

## REPORT OF THE 2011 INTER-SESSIONAL SCIENCE BOARD MEETING

Science Board met first on April 29, 2011 from 14:00–17:30 following a meeting of a PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science*. Science Board Chairman, Dr. Sinjae Yoo, welcomed members and guests to Honolulu and introductions were made (*ISB Endnote 1*). The agenda was reviewed and Dr. Yoo pointed out that Agenda Item 15 on “Discussion related to scientific activities on the impacts of the Great Eastern Japan Earthquake” was also relevant to discussions under the FUTURE SSC agenda scheduled for the following day (see *ISB Endnote 2*). The remainder of the draft agenda was adopted.

*Friday, April 29, 2011*

### AGENDA ITEM 2

#### **Interactions with other organizations**

##### *Land-Ocean Interactions in the Coastal Zones (LOICZ)*

Science Board agreed with a proposal to send a scientist associated with MEQ to the 2011 LOICZ Open Science Conference on “*Coastal systems, global change and sustainability*”, September 12–15, 2011 in Yantai, China. MEQ Chair, Dr. Steve Rumrill will advise Science Board on the desirability of longer-term collaboration between the two Organizations once an MEQ member is selected to attend. (Following ISB-2011, it was agreed that PICES would support Dr. Masahito Hirota (Study Group on *Human Dimensions*) to attend the OSC to take advantage of LOICZ expertise in the area of environmental and social interactions in coastal systems. In return, LOICZ expressed interest in co-sponsoring the Topic Session on “*Land–sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*” at PICES-2011. PICES Executive Secretary, Dr. Alexander Bychkov, will follow up with LOICZ. Science Board agreed that there could also be a potential to link an emerging IMBER LOICZ Task Team on continental margins agenda to that of the proposed Working Group on *Ecosystem Responses to Multiple Stressors* and to other MEQ interests such as harmful algal blooms.

#### **Recommendation**

Science Board recommends that PICES send a member of MEQ to the LOICZ OSC in Yantai, China.

#### **Action**

Dr. Rumrill to find an appropriate member within 2 weeks of ISB meeting to attend the LOICZ OSC, and to advise Science Board on potential long-term collaboration, based on meeting results.

##### *Global Alliance of CPR Surveys*

Hiroya Sugisaki (MONITOR Chair) and Sonia Batten (CPR-AP) will represent PICES at a SAHFOS workshop to inaugurate the formation of the Global Alliance of Continuous Plankton Recorder Surveys (GACS) on September 20–21, 2011 in Plymouth, UK. Using his own resources, Dr. Sugisaki will attend the SAHFOS 80<sup>th</sup> anniversary symposium entitled “*Plankton 2011: Plankton biodiversity and global change*” in Plymouth on September 22–23, so there is no need for PICES to cover his travel expenses.

#### **Recommendation**

Science Board recommends that Dr. Sugisaki attend the SAHFOS workshop on GACS in Plymouth, UK.

***Relations with SCOR***

*International Quiet Ocean Experiment (IQOE)*

Lack of detailed information about the experiment led to a reluctance by Science Board to get involved in the IQOE that will be discussed at the SCOR/POGO OSM from August 30–September 1, 2011 in Paris, France. It was agreed to keep track of the IQOE for future consideration.

**Recommendation**

Science Board agrees to monitor the IQOE and follow up on the results.

*SCOR Working Group proposals*

A list of proposals was reviewed by Science Board to determine if any were relevant to PICES. Comments/requests were to be submitted through the SCOR website. In addition, the Science Board Chairman requested to be informed by July 15, 2011 if any Committee was interested in nominating an associate member to one of the proposed working groups.

**Action**

Science Board members to inform the Science Board Chairman by July 15, 2011 if a Committee member is interested in participating in any proposed SCOR WG.

***IOC***

*IODE*

TCODE Chair, Dr. Toru Suzuki, reported that two TCODE members attended the 21<sup>st</sup> Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XXI, March 23–26, 2011) in Liège, Belgium, to explore *ex officio* relations with IODE. In return, an IODE member expressed interest in becoming an *ex officio* member of TCODE. Dr. Suzuki also informed Science Board that the term of the Census of Marine Life's (CoML) had expired and arrangements have been made for its database to be held by IODE.

*UN Regular Process program*

Dr. Chul Park was invited to speak to Science Board on behalf of the UN Regular Process for reporting and assessment of the state of the marine environment, including socio-economic aspects and encouraged PICES to become involved. He felt the scope of the program is linked with the objectives of FUTURE. PICES' role could be to contribute volunteers to draft, peer review, act as consultants, and/or edit report chapters after attending a regional workshop to determine the outline for the assessment. Science Board's main concern was the benefit to PICES from its involvement. Invited guest, Chairman of the ICES Science Committee, Dr. Manuel Barange, informed Science Board that ICES accepted an invitation by the UNRP to organize a regional workshop that will outline information which could be available to an expert group that is formed (funding for the group will be up to the individual countries involved) to assist the Group of Experts of Regular Process. ICES will keep PICES informed about the process.

***SOLAS and IMBER***

*Ocean Acidification International Coordination Office*

A request from IMBER/SOLAS to endorse the establishment of an Ocean Acidification International Coordination Office (with no financial commitment) was received from Dr. Jean-Pierre Gattuso, the Chairman of its Ocean Acidification Working Group. Science Board agreed that the Office was worthwhile and unanimously was in favour of its creation.

**Recommendation**

Science Board endorses the establishment of an Ocean Acidification International Coordination Office.

**Action**

The Secretariat to send a letter of support for the establishment of the OA-ICO to the Chair of the SOLAS-IMBER Ocean Acidification Working Group and to recommend that PICES CC-S Co-Chairs, Drs. James Christian and Toshiro Saino, act as points of contact.

***Continuing relations with ICES***

Science Board agreed that PICES should accept an invitation from ICES to co-sponsor a Symposium on “*Forage fish interactions: Creating tools for ecosystem-based management of marine resources*” to take place November 12–14, 2012 in Nantes, France. The FIS Committee will recommend a suitable candidate to act as a convenor.

**Recommendation**

Science Board recommends co-sponsoring an ICES/PICES symposium on “*Forage fish interactions*”.

**Action**

FIS to recommend a convenor from the Western Pacific by the end of May 2011 [deferred until PICES-2011 when Dr. V. Radchenko was selected.].

## AGENDA ITEM 3

**P/ICES Study Group on a *Framework for Scientific Cooperation***

A summary of the activities of the joint P/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Science* (SG-SP), held immediately prior to the inter-sessional Science Board meeting, was presented by Drs. Yoo and Barange. A draft report by SG-SP will be produced by the end of August 2011 for distribution to PICES and ICES. The intent is for report to act as a guideline for both Organizations, and will be subject to periodic update. A presentation and discussion of the final report will occur at each Organization’s meeting in the fall of 2011.

