

## REPORT OF FISHERY SCIENCE COMMITTEE

The meeting of the Fishery Science Committee (hereafter FIS) was held from 16:00–19:30 hours on October 31, 2007. The FIS Chairman, Dr. Gordon H. Kruse, called the meeting to order and welcomed the participants. The meeting was attended by 14 FIS members and 24 observers representing all PICES member countries (*FIS Endnote 1*). Dr. Anne B. Hollowed served as the rapporteur. The draft agenda was reviewed and accepted without changes (*FIS Endnote 2*).

### Implementation of PICES XV decisions (Agenda Item 3)

At PICES XVI, FIS sponsored

- a 1-day CCCC/FIS Topic Session (S3) on “*Towards ecosystem-based management: Recent developments and successes in multi-species modeling*”;
- a 1-day FIS Topic Session (S4) on “*Ecosystem approach to fisheries: Improvements on traditional management for declining and depleted stocks*”;
- a ¾-day FIS/CCCC/BIO Topic Session (S5) on “*Fisheries interactions and local ecology*”;
- a ½-day MEQ/FIS Topic Session (S7) on “*Coldwater biogenic habitat in the North Pacific*”;
- a 1-day BIO/FIS/POC Topic Session (S11) on “*Phenology and climate change in the North Pacific: Implications of variability in the timing of zooplankton production to fish, seabirds, marine mammals and fisheries (humans)*”;
- a 1-day FIS Contributed Paper Session;
- a 1-day FIS Workshop (W2) on “*Methods for standardizing trawl surveys to ensure constant catchability*”; and
- a 1-day FIS/MEQ Workshop (W3) on “*Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation*”.

Summaries of these sessions and workshops can be found in the *Session Summaries* chapter of this Annual Report.

During the past year, FIS was very active in international symposia:

- The symposium on “*Reproductive and recruitment processes of exploited marine fish stocks*” (co-sponsored by NAFO, PICES and ICES) was held October 1–3, 2007, in Lisbon, Portugal. The PICES Co-convenor was Dr. Richard D. Brodeur (U.S.A.) and Scientific Steering Committee members were Drs. Suam Kim (Korea) and Jie Zheng (U.S.A.).
- Drs. Nathan Mantua and William Sydeman (U.S.A.) were invited by the organizers as PICES-sponsored speakers at the *CLIOTOP (CLimate Impacts on Oceanic Top Predators)* Symposium that was convened December 3–7, 2007, in La Paz, Mexico.
- Drs. Brenda Norcross (U.S.A.) and Yoshiro Watanabe (Japan), were selected to join the Scientific Committee for the upcoming International Symposium on “*Linking herring biology, ecology, and status of populations in a changing environment*” (co-sponsored by ICES, PICES and GLOBEC), to be held August 26–29, 2008 in Galway, Ireland.

At PICES XV, FIS identified Drs. Kruse, Mikhail Stepanenko, Elizabeth Logerwell, and Yukimasa Ishida as reviewers of the second draft of the Working Group 16 final report on “*Impacts of climate and climate change on the key species in the fisheries in the North Pacific*”. In June 2007, the reviews were provided to Dr. Richard J. Beamish and additional revisions were sought prior to publication. The review team found that most of the substantive comments from a previous review had been addressed, except for those related to fisheries on the U.S. West Coast. Most other comments dealt with the need to standardize formats, correct spelling errors, and find missing references, *etc.* The report was revised, and the third draft (322 pages) was delivered to the FIS Chairman in late September 2007. That final review was completed in December 2007. It

was determined that many of the substantial comments had been addressed, although the lack of information on the California Current System continues to be a significant gap. Although a large number of editorial issues remained, the report was forwarded to the PICES Secretariat for copy editing and publication. This report represents a tremendous amount of work. Once published, it will provide useful information of wide interest to an international audience.

