

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
(PICES)**

ANNUAL REPORT

TWENTIETH MEETING
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REPORT OF OPENING SESSION

AGENDA ITEM 1

Opening by the Chairman of PICES

The Opening Session started at 09:00 hours on October 17, 2011. Dr. Lev Bocharov, Chairman of PICES, welcomed delegates, observers and researchers to Khabarovsk and formally declared that the PICES Twentieth Annual Meeting (PICES-2011) was open. The session agenda is appended as *OP Endnote 1*.

AGENDA ITEM 2

Welcome addresses on behalf of the host country

Prof. Vyacheslav Shport (Governor, Khabarovsk Region, Russian Federation) addressed the session on behalf of the local government, and Dr. Vasily Sokolov (Deputy Head, Federal Agency for Fisheries, Russian Federation) welcomed participants on behalf of the host country (*OP Endnotes 2 and 3*).

AGENDA ITEM 3

Remarks by the Chairman of PICES

Dr. Bocharov thanked Prof. Shport and Dr. Sokolov for their remarks, and addressed the participants on behalf of PICES (*OP Endnote 4*).

AGENDA ITEM 4

Wooster Award presentation ceremony

Dr. Bocharov and Dr. Sinjae Yoo, PICES Science Board Chairman, conducted the Wooster Award presentation ceremony. Dr. Yoo introduced the award and announced that the 2011 award was being given to the late Dr. Bernard A. Megrey, a world-renowned oceanographer with NOAA's Alaska Fisheries Science Center (*OP Endnote 5*). Reading of the Science Board citation was accompanied by a slide show dedicated to Dr. Megrey. A commemorative plaque was presented to Dr. Megrey's wife, Mrs. Ronnette Megrey, and his daughter Sarah (a permanent plaque identifying all Wooster Award recipients resides at the PICES Secretariat). After the Annual Meeting, Mrs. Megrey sent the following note to the PICES Secretariat:

"Our children, Sarah, Nick and Chris, and I would like to thank PICES for honoring Bern with this posthumous award. It is with great appreciation and gratitude that Bern's many friends and colleagues keep his memory alive and honor the work that he performed over his 30+ year career. We are so very happy, and Bern would be touched, that several early career scientists were able to travel to Khabarovsk for this meeting using the Dr. Bernard A. Megrey Fund established by Dr. Megrey's family and friends, to support participation of graduate students and early career scientists in PICES Annual Meetings and conferences co-sponsored by the Organization."

AGENDA ITEM 5

PICES Ocean Monitoring Service Award presentation ceremony

Drs. Bocharov and Yoo also conducted the presentation ceremony of the PICES Ocean Monitoring Service Award (POMA). Dr. Yoo introduced the award and announced that the 2011 award was being given to the NFRDI (National Fisheries Research and Development Institute of Korea) Network of Serial Oceanographic Observations (NSO; *OP Endnote 6*). Reading of the Science Board citation was accompanied by a slide show

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dedicated to NSO and the various people who contributed to the program for the past nine decades. A commemorative plaque (a permanent plaque identifying all POMA recipients resides at the PICES Secretariat) and a certificate were presented to Dr. Yangho Choi, NFRDI senior researcher, who accepted the award with the following remarks of appreciation:

“It is great honor for me to have a chance to accept this award on behalf of Korean Network of Serial Oceanographic Observations (NSO). First of all, I would like to thank PICES and its MONITOR Committee and Technical Committee on Data Exchange for selecting our Network for this year’s PICES Ocean Monitoring Service Award. As you know, our Network has a very long history, more than 90 years. I am not sure that this could be achieved without any contributions and sacrifices. On behalf of the NSO Monitoring Group, I would like to thank the hundreds of people, past and present, who contributed to this monitoring program over the past 90 years. I am confident that every member of the NSO Monitoring Group will work hard to serve the best data to you all. Thank you very much.”

AGENDA ITEM 6

PICES “Year-in-Review” 2011

Dr. Yoo reviewed PICES’ scientific accomplishments since the Nineteenth Annual Meeting (PICES-2010) in Portland, U.S.A. An article on the state of PICES science for 2011 will be published in the 2012 winter issue of PICES Press (Vol. 20, No. 1).

The 2011 keynote lecture entitled “Recent changes in the North Pacific marine ecosystems related to climate change: Global or regional forcing” (by Drs. Vyacheslav Shuntov and Olga Temnykh, Pacific Research Fisheries Centre, Russia) was given by Dr. Temnykh as part of the Science Board Symposium on “Mechanisms of marine ecosystem reorganization in the North Pacific Ocean”. The abstract of this talk is appended to the report as *OP Endnote 7*.

AGENDA ITEM 7

Closing remarks and announcements

After the closing remarks by Dr. Bocharov, Dr. Stewart (Skip) McKinnell, PICES Deputy Executive Secretary, made announcements related to the logistics of the Annual Meeting. The session was adjourned at 10:15 a.m.

OP Endnote 1**Opening Session agenda**

1. Opening by the Chairman of PICES, Dr. Lev Bocharov
2. Welcome addresses on behalf of the host country
 - Prof. Vyacheslav Shport (Governor, Khabarovsk Region, Russian Federation)
 - Dr. Vasily Sokolov (Deputy Head, Federal Agency for Fisheries, Russian Federation)
3. Remarks by the Chairman of PICES, Dr. Lev Bocharov
4. 2011 PICES Wooster Award presentation ceremony
5. 2011 PICES Ocean Monitoring Service Award presentation ceremony
6. PICES “Year-in-Review” 2011 by the Chairman of Science Board, Dr. Sinjae Yoo
7. Closing remarks/announcements

OP Endnote 2

**Welcome address on behalf of the local government of the host country
by Prof. Vyacheslav Shport (Governor, Khabarovsk Region, Russian Federation)**

Dear meeting participants, ladies and gentlemen,

We are very happy to welcome you to Khabarovsk, the administrative and cultural capital of the Russian Far East. This is the third meeting in the history of the North Pacific Marine Science Organization (PICES) to be held in Russia, and we are very excited and proud that Khabarovsk has been chosen as the host for the Twentieth Annual Meeting of PICES.

The Khabarovsk Region has been known for its vast marine and freshwater biological resources. The more than 2,500 km coast line, washed by two seas, is an area of intensive fishery activities and the development of shelf resources. The Amur River, one of the world’s longest rivers, flows through the Khabarovsk Region, and has a rich diversity of freshwater species (over 100 native species).

Fisheries, with major commercial species such as pollack, herring, crab, shrimp, squid, salmon, *etc.*, is a very important sector of our economy. The preservation and rational use of marine biological resources in the region has a high priority nowadays. Therefore, many issues to be discussed at the PICES Annual Meeting, especially the effect of regional and global climate change on marine ecosystems and biological resources, are of practical importance. Major international conferences, such as PICES Annual Meetings, contribute to a broad international integration of scientific knowledge. No doubt these conferences are also critical for the training of early career scientists.

I wish all meeting participants successful work and productive discussions. I also expect that you will be able to find time to explore and enjoy Khabarovsk: to get pleasure from the walks through its historical center, from the visits to the museums, theaters and other attractions offered by our hospitable city. I hope that you will fall in love with our region and will come back to visit us again.

OP Endnote 3

**Welcome address on behalf of the federal government of the host country
by Dr. Vasily Sokolov (Deputy Head, Federal Agency for Fisheries, Russian Federation)**

Dear delegates, colleagues, ladies and gentlemen,

On behalf of the Government of the Russian Federation, I would like to welcome you to the capital of the Far Eastern Federal District, the city of Khabarovsk, at the Opening Session of the Twentieth Annual Meeting of the North Pacific Marine Science Organization (PICES). This international forum is dedicated to a wide range

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of oceanic issues, which are vital for communities worldwide. Your meeting is very important for all countries around the North Pacific rim, and is undoubtedly of high value not only for the Russian Far East, but for the entire country of Russia.

The Russian Federation is a member of a number of international science organizations dealing with the exploration of the seas, and regional fishery management organizations, whose activities are associated with various aspects of fishing, studies of fishery resources, and conservation and sustainable use of biological resources of the world's oceans. The Russian Federation ratified the PICES Convention in 1994. Since that time, our country has been actively participating in a wide range of PICES activities, contributing in many ways to the fulfillment of the aims and objectives of this scientific organization.