A proposal for an ICES/PICES Strategic Initiative on Climate Change and Marine Ecosystems (SICCME), generated from the merging of an ICES Strategic Initiative on Climate Change with the joint P/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish*, was presented by Dr. Yoo on behalf of WG-FCCIFS Chair, Dr. Anne Hollowed. After extensive discussion among members, Dr. Yoo asked FUTURE Advisory Panel Chairs to work with Dr. Hollowed to develop a new expert group description with terms of reference that complement, but avoid overlap with, FUTURE plans and activities. Dr. Barange informed Science Board that he was very pleased with plans for PICES to collaborate with ICES, and felt that climate change required an interdisciplinary approach for the entire North Pacific. He will table a proposal for joint activities at the ICES SCICOM meeting in September, seeking approval in principle, and will report back to PICES on the outcome.

**Action**

- Dr. Sinjae Yoo to present a final SG-SP report for approval by Science Board at PICES-2011.
- FUTURE Advisory Panel Chairs to work with Dr. Hollowed on the Science Plan and terms of reference of a new expert group, for approval by Science Board at PICES-2011.

## AGENDA ITEM 4

**Status of proposed publications**

Concern was expressed by the Executive Secretary that no progress had been made on some PICES Scientific Report Series publications, most notably the final report of the Climate Change and Carrying Capacity (CCCC) Program and that of its Climate Forcing and Marine Ecosystem Response (CFAME) Task Team. It

was expected that one of the Co-Chairs of the former Program would take responsibility for completing the report, and Science Board recommended that Patricia Livingston (USA), be asked to encourage the former Chair of the Task Team, Dr. Kerim Aydin, to complete the CFAME report.

SOFE-AP Chair, Mr. Robin Brown, announced that SOFE was making progress with a professionally designed brochure for the second version of the North Pacific Ecosystem Status Report (PICES Special Publication No. 4) and was actively working with NPRB's outreach and communications section to bring down costs of publishing. He also hoped to have an EBM brochure, generated from PICES Scientific Report No. 37 on Ecosystem-based Management Science and its Application to the North Pacific, by the end of summer.

**Action**

Ms. Patricia Livingston to contact Dr. Aydin regarding completion of the final CFAME report.

AGENDA ITEM 5

**Inter-sessional workshops/symposia**

The Yeosu Declaration, tied closely to the theme of Expo 2012 Yeosu (*The Living Ocean and Coast Diversity of Resources and Sustainable Activities*) was drafted by a team of Korean experts and was introduced to Science Board by Dr. Dosoo Jang, Director of the Center for International Cooperative Program at KORDI and also the head of the Local Organizing Committee for the Yeosu Symposium on “*Effects of Climate Change on the World's Oceans*” (Yeosu, Korea, May 14–18, 2012). Dr. Jang invited PICES to become one of the member experts from a variety of ocean-related international organizations that would be part of the International Review Committee tasked to review the Declaration and to comment on the content. If interested, he asked that Science Board submit their comments by May 5 to the Secretariat who would forward them to the LOC. In addition, Dr. Jang announced that, as a legacy to Yeosu Expo 2012, a Yeosu Foundation is being established by the LOC which will provide funds for activities related to the Yeosu Project.

AGENDA ITEM 6

**Mid-term reports from Scientific and Technical Committees**

Highlights and updates of Committee activities that occurred after the PICES-2010 Annual Meeting are given in the following.

*BIO*

BIO Chairman, Dr. Atsushi Tsuda, announced that a draft of the final report of Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific* (WG 22), originally scheduled for submission to the Secretariat in June, will be delayed until August 2011. The Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* was formed at PICES-2010 and discussions have just begun on action plans needed to fulfill its terms of reference (TOR).

The Advisory Panel on *Marine Birds and Mammals* is in the process of revising its TOR and developing an action plan under the new chairmanship of Drs. Yutaka Watanuki (Japan) and Rolf Ream (USA). Members are discussing how to focus their research toward the FUTURE program. The Panel has been requested to submit new TOR by September 1 for review by BIO before submitting to the FUTURE Advisory Panels prior to PICES-2011.

BIO member, Dr. Angelica Peña, will co-convene an international workshop on “*Development and application of Regional Climate Models*” in Seoul, Korea, from October 11–12, 2011 (see POC report for more details).

*FIS*

FIS Chairman, Dr. Mikhail Stepanenko, reported that the joint P/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS) will hold a 1-day theme session during the Symposium on *“Forage fish interactions and ecosystem approach to fisheries management”* to take place September 10–14, 2012 in Nantes, France. The successor of WG-FCCIFS will also hold a 1-day Topic Session during the PICES/ICES/IOC Symposium on *“Effects of climate change on the world’s oceans”* to take place May 14–18, 2012 in Yeosu, Korea.

FIS supported an international symposium on *“Ecosystems 2010: Global progress on ecosystem based fisheries management”* convened November 8–11, 2010, Anchorage, USA. A summary was published in PICES Press (Winter 2011, Vol. 19, No. 1) and ICES Symposium Reports 2010. A peer-reviewed publication of accepted papers will be published by Alaska Sea Grant in late 2011.

FIS recommended that travel support be provided to early career Asian scientists to participate in the ESSAS Open Science Meeting to be convened May 22–26, 2011 in Seattle, USA, and for two convenors to attend the International Workshop on *“Reaction of Northern Hemisphere ecosystems to climate event (regime shifts): A comparison”* to be convened May 2–6, 2011 in Hamburg, Germany.

Progress was being made on the inter-sessional workshop report of WG-FCCIFS (Co-editors: A. Hollowed, M. Barange, S. Kim and H. Leong) and on a special issue of *Fisheries Research* (Guest editors: P. Livingston, G. Kruse and L. Richards) based on selected papers from the PICES-2009 Topic Session on *“Ecosystem-based approaches for the assessment of fisheries under data-limited situations”*.

*MEQ*

MEQ Committee Chairman, Dr. Steven Rumrill, reported that Dr. Tomoko Sakami (FRA, Japan) agreed to serve as one of the invited speakers for the ½-day MEQ/FIS Topic Session on *“Identification and characterization of environmental interactions of marine aquaculture in the North Pacific”* at PICES-2011, and that MEQ and FIS’s Working Group on *Environmental Interactions of Marine Aquaculture* (WG 24) would like to extend an invitation to Dr. Barry Costa-Pierce (Director, University of Rhode Island/Sea Grant Program) to be an invited speaker as well. WG 24 is working with the Secretariat to seek funding for the second speaker.