#### **2007 FIS Best Presentation and Poster Awards (Agenda Item 4)**

While the FIS Best Presentation Award is available to early career scientists only, the FIS Best Poster Award is open to all scientists. The recipient must be the senior author of the poster and must have attended the Annual Meeting. The awards for 2007 were selected from the FIS Contributed Paper Session and FIS Topic Session S4. Drs. Kruse and Michael Schirripa selected the best paper while the best poster was selected by Drs. Elizabeth A. Logerwell and Beamish. Naoki Tojo (Hokkaido University, Japan) won the FIS Best Presentation Award for the paper (co-authored by Akira Nishimura, Satoshi Honda, Tetsuichiro Funamoto, Seiji Katakura and Kazushi Miyashita) on “*Marine environment induced spatial dynamics of recruited walleye pollock juveniles (Theragra chalcogramma) and interactions with prey and predators along the Pacific coast of Hokkaido, Japan*”. The FIS Best Poster Award was given to Dongwha Sohn (Oregon State University, U.S.A.) for the poster (co-authored Lorenzo Ciannelli, Janet Duffy-Anderson, Ann Matarese and Kevin M. Bailey) on “*Distribution and drift pathways of Greenland halibut, Reinhardtius hippoglossoides, during early life stage in the eastern Bering Sea*”.

#### **Workshops on “Forecasting climate impacts on future production of commercially exploited fish and shellfish” (Agenda Item 5a)**

Dr. Hollowed reported on two FIS workshops on “*Forecasting climate impacts on future production of commercially exploited fish and shellfish*”, co-sponsored by PICES and NPRB. The first workshop was held July 19–20, 2007, in Seattle, U.S.A., and the second follow-up

workshop was convened on October 30, 2007, at PICES XVI. The proceedings of both workshops will be combined into one report to be published by PICES.

#### **Progress report of the Study Group on Marine Aquaculture and Ranching in the PICES Region (Agenda Item 5b)**

Dr. Toyomitsu Horii reported on the progress of a Study Group on *Marine Aquaculture and Ranching in the PICES Region* (SG-MAR). Working Group 18 on *Mariculture in the 21<sup>st</sup> Century – The Intersection between Ecology, Socio-economics and Production* was not successful in achieving its terms of reference. After this Working Group was disbanded at PICES XV, SG-MAR was formed under the direction of Science Board to evaluate how to make progress in this area of interest. After reviewing the factors inhibiting the progress of WG 18, SG-MAR recommended the formation of two Working Groups on: 1) *Environmental Risk Assessment and Interactions of Marine Aquaculture*, and b) *Technology and Management for Aquaculture*. It was proposed that the first Working Group, if approved, would sponsor a Topic Session on “*Mariculture technology and husbandry for alternate and developing culture species*” at PICES XVII. The session would highlight flatfish culture techniques, and breeding and disease management of Atlantic salmon stocks in Norway. It was also proposed that the second Working Group, if approved, would sponsor a Topic Session and a workshop in conjunction with PICES XVII in China, and a follow-up Topic Session at PICES XVIII in Korea.

#### **Progress report of WG 19 on Ecosystem-based Management Science and its Application to the North Pacific (Agenda Item 5c)**

Ms. Patricia Livingston reviewed activities of MEQ/FIS Working Group on *Ecosystem-based Management Science and its Application to the North Pacific* (WG 19). The Working Group received contributions from each nation, except China, regarding approaches to describe and implement a standard reporting format for EBM initiatives. These contributions are currently

under review. The Working Group assessed current national definitions of “eco-regions” but also noted that the World Wildlife Federation is leading a global effort to define eco-regions. Members of WG 19 will closely monitor this activity. Dr. Christopher Harvey, WG 19 member, is working with Dr. Elizabeth (Beth) Fulton (Australia) on a related effort.

The Working Group has also identified a list of quantitative ecosystem indicators and will report on the status of the development of these indicators within each of the PICES member countries. It was noted that human indicators have not been examined in detail. WG 19 reviewed a draft Science Plan for a new PICES scientific program, FUTURE (Forecasting and Understanding Trends, Uncertainties and Responses of North Pacific Marine Ecosystems), and noted that ecosystem indicators should be added to the list of deliverables.