Many scientists from the Russian Federation and our closest North Pacific neighbors: Canada, Japan, People's Republic of China, Republic of Korea, and the United States of America, as well as researchers from non-member countries, take part in PICES Annual Meetings. These forums are critical for facilitating fruitful communication and mutual understanding of scientific problems, and for providing increasing opportunities for collaboration and joint research. Exchange of knowledge and methodologies and synthesis of results at PICES-2011 will certainly strengthen the international relationships among scientists from our member countries. This will enable all of us to receive new fundamental and practical knowledge about the North Pacific Ocean and its marginal seas, where ecosystem and resource studies are hard to achieve using efforts of only one particular country.

I hope that the participants of this meeting will discuss results of their studies and outline the most promising research directions where scientists should concentrate their efforts in the near future. In the long run, this will help PICES member countries and their fishery industries to accurately assess and successfully manage fishery stocks in the North Pacific Ocean.

I wish all the participants of this Annual Meeting effective work, useful contacts and fruitful discussions. Thank you very much for your attention!

OP Endnote 4

Welcome address by Dr. Lev Bocharov (Chairman of PICES)

Dear delegates, respectful guests, ladies and gentlemen, welcome to PICES-2011.

First and foremost, on behalf of PICES, I would like to express my deep gratitude to the Government of Russia, Governor and Government of the Khabarovsk Region for hosting our Annual Meeting. I would also like to thank the Russian Federal Agency for Fisheries and the Local Organizing Committee for their help in the preparation of the Annual Meeting.

One of the main objectives of PICES is the study of regional and global climate change and its impact on marine ecosystems of the North Pacific Ocean. Thanks to research activities of the PICES Scientific and Technical Committees and expert groups, we are expanding our knowledge on how the Pacific Ocean responds to various natural and anthropogenic stressors. Our investigations today are aimed at forecasting how climate will affect socio-economic activities of PICES member countries, and at offering scientific advice on how to utilize natural resources, such as biological resources of the ocean. These are major objectives of our second integrative science program, FUTURE, which started in 2009. Studies of relationships between human society and ecosystems of the North Pacific Ocean are an important part of the FUTURE Program. This activity is new to PICES, and the main goal in this field is to analyze the role of social sciences and practices in decision making with respect to marine ecosystems.

The role of international organizations in the conservation of living resources of the world's oceans and the regulation of their commercial use has been growing in the last decade. In the North Pacific Ocean, such a

coordinating role belongs to PICES, which brings together multiple efforts of numerous scientists from our member countries as well as scientists from other states. PICES is constantly expanding its cooperation with other international organizations and programs, such as the International Council for the Exploration of the Sea (ICES), the North Pacific Anadromous Fish Commission (NPAFC) and others. Recently, for example, interesting results were obtained by the joint PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish*.

Many scientists in PICES use the unique opportunity, provided by our Organization, to broadly exchange their metadata and collaborate in building models. The North Pacific Ocean is the habitat for thousands of species playing various roles in ecosystem functioning. Therefore, to create marine ecosystem simulation models aimed at predicting such parameters as abundance and distribution of ecosystem components, we need a reliable database for planktonic, nektonic, benthic and other communities. To achieve a higher level of information for research we need to merge the efforts of all PICES Standing Committees, and their subsidiary bodies within the framework of the FUTURE Program.

As I see it, in the near future, we need to pay more attention to the unification of methods for data collection, first of all, by research vessels. We also need to organize coordinated international marine investigations.

Our Twentieth Annual Meeting provides a good chance for all of us to look back at what has already been achieved, define more exactly the prospects for future development of PICES and, through multi-national efforts, continue to move forward for the benefit of all people living on the coasts of the great Pacific Ocean.

Thank you for your attention.

OP Endnote 5

Science Board citation for the 2011 Wooster Award

It is with both great sadness and pleasure I announce that the late Dr. Bernard Megrey is the recipient of the 2011 Wooster Award.

As many of you know, Bern passed away suddenly at the age of 60, almost one year ago (October 1, 2010). The Wooster Award is given annually to an individual who has made significant scientific contributions to North Pacific marine science. In particular, the Award recognizes sustained excellence in research, teaching, administration or a combination of the three in the area of North Pacific marine science. Special consideration is given to individuals who have worked to integrate knowledge from the disparate disciplines of marine science.

Bern was born in July 1950, in Latrobe, Pennsylvania. Along his educational pathway, he earned an Associate of Science degree (1971) and a Bachelor of Arts degree from Cleveland State University in Ohio (1974). Bern began his scientific career in 1978, with a Masters in Environmental Science from Miami University in Ohio, and carried out his doctoral research at the University of Washington.

During his doctoral research, Bern found a position with the United States National Oceanic and Atmospheric Administration, working for the National Marine Fisheries Services at the Northwest Fisheries Science Center and Alaska Fisheries Science Center. In 1987, he became a permanent employee of NOAA. There, he worked on recruitment prediction, and his focus broadened from single species to ecosystems. During his time with the Alaska Fisheries Science Center, Bern's career spanned a broad spectrum of activities within his chosen disciplines, including fish population dynamics, stock assessment, fish reproductive biology, ecosystem simulation and climate impacts on marine ecosystem production.

Bern also worked tirelessly for several professional organizations, most notably the American Fisheries Society (AFS), International Council for the Exploration of the Sea (ICES), Global Ocean Ecosystem Dynamics (GLOBEC) and Ecosystem Studies of Sub-Arctic Seas (ESSAS) projects, and PICES.

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Held in the highest regard by his colleagues, he never missed a chance to collaborate, share research, or help others break into or advance their careers in fisheries science. During the course of his career, Bern either wrote or contributed to over 80 articles in primary scientific literature.

In PICES, Bern chaired the Technical Committee on Data Exchange (TCODE) and co-led the MODEL Task Team under the Climate Change and Carrying Capacity (CCCC) Program. The greatest achievement of this Task Team was the development of the NEMURO (North Pacific Ecosystem Model for Understanding Regional Oceanography) model. Bern made significant contributions to North Pacific marine science, including understanding of how fluctuations in climate may impact marine ecosystem production.

The American Fisheries Society recognized Bern's lifetime achievement in 2009 with the Oscar Elton Sette Award for sustained excellence in marine fishery biology. PICES honored Bern's leadership in building an inventory of biophysical data for the North Pacific and creating the PICES Marine Metadata Federation with the 2009 PICES Ocean Monitoring Service Award. In 2011, NOAA awarded him the NOAA Distinguished Career Award for lifetime contributions to NOAA's fishery management.

Bern was highly regarded regionally, nationally and internationally in the field of marine fishery science professionals. His wife Ronnette and daughter Sarah are here today to accept the award, and we welcome them to the Russian Federation, to Khabarovsk, to PICES, and to this meeting where we can honor Bern's memory.

OP Endnote 6

Science Board citation for the 2011 PICES Ocean Monitoring Service Award

Long-term monitoring observations are particularly critical to detecting and understanding ecosystem changes. The PICES Ocean Monitoring Service Award (POMA) was established to acknowledge monitoring and data management activities that contribute to the progress of marine science in the North Pacific. It is my great pleasure to announce that the 2011 POMA award goes to the NFRDI (National Fisheries Research and Development Institute of Korea) Network of Serial Oceanographic Observations (NSO).

Since the foundation of the Fisheries Experimental Station in 1921, the predecessor of NFRDI, NSO has been carried out for the purpose of monitoring climate variability and oceanographic conditions, and also for collecting information on fishing grounds and anthropogenic effects in Korean waters. The unique data and information collected by the observations provide the basis for assessing the status of the ecosystem and managing fisheries in the seas around the Korean Peninsula. Accumulated data also have enabled studies of long-term changes in the region. NSO has been one of the key monitoring systems in the marginal seas of the Northwest Pacific and is a good example of long-term oceanographic monitoring in the world.

In the beginning of NSO, 6 observation lines were surveyed occasionally from 2 to 6 times a year. In 1935, 14 observation lines covered the entire seas adjacent to Korea and expanded up to 100 miles from the coast. Among the lines at that time, 4 lines were located in North Korean waters. Oceanographic data collected in North Korean waters, which are hardly obtainable nowadays, were published in the book form of oceanographic charts. The Korea Oceanographic Data Center (KODC) operated by NFRDI keeps these precious old books. In 1961, NSO was reorganized for the Cooperative Study of the Kuroshio project to a bimonthly surveyed grid, with 175 stations from 22 observation lines. The present-day grid includes 196 stations from 25 lines around the Korean Peninsula and in the northern East China Sea surveyed from 4 to 6 times per year.