Harmful Algal Bloom Section (HAB-S) Co-Chair, Dr. Vera Trainer, submitted a detailed report describing activities and accomplishments for Year 4 of the PICES/MAFF (Ministry of Agriculture, Forestry, and Fisheries) Seafood Safety Project which is supported by a grant from the Fisheries Agency of Japan (JFA) to PICES. In addition, Dr. Trainer is working with Dr. Chang-kyu Lee (Korea) to prepare the workplan for Year 5 of the HAB-S component of the PICES/MAFF Seafood Safety Project. HAB-S intends to conduct a technical training course for the detection, identification, and monitoring of harmful algal blooms in Fiji (April 2011) to extend HAB training to South Pacific Island communities. HAB-S is also preparing a review of its progress and accomplishments over the past 6 years, and is revising TOR to better align its activities within the FUTURE. Science Board urged Dr. Rumrill to instruct HAB-S to complete the TOR by no later than September to allow the FUTURE Advisory Panels an opportunity to review them before the Annual Meeting.

MEQ’s Working Group on *Marine Non-Indigenous Species* (WG-21) is planning to organize a 3-4-day Rapid Assessment Survey for Marine Non-indigenous Species, to be held in association with the PICES-2011. It will be hosted by Dr. Vasily Radashevsky (Russia) and the field and laboratory work will take place at the Vostok Marine Station located on the Russian Pacific coast.

Drs. Thomas Therriault (Canada), Deborah Reusser (USA), and Henry Lee II (USA) were asked to prepare a workplan for Year 5 of the MNIS component of the MAFF Project. PICES will serve as a co-sponsor for the

## ISB-2011

7<sup>th</sup> International Conference on Marine Bioinvasions which will be held August 23–25, 2011 in Barcelona, Spain.

An invitation to Dr. Barbara Hickey (University of Washington, USA) to speak at a 1-day MEQ/FUTURE Topic Session on “*Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*” at PICES-2011 has fallen through so an invitation has been extended to Dr. Neil Banas (University of Washington). A reply is pending.

To assist with exploration of potential consequences of radioactive contamination in the North Pacific marine environment stemming from the aftermath of the tsunami that took place in northeastern Japan in March, MEQ proposed the formation of a rapid response study group. Details of the proposal can be found in *ISB Endnote 3*.

### Action

Dr. Rumrill to instruct HAB-S to complete its TOR revisions by September 2011.

### POC

POC Committee Chairman, Dr. Kyung-II Chang, reported that Dr. Enrique Curchitser has replaced Dr. Nathan Mantua, as the U.S. member of POC.

The location of the venue for an international workshop on “*Development and application of Regional Climate Models*” scheduled for October 11–12, 2011 was changed from Incheon to Seoul, Korea. Convenors are Kyung-II Chang (POC), Michael Foreman (POC), Chan Joo Jang (POC), and Angelica Peña (BIO). Twelve invited speakers have been decided, 8 from PICES member countries (2 from Canada, 1 from China, 1 from Japan, 2 from Korea, and 2 from the US) and 4 from ICES member countries (1 from Italy, 2 from Norway, and 1 from the UK). The speakers include 9 (ocean, atmosphere, coupled) physical and 3 ecological modellers. Several more are being sought, especially from PICES member countries. PICES is providing travel support for 2 invited speakers; the others are funded by the Korean government (through the OCCAPA Project) and by Seoul National University. A decision by ICES to co-sponsor the workshop is pending. Because the timing and venue of the workshop is so near to that of PICES-2011, the Executive Secretary recommended that Dr. Chang encourage participants to also attend the Annual Meeting in Khabarovsk, Russia.

Seven of 10 chapters of the final report of the Working Group on *Evaluation of Climate Change Projections* (WG 20) have been sent to the Secretariat for publication in a PICES Scientific Report series.

The science plan for the proposed P/ICES Strategic Initiative on Climate Change and Marine Ecosystems (SICCME) was reviewed and POC agreed to serve as a parent committee of the newly formed group.

At PICES-2010, Science Board instructed the Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas* (CREAMS-AP) to prepare a chapter, by PICES-2011, to describe the status and trends of a region that was not able to be included in the second version of the North Pacific Ecosystem Status Report (PICES Special Publication No. 4, 2010). An *ad hoc* group consisting of: Drs. Kuh Kim (Korea), C.K. Kang (Korea), T. Gamo (Japan), Joji Ishizaka (Japan), Vyacheslav Lobanov (Russia) and Yury Zuenko (Russia) was established to lead the initiative. Its first meeting will take place in May or June 2011 and a draft of the chapter will be completed before PICES-2011. A final review will take place at the POC workshop on “*Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program*” at PICES-2011.

CREAMS-AP members will encourage early career scientists in the area to participate in the NOWPAP/PICES/WESTPAC training course on “*Remote sensing data analysis*” to take place October 8–12, 2011 in Vladivostok, Russia. CREAMS-AP Co-Chair, Dr. Kyung Rhul Kim, announced that there was a possibility that a newly proposed Korean EAST-I project could convene a training course on ecological modelling in 2013.

*MONITOR*

MONITOR Technical Committee Chairman, Dr. Hiroya Sugisaki, reported that funding for the CPR-AP project, although not optimum, is stable for the next 2 years. Dr. Sanae Chiba is continuing to analyze western Pacific CPR samples from a research project that started in 2009 between SAHFOS and Japan. Dr. Sugisaki will attend a workshop and symposium on CPR activities in Plymouth, UK in September (see Agenda Item 2 for details).

MONITOR is maintaining close relations with ICES OOS groups (Working Group on *Ocean Hydrography*, WGOH, and Working Group on *Operational Oceanographic products for Fisheries and Environment*, WGOOFE) and there is the possibility of sending a MONITOR representative to a WGOOFE meeting to be held in Exeter, UK from November 15–17. Dr. Sugisaki participated as an *ex officio* member in the Pacific Arctic Group (PAG) meeting held in Tokyo, Japan on December 10, 2010, and introduced PICES monitoring activities.