A major gap in preparing the WG 19 final report is a lack of Chinese submissions and lack of participation from this country to date. Three options were proposed to complete the report:

- Get Chinese participation in an inter-session meeting in February 2008;
- Extend the Working Group for one more year and meet with Chinese scientists at the next PICES Annual Meeting in Dalian;
- Finalize the report without Chinese input.

**PICES XVI workshop (W2) on “Methods for standardizing trawl surveys to ensure constant catchability” (Agenda Item 5d)**

Dr. Kruse reported on the outcomes of the FIS workshop (W2) on “Methods for standardizing trawl surveys to ensure constant catchability”. There were 27 participants representing all PICES countries. A full report of the workshop can be found in the *Session Summaries* section of this Annual Report. It was recommended that FIS should consider options about how the theme of fishing gear research and survey technology can be continued by PICES in the future. Several approaches were discussed to address this issue, including holding a FIS Topic Session at PICES XVII and the formation of a Working/Study Group patterned after the ICES

Working Group on *Fishing Technology and Fish Behaviour*.

**PICES XVI workshop (W3) on “Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation” (Agenda Item 5e)**

WG 19 sponsored a workshop (W3) prior to PICES XVI in Victoria. This workshop noted the lack of socio-economic information to track the human dimension and received input regarding approaches currently underway to develop risk assessment frameworks in Australia and through use of the ATLANTIS model as a framework for management strategy evaluations. It was recommended that a Study Group on *Indicators of Human Well-being: Benefits, Health and Choice* be formed. A Topic Session for PICES XVII was proposed with a tentative title “*Human drivers, indicators, and other human dimensions in the marine environment*”. A full report of the workshop can be found in the *Session Summaries* section of this Annual Report.

**Relations with other international programs and organizations (Agenda Item 6)**

Dr. Steven Hare reviewed the research activities of the International Pacific Halibut Commission (IPHC). He described the Commission’s annual surveys and offered opportunities for collaboration with PICES from these survey platforms.

Dr. Shigehiko Urawa described the research activities of the North Pacific Anadromous Fish Commission (NPAFC). He noted their plans to hold a scientific symposium on the scientific findings of the BASIS (Bering-Aleutian Salmon International Surveys) program in November 2008, titled “*Climate change, production trends, and carrying capacity of Pacific salmon in the Bering Sea and adjacent waters*”. NPAFC is planning, jointly with the North Atlantic Salmon Conservation Organization (NASCO), a major symposium on salmon for 2010, and PICES co-sponsorship is invited. He also mentioned that the proceedings of the 2005 NPAFC-PICES joint symposium on “*The status of Pacific salmon and their role in North Pacific Marine*

*Ecosystems*” has been just published as NPAFC Bulletin No. 4 (<http://www.npafc.org>).

Dr. Beamish discussed a new NPAFC-sponsored effort to assess how salmon production is likely to change under a changing climate. NPAFC received substantial funding from the Moore Foundation to put together a group of 22 experts to meet and report on the future of salmon production in the North Pacific.

Mr. Robert Day discussed the research focus of the APEC (Asia-Pacific Economic Cooperation) Fisheries Working Group. APEC operates a cooperative, multilateral economic and trade forum. He noted that collaborations with APEC could address the human dimension of the PICES FUTURE program. He emphasize that, within the Fisheries Working Group, there is a research program focused on “*Ecosystem, Production, Processing, Trade and Markets*” and that scientists involved in this program are developing models to create an ensemble of scenarios of future trends in fisheries. He also inquired whether there was an opportunity to foster an organization similar to PICES that would address issues in the South Pacific.

FIS member, Dr. Alexander Glubokov, reported on a new fisheries management organization that has been formed with four consultative participants: Japan, Korea, Russia and U.S.A. The tentative name of this organization is “*New Principals of Regulation of Bottom Fishes*”. The geographic region covered by the organization and its terms of reference are under discussion.

The Committee received proposals for PICES co-sponsorship of upcoming symposia with international organizations, and these proposals were discussed under Agenda Item 9.