NSO has guided the Korean oceanographic community to modernization of oceanographic equipment and standardization of seawater analysis methods. NFRDI has been provided a huge amount of oceanographic data and information obtained by NSO for domestic and international users in many ways. For example, the "annual reports of NSO" have been published every year since 1952. They include the data on water temperature, salinity, dissolved oxygen, nutrients, zooplankton, and meteorological variables. Statistical analysis of the NSO data has been provided intermittently by the "Oceanographic handbook of the neighboring seas of Korea".

NFRDI has sent the NSO data to up to 200 institutes in the world, and those data have been used for various research. The vertical temperature and salinity profiles from ship observations are prepared and released within 2 days of observation time. The NSO data are also released at the KODC website. Near real-time ocean bulletins for several serial lines have been released at the NFRDI website. The data could also be used for monthly ocean forecasts, providing simple statistical information. NFRDI is now planning a real-time/near-real time automated transmission system for oceanographic data to be used for ocean forecast modeling.

The accomplishments of NSO are so numerous that we cannot mention all of them here. Many students and researchers have used the NSO data for academic purposes, and the research results are utilized for marine and fisheries policy issues by policy makers. Furthermore, the long-term NSO data have expedited climate research, providing data with clear signals of regime shifts and warming in the Northwest Pacific. In addition, NSO has supported domestic and international researchers to share NSO data and gives an opportunity of boarding its research vessels.

Please join me in congratulating Dr. Yangho Choi, NFRDI senior researcher, who is receiving the 2011 POMA Award on behalf of the hundreds of people, past and present, who contributed to the Korean Network of Serial Oceanographic Observations over the past nine decades.

OP Endnote 7

***“Recent changes in the North Pacific marine ecosystems related to climate change:
Global or regional forcing”***

(Abstract of the keynote lecture by Drs. Vyacheslav Shuntov and Olga Temnykh, TINRO-Centre, Russia)

The idea that anthropogenic greenhouse gases are among the major drivers of climate change became widespread at the end of the 20th century. Some researchers suggest that global warming caused by the greenhouse effect will continue at least until the end of the 21st century. We do not argue that increasing human activity will have an increasing effect on regional and global climate. However, there is a real need to outline the magnitude of natural climate oscillations, with periods from hundreds to thousands of years, that were occurring long before humans started to have any noticeable impacts on the biosphere. All physical processes on the Earth evolve under the guidance of cosmogenic and global geophysical factors influencing the atmosphere and hydrosphere. This may be the reason for the approximately synchronous cycles in physical (climate) and biological processes. The simultaneous overlaying of cycles having a time-span from years and decades to centuries produce numerous combinations in the observed patterns of climatic, and especially, biological events. Existing trends in the dynamics of populations, biotic communities, and ecosystems depend on temporal and spatial factors. When global factors produce major effects, changes in biota occur in phase over wide areas and on a long time scale. When regional (provincial) factors are in play, local and short-term trends are more evident. Therefore, even large, occasionally local, anomalies should not be interpreted as responses to global causes, either natural or anthropogenic. Global changes may occur differently in different regions. Patterns in population and community dynamics may differ significantly even during analogous cycles due to multivariate impacts on biota. Biotic processes are influenced not only by fundamental environmental factors, but by population and community factors as well. Thus, widely used climatic indices are not always reliable for unraveling mechanisms and cause-and-effect relationships. Such a conclusion is supported by newly revised datasets on variations in productivity of pelagic and bottom fish, squids, zooplankton and jellyfish acquired by TINRO-Centre in the northwestern Pacific Ocean during the last 3 decades. Observed sharp changes in fluctuating fish stocks are still poorly predictable on the basis of existing stock assessment approaches. It is, therefore, important to support stock assessment models with real observational data obtained in ecosystem surveys when abundance and biomass of each species are evaluated. Macroecosystems of the North Pacific function normally, keeping biological (in particular, fish) productivity at a high level today, though it is somewhat lower than in the 1980s. Traditional methods of assessing further changes in populations and ecosystems do not have the power for producing long-term forecasts. To improve our understanding of marine ecosystem function, we need in-depth studies on how climate and oceanographic factors impact energy transfer (especially during the earliest ontogenetic stages of marine organisms) in the biosphere.

Report of Governing Council

The Governing Council (GC) met from 9:00–18:00 hours on October 22, 2011, and from 13:00–19:15 hours on October 23, under the chairmanship of Dr. Lev Bocharov. All Contracting Parties were represented at the two sessions (*GC Endnote 1*).

AGENDA ITEM 1

Welcome and opening remarks

The Chairman called the meeting to order, welcomed the participants and requested an introduction of members for each national delegation and representatives of PICES. Dr. Bocharov noted changes in the GC membership after the 2010 PICES Annual Meeting (PICES-2010) and welcomed new national delegates, Dr. David Gillis (Canada), Dr. Ichiro Nakayama (Japan) and Mr. Hyun Taek Lim (Korea), to the Organization.

The Contracting Parties were invited to make their opening remarks, and all statements are appended as *GC Endnote 2*.

In accordance with *Rule 1(ii)* of the PICES Rules of Procedure (http://www.pices.int/about/rules_procedure.aspx), all Contracting Parties were requested to notify the Executive Secretary, three weeks in advance (by September 26), of the names of delegates, advisors, members and alternates, attending each meeting of the Organization. The Executive Secretary briefly reviewed the draft Delegation List included in the GC Briefing Book and asked each Contracting Party to submit corrections to the PICES Secretariat so that Council can examine the final Delegation List at its second session.

AGENDA ITEM 2

Adoption of agenda and meeting procedures

Council reviewed and approved, without modifications, the provisional agenda circulated on August 25, 2011 (*GC Endnote 3*). At the first session, the Chairman suggested the order in which to take up the various agenda items. This report summarizes the treatment of each agenda item during the course of the two sessions.

AGENDA ITEM 3

Membership and observers from other countries

In 2011, the Secretariat did not receive proposals from any country to accede to the PICES Convention.

The Executive Secretary reminded Council that after the Rules of Procedure were amended to allow experts from outside of PICES to serve as *ex-officio* members on PICES Technical Committees and subsidiary bodies of PICES Scientific Committees (Decision 2009/A/5(i)), four organizations requested this status: representatives of SAHFOS (Sir Alister Hardy Foundation for Ocean Science; <http://www.sahfos.ac.uk/>), NOWPAP (Northwest Pacific Action Plan; <http://www.nowpap.org/>), IGBP (International Geosphere-Biosphere Programme; <http://www.igbp.kva.se/>) and SAON (Sustaining Arctic Observing Networks; <http://www.arcticobserving.org/>) have joined as *ex-officio* members of the Advisory Panel on *Continuous Plankton Recorder Survey in the North Pacific* (AP-CPR), Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB), Section on *Carbon and Climate* (S-CC) and Technical Committee on Monitoring (MONITOR), respectively. It was pointed out that so far no interest in *ex-officio* membership was expressed by non-Contracting Parties. Council re-iterated its view expressed at PICES-2010 that the appropriate approaches to advertise the *ex-officio* membership system and to recruit scientists from other countries to PICES, are scientist-to-scientist

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communication and bilateral meetings between Contracting and non-Contracting Parties. National delegates were asked to use these approaches as feasible.

AGENDA ITEM 4

Report on administration for 2010–2011

The Executive Secretary summarized the activities of the Organization and the Secretariat since PICES-2010. Council reviewed and adopted the report (*GC Endnote 4*).

AGENDA ITEM 5

Relations with relevant international and regional organizations/programs

The Executive Secretary reported that letters of invitation to attend PICES-2011 as observers were sent to 48 organizations and programs selected from the *2010 Standing List of International and Regional Organizations and Programs* (with some additions), and 28 were present at the meeting (*GC Endnote 5*). Representatives of these organizations and programs attended meetings of Science Board, Standing Committees and/or their subsidiary bodies. In particular:

- Dr. Adolf Kellermann (Head of ICES Science Programme) attended the Science Board meeting (October 16) to discuss the draft report and recommendations of the PICES/ICES Study Group on *Strategic Planning for Scientific Cooperation in Northern Hemisphere Marine Science* (see *Agenda Item 6* for details) and joint activities of the two organizations in 2012 and beyond.
- Representatives of several organizations and programs expressed their views on potential areas of collaboration with PICES (including specific proposals for 2012 and beyond) at the meetings of Standing Committees and/or their subsidiary bodies (details can be found in the annual reports of Standing Committees).
- A number of organizations and programs had posters on display outlining general information about these programs/organizations and highlighting their scientific objectives and recent activities.