*TCODE*

TCODE Technical Committee Chairman, Dr. Toru Suzuki, announced that, in cooperation with other data management groups, TCODE activities since PICES-2010 have included:

- Dr. Suzuki joining the ICES Working Group on Data and Information Management (WGDIM) mailing list;
- Dr. Hernan Garcia, Vice-Chair of TCODE, and Dr. Suzuki attending the IODE GE-BICH's (Group of Experts on Biological and Chemical Data Management and Exchange Practices) 5<sup>th</sup> session in Oostende, Belgium in January 2011 and Dr. Garcia being elected Co-Chair of GE-BICH;
- Dr. Suzuki attending the 21<sup>st</sup> Session of the IOC Committee on International Oceanographic Data Information Exchange (IODE-XXI) March 23–26, 2011 as a representative of PICES, and an International Conference celebrating IODE's 50<sup>th</sup> Anniversary March 21–22, 2011, in Liège, Belgium,;
- establishing IODE Ocean Data Portal nodes at the Marine Information Research Center, Japan, and NMDIS, SOA (China) in 2010; KODC (Korea) has expressed interest in having an ODP node established;
- contacting Dr. Edward Vanden Berghe, Executive Director of the Ocean Biogeographic Information System (OBIS), to invite a representative from OBIS to be an *ex-officio* member of TCODE.

Dr. Garcia nominated the A-line to be considered for the POMA at PICES-2011. TCODE, along with MONITOR, ranked 4 nominations for the POMA, which will be discussed *in camera* by Science Board at the present inter-sessional meeting.

*Saturday, April 30, 2011*

Because some invited presenters were not able to stay for the entire Science Board meeting on the second day, the order of the remaining agenda was re-scheduled so that FUTURE SSC agenda items 1 to 3 could be discussed first. However, for continuity in this report, the rest of the Science Board agenda items are continued in sequence.

## AGENDA ITEM 7

**Report on Study Group on *Human Dimensions***

Dr. Sugisaki made a presentation for Study Group on *Human Dimensions* (SG-HD) Chairman, Dr. Mitsutaku Makino, who was unable to attend the inter-sessional Science Board meeting. Science Board agreed with Dr. Makino's proposal for a working group on provision that the TOR be clarified to bring them into alignment with the FUTURE Science Plan. SOFE-AP Chairman, Mr. Robin Brown, agreed to help Dr. Makino with the revisions, and to clarify with him if the term "ecosystem-based fisheries management" (TORs 2 and 3) was in agreement with the recommendations from the report of Working Group 19 on *Ecosystem-based Management Science and its Application to the North Pacific* (PICES Scientific Report No. 37, 2010).

**Action**

SOFE-AP Chair to work with Dr. Makino to revise TOR of proposed working group on human dimensions to align with FUTURE Science Plan.

AGENDA ITEM 8

**Status of planning for PICES-2011, Khabarovsk, Russia**

Preparations for the PICES Annual Meeting in 2011 are progressing and the Secretariat is working with the local organizing committee on logistics. The Executive Secretary informed Science Board that everyone needs an invitation letter from the government of Khabarovsk to obtain a visa, and stressed that it is important to start the process soon. He also noted that topic sessions for this year's theme (*Mechanisms of marine ecosystem reorganization in the North Pacific Ocean*) appear to be attractive to other international organizations i.e., ICES, NOWPAP, IMBER, GESAMP, IOC), as they agreed to be a co-sponsors for a number of them.

AGENDA ITEM 9

**Implementation of Science Board recommendations and Governing Council decisions from 2010, Portland**

Science Board reviewed the list of recommendations made by Science Board at PICES-2010 in Portland, USA and subsequent decisions by Governing Council. It was noted that problems have arisen only with some of the final publications destined for the PICES Scientific Report series (see Agenda Item 4).

AGENDA ITEM 10

**Capacity building/Plan for PICES summer school in 2013**

***International training courses***

*Harmful algal blooms (HABs)*

Dr. Rumrill reported that 2 HAB members travelled to Fiji to investigate the most appropriate South Pacific island community for a training course in 2011 on HAB monitoring and testing.

*Rapid Assessment Surveys (RAS)*

Dr. Therriault reported that preparations were on track for the PICES/WESTPAC Rapid Assessment Survey Demonstration Workshop to take place from July 19–21, 2011 in Phuket, Thailand. Applications for participation have been received from Thailand, Korea, Singapore, the Philippines, China, Vietnam, Malaysia, and Indonesia, and from Iran, Pakistan and Egypt through WESTPAC; the list is being finalized.

Training course on “*Remote sensing data analysis*”

A NOWPAP/PICES/WESTPAC training course on “*Remote sensing data analysis*” will be held October 8–12, 2011 in Vladivostok, Russia. A Scientific Organizing Committee is being set up and will be represented by a member from each sponsor and the local host (V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch of the Russian Academy of Science). An expert from the North American side has been requested, and it was suggested that HAB-S Co-Chair, Dr. Vera Trainer, be contacted to advise on a suitable candidate. Invited speakers have been determined and PICES is providing support for Dr. Raphael Kudela (USA) to serve as guest lecturer. PICES is also supporting travel for 3 students/trainees from the Northwest Pacific to attend.

**Action**

Secretariat to contact Vera Trainer to recommend a North American candidate to be part of the Scientific Organizing Committee for the remote sensing training course.



***Early Career Scientist conference***

Deputy Executive Secretary, Dr. Skip McKinnell, informed Science Board that plans are on track for the 2<sup>nd</sup> ICES/PICES Conference on “*Oceans of change*” for early career scientists (ECS) to take place from April 24–27, 2012 in Palma de Majorca, Spain. Like the first conference held in 2007 near Baltimore, USA, participation will be by invitation only, as ICES and PICES will be covering the on-site costs and some of the travel by participants. The Scientific Steering Committee (SSC) is composed of 6 early career scientists (3 from each organization); Dr. Franz Mueter (PICES) and Dr. Elizabeth North (ICES) who were on the SSC of the original ECS conference have been invited to join the present SSC as senior advisors. Drs. Adi Kellermann (ICES) and McKinnell will, again, serve as conference coordinators.

***Summer schools/training courses***

Science Board discussed possibilities for the next summer school or training course proposed for 2013. Since the last three summer schools have taken place on the western Pacific side, it was suggested that the next one be held in North America. Dr. Rumrill proposed that a potential venue might be Oregon State University (OSU) in Corvallis/Newport, USA. He also mentioned that Dr. Bryan Black, one of the PICES SSC members for the ECS conference in 2012, was at OSU and might be able to offer suggestions or advice for running the school there. Dr. Chang announced that CREAMS-AP member, Dr. Kyung-Ryul Kim, was preparing a proposal for another summer school for 2013 and this would be submitted to Science Board at PICES-2011. Science Board agreed that this was worthwhile as it will increase the pool of proposals.

**Action**

Dr. Rumrill to discuss with Dr. George Boehlert the feasibility of OSU hosting the next summer school in 2013, and to report the outcome at PICES-2011.

## AGENDA ITEM 11

**Wooster and POMA Awards**

Science Board met *in camera* to select a recipient from two nominations (one rolled over from 2010) for the 2011 Wooster Award and four nominations for the 2011 POMA (one new and three rolled over from 2010). The recipient for each award will be announced at the Opening Session of PICES-2011 in Khabarovsk, Russia. Remaining nominations for both awards will be rolled over to 2012 for consideration at the next inter-sessional Science Board meeting.