#### **Future Integrative Science Program (Agenda Item 7)**

Dr. Kruse reviewed the history and status of development of the new PICES integrative scientific program, FUTURE. The Committee discussed the most recent version (4.2) of the FUTURE Science Plan and made the following recommendations:

- FIS supports the overall plan and appreciates the efforts of the Writing Team.
- FUTURE should consider setting priorities as the program is very ambitious, and priorities should be set to establish the most important items to be accomplished.
- Given the stated FUTURE challenges to involve social scientists and to communicate with policy makers, both areas in which PICES has limited expertise, FUTURE should emphasize collaboration with other programs and organizations with expertise in these areas.
- In order to be policy-relevant to business and other public sectors, PICES needs to communicate its research findings more rapidly, in addition to peer-reviewed publications.
- FIS can contribute to this need by ensuring that the FIS-related portions of FUTURE focus on emerging fishery science issues.
- The FISP Writing Team should consult with policy makers to ensure that FUTURE includes research themes that are directly relevant to their needs.
- The PICES Secretariat can contribute to this effort by improving their approach to communication and dissemination of science to the public.
- Given the emphasis on human activities and aquaculture in FUTURE, PICES should consider the formation a Mariculture Committee, as expertise in this area within PICES is currently limited.

#### **Review of FIS Action Plan (Agenda Item 8)**

Dr. Kruse proposed revisions of the FIS Action Plan and distributed them to the Committee for review on September 19, 2007. Comments were received from a number of FIS members, and an updated draft was prepared and sent to the Committee on October 18, 2007. This second revised version was discussed at the FIS meeting. The Committee accepted the changes proposed so far and recommended that the plan be reviewed carefully again next year after FUTURE has been adopted. The revised FIS Action Plan has been posted on the PICES website. FIS is going to consider developing priorities in their Action Plan next year.

**Proposals for PICES co-sponsorship of future international symposia and workshops (Agenda Item 9)**

A number of proposals were received for PICES to co-sponsor international symposia and workshops.

Dr. Jürgen Alheit presented a proposal for an ICES/PICES/GLOBEC-SPACC workshop on “*Changes in distribution and abundance of clupeiform small pelagic fish in relation to climate variability and global change*” to be held in November 2008, in Kiel, Germany. FIS placed a high priority on this effort and endorses travel support for a PICES co-convenor. FIS recommended that, if supported, consideration should be given for a co-convenor from the western North Pacific; to be resolved by correspondence.

Dr. R. Ian Perry described the International Symposium on “*Coping with global change in marine social-ecological systems*” (co-sponsored by GLOBEC, EUR-OCEANS, FAO, IRD, SCOR, IMBER and PICES) to be convened July 8–11, 2008 in Rome, Italy. This effort was given a high priority because it complements new and existing efforts. FIS discussed the level of PICES involvement and suggested 1–2 potential invited speakers from the North Pacific.

Dr. Kruse briefly reviewed the International Symposium on “*Effects of climate change on the world's oceans*” (co-sponsored by ICES, PICES, IOC, GLOBEC, SCOR and WCRP) to be held May 19–23, 2008, Gijón, Spain. Co-sponsorship of this symposium was approved in 2006, and PICES is represented among the convenors, Scientific Steering Committee (SSC), and invited speakers. Two of its scientific sessions may be of greater interest to FIS members: Theme Session 4.2 on “*Impacts of climate change on marine ecosystems – Impacts on upper trophic levels*” and Theme Session 5 on “*Scenarios-mitigation-reduction of impact of future climate change on the marine environment – from regional to global scale*”. In conjunction with the symposium, there will be a workshop on “*Linking climate to trends in*

*productivity of key commercial species in the World's oceans*”. The workshop convenors requested support for 1–2 scientists from PICES to attend, and FIS endorsed this request.

FIS discussed the International Symposium on “*Eastern boundary upwelling ecosystems: Integrative and comparative approaches*” (co-sponsored by GLOBEC, IMBER, SOLAS, EUR-OCEANS and IRD) to be held June 2–6, 2008, Las Palmas, Spain. PICES was invited to join this effort after the SSC was already formed. Members from the North Pacific include Drs. Jack Barth (MONITOR) and Cynthia Tynan. FIS did not give a high priority to this event.

