

## Report of the Fishery Science Committee

The meeting of the Fishery Science Committee (FIS) was held during 18:00–18:40 on October 13, 2013, and 14:00–18:00 on 16 October 2013. Vice-Chairman Xianshi Jin called the meeting to order and welcomed the participants, who introduced themselves. At the request of Dr. Jin, and with the approval of FIS, Dr. Gordon Kruse chaired the 2013 FIS annual meeting. The meeting was attended by 10 FIS members plus 17 observers (*FIS Endnote 1*). Anya Dunham (October 13) and Laura Brown (October 16) served as rapporteurs.

The agenda was adopted with one modification (*FIS Endnote 2*). Dr. Chang-Ik Zhang provided an update on AP-SOFE (FUTURE Advisory Panel on *Status, Outlooks, Forecasts, and Engagement*) after Agenda Item 3 on October 13. In addition, FIS members were asked to attend a plenary briefing on SOFE during 14:00–14:30 on October 16.

### AGENDA ITEM 3

#### **2013 FIS Best Oral presentation and Poster Awards**

Volunteers were sought to serve on subcommittees to select the FIS awards for Best Oral Presentation by an early career scientist and Best Poster presentation during PICES-2013. The Best Oral presentation subcommittee was comprised of Drs. Xianshi Jin, Gordon Kruse, Anya Dunham and Sukgeung Jung. The first three of these are co-conveners of the FIS Paper Session. The subcommittee for FIS Best Poster presentation was comprised of Drs. Jacquelynne King and Akihiko Yatsu. The FIS Committee appreciates the work of these subcommittee members. The PICES Best Oral Presentation award was given to Megan Stachura for her presentation, titled “*Linking recruitment synchrony to environmental variability*”. The PICES Best Poster Presentation award was given to Yang Liu for his presentation titled “*Development of the 3-D growth prediction model for Japanese scallop in Funka Bay, Japan*”. This year’s selections were chosen from topic session S2 and the FIS Paper session.

### AGENDA ITEM 4

#### **FIS Chairman’s report: Implementation of PICES 2012 decisions**

##### *PICES-2013 sessions*

At PICES-2013, FIS sponsored the following sessions:

- S1 Science Board Symposium (Oct. 14, ¾ day). *Communicating forecasts, uncertainty and consequences of ecosystem change*. Co-conveners: Sinjae Yoo (SB), Atsushi Tsuda (BIO), Elizabeth Logerwell (FIS), Chuanlin Huo (MEQ), Hiroya Sugisaki (MONITOR), Kyung-II Chang (POC), Toru Suzuki (TCODE), Thomas Therriault (AP-AICE), Hiroaki Saito (AP-COVE), Phillip Mundy (AP-SOFE), and Igor Shevchenko (Russia);
- S2: BIO/FIS/POC Topic Session (Oct. 18, ½ day). *Are marine ecosystems of the North Pacific becoming more variable?* Co-conveners: Steven Bograd (USA), Elizabeth Logerwell (USA), William Sydeman (USA), and Yutaka Watanuki (Japan);
- S5: BIO/FIS Topic Session (Oct. 15, 1 day). *Marine ecosystem services and the contribution from marine ecosystems to the economy and human well-being*. Co-conveners: Shang Chen (China), Keith Criddle (USA), Ekaterina Golovashchenko (Russia), Mitsutaku Makino (Japan), Jungho Nam (Korea), Minling Pan (USA), and Ian Perry (Canada);
- S8: BIO/FIS/MEQ/TCODE/FUTURE Topic Session (Oct. 17–18, 1 day). *Ecosystem indicators to characterize ecosystem responses to multiple stressors in North Pacific marine ecosystems*. Co-conveners: Vladamir Kulik (Russia), Chaolun Li (China), Ian Perry (Canada), Jameal Samhoury (USA), Peng Sun (China), Motomitsu Takahashi (Japan), and Chang-Ik Zhang (Korea).

## FIS-2013

- S10: FIS/TCODE Topic Session (Oct. 17, 1 day). Co-sponsored by ISC. *Banking on recruitment curves: returns on intellectual investment*. Co-convenors: Anne Hollowed (USA), Skip McKinnell (PICES), Hiroshi Okamura (Japan), and Cisco Werner (ISC);
- FIS Contributed Paper Session (Oct. 15, 1 day). Co-convenors: Xianshi Jin (China), Gordon Kruse (USA), and Anya Dunham (Canada).

Summaries of these sessions and Symposium can be found in the [Session Summaries](#) section of the 2013 Annual Report.

### *PICES co-sponsorship at the ICES Annual Science Conference 2013*

PICES co-sponsored three theme sessions at the 2013 ICES ASC:

- *Marine litter* (Thomas Therriault, Canada);
- *Responses of living marine resources to climate change and variability: learning from the past and projecting the future* (William Cheung, Canada);
- *Do foodweb dynamics matter in fisheries management?* (Ian Perry, Canada).