## AGENDA ITEM 12

**Venue and dates of ISB-2012**

Science Board identified a need for an inter-sessional meeting in 2012 because of the increase in PICES business, including Science Board duties as SSC for FUTURE. Yeosu, Korea appeared to be an attractive venue because of the draw and timing for the PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” in May 2012. However, it was suggested that Science Board wait until results of the Yeosu Project proposals submitted by the FUTURE Advisory Panels were known. If accepted, there would be some events that will be associated with FUTURE, and this could be combined with an ISB-2012 meeting. On the other hand, if the Yeosu proposals are rejected, TINRO-Centre would be willing to host the meeting in Vladivostok.

**Recommendation**

Science Board to wait until the results of the Yeosu Project proposals are known before deciding the ISB-2012 venue during PICES-2011.

AGENDA ITEM 13

**Possible PICES-sponsored conferences/symposia in 2013 and beyond**

As no PICES-sponsored conferences or symposia are planned for 2013, the Science Board Chairman tabled for discussion the feasibility of having a FUTURE Open Science Meeting (OSM), as FUTURE will be nearing its mid-life. There were concerns that PICES might not have the capacity to hold an OSM if the Yeosu Project proposals are accepted, that the 2012 Symposium on “*Climate change on the world’s oceans*” might be too close to the time of the FUTURE meeting to draw international attendance, and that a theme for the OSM had not yet been decided. On the other hand, it was pointed out that if the potential Working Group on Ecosystem Responses to Multiple Stressors and Working Group on Human Dimensions are endorsed, they should elicit enough participation to warrant an OSM, and once the goals of the potential working groups were clear, a plan could be drawn up for the meeting.

**Action**

FUTURE AP Chairs to draft a plan for a FUTURE OSM in 2013 and submit to the Secretariat by September 26, 2011.

AGENDA ITEM 14

**Status of PICES-2012 Japan theme and venue**

The proposed theme of the 2012 Annual Meeting, “*Scientific challenge to the North Pacific ecosystem: For the mitigation of the effects of natural and anthropogenic stress*”, to be held in Hiroshima, Japan, was approved in principle by Governing Council at PICES-2010. The original description of the theme was sent to the PICES Secretariat in February 2011 for English editing. The revised version was reviewed and revised by Science Board at the inter-sessional meeting, and Dr. Rumrill volunteered to make further clarifications and edits at the meeting with the help of the Japanese participants. The edited version can be found in *ISB Endnote 4* and will be finalized at PICES-2011.

**Action**

Science Board to finalize theme for PICES-2012 at PICES-2011.

AGENDA ITEM 15

**Discussion related to the scientific activities on the impacts of the Great Eastern Japan Earthquake**

Dr. Yoo opened this agenda item by asking Science Board to consider the role of PICES in relation to the unfortunate incident that befell Japan in March 2011. Past Chairman of PICES, Dr. Tokio Wada, began with a statement to Science Board expressing his deepest thanks to all PICES member countries, PICES scientists and the Secretariat for their support in the aftermath of the destructive tsunami that hit the northeast coast of Honshu. He said that there was great concern about environmental degradation in the area affected by the tsunami, and about the leakage of radioactive materials into the ocean and atmosphere from the Fukushima nuclear power plants. Although Japanese scientists were actively monitoring the affected area, the understanding of the impact of radioactivity in the ocean and what mitigation measures to take was limited at this time.

Dr. Taro Ichii, representing the Fisheries Agency of Japan (FRA), spoke on the damages incurred to fisheries and the short- and long-term plans to rebuild and reorganize them. To ensure the safety of fishery products on the market, the Agency quickly introduced monitoring programs to measure the levels of radioactive Cesium and Iodine in them by imposing a suspension of related fishing activities and market distribution as soon as a sampling measurement of a fishery product exceeds the Provisional Regulation Value. Seawater monitoring was conducted by the Ministry of Education, Culture, Sports, Science and Technology at mid-water depth within a 30-km radius of the Fukushima nuclear power plant, but the Agency was requesting more stations be set up.

Dr. Hiroaki Saito discussed damage incurred by various campus buildings and experimental stations at Tohoku University, Ishinomaki Sensyu University, Kitasato University, and University of Tokyo that are connected with FRA. A survey was taken among Japanese fishermen in the area and plans are being made by FRA to act on their top 7 requests. FRA is in the process of establishing a Research Promotion Headquarters for the Reconstruction of Fisheries to handle activities. International collaboration is taking place between New Zealand and Japan, and WHOI is planning a cruise with Japanese scientists in the western North Pacific to monitor  $^{137}\text{Cs}$ .

Dr. David Detlor, Deputy Director of the Office of Science and Technology of NOAA, discussed NOAA's present activities in supporting the Department of Energy on atmospheric modelling, providing atmospheric model results to the International Atomic Energy Agency, supporting the Food and Drug Agency on seafood safety, and acting as the co-lead for ocean plume modelling. He determined that there were many international opportunities for NOAA to do marine radionuclide monitoring; NOAA is considering partnering with WHOI and universities, doing collaborative sampling of the Kuroshio, obtaining information from fisheries observers, performing dockside sampling of landings, and reactivating its program to monitor radionuclides in migratory animals, and inquired if PICES would be interested in being engaged in any activities.

Dr. Oleg Katugin, Head of International Department of TINRO-Centre, informed Science Board commercial fish species in the Russian EEZ were being monitored and that collected information was being posted on TINRO's web server to share with the PICES community.

After presentations, the floor was opened to discussion of what PICES' role might be. Dr. Katugin suggested that PICES undertake a coordinated study of stressors in the ecosystem in the affected area. Dr. Rumrill inquired whether a rapid response group should be set up (see MEQ mid-term report in Agenda Item 6 and *ISB Endnote 3*) to monitor nearshore areas. Mr. Brown questioned if PICES had the expertise to handle radionuclide issues; Dr. Detlor added that NOAA also did not have the experts to look at ocean radiochemistry. Dr. Rumrill felt MEQ could still play a role, even in just identifying the issues, such as marine debris. Dr. Bychkov felt this might be relevant as physical pollution was named as one of the anthropogenic stressors that would be geo-referenced in the Yeosu Project proposal submitted by AICE-AP. Mr. Brown suggested that Japan be approached on what areas it might want PICES to investigate. The Chairman thanked everyone for their input and affirmed that any decisions on PICES' role did not have to be made at this time.

#### **Action**

- Science Board to re-visit issues related to radioactive pollution at PICES-2011;
- Secretariat to write to Japanese agencies to ask if there is anything PICES can offer help in.