FIS was informed that the 4<sup>th</sup> PICES workshop on “*The Okhotsk Sea and adjacent areas*” would be convened in late August 2008, in Abashiri, Japan. However, no other information was available. FIS advice on co-convenors will be developed subsequently by correspondence.

FIS was informed that the 2<sup>nd</sup> CREAMS/PICES Summer School on “*Biomass-based management*” would be held in late August 2008, in Hakodate, Japan. However, no additional information was available.

ICES requested PICES sponsorship for International Symposia on “*Issues confronting the deep oceans*” (April 2009), and “*Rebuilding depleted fish stocks: Biology, ecology, social science and management strategies*” (autumn 2009), and “*Collection and interpretation of fishery dependent data*” (summer 2010). Among these, FIS placed highest priority on the second symposium and the next priority on the third symposium. The level of PICES budget and other financial obligations may determine whether PICES would be able to co-sponsor one or both of these symposia. No priority was placed on “*Issues confronting the deep oceans*”.

ICES also requested PICES to co-sponsor Theme Sessions at the 2008 Annual Science Conference (Halifax). Among these, FIS placed highest priority on sessions: (1) “*New methodology for tracking fish, mammals and marine seabird migrations and behavior*”, and (2) “*Size is almost everything! Size and trait-*

*based processes and models in ecosystems and management*". A third session was of interest to PICES, but the title was too vague to evaluate, namely "*The life history, dynamics and exploitation of living marine resources: Advances in knowledge and methodology*".

### **Planning for PICES XVII (Agenda Item 10)**

Proposals for Topic Sessions included:

1. "*Existing and future institutions for sustainable fisheries management under resource fluctuations*" (M. Makino);
2. "*Fisheries institutions and fishers for ecosystem-based management*" (M. Makino);
3. "*Ecosystem status in the North Pacific Ocean: mechanisms and production*" (jointly with BIO);
4. "*Methods for reducing bycatch and discarding in commercial fisheries*" (or as a workshop) (D. Somerton);
5. "*Mariculture technology and husbandry for alternate and developing culture species*" (Jie Kong, jointly with MEQ);
6. "*Social and human dimensions*" (WG 19, jointly with MEQ).

FIS recommended that the first two of the proposed sessions should be combined and consider some elements of the third proposed session. The merged session was finalized after PICES XVI and approved as a ¾-day FIS Topic Session titled "*Institutions and ecosystem-based approaches for sustainable fisheries under fluctuating marine resources*" (FIS Endnote 3).

FIS discussed the merits of the fourth proposed session and recommended that this session should emphasize the science, and less technology, of bycatch, as described in Action Item 2.2 of the FIS Action Plan. The revised session was finalized after PICES XVI and approved as a ½-day FIS Topic Session titled "*Effects of fisheries bycatch and discards on marine ecosystems and methods to mitigate the effects*" (FIS Endnote 4).

FIS members expressed concern about the technology-only emphasis of the fifth proposed session and recommended that this session should be modified to include the science of the

ecosystem impacts of mariculture. The finalized description of the approved ¾-day MEQ/FIS Topic Session, completed after PICES XVI, reflects this interest (FIS Endnote 5).

Ms. Patricia Livingston informed FIS that Dr. Glen Jamieson was proposing the last Topic Session as an MEQ Topic Session. FIS had no further discussion of this proposal.

In summary, FIS recommended that three Topic Sessions be convened at PICES XVII:

- a ¾-day FIS Topic Session on "*Institutions and ecosystem-based approaches for sustainable fisheries under fluctuating marine resources*";
- a ½-day FIS Topic Session on "*Effects of fisheries bycatch and discards on marine ecosystems and methods to mitigate the effects*";
- a ¾-day MEQ/FIS Topic Session "*Mariculture technology and husbandry for alternate and developing culture species*."

Finally, the Committee unanimously approved having a 1-day FIS Contributed Paper Session at PICES XVII.

### **Proposals for new FIS subsidiary bodies (Agenda Item 11)**

FIS received a proposal for a Study Group on *Indicators of Human Well-being: Benefits Health and Choice* (recommended by WG 19). FIS recommended that this proposal should be re-visited next year after the symposium on "*Coping with global change in marine social-ecological systems*".