### *International symposia (late 2012 and 2013):*

- ICES/PICES Symposium on “*Forage fish interactions: Creating the tools for ecosystem based management of marine resources*”, November 12–14, 2012, Nantes, France.

FIS members served as co-convenors and participants in the following joint international meetings:

- “*Responses of Arctic marine ecosystems to climate change*”, March 26–29, 2013, Anchorage, Alaska (Steering Committee member: Elizabeth Logerwell);
- PICES/ICES Workshop on “*Global assessment of the implications of climate change on the spatial distribution of fish and fisheries*”, May 22–24, 2013, St. Petersburg, Russia.

### *FIS-related PICES publications*

None to report.

## AGENDA ITEM 5

### **Update on FUTURE activities and preview of FUTURE meeting**

Dr. Jacquelynne King (FIS and COVE-AP member) gave a progress report on FUTURE activities. FUTURE held its meeting on Sunday October 13, 2013. FUTURE continues to seek input from expert groups related to FUTURE and updates on relevant activities and products. Coordination could be improved, and one recommendation is that meetings with expert groups be held at Annual Meetings to provide updates on activities, products and future plans. Another recommendation is to host a single FUTURE website where all products are posted.

The FUTURE Open Science Meeting will be held April 15–18, 2014 in Hawaii. This falls at the mid-point in FUTURE timelines. Session themes are posted on the PICES website.

Anya Dunham (Canada) was nominated and agreed to serve as FIS representative on AP-AICE.

## AGENDA ITEM 6

### **Status reports of FIS-sanctioned groups**

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

Dr. Jacquelynne King reported on S-CCME activities. Progress was made in terms of the 3 Goals and 4 Objectives of S-CCME.

## Goals:

1. Define, coordinate and integrate 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 when possible predictions should include quantifying estimations of uncertainty.
2. To build global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.
3. Define and quantify the vulnerability of marine ecosystems to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use.

## Objectives:

1. Advancing the scientific capacity on the three main challenges identified above by engaging the PICES and ICES scientific community in focused workshops, theme/topic sessions and symposia that target key uncertainties and technical barriers that impact the predictive skill of ocean models used to project the impacts of climate change.
2. Effectively communicating this capacity to clients, Member Countries, stakeholders and the broader scientific community.
3. Facilitating an international effort to design data collection networks at the spatial and temporal scales needed to monitor, assess and project climate change impacts on marine ecosystems.
4. Facilitating international collaboration to design and implement comparative analysis of marine ecosystem responses to climate change through modelling and coordinated process studies.

There have been 16 activities related to Goal 1, 10 to Goal 2 and 4 to Goal 3. There have been 16 activities related to Objective 1, 6 to Objective 2, 9 to Objective 3 and 5 to Objective 4. This shows some gaps in S-CCME activities. In addition, it was reported that the Section needs to address the following issues:

- Link proposed research activities to strategies for sustainable delivery of ecosystem goods and services and biodiversity preservation,
- Build global prediction networks,
- Address how predictive skill of ocean models can be improved for projecting climate change impacts,
- Communicate results to clients and stakeholders, and develop new ways of doing so,
- Conduct comparative analyses in an international collaboration.

S-CCME produced two publications in 2013:

- *Projected impacts of climate change on marine fish and fisheries*. Hollowed *et al.* 2013. ICES J. Mar. Sci 70: 1023–30;
- Report on *Workshop on Global Assessment of the Implications of Climate Change on the Spatial Distribution of Fish and Fisheries*. 65 pp.
- S-CCME Chairs convened the PICES/ICES Workshop on “*Global assessment of the implications of climate change on the spatial distribution of fish and fisheries*”, May 22–24, 2013, St. Petersburg, Russia. The report is available on the PICES website at [http://www.pices.int/publications/other/WKSICCME-Spatial13\\_140408\\_forPICESwebsite.pdf](http://www.pices.int/publications/other/WKSICCME-Spatial13_140408_forPICESwebsite.pdf). Manuscripts from the workshop will be published in a special volume of ICES Journal of Marine Science.

S-CCME participated in several theme sessions at the ICES 2013 ASC:

- Responses of living marine resources to climate change and variability: learning from the past and projecting the future;
- Physico-chemical aspects of ocean acidification in the ICES area;
- Hydrographic processes, circulation, and water mass formation in the polar and subpolar basins;
- Identifying mechanisms linking physical climate and ecosystem change: Observed indices, hypothesized processes, and “data dreams” for the future;
- The pelagic fish complexes in the North Atlantic Ocean: Distribution, productivity, and inter-specific competition during changing climate.

## FIS-2013

S-CCME members convened and/or participated in two workshops during PICES-2013:

- W1: *Comparison of size-based and species based ecosystem models*;
- W2: *Identifying mechanisms linking physical climate and ecosystem change: Observed indices, hypothesized processes, and “data dreams” for the future.*

Both workshops were co-sponsored by ICES.