The Executive Secretary also provided information on PICES representation at meetings of other programs and organizations since PICES-2010:

- Dr. Vladimir Radchenko, Russian National Delegate to Council, represented PICES at the 2010 NOWPAP Intergovernmental Meeting (November 16–18, 2010, Moscow, Russia);
- Dr. Alexander Bychkov, PICES Executive Secretary, represented PICES at the 2011 POGO Annual Meeting (January 24–26, 2011, Seoul, Korea), the 2011 meeting of the ESSAS Scientific Steering Committee (May 27–28, 2011, Seattle, U.S.A.), the 2011 General Assembly of IOC-UNESCO (June 22–July 1, 2011, Paris, France), and the 2011 SCOR Executive Committee Meeting (September 12–15, 2011, Helsinki, Finland);
- Dr. Toru Suzuki, Chairman of the Technical Committee on Data Exchange, represented PICES at the 2011 IODE Session (March 23–26, 2011, Liège, Belgium);
- Drs. Mark Wells and Charles Trick, S-HAB members, represented PICES at the 2011 meeting of ICES-IOC Working Group on *Harmful Algal Bloom Dynamics* (April 5–8, 2011, Gothenberg, Germany) and at the 2011 IPHAB (Intergovernmental Panel on Harmful Algal Blooms) meeting (April 12–14, 2011, Paris, France);
- Dr. Sinjae Yoo, Science Board Chairman, represented PICES at the 2011 meeting of the IMBER Scientific Steering Committee (April 11–13, 2011, Marseille, France), and the 2011 ICES Annual Science Conference (September 19–23, 2011, Gdansk, Poland);
- Dr. Skip McKinnell, PICES Deputy Executive Secretary, represented PICES at the 2011 meeting of the ESSAS Scientific Steering Committee and the 2011 ICES Annual Science Conference;
- Dr. Masahito Hirota, member of the Study Group on *Human Dimensions*, represented PICES at the 2011 meeting of the LOICZ (Land-Ocean Interactions in the Coastal Zone) Scientific Steering Committee (September 12–15, Yantai, China).

Council reviewed the progress made in the integration and coordination of PICES activities with other international scientific organizations and programs of regional and global scale, and with regional scientific and monitoring efforts (national and involving several PICES Contracting Parties) in the North Pacific (for details see *Appendix 4* in *GC Endnote 4*), and re-confirmed its support to the holding of co-sponsored symposia, sessions, workshops and training courses, and to the creation of joint expert groups as directions of actual collaboration. Council also approved the revised *Standing List of International and Regional Organizations and Programs* developed by Science Board and agreed with the identified priorities for interaction in 2011–2012 (*GC Endnote 6*; Decision 2011/S/8(i)). This list will be used, in part, to assist the Executive Secretary and Science Board in decisions regarding sending PICES representatives to meetings of other organizations and programs.

AGENDA ITEM 6

Report of the PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science*

The two major international marine science organizations in the Northern Hemisphere, ICES and PICES, are focused on different oceans but have many scientific issues in common. Scientific collaboration between PICES and ICES was initiated in 1998, when the Chairman of PICES and the President of ICES signed a Memorandum of Understanding on scientific cooperation that provided a first opportunity for the two organizations to explore each others' interests in marine science and to determine how new advances might be made through cooperative activities. In the past 10 years, there have been significant increases in reciprocal exchanges, cooperative sponsorships of scientific meetings and projects, and deeper linkages that have often developed on a case-by-case basis. The recognition of a need to build a formal framework for cooperation to serve as the basis for linkages of science plans and longer-term strategic planning has resulted in establishing a joint PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* (SG-SP; Decision 2009/S/10(iii)). The SG-SP terms of reference and membership can be found in the 2010 PICES Annual Report at http://www.pices.int/publications/annual_reports/Ann_Rpt_10/2010-GC.pdf.

A summary report on SG-SP activities was given by Dr. Sinjae Yoo. The major points from his presentation were:

- Several SG-SP members and some invited guests, Jürgen Alheit (Germany) and William Karp (U.S.A.) from ICES, and Anne Hollowed (U.S.A.) and Suam Kim (Korea) from PICES, met for the first time on September 21, 2010, at the ICES Annual Science Conference in Nantes, France, to prepare a workplan.
- The second meeting, with all SG-SP members present, took place on April 29, 2011, in conjunction with the 2011 inter-sessional PICES Science Board meeting (Honolulu, U.S.A.). At this meeting, the Study Group: (1) considered specific research areas that can be enhanced by greater cooperation between the two organizations, (2) reviewed possible forms of collaboration, (3) discussed procedures for cooperation and how to monitor/steer joint activities, and (4) agreed on the structure of the final report to be completed by correspondence by August 31, in time to be tabled at the ICES SCICOM meeting in September, and the PICES Science Board meeting in October.
- The draft SG-SP report identified the following research foci that are currently, or soon to become, areas of joint interest: (1) climate change, (2) ecosystem assessment, (3) marine spatial planning, and (4) ocean acidification and hypoxia/anoxia. A desire was also expressed by both organizations to foster and enhance collaboration in operational areas such as training, knowledge exchange, and communication. Under the proposed framework, cooperation can take the form of co-sponsored symposia, workshops, or topic sessions at each other's annual meetings; expert groups and strategic initiatives where PICES and ICES appoint scientists to focus on topics of joint interest; joint publications; joint training initiatives; joint advice; etc.
- The draft report was discussed at the SCICOM meeting during the 2011 ICES Annual Science Conference, and the revised version then had been sent to PICES for further comments.
- Because there was little time for Science Board to review this updated version before the 2011 PICES Annual Meeting, the PICES Secretariat was requested to circulate the report to all Committee and FUTURE Advisory Panels for comments by mid-November. These comments are expected to be reviewed

by PICES SG-SP members who would then make the appropriate changes. The new draft will then be placed on the PICES website for comments by the broader PICES scientific community before finalization.

Council reviewed the available SG-SP draft report and endorsed the outlined approach for strategic collaboration between PICES and ICES. It was concluded that (1) the identified areas for scientific cooperation are of high interest to the Contracting Parties and (2) the proposed framework takes advantage of existing structures in each organization to minimizing additional cost to either of them, and will provide guidance to the scientists in the ICES and PICES communities to develop joint activities and information on the specific (and necessary) procedures of the two organizations that will ensure timely and beneficial results.

Council agreed that the Study Group completed its terms of reference and should be disbanded and that the SG-SP draft report should be included in the 2011 PICES Annual Report (Decision 2011/S/5(i)). Council also supported the recommendations that: (1) a group consisting of the ICES SCICOM Chairman, the PICES Science Board Chairman, the ICES Secretariat Head of Science Programme and the PICES Deputy Executive Secretary monitor, steer and implement collaborative arrangements in line with the SG-SP report, and act as an interface between the Science Board, SCICOM and the proponents of joint activities; and (2) a wider strategic analysis be conducted every 3–5 years, and that this will require an addition of 2–5 members from each organization.

AGENDA ITEM 7

Report on the UN Regular Process (UNRP) for Global Reporting and Assessment of the State of the Marine Environment

At the 2011 inter-sessional Science Board meeting, Dr. Chul Park (Korea) made a brief presentation on the UN Regular Process (UNRP) for Global Reporting and Assessment of the State of the Marine Environment. He suggested that PICES should become involved in this activity, as the scope of the UNRP is linked well with that of FUTURE, and pointed out that PICES' potential role could be to contribute volunteers to draft, peer review, act as consultants, and/or edit report chapters after organizing or participating in a regional workshop (or workshops) to determine the outline for the assessment.

In May 2011, PICES was invited to attend, as an observer, a meeting of the Ad Hoc Working Group of the Whole on *the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socio-economic Aspects* (AHWG), held June 27–28, 2011, in New York. The invitation was accepted, with expectation that information gathered at the meeting will allow Council to make a decision on the level of PICES' involvement in the UNRP, and Dr. Skip McKinnell, Deputy Executive Secretary and Editor of the PICES North Pacific Ecosystem Status Report, participated in the meeting. A product of this meeting, the UN report A/66/189, can be found at http://www.un.org/depts/los/global_reporting/global_reporting.htm. A summary by Dr. McKinnell was included in the PICES-2011 Council Briefing Book.