#### AGENDA ITEM 16

##### **Other business**

##### ***PICES report to Canada's Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River***

The Deputy Executive Secretary, Dr. McKinnell presented Science Board with a draft of a response to a letter that was received by PICES from Mr. Brian Wallace, Queen's Counsel for the "Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River." It concerned a response from PICES to significant delays by the Commission in allowing open discussion of the contents of the PICES report, of which he was senior author.

#### **Action**

Dr. McKinnell to contact Mr. Wallace to discuss a resolution to problems.

FUTURE SSC AGENDA ITEM 1

**Presentation and discussion of current status of FUTURE Advisory Panels**

AICE-AP Chairman, Dr. Tom Therriault, reviewed activities since meeting at PICES-2010 in Portland, USA. He reminded everyone of the need for Working Group on *Aquatic Non-indigenous Species* (WG 21), Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23), and HAB-S to include the topic of stressors in coastal systems in their TOR. AICE-AP held a 3-day FUTURE Workshop with COVE-AP on “*Indicators of status and change within North Pacific Marine Ecosystems*” from April 26–28, 2011 in Honolulu (Dr. Therriault served as a co-convenor; no other AICE-AP members were present). The Advisory Panel revised TOR for the proposed Working Group on Ecosystem Responses to Multiple Stressors as a part of the FUTURE Workshop.

Dr. Therriault noted some on-going challenges of FUTURE: getting AICE-AP members to participate and communicate, a need to improve communications with Committees, as not all Committee members had been briefed on FUTURE Advisory Panel activities, a need for clear plans outlining the advisory role of the FUTURE Advisory Panels, as there appeared to be confusion among some expert groups as to what FUTURE expected of them, of the need for the Advisory Panels to communicate better with the Secretariat about posting updated work plans. SOFE-AP Chair, Mr. Robin Brown, suggested a strategy to improve exchange among members might be to place documents on a secure internal website that does not involve going through the Secretariat. Another approach would be to provide a list of active/inactive Advisory Panel members so Committee Chairs can contact members to encourage more active participation.

COVE-AP Chairman, Dr. Hiroaki Saito, noted that a COVE-AP member, Dr. Jacquelynne King served as co-convenor of the 3-day FUTURE Workshop (see FUTURE SSC Agenda Item 2) where 3 COVE-AP members were in attendance. He advised that the TOR for the proposed Working Group on *North Pacific Climate Variability and Change* was sent to Science Board in early 2011, and a presentation on this topic was made by Dr. Emanuele Di Lorenzo at the meeting of the P/ICES SG-SP, held immediately prior to the inter-sessional Science Board meeting.

SOFE-AP Chairman, Mr. Robin Brown, reported on major activities since PICES-2010 which included overseeing a peer review of the PICES submission of a report to Canada’s Commission of Inquiry into the Decline of Fraser River, participation at the 3-day FUTURE Workshop (see FUTURE SSC Agenda Item 2), with 3 SOFE-AP members attending, a nearly complete Power Point summary and 2-page brochure of the second version of the North Pacific Ecosystem Status Report for outreach, and experimenting with the “Google sites”, an internal website to be used as a tool for document distribution among FUTURE APs and PICES expert groups. Mr. Brown indicated that SOFE’s challenge was in trying to identify and communicate with target audiences outside the scientific community. Whereas PICES was good at providing information “by scientists – for scientists”, it had limited experience in supplying material/advice/products for “non-traditional” audiences. SOFE would welcome any assistance Council could provide, as well as from the proposed new working groups or ICES/PICES Strategic Initiative on Climate Change and Marine Ecosystems.

**Action**

- Secretariat to provide information on appointments of FUTURE AP members to FUTURE APs and Committee Chairmen;
- Committee Chairmen to contact FUTURE AP members to encourage engagement;
- FUTURE AP Chairmen to clarify and standardize wording of FUTURE AP work plans for expert groups to follow;
- FUTURE APs to provide Secretariat with updated work plans.

## FUTURE SSC AGENDA ITEM 2

**Outcomes of the FUTURE Workshop**

Dr. Therriault reported that the FUTURE Workshop on “*Indicators of status and change within North Pacific Marine Ecosystems*”, co-convened by Drs. Therriault (AICE-AP) Jacquelynn King (COVE-AP) and Sachihiko Itoh (Japan), held from April 26–28, 2011 in Honolulu, had an excellent turnout (55 invited participants) from within and outside the PICES community, with high quality talks. However, he felt the real benefit from the workshop occurred during a lively discussion period. An attempt was made to tackle the issue of ecosystem resilience and vulnerability as one of the goals, but the topic proved to be too complex to be discussed at the workshop. Dr. Therriault suggested that there may be a need to establish a working group on this topic. The workshop was successful in putting a framework in place to identify good indicators. When selecting criteria for selecting indicators for comparison at different scales, their levels of uncertainty must be considered. If the proposed Working Group on Ecosystem Responses to Multiple Stressors is approved by Council, it will include a TOR related to developing indicators. The Workshop convenors will prepare a report in one month for posting on the PICES website and publication in PICES Press.

**Action**

FUTURE workshop convenors to submit report to the Secretariat by the end of May 2011.

## FUTURE SSC AGENDA ITEM 3

**New expert groups**

Dr. Therriault presented Science Board with revised TOR for the proposed Working Group on Ecosystem Responses to Multiple Stressors, including two additional ones (*ISB FUTURE SSC Endnote 1*) that were developed at the FUTURE workshop.

Dr. Di Lorenzo made a presentation on the proposed Working Group on North Pacific Climate Variability and Change (*ISB FUTURE SSC Endnote 2*).

Although not an expert group under the auspices of the FUTURE Advisory Panels, the FUTURE Chairs will work with proposed ICES/PICES Strategic Initiative on Climate Change and Marine Ecosystems (SICCME) to develop TOR and a work plan to ensure that there is no overlap with FUTURE activities (see Agenda Item 3).

**Recommendation**

Science Board recommends that the proposals for the Working Group on Ecosystem Responses to Multiple Stressors and the Working Group on North Pacific Climate Variability and Change be submitted to Council for approval.

## FUTURE SSC AGENDA ITEM 4

**Study Group on *Updating the PICES Strategic Plan* (SG-USP) – Alignment with FUTURE**

SG-USP Chairman, Dr. Wada, described the PICES Strategic Plan that was written in 2004 and noted the need to update it in light of changes, such as the implementation of FUTURE. He requested that Science Board provide suggestions and comments to him for incorporation for discussion at the SG-USP meeting the following day. Revisions to the PICES Strategic Plan will be finalized at PICES-2011.