S-CCME activities planned for 2014 include a theme session and workshop at the FUTURE OSM, one theme session at the ICES 2014 ASC, and three topic sessions at PICES-2014:

- PICES FUTURE OSM Theme Session S7, PICES FUTURE OSM: *Strategies for ecosystem management in a changing climate.* Co-conveners: M. Barange, A. Hollowed, S. Kim;
- PICES FUTURE OSM Workshop W3: *Climate change and ecosystem-based management of living marine resources: Appraising and advancing key modelling tools.* Co-conveners: M. Peck, A. Hollowed, T. Essington;
- ICES ASC Theme Session Q: *Physical and biological consequences of exchanges between the Atlantic Subarctic and the Arctic.* Session: Co-Conveners: Olafur S. Astthorsson, K. Drinkwater;
- PICES-2014 Topic Session S6: *Climate change impacts on spatial distributions of marine fish and shellfish.* Co-conveners: A. Hollowed, J. Hare, S. Kang (*FIS Endnote 3a*);
- PICES-2014 Topic Session S7: *Recent assessments of climate change impacts on marine ecosystems.* Co-conveners: A. Hollowed, S. Jung, H.-O. Pörtner, J. Rice (*FIS Endnote 3b*);
- PICES-2014 Topic Session S9: *Variability in advection and its biological consequences for Subarctic and Arctic ecosystems.* Co-conveners: F. Mueter, E. Curchitser, K. Drinkwater, S.T. Kim, H. Kuroda, S.I. Saitoh (see *POC Endnote 3*).

### b. PICES/NPAFC Study Group on *Scientific Cooperation in the North Pacific* (SG-SC-NP)

Dr. James Irvine reported on the joint PICES/NPAFC Study Group on *Scientific Cooperation in the North Pacific* (SG-SC-NP).

PICES members of the SG are Thomas Therriault (Chairman-elect, Science Board), Skip McKinnell (PICES Deputy Executive Secretary), Libby Logerwell (FIS Committee Chair), Hiroaki Saito (FUTURE/COVE Advisory Panel Chair). NPAFC members are Shigehiko Urawa (Science Sub-Committee Chair), Jim Irvine (Stock Assessment Working Group Chair), Alexander Zavolokin (Science Sub-Committee member), Nancy Davis (NPAFC Deputy Director).

The objective of the SG is to develop a framework of enhanced collaboration between the two organizations to achieve better and/or more rapid understanding of natural and anthropogenic variability in marine ecosystems.

NPAFC/Committee on Scientific Research and Statistics (CSRS) and PICES Science Board endorsed the formation of SG-SC-NP in May 2013. The SG met October 16, 2013 during the PICES 2013 Annual Meeting in Nanaimo, Canada. During spring 2014 SG members drafted the text of a framework describing scientific topics of joint interest and mechanisms for implementing collaboration. SG-SC-NP will seek feedback from PICES Science Board at the inter-sessional Science Board meeting in April 2014 and final PICES approval at the October 2014 Annual Meeting. The SG will seek approval from NPAFC at their May 2014 Annual Meeting.

The two major topics of joint interest to NPAFC and PICES in the framework are:

- Effects of climate change on the dynamics and production of Pacific salmon populations;
- Oceanographic properties and the growth and survival of Pacific salmon.

Focused research questions pertaining to each of these two topics are described in the framework.

The SG proposed a ½-day joint NPAFC/PICES Topic Session for PICES-2014 (see *SG-SC-NP Endnote 3*). Note: this proposal was accepted as a 1-day workshop (W2) and the title was changed from “*Towards improved understanding of linkages between Pacific salmon and their marine ecosystems*” to “*Linkages*”

between the winter distribution of Pacific salmon and their marine ecosystems and how this might be altered with climate change”. The goal is to produce a collaborative manuscript from the workshop.

#### AGENDA ITEM 7

#### **Relations with other programs and organizations**

##### *a. Asia-Pacific Network for Global Change Research*

The representative of this organization, Dr. Linda Stevenson, was not present at the meeting but sent a poster describing the organization.

##### *b. Ecosystem Studies of Sub-Arctic Seas (ESSAS)*

Dr. Franz Mueter provided an update on the activities of Ecosystem Studies of Sub-Arctic Seas (ESSAS).

The ESSAS Annual Science Meeting was held January 7–9, 2013 in Hakodate, Japan. Sessions on Monday focused on Japanese Research and the “Green Network of Excellence (GRENE) Programs: Seeking comprehensive understanding of the rapid changes occurring in the climatic systems of the Arctic and its global effects”. Sessions on Tuesday and Wednesday addressed topics such as Arctic-Subarctic interactions, human dimensions, bioenergetic modeling and spatial dynamics of subarctic and Arctic marine communities.