Several critical points were highlighted in the report presented by Dr. McKinnell to Council:

- The UNRP is a top-down global endeavour where PICES Contracting Parties may have different views on its utility. By its nature, the process has a strong element of global politics overlaying the development of what is essentially a technical report.
- The current approach implies strong UN leadership, with relatively minor roles for others, including inter-governmental regional organizations.
- The UNRP anticipates that UN Member States will offer to host regional workshops to fulfil the needs of the process. If accepted, UN Member States have to negotiate a UN host conference agreement.
- Capacity building seems to have an inordinately high profile in the UNRP, especially considering that capacity building will have relatively little role to play in meeting the 2014 deadline for the first global assessment.
- The current balance in the Trust Fund established to support the UNRP is very low.
- The North Pacific (extends to the Equator, beyond the area of primary concern to PICES) is considered a region in the UNRP, although marginal seas along the Asian continent are a separate region entitled "The Eastern and South-Eastern Asian Seas (including the Indonesian seas)".

- Current documentation on the UNRP does not specify a period of primary interest, but the 2010 PICES North Pacific Ecosystem Status Report will be six years old by the 2014 target date for the first global assessment because its focus was on the period from 2003–2008.
- The UNRP includes some topics (e.g., socio-economics) that are not part of the normal skill set of the traditional cadre of PICES scientists.

After receiving the report, the following views were expressed by Contracting Parties:

- Japan noted a similarity between the UNRP and the reporting on the status and trends of North Pacific ecosystems by PICES, and pointed out that due to current funding constraints, PICES should focus on its own assessments, and provide outcomes/products to the UNRP, if appropriate.
- China supported PICES' involvement in the UNRP to enlarge PICES' role in global marine affairs.
- Korea suggested for PICES to contribute to the UNRP in the context of FUTURE/AICE (*Anthropogenic Influences on Coastal Ecosystems*), and to be represented at the UNRP Workshop for the Eastern and South-Eastern Asian Seas to be held in February 2012, in China.
- Russia indicated that because of the uncertainty in the UNRP, mismatch of the delineated North Pacific Region in this process with the area of primary concern to PICES, and lack of funding, it would be more appropriate for the Organization to abstain from being involved as a contributor to the report/assessment at this time. However, the experience and expertise PICES has gained in producing comprehensive science-based assessments of North Pacific marine ecosystems might be useful for the UNRP and activities of AHWG. PICES' involvement as a reviewer of regional assessments of North Pacific marine ecosystems will meet the credibility of the Organization and encourage cooperation with other scientific organizations and programs.
- The United States agreed with Russia that while PICES has considerable experience and expertise in developing regional assessments, the best approach for the Organization at this time is to indicate its willingness to conduct scientific peer review of regional assessment of North Pacific marine ecosystems.

Based on this discussion, Council instructed the Executive Secretary to inform the UN Division for Ocean Affairs and the Law of the Sea (UN DOALOS) of PICES' interest in conducting scientific peer review of UNRP regional assessments of North Pacific marine ecosystems and in being involved in the regional workshops for the North Pacific and East Asian marginal seas (Decision 2011/A/6).

AGENDA ITEM 8

Yeosu Declaration and Yeosu Project

The Ocean Expo-2012 (<http://eng.expo2012.or.kr/eng/main.asp>) will be held from May 12 to August 12, 2012, in Yeosu, Korea, under the theme "*The Living Ocean and Coast: Diversity of Resources and Sustainable Activities*". PICES is a major international sponsor, jointly with ICES and IOC, of the 2nd International Symposium on "*Effects of climate change on the world's oceans*" (<http://www.pices.int/climatechange2012.aspx>) to be convened as one of the official events (the first academic event) related to the Expo-2012.

Yeosu Declaration

The Yeosu Declaration is pursued as part of the legacy of the Ocean Expo-2012 and is intended to: (1) enhance the awareness of dangers faced by the ocean; and (2) promote the necessity of international cooperation for turning these challenges into hopes for the future. It is expected that the Yeosu Declaration will celebrate humanity's efforts to find sustainable ways to develop the ocean, and create an international consensus in support of the Expo's theme.

As an international manifesto, the Yeosu Declaration is being developed in consultation with Korean and international marine experts, including those from international organizations. PICES was invited to be on the International Review Committee (IRC) of the Yeosu Declaration. The March 9 draft of the Declaration was presented by Dr. Dosoo Jang, Chairman of the Yeosu Declaration Preparation Committee, and was briefly

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discussed at the 2011 inter-sessional Science Board meeting. Dr. Sinjae Yoo, Science Board Chairman, represented PICES at a roundtable IRC meeting held on May 11, 2011, in Seoul, to digest all comments to this draft. The May 20 draft was circulated to all Contracting Parties on May 25, but no comments were received.

At PICES-2011, Dr. Jang presented the September 27 version of the Declaration submitted to the Bureau des International Expositions (BIE) for endorsement at its 150th Assembly scheduled for November 23, 2011. He informed Council that the Yeosu Declaration Ceremony is planned for August 12, 2012, just prior to the Expo Closing Ceremony. The Yeosu Declaration will then be presented at various fora and symposia to raise its visibility and to build a consensus in the international community in support of the content of the document.

All Contracting Parties agreed that the Yeosu Declaration respects the spirit and principles of the United Nations Convention on the Law of the Sea, the Convention on Biological Diversity and many other important documents, and accepted for PICES to be an IRC member for the Declaration (Decision 2011/A/5).

The United States expressed their interest in providing some editorial comments after the meeting, and Dr. Jang confirmed that it will be an opportunity for editorial comments/revisions after the BIE Assembly.

Yeosu Project

The Yeosu Project is an international cooperation program designed to strengthen capabilities of developing countries to meet the challenges related to the ocean. It is being established as a practical element that translates the spirit of the Yeosu Declaration and the theme of the Expo-2012 into action. It is hoped that *“the Yeosu Project will become an important legacy of the Expo-2012 by helping developing countries to create forward looking and environment-friendly methods to preserve and make judicious use of marine resources”*.

The Korean government has allocated approximately ten million US dollars to support the Yeosu Project, and has entrusted its implementation to the Korea International Cooperation Agency (KOICA). The main areas of support were identified as follows:

- Improvement of the marine environment: Measures to respond to climate change, marine pollution, management and conservation of marine resources, marine exploration, and marine safety;
- Development of new marine technologies: Practical use of fisheries resources, utilization of marine biological resources, utilization of marine mineral resources, feasibility studies on offshore and gas development;
- Preservation and utilization of marine resources: Preservation of fisheries resources, advances of fisheries technologies, port logistics technologies.

It was decided that the Yeosu Project will have 3 phases. The first phase, launched in October 2010, includes 7 research and development (R&D) projects and 5 educational/training projects selected for 7 countries in Southeast Asia and the South Pacific. The second phase of the Project, initiated in 2011, focuses on R&D projects carried out by leading Korean institutions in collaboration with local government and research agencies. The third phase of the Project was expected to start in 2011, and to be conducted in collaboration with international organizations. According to the Call for Proposals, the duration of each project is from 6 to 24 months, and available funding is up to \$500,000 US per project.

The Executive Secretary reported that PICES was invited to submit a proposal for the third phase of the Yeosu Project. In consultation with the Science Board Chairman and Vice-Chairman, it was agreed that the proposal should be linked to PICES' integrative science program, FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems), as this program is a vehicle that the PICES community has been using to increase understanding of climatic and anthropogenic impacts on marine ecosystems, and to prepare and deliver ecosystem products. A set of three proposals, each associated with a different FUTURE Advisory Panel, was developed:

- Understanding ecosystem responses to critical stressors around the Pacific Ocean (linked to activities of the Advisory Panel on *Anthropogenic Influences on Coastal Ecosystems*, AICE);

- Understanding North Pacific Climate variability and change (linked to activities of the Advisory Panel on *Climate, Oceanographic Variability and Ecosystems*, COVE);
- Yeosu – Ecosystem Observations for Society and Understanding (YEOSU) (linked to activities of the Advisory Panel on *Status, Outlooks, Forecasts, and Engagement*, SOFE)

Each proposal included both new research and capacity building opportunities. It was also expected that the first two proposals will support activities of two new working groups (WG) established to advance FUTURE science, WG on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* and WG on *North Pacific Climate Variability and Change*, and the third proposal will assist in developing an operational capacity within the PICES Secretariat for FUTURE/SOFE products. Unfortunately, PICES' proposals were not selected to be funded, mainly due to “insufficient capacity building component”.

