem Status Report*
- WG 39: Joint PICES/ICES/PAME Working Group on *Integrated Ecosystem Assessment for the Central Arctic Ocean*
- S-CCME: Section on *Climate Change Effects on Marine Ecosystems*
- S-MBM: Section on *Marine Birds and Mammals*

Linkages to other organizations and programs:

ICES, Arctic Council Joint (PAME/AMAP/CAFF/SDWG) EA-EG, NOAA IEA Program

Linkages to FUTURE:

This activity will support the FUTURE research themes “How do ecosystems respond to natural and anthropogenic forcing, and how might they change in the future?” and “How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?”

Motivation and Goals

Preparing an Integrated Ecosystem Assessment for the Northern Bering-Chukchi Sea LME area is a step needed to provide scientific advice on issues such as the prospect for future fisheries in the Arctic, vulnerability to shipping, impacts of oil and gas development, effects of invasive species, and consequences of climate change. The potential impacts of climate change on Arctic marine mammals and seabirds, many of which provide subsistence resources for local and indigenous communities is also growing concern.

Ecosystem surveys of the NBS-Chukchi Seas have been conducted intermittently both by Russia and the USA since 1980-1990s. One of the most recent efforts, the North Pacific Research Board Arctic Integrated Ecosystem Research Program will enter its synthesis phase in 2020 and could provide a collaborating forum to conduct IEA activities.

International organizations such as ICES and the Arctic Council Protection of the Arctic Marine Environment (PAME) Working Group have been engaged in developing guidelines and recommendations for IEA and for the Ecosystem Approach in the Arctic. The time is ripe to realize these recommendations and provide technical advice for managers and agencies.

The Study Group will draw on the expertise of other organizations and programs that have been conducting IEA in the Arctic and North Pacific, such as the NOAA IEA Program and the ICES IEA Steering Group. The Study Group will also include representatives from local and indigenous groups to fully integrate their perspective and use of TLK in the process.

Terms of Reference:

1. Review recent research, activities and priorities related to IEA of Arctic Ecosystems
2. Assess the opportunities to partner with other organizations to address the IEA issues
3. Conduct a workshop at PICES 2019 to review the interest, data availability and overall feasibility of conducting such an IEA



4. If above activities demonstrate the feasibility of conducting an IEA of the NBS-Chukchi Seas, prepare Terms of Reference and determine possible members for a Working Group to do so

Proposed membership:

Canada: TBD

China: TBD

USA

1. Lisa Eisner (lisa.eisner@noaa.gov), Alaska Fisheries Science Center, NMFS, NOAA
2. Kirstin Holsman (Kirstin.holsman@noaa.gov), Alaska Fisheries Science Center, NMFS, NOAA

Japan: TBD

Korea: TBD

Russia

1. Kirill Kivva

Proposed leadership:

Co-Chair: Libby Logerwell (USA, TBC) libby.logerwell@noaa.gov

Co-Chair: Yury Zuenko (Russia, TBC) zuenko\_yury@hotmail.com

*FIS Endnote 5*

**Proposal for a Workshop on**  
***“Integrating biological research, fisheries science and management of Pacific halibut and other widely distributed fish species across the North Pacific in the face of climate and environmental variability”***  
**at PICES-2019**

Duration: 1 day (09:00-17:00)

Co-sponsor: IPHC

Convenors: Dr. Gordon Kruse (University of Alaska Fairbanks, US); Dr. Chris Rooper (Department of Fisheries and Oceans, Canada), Dr. Roman Novikov (Kamchatka Research Institute of Fisheries and Oceanography, Russia), Dr. Naoki Tojo (Hokkaido University, Japan), Dr. Josep Planas (International Pacific Halibut Commission)

Proposed invited speakers: (IPHC will provide funds to cover attendance of one invited speaker from an eastern North Pacific country and one invited speaker from a western North Pacific country.)

The North Pacific Ocean is a large and productive ecosystem that is characterized by strong interdecadal climate variability. One of the key species in the North Pacific Ocean ecosystem is the Pacific halibut due to its wide distribution along the continental shelf throughout the North Pacific and to its important trophic position. In addition to its key ecological role, the Pacific halibut is highly relevant from a socio-economic and cultural perspective in the North Pacific Ocean region because it supports important commercial, recreational and ceremonial or subsistence fisheries. In the Northeastern Pacific Ocean, the Pacific halibut stock in waters off north American is managed by the International Pacific Halibut Commission (IPHC) that also conducts research on the biology of the species. Due to its highly migratory nature, its key ecological role and its wide distribution in the North Pacific Ocean, increased efforts are needed to expand and integrate information on the biology and the management of the Pacific halibut and interacting species across all countries involved in its fisheries, particularly in the face of a changing North Pacific. Therefore, the main objective of this Workshop is to provide state-of-the-art information on important current topics related to the biology and fishery of Pacific halibut and interacting species by bringing together researchers, scientists and managers from countries that are invested in this resource. The workshop will consist in a series of invited presentations on specific topics related to the biology of the Pacific halibut and interacting species as well as management and policy issues, followed by a discussion session on national and international research and management efforts that are currently in place as well as opportunities for establishing novel cooperative efforts at an international level.

Publication: special journal issue or review paper.