ESSAS was involved in several theme sessions during the ICES 2013 ASC in Reykjavik, Iceland, in September:

- Theme session B: *Responses of living marine resources to climate change and variability: Learning from the past and projecting the future*. Co-Convenors: M. Peck (Denmark), W. Cheung (Canada), V. Saba (USA), K. Drinkwater (Norway);
- Theme session C: *Modelling human behaviour as part of integrated models of marine ecosystems*. Co-Convenors: J.J. Poos (The Netherlands), O. Thebaud (Australia) and R. Groeneveld (The Netherlands);
- Theme session L: *Hydrographic processes, circulation, and water mass formation in the polar and subpolar basins*. Co-Convenors: S. Dye (UK) and H. Valdimarsson (Iceland), I. Yashayaev (Canada);
- Theme session M: *Identifying mechanisms linking physical climate and ecosystem change: Observed indices, hypothesized processes, and “data dreams” for the future*. Co-Convenors: E. Di Lorenzo (USA), A. Miller (USA), M. Hufnagl (Denmark).

ESSAS was also involved in the 6<sup>th</sup> CJK IMBER Symposium, October 3–4, 2013, in Tokyo.

ESSAS was involved with several Workshops and Topic Sessions at PICES-2013 in Nanaimo:

- Topic Session S6: *Recent trends and future projections of North Pacific climate and ecosystems*. Co-Convenors: J. Christian (Canada), E. Curchitser (USA), C.J. Jang (Korea), A. Peña (Canada);
- Topic Session S8: *Ecosystem indicators to characterize ecosystem responses to multiple stressors in North Pacific marine ecosystems*. Co-Convenors: V. Kulik (Russia), C. Li (China), I. Perry (Canada), J. Samhuri (USA), M. Takahashi (Japan), C.-I. Zhang (Korea);
- Topic Session S10: *Banking on recruitment curves; returns on intellectual investment*. Co-chairs: A. Hollowed (USA), S. McKinnell (Canada), H. Okamura (Japan), C. Werner (USA);
- Workshop W2: *Identifying mechanisms linking physical climate and ecosystem change: Observed indices, hypothesized processes, and “data dreams” for the future*. Co-Convenors: E. Di Lorenzo (USA), M. Hufnagl (Denmark), J. King (Canada), A. Miller (USA), S. Minobe (Japan), R. Rykaczewski (USA), K. Tadokoro (Japan).

The ESSAS Annual Science Meeting will be held in Copenhagen Denmark, April 1–9, 2014. There will be workshops on polar/Arctic cod and ice cod; human responses to regime shifts; and paleo-ecology of the sub-Arctic Sea.

ESSAS members will be convening a Topic Session at the *IMBER Open Science Conference Future Oceans*, June 23–27 2014, Bergen, Norway titled “*Changing ecosystems in Subarctic and Arctic regions*”.

ESSAS proposed a Theme Session for the 2014 ICES Annual Science Conference, Sustainability in a changing ocean, A Coruna, Spain, September 15–19, titled “*Physical and biological consequences of North Atlantic circulation patterns*”. ESSAS also proposed a Topic Session for the PICES-2014 in Yeosu, Korea, titled “*Variability in advection and its biological consequences for Subarctic and Arctic ecosystems*” (see POC Endnote 3). Contributions from the Pacific and Atlantic would be welcome.

*c. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC)*

Dr. John Holmes provided an overview of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC).

The ISC was established in 1995 as an inter-governmental body to answer tuna or tuna-like science questions, in areas north of the Equator. The ISC provides stock assessment results and research and undertakes scientific collaboration with the Inter-American Tropical Tuna Commission (IATTC). The mission of the ISC is to enhance science research for conservation and rational utilization and to establish scientific groundwork conservation. The member nations of ISC are: Canada, China, Chinese-Taiwan, Japan, Korea, Mexico, and USA. Non-voting members are the Food and Agriculture Organization (FAO), North Pacific Marine Science Organization (PICES), Secretariat of the Pacific Community (SPC), and Inter-American Tropical Tuna Commission (IATTC).

In 2013 the ISC conducted three stock assessments: bluefin tuna, blue marlin and blue shark. In 2014 the ISC plans assessments for albacore, bluefin tuna, striped marlin, swordfish and possibly blue shark.

ISC and PICES share research interests in the relation between spatio-temporal patterns of variability and environmental signals, future climate scenarios, and end-to-end modeling.

ISC-PICES dialogue in 2013 to 2014 is evidenced by mutual participation in several events:

- ISC co-sponsored a Topic Session S10 at PICES-2013: *Banking on recruitment curves: Returns on intellectual investment*. Co-convenor: C. Werner (USA and ISC); Invited speaker: Jon Brodziak (PIFSC, USA and ISC);
- A Seminar at ISC13 (Busan, Korea, July 2013) focused on Pacific Ocean ecosystems and tuna dynamics, including a presentation by a PICES scientist (C.I. Zhang, Korea) on “*Ecosystem-based assessment and management for sustainable fisheries*”;
- FUTURE Open Science meeting, Kohala Coast, Hawaii, April 15–18, 2014 – it is anticipated that ISC-affiliated scientists will participate in this forum;
- ISC (G. DiNardo, C. Werner) proposal for a workshop on “*Dynamics of pelagic fish in the North Pacific under climate change*” (W1) at PICES-2014 (Yeosu, Korea) was accepted by Science Board (FIS Endnote 3c).