The Korean delegation informed Council that the fourth phase (the end of the pilot stage) of the Yeosu Project will focus on capacity building of small island states, and re-submitting the proposal at this time is not feasible. However, the future main stage of the Yeosu Project is expected to provide opportunities for international organizations.

AGENDA ITEM 9

Report of the Study Group on Updating the PICES Strategic Plan

In 2002, the PICES Review Committee identified the importance of developing a long-term “vision” or Strategic Plan for the Organization. At the 2003 inter-sessional meeting, Council re-iterated the value of such a plan and formed, under the direction of Council, a Study Group on *PICES Strategic Issues* to develop a Strategic Plan (Decision 2003/S/5(iv)). The Study Group was led by the Chairman of PICES and included the Chairman of Science Board and one representative from each Contracting Party as members. The Strategic Plan drafted by this Study Group was adopted at the 2004 inter-sessional meeting (Decision 2004/A/6(i)).

At PICES-2009, Council agreed that the Strategic Plan of the Organization should be updated to ensure that it reflects the vision of all Contracting Parties on the direction of PICES over the next 5–10 years, and approved the establishment of a Study Group on *Updating the PICES Strategic Plan* (SG-USP; Decision 2009/S/7(ii)), under the direction of Council, with the terms of reference and membership as described at http://www.pices.int/members/study_groups/Disbanded_Study_Groups/SG-USP.aspx.

At PICES-2010, Council reviewed the draft SG-USP report and agreed to: (1) extend the life span of SG-USP for 6 months (Decision 2010/S/6(vi)) and (2) convene a SG-USP meeting in conjunction with the 2011 inter-sessional Science Board meeting (Decision 2010/S/3). The draft Strategic Plan developed at this meeting (May 1, 2011) was circulated to and reviewed by all SG-USP members.

At PICES-2011, the latest version of the Strategic Plan was presented by Dr. Laura Richards and unanimously approved by Council (Decision 2011/A/4). Council acknowledged the efforts of the Study Group for developing a concise, forward looking, and well written document. It was also agreed that SG-USP completed its terms of reference and should be disbanded, and that the Strategic Plan should be included in the 2011 PICES Annual Report (Decision 2011/S/5(i); see *GC Endnote 7*).

AGENDA ITEM 10

Schedule, structure and financing of future Annual Meetings

PICES-2012

At PICES-2010, Council accepted the offer of Japan to host the Annual Meeting from October 12–21, 2012, in Hiroshima (Decision 2010/A/5(ii)). A brief presentation on the status of preparations for PICES-2012 was

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given by Dr. Taro Ichii. At the recommendation of the F&A Committee, Council decided to keep the same registration fee structure for PICES-2012 as for PICES-2010 and PICES-2011 (Decision 2011/A/7(iv)), and to provide \$40,000 to the host country to partially cover meeting costs (Decision 2011/A/7(i)).

The proposed theme of PICES-2012, “*Scientific challenge to the North Pacific ecosystem: For the mitigation of the effects of natural and anthropogenic stress*”, was approved in principle at PICES-2010 (Decision 2010/A/5(ii)). The original description was reviewed at the 2011 inter-sessional Science Board meeting and finalized at PICES-2011.

PICES-2013

At PICES-2010, Council invited Canada to explore the feasibility of hosting the PICES Annual Meeting in 2013, and inform the Secretariat on this matter by March 31, 2011 (Decision 2010/A/5(iii)). The Canadian delegation accepted the request and indicated that it had already initiated discussions with its government on this issue. In early December 2010, Canada confirmed its willingness to host PICES-2013. Council approved the proposal to hold the meeting from October 11–20, 2013, at the Vancouver Island Conference Centre in Nanaimo, British Columbia (Decision 2011/A/7(ii)). Some brief information on the status of preparations for PICES-2013 was provided by Dr. Laura Richards.

Council approved in principle the proposed theme of the meeting, “*Communicating forecasts, uncertainty and consequences of ecosystem change to society*”, and instructed Science Board to finalize the theme description at the 2012 inter-sessional Science Board meeting (Decision 2011/A/7(ii)).

PICES-2014

In keeping with the 6-year rotation cycle (Decision 1994/A/6), China was requested to consider the possibility of hosting the PICES Annual Meeting in 2014, and inform the Secretariat on this matter by March 31, 2012 (Decision 2011/A/7(iii)).

Structure of Annual Meetings

At PICES-2009, Council adopted the final report of the Study Group on *Restructuring of the PICES Annual Meeting* (SG-RAM), and agreed to implement most of the approved changes in the Annual Meeting format starting with PICES-2011 (Decision 2009/A/6(i)). It was though decided that the proposed changes in the format of the Opening Session be implemented beginning with PICES-2009, and the recommendation to increase the number of concurrent scientific sessions to 4 per day be on trial at PICES-2010. Due to the limited capacity of the venue in Khabarovsk, the number of concurrent sessions at PICES-2011 was 3 instead of 4 as suggested in the SG-RAM report (http://www.pices.int/publications/annual_reports/Ann_Rpt_10/2010-SG-RAM%20Report.pdf). Considering that most of the approved changes in the format of the Annual Meeting are to be implemented at PICES-2011 and PICES-2012, Council agreed to discuss their effectiveness at the next Annual Meeting in Hiroshima (Decision 2011/A/7(v)). Some preliminary comments were offered by Russia and the United States:

- Russia indicated that increasing the number of concurrent sessions is a preferred option compared with the extension of the Annual Meeting duration.
- The United States pointed out that even with a ¾-day business meeting, the Standing Committees do not have enough time to consider all important agenda items, and additional pre-work by the Committees before the Annual Meeting is needed to ensure that key decisions can be made with adequate deliberations.

2011 inter-sessional Science Board meeting

Holding inter-sessional meetings of Science Board and Governing Council has already become an integral part of PICES management, providing an essential opportunity for (1) making timely decisions under the current fast-changing situations in ocean science and policy, (2) mid-term reviews of scientific activities and (3) in-depth

discussions on administrative issues of the Organization. The inter-sessional Science Board meetings became even more crucial after Science Board assumed the duties of the Scientific Steering Committee for FUTURE.

Earlier, both the F&A Committee and Council expressed and reiterated their support for the concept of inter-sessional meetings but stressed that given meeting costs (including time commitment of the members), the need for such meetings should be evaluated each year. It was also agreed that rotating the place for inter-sessional meetings is highly desirable, especially if overall costs for the Organization are kept to the minimum possible. This approach was implemented by obtaining financial support from the country hosting the inter-sessional meeting and by having the meeting in conjunction with other PICES events.

Council approved an inter-sessional Science Board meeting to be held in conjunction with a 3-day FUTURE implementation workshop in Busan, Korea, immediately after the 2nd PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” in Yeosu, Korea (Decision 2011/A/7 (vi)). Council accepted with gratitude an offer from Korea to host both events in 2012, and thanked Russia for the intent to host ISB-2013, if approved.

AGENDA ITEM 11

Progress report on implementation of the second PICES integrative science program, FUTURE

The second integrative scientific program of PICES, FUTURE, is the highest priority undertaking for the next decade. The basic principles of the program are contained in the Science Plan approved in principle at PICES-2007 (Decision 2007/S/1), and finalized in February 2008. The FUTURE Implementation Plan was approved in principle at IGC-2009 (Decision 2009/S/1) and finalized in June 2009. Both documents are available on the PICES website, along with terms of reference for three FUTURE Advisory Panels, AICE (*Anthropogenic Influences on Coastal Ecosystems*), COVE (*Climate, Oceanographic Variability and Ecosystems*) and SOFE (*Status, Outlooks, Forecasts, and Engagement*) established to provide continuing direction, leadership, coordination, and synthesis within PICES toward attaining FUTURE goals (http://www.pices.int/members/scientific_programs/FUTURE/FUTURE-main.aspx). These Advisory Panels are expected to recommend specific activities for consideration by Science Board which serves as the Scientific Steering Committee (SSC) for FUTURE (Decision 2009/S/7(i)).

A report on the progress made in the implementation of FUTURE since PICES-2010 was presented to Council by Dr. Sinjae Yoo.