FIS received proposals for the following three Working Groups on: (1) *Environment Risk Assessment and Interactions of Marine Aquaculture*, (2) *Technology and Management for Aquaculture*, and (3) *Implications of Climate Variability and Climate Change on Trends in Commercially Important Fish and Shellfish*.

FIS considered that the objectives of the proposed Working Group on *Technology and Management for Aquaculture* could be addressed through Topic Sessions at PICES Annual Meetings without forming a Working Group

with such limited terms of reference. The Committee placed a high priority on two other proposals. FIS recommended that the Working Group on *Environment Risk Assessment and Interactions of Marine Aquaculture* could be co-sponsored with MEQ, as it is consistent with the goals of WG 19. The proposal to form a Working Group on *Implications of Climate Variability and Climate Change on Trends in Commercially Important Fish and Shellfish (FIS Endnote 6)* received strong support from the Committee. It was indicated that this effort is consistent with the activities envisioned under FUTURE and that PICES-sponsored work in this area would provide a good start to this line of research that is likely to become an ongoing effort in FUTURE. It was noted that the title of the Working Group could be shortened to reflect emphasis on commercially exploited species (so the title reported here is tentative). It was also suggested that a phased approach to initially implement forecasts for those species with the most complete information on climate linkages would be best. For other species with incomplete information, a scenario approach may be best until research confirms the nature of climate linkages for those species. Dr. Hollowed proposed that if the Working Group is approved, its first meeting should be held in conjunction with PICES XVII in Dalian.

#### **Proposal for FIS inter-sessional meetings (Agenda Item 12)**

No inter-sessional workshops are planned, except those discussed under Agenda Item 9.

#### **Theme for PICES XVIII (Agenda Item 13)**

The proposed theme for PICES XVIII (2009, Korea) is “*Understanding ecosystem dynamics, pursuing ecosystem approaches to management*”. Unfortunately, there was insufficient time to discuss this topic.

#### **Proposed publications (Agenda Item 14)**

It is intended that the final report of WG 16 on *Climate Change, Shifts in Fish Production, and Fisheries Management* will be published as a PICES Scientific Report in 2008.

A set of selected papers from the PICES XVI FIS Topic Session on “*Ecosystem approach to fisheries: Improvements on traditional management for declining and depleted stocks*” is planned to be published as a special issue of *Fisheries Research*.

#### **Requests for travel support (Agenda Item 15)**

There was insufficient time to discuss this issue but it is anticipated that 1 to 2 invited speakers would be sought for each FIS-sponsored Topic Session at PICES XVII. If two proposed Working Groups are approved, travel support to their meetings must be considered. Travel support to proposed PICES co-sponsored symposia and workshops was discussed previously.

#### **Other business (Agenda Item 16)**

No other business was raised.

## FIS Endnote 1

### Participation list

#### Members

Richard J. Beamish (Canada)  
Elena P. Dulepova (Russia)  
Alexander Glubokov (Russia)  
Toyomitsu Horii (Japan)  
Yukimasa Ishida (Japan)  
Kong Jie (China)  
Masahide Kaeriyama (Japan)  
Jin-Yeong Kim (Korea)  
Gordon H. Kruse (U.S.A., Chairman)  
Elizabeth A. Logerwell (U.S.A.)  
Ted Perry (Canada)  
Laura Richards (Canada)  
Michael Schirripa (U.S.A.)  
Chang-Ik Zhang (Korea)

#### Observers

Jürgen Alheit (Germany)  
George Boehlert (U.S.A.)  
Jung Hwa Choi (Korea)

Robert Day (APEC-FWG)  
Rick Deriso (IATTC)  
Caihong Fu (Canada)  
Garilova Galina (Russia)  
Steven Hare (IPHC)  
Anne B. Hollowed (U.S.A.)  
Suam Kim (Korea)  
Jacquelynne King (Canada)  
Tokimasa Kobayashi (Japan)  
Geoff Krause (Canada)  
Jae Bong Lee (Korea)  
Hyun Jeong Lim (Korea)  
Patricia A. Livingston (U.S.A.)  
Mitsutaku Makino (Japan)  
Gordon A. (Sandy) McFarlane (Canada)  
R. Ian Perry (Canada)  
Shigehiko Urawa (NPAFC)  
Mikhail Stepanenko (Russia)  
Akihiko Yatsu (Japan)  
Inja Yeon (Korea)  
Tokio Wada (PICES Chairman)