In addition, ISC and PICES can interact through participation or *ex-officio* membership in appropriate committees and WGs, *e.g.*, PICES scientists in ISC Working Groups, *e.g.*, North Pacific Albacore, and/or of ISC scientists in PICES WGs.

Finally, the linkages between ISC and FUTURE were discussed:

- Tuna and tuna-like species are sentinels of open ocean environments. Increased understanding of climatic and anthropogenic impacts on tuna provides insight into responses of open ocean ecosystems, for which much less is known than coastal ecosystems; [addresses a gap]
- Tuna and tuna-like species are foundation of high-valued fisheries in most PICES member countries; there is demand from decision-makers, industry and the general public for products (*e.g.*, status reports, outlooks, forecasts) for these fisheries that clearly present risks and opportunities associated with climatic forcing and human activities.

For more information see [isc.ac.affrc.go.jp](http://isc.ac.affrc.go.jp)

*d. North Pacific Anadromous Fish Commission (NPAFC)*

A presentation on the NPAFC was prepared by Drs. Vladimir Radchenko and Nancy Davis. Dr. Radchenko made the presentation.

NPAFC was established under the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean in 1993. NPAFC is dedicated to the conservation of anadromous stocks in the Convention Area, where there is no directed fishing for anadromous stocks. Areas of potential collaboration between NPAFC and PICES lie in the fields of improved ecosystem models and practical applications; improved forecasting and monitoring; and outreach. The Bering-Aleutian Salmon International Survey (BASIS) is a coordinated program of cooperative research on Pacific salmon designed to clarify the mechanisms of biological response by salmon to climate change, and provides many opportunities for collaboration between PICES and NPAFC.

NPAFC activities of interest to PICES in 2013 include the publication of a Technical Report (#9) on the 3<sup>rd</sup> International Workshop on Migration and Survival Mechanisms of Juvenile Salmon and Steelhead in Ocean Ecosystems.

Upcoming activities of interest to PICES include the May 2015 NPAFC Symposium in Japan on “*Forecasting Pacific salmon production in ocean ecosystems under changing climate*”. In addition, NPAFC is examining the feasibility of developing an International Year of the Salmon, which would allow experts from all Pacific salmon producing countries to focus on identifying the mechanisms that regulate Pacific salmon abundance and to use this understanding to maximize economic opportunities in the future while ensuring responsible stewardship. The purpose is to show the major climate and ocean influences on Pacific salmon production and indicate the major changes in abundance trends in the future. It is anticipated that the prospectus for this initiative will be completed in May 2014.

*e. Pacific Salmon Commission (PSC)*

Dr. John Field described the activities of the Pacific Salmon Commission (PSC). PSC is a bi-lateral fisheries management organization of the USA and Canada. It was established by treaty and is part of more than one hundred years of cooperative management. The underlying philosophy is that stewardship and management of salmon stocks is responsibility of the two countries. This management is supported by research between two countries. Two borders are shared (Canada/Alaska and Canada/Washington State) and there are many stocks, rivers, and salmon populations. PSC is comprised of 8 commissioners from each country for a total of 16. Commissioners represent industry, conservation and fishery interests as well as provincial and federal interests. The Secretariat is based in Vancouver, BC.

One of the current issues facing PSC is that regional stocks of Chinook, coho and steelhead are still declining, particularly in the Salish Sea. In fact, many are listed as endangered under the USA Endangered Species Act. Other species are highly variable, *e.g.*, sockeye in 2010 showed a record high. PSC management regimes are robust and resilient but difficulties in forecasting exist.

PSC is funded through two Endowment Funds: Northern and Southern. There has been \$60M in research contributions since 2004. Dr. Field will present a poster on the Endowment fund proposal process.

PSC has identified a need to increase collaboration with PICES, NPAFC and the private sector. Dr. Mark Saunders (DFO, Canada) chairs the NPAFC Scientific Research and the PSC Scientific Cooperation Committee.

PSC is currently developing the PSC Science Agenda. For more information: [www.psc.org](http://www.psc.org)

*f. North Pacific Fisheries Commission (NPFC)*

Dr. Oleg Katugin indicated that a convention has been signed to establish a new Regional Fishery Management Organization, the North Pacific Fisheries Commission (NPFC). The applicable region is similar to that covered by the North Pacific Anadromous Fish Commission, except for the Sea of Okhotsk and Bering

## FIS-2013

Sea. The scope includes high seas fishery resources except those covered by other organizations (*e.g.*, not salmon). Several very important fishery resources will be addressed, such as Pacific saury and cephalopods.

**Recommendation:** FIS Committee recommends PICES establish linkages to this new organization, to be formed in 2014 when the NPRC Scientific Working Group is established.

### AGENDA ITEM 8

#### Status report on FIS topic sessions and workshops for PICES-2014

##### *PICES-2014 Topic Sessions*

FIS reviewed 15 Topic Session proposals. The rankings are summarized below, with points that each proposal scored.