FUTURE SSC AGENDA ITEM 5

**Other business**

***Yeosu Project proposals***

Each FUTURE Advisory Panel developed a proposal for a project that would form part of the legacy of Ocean Expo 2012 in Yeosu, Korea. The PICES Secretariat submitted the proposals to the Yeosu Project Office at the invitation of the Local Organizing Committee for the Yeosu Symposium. Brief presentations were made by Dr. Therriault (representing AICE) on “*Understanding ecosystem responses to critical stressors around the Pacific Ocean*”, by Dr. Di Lorenzo (representing COVE) on “*Understanding North Pacific climate variability and change*”, and by Dr. McKinnell (representing SOFE) on “*Yeosu – Ecosystem Observations for Society and Understanding (YEOSU)*”. If accepted, funding for the AICE and COVE proposals will go to support the activities of two new working groups (see FUTURE SSC Agenda Item 3) and funding for the SOFE proposal would be directed to assisting SOFE in developing an operational capacity within the PICES Secretariat for developing and distributing FUTURE/SOFE products.

***ISB Endnote 1***

**Science Board list of participants**

Members

Robin Brown (SOFE-AP)  
Kyung-Il Chang (POC)  
Steven Rumrill (MEQ)  
Hiroaki Saito (COVE-AP)  
Mikhail Stepanenko (FIS)  
Hiroya Sugisaki (MONITOR)  
Toru Suzuki (TCODE)  
Tom Therriault (AICE-AP)  
Atsuki Tsuda (BIO)  
Sinjae Yoo (Chairman, Science Board)

Observers

Keyseok Choe (KORDI)  
Taro Ichii (F&A)  
Chul Park (GC, F&A)  
Dosoo Jang (KORDI)  
Alex Bychkov (PICES, SG-USP)  
Laura Richards (GC, F&A, FIS, SG-USP)  
Adolf Kellermann (ICES)  
Lev Bocharov (Chairman, PICES)  
David Detlor (NOAA)  
Skip McKinnell (PICES, SG-USP, SG-SP)  
Patricia Livingston (F&A)  
John Stein (GC, MEQ, SG-USP)  
Oleg Katugin (SOFE-AP)  
Vera Alexander (SG-USP)  
Emanuele Di Lorenzo (COVE-AP)  
Manuel Barange (ICES)  
Tokio Wada (Past Chairman, PICES, SG-USP)  
Michael Seki (BIO)

**ISB Endnote 2****Science Board meeting agenda***April 29, 2011*

1. Welcome and adoption of agenda (Yoo)
2. Interactions with other organizations (All)
3. P/ICES Study Group on a Framework for Scientific Cooperation (Yoo/Barange)
4. Status of proposed publications (Secretariat)
5. Status of proposed inter-sessional workshops/symposia (All)
6. Mid-year reports from Scientific and Technical Committees (Committee Chairs)

*April 30, 2011*

7. Report on Study Group on *Human Dimensions* (Makino)
8. Status of planning for PICES-2011, Khabarovsk, Russia (Secretariat)
9. Implementation of Science Board recommendations and Governing Council decisions from 2010, Portland
10. Capacity building/Plan for PICES summer school in 2013 (Yoo)
11. Wooster and POMA Awards (All)
12. Venue and dates of ISB-2012 (Yoo)
13. Possible PICES-sponsored conferences/symposia in 2013 and beyond (All)
14. Status of PICES-2012 Japan theme and venue
15. Discussion related to the scientific activities on the impacts of the Great Eastern Japan Earthquake (Ichii, Saito, Detlor, Katugin)
16. Other business

**FUTURE Scientific Steering Committee**

1. Presentation and discussion of current status of FUTURE Advisory Panels (Therriault, Saito, Brown)
2. Outcomes of the FUTURE Workshop (Therriault)
3. New expert groups (All)
4. Study Group on Updating the PICES Strategic Plan (SG-USP) – Alignment with FUTURE (Wada)
5. Other business (All)
6. Adjourn

**ISB Endnote 3****MEQ proposal for a rapid response study group**

The combined earthquake/tsunami that originated offshore from northern Japan in March 2011 presents an opportunity for PICES scientists to assist our Japanese colleagues with the emerging understanding of the potential and realized impacts of this catastrophic event to the affected marine environment. In particular, a series of pressing problems are posed by contamination of the nearshore and offshore marine environment by various radionuclides released from the damaged Fukushima-Daiichi nuclear power station. These problems include: (a) assessments of the levels of radioactive contaminants in nearshore marine waters, sediments, and marine organisms associated with direct release of contaminated water; (b) conveyance and transport of the materials by atmospheric release of radioactive steam; (c) offshore transport of radionuclides by oceanographic currents; and (d) binding of contaminants with sediments and organic material coupled with transport and deposition on the ocean floor. The time-frame required to address these issues is on the scale of months for short-lived radioactive elements such as iodine (I-131) and on the scale of years for the long-lived radioactive elements such as cesium (C-134 & C-137) and ruthenium (Ru-106). The transport and potential incorporation of the radioactive materials into living marine organisms calls for a cooperative program for process-oriented research coupled with long-term monitoring and assessment of the coastal zone, nearshore marine environment, and offshore regions. The immediate response also extends to the need for a wide-ranging ecological assessment of the broad impacts precipitated by the earthquake/tsunami and damage to the nuclear power plant, coupled with the need for rebuilding of damaged marine habitats, recovery of impacted fisheries stocks, repair to aquaculture facilities, and re-establishment of essential infrastructure throughout the coastal zone of northern Japan.

Our colleagues in Japan are in the key leadership position to design and direct the scientific assessment of contaminant impacts, and their perspectives and guidance are essential and greatly appreciated. It is suggested that PICES receive an update on the status of the contaminant problems, and then consider formation of a rapid-response multi-disciplinary study group (SG-RME) that will function to assist Japan and the Pacific Rim nations with exploration of the potential issues associated with release of radioactive materials into the nearshore marine environment and offshore regions resulting from damage to the Fukushima-Daiichi nuclear power-generation facility. The purpose of the new study group will be to draw on expertise from the established PICES expert groups and affiliated outside scientists, and to develop a white-paper that will focus on: (a) ocean and atmospheric transport of radionuclide contaminants (hydrodynamic and atmospheric circulation/numerical modeling; POC); (b) potential incorporation of radionuclides into nearshore waters, primary production and marine aquaculture species (HAB-S and MEQ WG 24); (c) potential impacts of exposure to copepods, euphausiids, salps, other zooplankton, and the potential trophic impacts to higher trophic levels such as herring, sardines and salmon (BIO WG 23 and FIS); (d) potential exposure of marine birds and mammals (FIS); (e) potential exposure risks to humans in Japan and throughout the PICES member nations (MEQ); and to explore the socio-economic impacts and human dimensions of the earthquake/tsunami on perturbation of the marine environment (SG-HD). PICES should also give consideration to the potential role for the TCODE expert group to assist with the sharing of data and technical information that is relevant to trans-boundary atmospheric movements and transport in offshore oceanographic currents.