## FIS Endnote 2

### FIS meeting agenda

1. Welcome, introductions, and nomination of a rapporteur
2. Adoption of agenda
3. Implementation of PICES XV decisions
4. 2007 Best Presentation and Poster Awards
5. Status reports of FIS-related groups/activities
  - a. Workshops on “*Forecasting climate impacts on future production of commercially exploited fish and shellfish*”
  - b. Study Group on *Marine Aquaculture and Ranching in the PICES Region*
  - c. Working Group 19 on *Ecosystem-based Management Science and its Application to the North Pacific*
  - d. PICES XVI workshop on “*Methods for standardizing trawl surveys to ensure constant catchability*” (W2)
  - e. PICES XVI workshop on “*Comparative analysis of frameworks to develop an ecosystem-based approach to management and research needed for implementation*” (W3)
6. Relations with other international programs and organizations
  - a. IPHC (S. Hare)
  - b. NPAFC (S. Urawa, R. Beamish)
  - c. APEC FWG (R. Day)
  - d. Other organizations
7. Future Integrative Science Program
8. Review of FIS Action Plan
9. Proposals for PICES co-sponsorship of future international symposia and workshops
10. Planning for PICES XVII
11. Proposals for new FIS subsidiary bodies
12. Proposals for FIS inter-sessional meetings
13. Theme for PICES XVIII (2009, Korea)
14. Proposed publications
15. Travel support requests
16. Other business



**FIS Endnote 3****A ¾-day FIS Topic Session at PICES XVII on “Institutions and ecosystem-based approaches for sustainable fisheries under fluctuating marine resources”**

In PICES member countries, some fisheries resources are in high abundance and healthy, but others are decreasing or already depleted. Most causes of stock declines can be ascribed to climate changes and overfishing. Stocks in declining or depleted conditions require prompt management actions based on sound science. This session will provide opportunities to address such questions as: (1) how do current fishery institutions address sustainable fisheries and what institutional changes may be necessary to fully implement an ecosystem-based approach to fisheries management? (2) What are the roles of fishers and government concerning sustainable fisheries under fluctuating resources? (3) How should fishery management strategies recognize and address changes in productivity prior to, during and after regime shifts? and (4) What kind of information and

research activities are needed to support sustainable fisheries management in an ecosystem context, given regime shifts? This session encourages papers addressing institutions, management strategies, and research supporting sustainable fisheries management of fluctuating marine resources using ecosystem-based approaches. Lessons from other marine ecosystems are invited for comparison to the PICES region. A publication in a special issue of a primary journal or in the PICES Scientific Report Series is intended as an outcome of the session.

Recommended convenors: David Fluharty (U.S.A.), Xianshi Jin (China), Mitsutaku Makino (Japan), Vladimir Radchenko (Russia), Laura Richards (Canada) and Chang-Ik Zhang (Korea).

**FIS Endnote 4****A ½-day FIS Topic Session at PICES XVII on****“Effects of fisheries bycatch and discards on marine ecosystems and methods to mitigate the effects”**

Commercial fisheries using gears, such as bottom trawling, capture both target and non-target species. In some instances, bycatch mortality is sufficiently high to adversely affect the stock status and productivity of non-target species. To minimize unintended impacts on the environment, commercial fisheries should strive to increase their selectivity by reducing the bycatch of birds, mammals, turtles and other non-target species, as well as by reducing the catch and discard of undersized commercial

species. This session will examine the magnitude of bycatch of non-target species, effects of bycatch mortality on the health of non-target stocks, and recent research on methodology to reduce bycatch and discards in the PICES region. Particular emphasis will be placed on studies that have resulted in changes in commercial fishing practices.