FIS highest priority:

- (20 pts) #3 Kruse – *Ecosystem considerations in fishery management of cod and other important demersal species (FIS Endnote 3d)*;
- (20 pts) #12 Hollowed – *Recent assessments of climate change impacts on marine ecosystems*.

However, FIS recommends to Science Board that Topic Session proposal #12 could become a Science Board session. As an alternative, a couple of keynote speakers could headline the Science Board session to present comprehensive overviews on this topic. If Science Board does not accept either of these FIS recommendations, then FIS is very pleased to sponsor #12 as one of our top two priorities.

FIS third priority

- (18 pts) #13 Hollowed – *Climate change impacts on spatial distributions of marine fish and shellfish*.

FIS priorities (tied)

- (17 pts) #2 Mueter – *Variability in advection and its biological consequences for Subarctic and Arctic ecosystems*;
- (17 pts) #7 Martone – *Tipping points: defining reference points for ecological indicators of multiple stressors in coastal and marine ecosystems*;
- (17 pts) #11 Hirota – *Ecological and human social analyses and issues relating to Integrated Multi Trophic Aquaculture*.

Note: FIS recommends moving proposal ID #6 Werner to be a workshop (it was mis-filed), as well as #6 Irvine and #5 Kang.

##### *PICES-2014 Workshops*

The FIS ranking of proposed workshops is:

1. #6 Werner – Dynamics of pelagic fish in the North Pacific under climate change;
2. #8 Irvine – Towards improved understanding of linkages between Pacific salmon and their marine ecosystems;
3. #1 Trainer – Mitigation of harmful algal blooms: Novel approaches to a decades long problem affecting the viability of natural and aquaculture fisheries;
4. #5 Kang – Ecosystem changes and driving factors in marginal seas of Pacific Rim.

##### *Inter-sessional Workshops*

FIS discussed the proposed inter-sessional workshop on “*Evaluating the significance of 2011 hydrologic regime on juvenile salmon recruitment and survival across North American stocks*” and felt this workshop was too regional in focus and did not support as proposed.



## AGENDA ITEM 9

**Proposals for new FIS working groups, study groups, and special projects**

The FIS Committee received no new proposals for working groups.

## AGENDA ITEM 10

**Proposals for new meetings/conferences with PICES as co-sponsor***a. ICES Annual Science Conference 2014*

The FIS Committee received a description of only one ICES ASC theme session: *Gelatinous zooplankton on a global perspective: interactions with fisheries and consequences for socio-economics*. This proposed theme session is well conceived, relevant to PICES interests, and received the top ranking by ICES. The FIS Committee recommends PICES co-sponsor this session. The FIS Committee very briefly examined other proposed theme sessions, however, available time was very short and there was no supplemental information. A number of proposed theme sessions appeared to be highly relevant to the FIS Committee's Action Plan. FIS would like to co-sponsor up to three more ICES theme sessions, but the Committee did not have information needed to make a decision at PICES-2013. FIS requests further information and wishes to vote via email.

*b. Session and workshop topics for the Third International Symposium on the "Effects of climate change on the world's oceans", March 25–27, 2015, Santos, Brazil*

Symposium Co-Convenor, Dr. Jacquelynne King, provided information on the planning for this symposium. She emphasized the need to convene sessions and workshops that will attract PICES experts to the symposium. The intention is to select session topics by November 2013. Dr. King provided the current list of keywords that were identified to motivate decisions about theme sessions. FIS noted that "fisheries" was a missing key word. Also, most climate change forecasts are based on single-species projections. However, it was noted that species do not react in isolation. Moving beyond single species to communities is desirable. Therefore, a second area for a theme session could be "climate-driven ecological changes".

*c. SCOR (Scientific Committee on Ocean Research) working group proposals*

The FIS Committee rankings of SCOR working group proposals are:

1. Studying ocean acidification effects on continental margin ecosystems;
2. Science and technology imperatives created by deep-ocean industrialization;
3. Response of marine biota to complex global environmental change: Co-ordination and harmonization of experimental approaches.

These three proposals were selected for their relevance to fishery science issues of interest to PICES.

*d. 29th Lowell Wakefield Fisheries Symposium: Fisheries bycatch: Global issues and creative solutions, May 13–16, 2014, Anchorage, Alaska, USA.*

Dr. Gordon Kruse provided an update on this international bycatch symposium. The goal of this symposium is to bring together fishery and social scientists, managers, fishermen, and other stakeholders from around the world to report on creative approaches to solving fishery bycatch issues. A Scientific Steering Committee has been formed, keynote and invited speakers have been invited, announcements have been distributed, and a website has been created: <http://seagrant.uaf.edu/conferences/2014/wakefield-bycatch/index.php>. The symposium proceedings will be peer-reviewed and published as an electronic and bound book. In summer 2014 the FIS Committee supported a request for PICES travel support for Dr. Heui Chun An (Korea) to attend the meeting. Dr. An would serve as a PICES member of the SSC and he would present an invited talk. Science Board is scheduled to take action on this request at its meeting at the end PICES-2013.