- The following events were organized in 2011 to advance FUTURE science:
 - A 3-day workshop on “*Indicators of status and change within North Pacific marine ecosystems*” was held April 26–28, 2011, at the East-West Center, Honolulu, U.S.A. The workshop was co-convened by Sachihiko Itoh (Japan), Jacquelynne King (AP-COVE; Canada), and Thomas Therriault (AP-AICE; Canada) and was attended by more than 50 experts, including 14 contributors (unfortunately Chinese scientists were missing again). The three workshop themes were: (1) ecosystem-level indicators and assessments, (2) ecosystem resilience, and (3) indicator uncertainty, and the goal was to impart existing approaches and concepts to the PICES community in order to provide direction on elements of the FUTURE Science Plan. The major outcome from the workshop was reaching an agreement on a framework to be utilized when selecting and calculating indicators for the common descriptors and attributes for North Pacific ecosystems. The workshop summary and presentations can be found at <http://www.pices.int/publications/presentations/2011-FUTURE-wsh/2011-FUTURE-workshop.aspx>. The workshop led to the refinement of the terms of reference for the PICES Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*.
 - A 2-day PICES/ICES workshop on “*Development and application of Regional Climate Models*” was held October 11–12, 2011, at Mayfield Hotel, Seoul, Korea. The workshop was co-convened by Kyung-II Chang (Korea), Michael Foreman (Canada), Chan Joo Jang (Korea), Myron Peck (Germany) and Angelica Peña (Canada), and funded by two Korean organizations (Ministry of Land, Transport and Maritime Affairs and Seoul National University). The workshop goals were to: (1) provide a

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platform to discuss various aspects of regional climate modeling such as different approaches, downscaling, parameterizations, and coupling to the Global Climate Models, and (2) encompass the coupling of Regional Climate Models (RCMs) to ecosystem models. The workshop led to the recommendation of a new PICES expert group on *Regional Ecosystem Modeling*.

- At PICES-2011, the Advisory Panels met concurrently (½ day) and then jointly (½ day) to: (1) review their terms of reference and work plans, and (2) finalize their proposals for new expert groups.
- Based on discussions at the 2011 inter-sessional FUTURE workshop and PICES-2011, several new expert groups were proposed:
 - Working Group 27 on *North Pacific Climate Variability and Change* (under POC)
 - Working Group 28 on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (under MEQ and BIO)
 - Working Group 29 on *Regional Climate Modeling* (under POC)
 - Section on *Climate Change Effects on Marine Ecosystems* (under BIO, FIS and POC)
 - Section on *Human Dimensions of Marine Systems* (under Science Board)
 - Study Group on Marine Pollutants (under Science Board)The first two groups, with terms of reference as described in *GC Appendix B*, were approved in the interim period (Decision 2011/S/6(i)).
- Understanding the roles and responsibilities of each expert group within the FUTURE framework and conducting the necessary work in concert with other groups in a timely manner are vital for the success of the Program. A 3-day inter-sessional workshop was proposed to develop a higher level coordination plan where tasks and roles of expert groups are specified and aligned. The expected outcome from this workshop is a 3- to 5-year roadmap for FUTURE.
- Discussion was initiated on planning for a FUTURE Open Science Meeting to be convened in the spring of 2014 as the Program will be nearing its mid-life by that time. Potential themes and format for the OSM are expected to be considered at ISB-2012.

Council agreed to establish all expert groups proposed by Science Board, with terms of reference as described in *GC Appendix B* (Decision 2011/S/6(ii)). Council also approved a 3-day inter-sessional FUTURE workshop in conjunction with ISB-2012 and accepted an offer from Korea to host both events in Busan, immediately after the 2nd PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (Decision 2011/A/7 (vi)).

The Executive Secretary reported on the evolution of the FUTURE fund and indicated that the estimated year-end balance for this fund is insufficient. Given the current lack of funding allocated specifically to FUTURE, Council approved the recommendation of the F&A Committee that funds available from all completed projects in the Working Capital Fund as of December 31, 2011, be allocated to the development of the Program, with the provision that it should be used over the next three years (Decision 2011/A/3(iv)).

Dr. John Stein (U.S.A.) pointed out that the progress to date in the implementation of FUTURE has been excellent in some areas and only adequate in others, and commended efforts of Science Board as the FUTURE SSC to make mid-course corrections in the implementation of science program.

AGENDA ITEM 12

PICES Advisory Report to the “*Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River*”

On April 15, 2010, PICES received an invitation to provide scientific advice to the Canadian *Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River*. As the investigation is being conducted by British Columbia Supreme Court judge, Mr. Bruce Cohen, the Commission has taken his name, the Cohen Commission (<http://www.cohencommission.ca>). The advice from PICES was requested in the form of a technical report on the status and trends of marine ecosystems where Fraser River sockeye are known to occur and on potential effects of recent ecosystem variability on their survival, distribution and migration, and participation of a Lead Author in a few expert meetings related to the report’s contents. At the 2010 inter-sessional meeting, Science Board discussed the invitation and agreed that this request is a clear recognition of

PICES' expertise and scientific leadership on issues of climate variability and marine ecology, and accepting the invitation is something that PICES should undertake. This view was supported by Council in June 2010. Dr. Skip McKinnell, PICES Deputy Executive Secretary, was asked to lead the project. The Cohen Commission and PICES agreed to enter into a contract for PICES to recover some of the costs of developing the report.

At the recommendation of Science Board at PICES-2010, Council authorized the release of the draft PICES Advisory Report on "*The decline of Fraser River sockeye salmon *Oncorhynchus nerka* (Steller, 1743) in relation to marine ecology*" to the Cohen Commission (Decision 2010/S/1). At PICES-2011, Dr. McKinnell presented Council with an update on the project:

- The draft PICES Advisory Report was delivered on November 15, 2010, the date specified in the contract between PICES and the Commission. The highlights of the report were presented at a workshop attended by all of the Commission's contract authors on November 29–30, 2010. No comments were received from Commission staff, so the final version was submitted on December 15, 2010, as specified in the contract.
- Subsequently, the report was sent by the Commission for review by scientists of their choosing. Authors of the PICES Advisory Report were provided with an opportunity to respond to reviewers' comments in writing, but there was insufficient time allowed to make revisions in the report because of the Commission's internal deadlines.
- As the lead author of the PICES report, Dr. McKinnell was invited by the Commission to participate in formal hearings before Commissioner Bruce Cohen. He attended a witness preparation session with the Commission's lawyers on June 24, 2011, in Vancouver, British Columbia. The PICES Advisory Report was submitted as "evidence" at a formal hearing on July 5–7, 2011, where Dr. McKinnell was one of three members of a scientific panel providing testimony on marine ecology. Panelists were asked questions by the Commission's lawyers before cross-examination by the Commission's "Participants". These included the Government of Canada (represented by the Department of Justice), the Government of British Columbia, and the lawyers for various groups of stakeholders (aquaculture industry, fishermen, indigenous peoples, *etc.*). Commission hearings are expected to continue through September 2011, and the Commissioner's final report will be made public in June 2012.
- Informal discussions with Commission staff indicate that the PICES Advisory Report drew attention to ocean/climate events in relation to the survival of Fraser River sockeye salmon that had not been previously known or discussed, and that this report will feature rather prominently in the Commissioner's final report. The PICES Advisory Report is now available as Technical Report No. 4 on the Cohen Commission website at <http://www.cohencommission.ca/en/TechnicalReports.php>.
- With a request to bear in mind the integrity of judicial process, the Commission granted permission to present findings from the report at the international conference on "*Salmon at sea: Scientific advances and their implications for management*", held October 11–13, 2011, in La Rochelle, France, and to publish a part of the Advisory Report (an overview on Fraser River sockeye salmon and their marine environment) in a peer-reviewed journal.
- The original contract with the Cohen Commission was amended from \$100,275 to \$109,666 to (1) move some funds from expenses to fees, and (2) cover up preparatory work for Dr. McKinnell's appearance as a witness at the Commission's hearings and travel allowance in this regard. Due to the agreed amendments, the overhead retained by PICES to offset expenses related to the Secretariat's involvement in the Cohen Commission project increased from \$8,775 to \$11,830.

Council thanked Dr. McKinnell and his team for the excellent work in preparing the Advisory Report to the Cohen Commission and agreed to reproduce this report in the PICES Scientific Report Series in 2012 (Decision 2011/S/4(ii)).

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AGENDA ITEM 13

Progress report on the PICES project “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” supported by the Japanese Trust Fund

In April 2007, the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan, through the Fisheries Agency of Japan (JFA), approved funding for a 5-year PICES project entitled “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*”. The goals of the project (to be completed by March 31, 2012) are to develop international systems to collect, exchange and store relevant data, and to foster partnerships with non-PICES member countries and related international organizations. The contribution is from the Official Development Assistance (ODA) fund, and involvement of developing Pacific Rim countries is required in activities under this project.