Recommended convenors: David A. Somerton (U.S.A.) and Hui Chun An (Korea).

## **FIS Endnote 5**

### **A ¾-day MEQ/FIS Topic Session on at PICES XVII on “*Mariculture technology and husbandry for alternate and developing culture species*”**

After considering the recommendations of the Study Group on Mariculture, PICES representatives have agreed that they share a common interest in the development of a highly efficient, environmentally friendly and diverse aquaculture industry. The diversification of aquaculture operations through the culture of new species and the use of innovative grow out technologies is of world-wide interest to both industry investors and the agencies responsible for ecosystem protection. New species and technologies may offer economic opportunities while providing solutions to the perception that current aquaculture practices threaten natural habitat and wild stocks. In many Pacific Rim countries recent developments of effective and efficient fish feed, development of animal husbandry protocols to ensure fish health and

welfare, use of biotelemetry procedures to evaluate grow out facilities from the perspective of the fish, and advances in reproductive physiology using state-of-the-art molecular techniques show promise for enabling the socio-economic acceptance of aquaculture operations while preventing or mitigating environmental impacts. A variety of tools presently exist that permit the modeling of environmental risk from these developments and the subsequent incorporation of risk into an ecosystem management scheme. We encourage presentations that highlight scientific developments in the field of mariculture, particularly those that support the diversification of the industry and enable sustainable development while serving to protect natural ecosystems and wild stocks.

## **FIS Endnote 6**

### **Proposal for a Working Group on *Implications of Climate Variability and Climate Change on Trends in Commercially Important Fish and Shellfish***

An interdisciplinary Working Group to facilitate a coordinated international research effort to forecast climate change impacts on the distribution and production of major fisheries in the Northern Hemisphere is proposed. The objectives of the Working Group are to:

- review the activities of existing programs within each nation;
- examine the evidence for climate impacts on production of commercial fish species;
- develop medium-term to long-term forecasts of climate impacts on fish production; and
- assess the performance of management strategies to respond to these changes in production.

An interdisciplinary team of scientists representing the fields of climatology (global climate modeling), oceanography (physical and biological oceanography, and coupled biophysical models), fisheries oceanography, fish population dynamics, fisheries assessment, fisheries economics and ecosystem modeling will

be assembled. This team would identify climate scenarios for use in forecasting and then develop tools for predicting climate impacts on commercial fish production. These tools will be used to develop quantitative forecasts of fish production around the Pacific Rim. The Working Group will provide a forum for discussion of four components needed to complete the forecasts in a timely and coordinated fashion including: (1) IPCC scenarios, (2) predictions of oceanographic impacts, (3) modeling approaches, and (4) scenarios for natural resource use and enhancement.

This Working Group builds on the work of the Climate Forcing and Marine Ecosystems Task Team (CFAME) and continues collaboration between FIS and POC via interactions with the Working Group 20 on *Evaluations of Climate Change Projections*. This effort is directly responsive to FUTURE and will encourage timely completion of early forecasts and associated management implications that can be

used by FUTURE Task Teams to formulate cooperative research programs focused on improving forecasting skill through knowledge of processes influencing marine fish production.

Expected benefits from this effort are as follows:

- International consensus could be reached on new directions for fisheries modeling and techniques for incorporation of ecosystem indicators and climate forcing in stock assessments.
- It is anticipated that the results of the coordinated research effort will be utilized by a broad spectrum of individuals outside of the research community. Stakeholders who rely on fish and shellfish resources will utilize the forecasts to anticipate changes that would influence their businesses and communities. Fisheries managers will utilize the forecasts to evaluate whether actions are needed to sustain fisheries in their regions. Conservation groups will be

interested to better understand the regional and species-specific risks and challenges that climate change poses for species of interest.

The life span of the Working Group is 3 years and its milestones are:

- October 2008 – Convene an inter-sessional workshop to present forecasting results and to introduce techniques for evaluating management strategy evaluations;
- October 2009 – Report on implications of climate change and climate variability on commercial fish species (a contribution to the North Pacific Ecosystem Status Report);
- December 2009 – Finalize manuscript for publication in peer-reviewed literature.

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