*e. Other proposals*

None

## **FIS-2013**

### AGENDA ITEM 11

#### **High priority projects and activities with financial/policy implications**

None.

### AGENDA ITEM 12

#### **Priority items with funding implications**

None.

### AGENDA ITEM 13

#### **Proposed publications**

A PICES/ICES workshop on “*Global assessment of the implications of climate change on the spatial distribution of fish and fisheries*” was held in St. Petersburg, Russia, in May 22–24, 2013. Manuscripts from Session B of this workshop are intended to be published in a special journal issue in the ICES Journal of Marine Science. Publication is at least one year away.

### AGENDA ITEM 14

#### **Inter-session activities and meetings, travel support requests**

None.

### AGENDA ITEM 15

#### **Other business**

FIS members heard a plenary report by AP-SOFE on the North Pacific Ecosystem Status Report. A new plan is proposed whereby each country would submit electronic data and a short data description rather than providing graphs and explanations as done in the first two reports. The FIS Committee raised questions about whether all PICES member countries will agree to provide data. Another question concerned what would happen if some countries do not agree to do so. Therefore, the support of FIS for this proposal is contingent on data-sharing agreements with all PICES member countries being accomplished. Additional questions raised:

- Financial costs of developing and maintaining databases, servers, *etc.* need to be considered.
- How do AP-SOFE and MONITOR propose to deal with differences between the proposed program and the two previous Ecosystem Status reports? For instance, there is a disparity between reports focused on continental shelves versus reports that are based on marine ecosystems.
- Some other details not clear. For instance, will the website host only just data and graphics? Will there be explanations? Integration? Synthesis? A website of datasets/graphics may be of value to scientists, but descriptions and explanations would be of broader interest, including non-scientists.

FIS seeks clarification on these questions.

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

Laura Brown (Canada)  
 Anya Dunham (Canada)  
 Xianshi Jin (Co-Chair, China)  
 Sukgeun Jung (Korea)  
 Jacquelynne King (Canada)  
 Gordon Kruse (USA)  
 Kazushi Miyashita (Japan)  
 Motomitsu Takahashi (Japan)  
 Akihiko Yatsu (Japan)  
 Chang-Ik Zhang (Korea)

Observers

Linsey Arnold (Oregon State University, USA)  
 Nancy Davis (NPAFC)  
 Andrew Edwards (Fisheries and Oceans Canada)  
 John Field (Pacific Salmon Commission)  
 Masahito Hirota (FRA, Japan)  
 John Holmes (Fisheries and Oceans Canada; ISC)  
 James Irvine (Fisheries and Oceans Canada; NPAFC)  
 Oleg Katugin (TINRO-Centre, Russia)  
 Skip McKinnell (PICES)  
 Jessica Miller (Oregon State University, USA)  
 Franz Mueter (ESSAS)  
 Vladimir Radchenko (NPAFC)  
 Nadezda A. Rastyagaeva (KamchatNIRO, Russia)  
 Chuanxin Qin (South China Sea Fisheries Research Institute, China)  
 Xianjuan Shan (Yellow Sea Fisheries Research Institute, China)  
 Shigehiko Urawa (FRA, Japan)  
 Nadezda Yavosh (KamchatNIRO, Russia)

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

1. Welcome and introductions
2. Adoption of agenda
3. 2013 FIS Best Oral presentation and Poster awards
4. FIS Chairman's report: Implementation of PICES 2012 decisions
5. Update on FUTURE activities and preview of FUTURE meeting
6. Status reports of FIS-sanctioned groups
7. Relations with other programs and organizations
8. Status report on FIS topic sessions and workshops for PICES-2014
9. Proposals for new FIS working groups, study groups, and special projects
10. Proposals for new meetings/conferences with PICES as co-sponsor
11. High priority projects and activities with financial/policy implications
12. Priority items with funding implications
13. Proposed publications
14. Inter-session activities and meetings, travel support requests
15. Other business

*FIS Endnote 3*

**Proposals for FIS-sponsored Topic Sessions and Workshop at PICES-2014**

**a) *Climate change impacts on spatial distributions of marine fish and shellfish***

Proposed by S-CCME

Duration: 1 day

Conveners: Jon Hare (USA), Anne B. Hollowed (USA), Sukyung Kang (Korea)

Changes in fish and shellfish distributions are an important indicator of climate change and are being incorporated into national climate change assessment. Fishing, however, also affects fish and shellfish distributions and fishing effort is changing in many ecosystems. Changes in distributions will also affect fisheries, shifting the resource toward or away from fishing ports. We invite papers that examine the combined effect of climate change and fishing on fish and shellfish distributions and the impact of these changes on fisheries. Specifically, we encourage papers that 1) develop and use analytical approaches for separating the effect of fishing and climate, 2) evaluate life history and fishery traits that are associated with shifting distributions, and 3) examine the effect of shifting distributions on fisheries, fishing communities, resource economics, and international allocation.