Specific actions will be to develop detailed terms of reference for the rapid-response study group, identify the specific individuals that have valuable scientific expertise that can be contributed to the problem-solving effort, and create an avenue for PICES to direct financial and personnel resources toward development of the time-sensitive datasets required to describe the potential impacts to the North Pacific marine environment.

#### ***ISB Endnote 4***

#### **Theme for PICES-2012 in Hiroshima, Japan**

#### ***Effects of Natural and Anthropogenic Stressors in North Pacific Ecosystems: Scientific Challenges and Possible Solutions***

Human society depends on ocean ecosystems to meet many of its needs. The availability of marine ecosystem services to humans is important to sustain coastal communities and to ensure human health and well-being. Global warming, shoreline development, pollution, eutrophication, overfishing, non-indigenous species, and intensive mariculture are examples of anthropogenic stressors that affect marine ecosystems. These stressors can act alone or in combination to alter the structure, function, and productivity of marine ecosystems. Consequently, the potential for decline in the ability of the ocean to provide essential ecosystem services, as a result of synergies in natural and anthropogenic stressors, is a serious concern for human society. To advance ecosystem-based management and to mitigate the influence of stressors, there is a need to develop improved understanding of the mechanisms of change in marine ecosystems. Improved understanding of ecosystem structure, function, and resilience will aid the development of practical methods to maintain and monitor ecosystem health. These are challenging issues for marine science and PICES will continue to promote research to address these issues through FUTURE.



***ISB FUTURE SSC Endnote 1*****Proposal for a Working Group on *Ecosystem Responses to Multiple Stressors***

Parent Committees: MEQ and BIO

Proposed Chairs: Motomitsu Takahashi (Japan) and Steven Rumrill (USA)

Duration: 3 years (2011 to 2013)

**Motivation:**

Marine ecosystems of the North Pacific, both coastal and offshore, are impacted by multiple emerging stressors, such as increased temperature, change in iron supply, harmful algal bloom events, invasive species, hypoxia/eutrophication and ocean acidification. These multiple stressors can act synergistically to change ecosystem structure, function and dynamics in unexpected ways that differ from single stressor responses. Further, it is expected that stressors will vary by region, and critical stressors in PICES' regional ecosystems should be identified and characterized to allow comparative studies on North Pacific ecosystem responses to multiple stressors that will help determine how ecosystems might change in the future and identify ecosystems that are vulnerable to natural and anthropogenic forcing.

This working group can address emerging issues from WG22 (iron chemistry in low pH ocean, anthropogenic dust flux), WG23 (hypoxia impact on euphausiids), and WG21 (non-indigenous marine species) thereby highlighting the need for integrative studies.

**Terms of Reference:**

1. Identify and characterize the spatial (and temporal) extent of critical stressors in North Pacific ecosystems both coastal and offshore and identify locations where multiple stressors interact.
2. Review and identify categories of indicators needed to document status and trends of ecosystem change at the most appropriate spatial scale (*e.g.*, coastal, regional, basin).
3. Using criteria agreed to at the PICES FUTURE Intersessional Workshop in Honolulu, determine the most appropriate weighting for indicators used for:
  - a. documenting status and trends
  - b. documenting extent of critical stressors
  - c. assessing ecosystem impacts/change.
4. Review existing frameworks to link stressors to impacts, assessing their applicability to North Pacific ecosystems. (identifying the most appropriate for application to North Pacific ecosystems.)
5. Determine if ecosystem indicators provide a mechanistic understanding of how ecosystems respond to multiple stressors.
6. For 1–2 case studies, identify and characterize how ecosystems respond to multiple stressors using indicators identified above. Are responses to stressors simply linear or are changes non-linear such that small additional stressors result in much larger ecosystem responses? Do different parts of the ecosystem respond differently (*e.g.*, trophic level responses)? How do stressors interact?
7. Publish a final report summarizing results with special attention to FUTURE needs.

*ISB FUTURE SSC Endnote 2*

**Proposal for a Working Group on North Pacific Climate Variability and Change**

Parent Committees: POC

Proposed Chairs: Emanuele Di Lorenzo (USA), Shoshiro Minobe (Japan), and Michael Foreman (Canada)

Duration: 3 years (2011 to 2013)

Motivation

To develop essential understandings of the mechanisms of North Pacific climate variability and change that can better guide the formulation of process-based hypotheses underlying the links between ecosystem dynamics and physical climate.

Terms of Reference

1. Summarize the current understanding of mechanisms of Pacific climate variability and change, and evaluate the strengths of the underlying hypotheses with supporting evidence.
2. Develop conceptual frameworks or low-order models of North Pacific climate variability and change, which can be used by climate researchers to investigate the mechanisms of climate variations and by ecosystem scientists to explore hypotheses linking ecosystem dynamics to physical climate.
3. In conjunction with ecosystem scientists, coordinate the development and implementation of process-based models, which include important processes in simple forms, to hindcast the variability of available long-term biological time series.
4. Develop methods to identify and provide uncertainty estimates of decadal variability in recent historical climate and ecosystem time series.
5. Provide improved metrics to test the mechanisms of climate variability and change in IPCC models, and in coordination with other PICES working groups and FUTURE Advisory Panels, assist in evaluating those models and providing regional climate forecasts over the North Pacific.
6. Understand and fill the gaps between what physical models can currently produce and what ecosystem scientists suggest are the important physical forcing factors required for predicting species and ecosystem responses to climate variability and change.
7. Maintain linkages with, and summarize the results from National and International programs/projects such as CLIVAR, IMBER, US CAMEO, ESSAS, Japanese Hot Spot in the Climate System, POMAL, CREAMS EAST-I, POBEX, and others.
8. Convene workshops and sessions to evaluate and compare results and maintain an awareness of state-of-the-art advances outside the PICES community.
9. Publish a final report summarizing results.

Potential members

Canada: Patrick Cummins, Michael Foreman

China: Xiaopei Lin, Guimei Liu, Lixin Wu

Japan: Shin-ichi Ito, Shoshiro Minobe, Takashi Mochizuki, Bunmei Taguchi

Korea: Soon Il An, Sang-Wook Yeh, Chang Joo Jang

Russia: Yury Zuenko, Elena Ustinova, Vladimir Kattsov

USA: Emanuele Di Lorenzo, Enrique Curchitser, Taka Ito