**b) *Recent Assessments of Climate Change Impacts on Marine Ecosystems***

Proposed by S-CCME

Duration: 1 day

Conveners: Anne Hollowed (USA), Sukgeun Jung (Korea), Hans-O. Pörtner (Germany), Jake Rice (Canada)

Co-Sponsor: ICES

The Intergovernmental Panel on Climate Change expects to release the full reports of Working Groups 1, 2 and 3 electronically in January, August, and September of 2014, respectively. Other organizations have recently completed assessment reports that focus on specific geographic regions or fishing sectors (e.g., the U.S. National Climate Assessment or FAO's report on Priority adaptations to climate change for Pacific fisheries and Aquaculture: Reducing risks and capitalizing on opportunities). Collectively these reports will mark a major milestone by updating our knowledge of the observed and projected implications of climate change on the earth. Of particular interest to PICES and ICES will be the findings of the reports with respect to impacts on marine ecosystems. This session encourages presentations that summarize the key findings of the IPCC. It also encourages talks that provide guidance and insight on future directions for climate change research within the ICES and PICES communities.

**c) *Workshop on "Dynamics of pelagic fish in the North Pacific under climate change"***  
[originally proposed as a Topic Session]

Proposed by S-CCME

Duration: 1 day

Conveners: Gerard DiNardo (USA), Suam Kim (Korea), Sei-Ichi Saitoh (Japan), Cisco Werner (USA)

Co-Sponsor: ISC

The goal of the workshop is to define a scientific framework to assess the dynamics of pelagic fish under climate/environmental variability. We will discuss the overlapping PICES and ISC science missions and outline a Science Plan for a multi-year collaborative effort. Climate variability affects pelagic fish distributions and migration, and ultimately pelagic fisheries, the level of impact depending on the persistence, direction, and magnitude of the variability. Survival and growth rates of pelagic fish are linked to oceanographic conditions, and changes to these conditions can have dramatic impacts on the composition of

species assemblages within pelagic ecosystems, as well as the persistence and magnitude of individual pelagic fish populations (PICES/ICES, 2013). Understanding the links between environment and pelagic fish behavior, growth, recruitment, and production are paramount to understanding the impacts of climate variability.

Pelagic fishes occupy surface waters of the North Pacific Ocean, from coastal shelf to open ocean ecosystems. Many of these species undertake large-scale feeding, spawning, and ontogenetic migrations linked to seasonal changes in water masses. For example, Pacific bluefin tuna use waters off Japan as a nursery habitat, undertaking an ontogenetic movement eastward to waters off North America where they remain as subadults for 2-3 years. Additionally, many pelagic species have environmental thresholds and preferences, which limit the spatial distribution of a species. The most important environmental factors include oxygen, salinity and temperature, and because these factors generally exhibit persistent spatiotemporal patterns, the general distribution of pelagic fishes is known. Knowledge of these relationships allows for the incorporation of climate change into stock assessments, which forms the basis for fisheries management.

**d) *Ecosystem considerations in fishery management of cod and other important demersal species***

Proposed by FIS

Duration: 1 day [later changed to ½ day]

Conveners: Gordon H. Kruse (USA), Sukgeun Jung (Korea), Alexei Orlov (Russia), Xianshi Jin (China), Jacquelynne King (Canada), Kenneth Drinkwater (Norway)

Co-Sponsor: ICES

Pacific cod (*Gadus macrocephalus*) sustain important commercial fisheries throughout the North Pacific Ocean and, historically, Atlantic cod (*Gadus morhua*) have supported some of the most valuable commercial fisheries in the North Atlantic Ocean. Their dynamics have been linked to fishing, climate and other commercially important demersal species. Cod are also extremely important ecologically. As predators, they have been implicated in the decline or lack of recovery of shrimp, king crab, capelin and herring. As prey, they are important forage for pinnipeds; some research implicates seal predation in the lack of recovery of some Atlantic cod stocks and other studies implicate Pacific cod in the lack of recovery of Steller sea lions in the western Gulf of Alaska and Aleutian Islands. Multispecies models demonstrate co-variation of cod with other important demersal species, as well as explicit tradeoffs in cod and forage fish populations with implications on the joint setting of catch quotas. Moreover, cod recruitment and spatial distribution can be strongly influenced by climate-driven changes in oceanography on decadal and shorter time scales, implying that catch levels must be adjusted for bottom-up changes in productivity. For these and other reasons, ecosystem considerations must be taken into account in cod fishery management. By drawing upon insights gained from different systems, as well as from studies of other important co-occurring demersal species (*e.g.*, walleye pollock, small yellow croaker), this session will deepen our understanding of the roles of cod in the marine ecosystem and their implications on fishery management. Contributions are sought that consider stock identification, stock assessment and population dynamics, effects of climatology and oceanography on recruitment and biomass, trophodynamics, movements and distribution with respect to oceanographic features, multispecies models and their implications on management strategies, and other ecosystem approaches to the management, including aquaculture alternatives. Presentations are welcome from marine ecosystems in the North Pacific and North Atlantic.