The Executive Secretary informed Council on activities under the project since PICES-2010 (the financial report for *Year 4* is appended as *GC Endnote 8*) and provided a summary on fund transferring and project reporting to date:

- Funds for *Year 1* of the project (completed on March 31, 2008) in the amount of \$184,980 were transferred to the PICES/MAFF bank account on July 27, 2007. The progress report and the financial report for *Year 1* were submitted to JFA on July 19 and July 23, 2008, respectively.
- Funds for *Year 2* of the project (completed on March 31, 2009) in the amount of \$161,466 were transferred to the PICES/MAFF bank account on July 17, 2008. The financial report for *Year 2* was submitted to JFA on July 21, 2009, and the progress report was sent on August 13, 2009.
- Funds for *Year 3* of the project (completed on March 31, 2010) in the amount of \$187,505 were transferred to the PICES/MAFF bank account on July 15, 2009. The progress report and the financial report for *Year 3* were submitted to JFA on July 26, 2010.
- Funds for *Year 4* of the project (completed on March 31, 2011) in the amount of \$187,505 were transferred to the PICES/MAFF bank account on July 12, 2010. The financial report and the progress report for *Year 4*, as well as handouts summarizing activities within both sub-projects by the end of *Year 3* were sent to JFA on July 28, 2011 (the reports are included in this section).
- The set of documents requesting funding for *Year 5* (to be completed by March 31, 2012) was sent to the Consulate General of Japan in Vancouver on June 10, 2011, and the additional clarifications were directed to JFA on June 17 and June 22. Funds in the amount of \$164,641 were transferred to the PICES/MAFF bank account on July 27.
- The status of the PICES/MAFF account as of December 31, 2010, was assessed in the regular PICES audit of *FY 2010*. The financial statements for the rest of *Year 4* (January 1 to March 31, 2011) and for part of *Year 5* (April 1 to December 31, 2011) will be evaluated in the regular PICES audit of *FY 2011*.

Japan expressed their satisfaction with the implementation of the project and indicated that a proposal was developed and submitted for a new 5-year (2012–2017) PICES/MAFF project related to ecosystem-based management in the coastal zone, including the topics under the 2007–2012 project. The fate of the proposal will be known in December 2011.

Council re-iterated that the PICES/MAFF project has been successful not only in accumulating new scientific knowledge and building capacities within PICES and developing countries, but also in providing support for daily operations of the Secretariat through the agreed 13% overhead. Council thanked Japan for their generous contribution.

AGENDA ITEM 14

Capacity building activities including PICES Intern Program

The Executive Secretary reported on capacity building events/activities organized/funded in 2011 (see Table below) and plans for 2012 and beyond. All essential components of PICES’ strategy for capacity building (http://www.pices.int/about/capacity_strategy.pdf) were reviewed by Council.

2012 PICES/ICES Conference for Early Career Scientists

The main objective of the joint PICES/ICES Conferences for Early Career Scientists (ECS) is to provide an opportunity for scientists at the beginning of their careers to meet colleagues from around the world and develop contacts and collaborations across international borders and disciplines that would persist for decades.

TABLE PICES-sponsored capacity building activities in 2011

Event/Activity	Amount	Fund
Travel support for 2011 Zooplankton Production Symposium	3,939	TRF
Travel support for 2011 ESSAS Open Science Meeting	3,195	MSF/TRF
Travel support for 2011 International Conference on “ <i>Marine bioinvasions</i> ”	6,932	MAFF
Travel support for 2011 SOLAS Summer School	8,254	TRF
2011 NOWPAP/PICES/WESTPAC training course on “ <i>Remote sensing data analysis</i> ”	4,813	TRF
Travel support for PICES-2011	19,923	TRF
Demonstration Workshop for developing countries on “ <i>Rapid assessment survey methodologies for detecting marine non-indigenous species</i> ”	24,249	MAFF
Intern Program	33,232	TRF
Total	104,537	

After the success of the first conference on “*New frontiers in marine science*” (June 2007, near Baltimore, Maryland, USA), PICES and ICES agreed to hold these conferences at regular intervals (every 5 years). At ISB-2009, Science Board endorsed the concept of the second PICES/ICES ECS Conference to be held in 2012 in Europe. The conference, under the theme “*Oceans of change*”, will take place on April 24–27, 2012, in Majorca, Spain (<http://www.ices.dk/marineworld/oceans/index.asp>).

The commitment from ICES for the 2012 ECS Conference is ~\$75,000 (400,000 DKK). An additional contribution of \$50,000 US was provided by the U.S. National Marine Fisheries Service (NMFS). In order to have participation comparable to 2007, Council agreed that the remainder of unused funds from the 2010 PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries*” be allocated for the 2012 ECS Conference (Decision 2010/A/3(vii)). This was not implemented as, after consultation with ICES colleagues, all remaining funds from the conference were donated to Japan for the recovery of the fisheries and marine sciences in the Tohoku region impacted by the March 11 Great East Japan Earthquake and tsunami (this donation was used as a core contribution to a fund established by the Japanese Society of Fisheries Oceanography). To compensate for that, \$45,000 of the PICES-2010 Fund surplus was transferred to the 2012 ESC Conference Fund.

Schools on marine sciences

In the past, PICES Summer Schools on marine science have been organized in Asia:

- School on “*Ocean circulation and ecosystem modeling*”, August 23–25, 2006, Busan, Korea;
 - School on “*Ecosystem-based management*”, August 23–26, 2008, Hakodate, Japan;
 - School on “*Satellite oceanography for the Earth Environment*”, August 25–28, 2009, Seoul, Korea.
- Council approved the request from Science Board to hold the PICES Summer School on “*Ocean observing systems and ecosystem monitoring*” in August 2013, in Newport, Oregon, U.S.A. (Decision 2011/S/2(iv)).

At PICES-2009, Science Board strongly supported PICES’ involvement in summer schools organized by large-scale ocean research programs. The following events were co-sponsored by PICES in 2010–2012:

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- IMBER ClimECO2 Summer School on “*Oceans, marine ecosystems, and society facing climate change - A multidisciplinary approach*” (August 23–27, 2010, Brest, France) by providing travel funds and arranging additional support (through national programs/agencies) for 9 early career scientists from all PICES member countries (1 from Canada, 1 from Japan, 2 from Korea, 2 from China, 1 from Russia, and 2 from U.S.A.);
- 5th SOLAS Summer School (August 29–September 10, 2011, Corsica, France) by providing travel funds for 3 students/early career scientists from PICES member countries: 1 from each of Canada, China and U.S.A.

At the recommendation of Science Board, Council agreed to co-sponsor the IMBER ClimECO3 Summer School on “*A view towards Earth System models: Human-natural system interactions in the marine world*” to be held July 23–28, 2012, in Ankara, Turkey (Decision 2011/S/2(iv)).

Training courses

The common use of agreed methods for observations and modeling is essential for the pooling of data resulting from cooperative programs. The inter-comparability of methods and their use can be improved through methodological workshops and training courses.

This year, PICES co-sponsored, jointly with NOWPAP, IOC-WESTPAC and several Russian organizations, a training course on “*Remote sensing data analysis*” held October 8–12, 2011, in Vladivostok, Russia. This course focused on practical applications, such as red tide detection, eutrophication, oil spill monitoring, *etc.*, and was complementary to the 2009 PICES Summer School on “*Satellite oceanography for the earth environment*” which had emphasis on sensors (optical, infra-red and microwave) and image processing. PICES provided travel support for a lecturer and 3 students/early career scientists from PICES member countries (Japan, Korea and China).

One of the key activities for a component of the PICES/MAFF project (see Agenda Item 13) conducted by the Working Group on *Non-indigenous Aquatic Species* (WG 21) is the organization of a series of demonstration workshops for developing countries on methodologies for rapid assessment surveys for marine non-indigenous species and collector surveys for biofouling organisms. A pilot workshop took place on July 13–16, 2010, at the Kobe University Research Center for Inland Seas, Awaji Island, Japan, and was attended by scientists from 6 Southeast Asian countries. A larger-scale workshop on “*Rapid assessment survey methodologies for detecting marine non-indigenous species*” (co-sponsored by IOC-WESTPAC) was held July 19–21, 2011, at the Phuket Marine Biological Center, Thailand, and attended by 26 participants, mostly from Southeast Asian countries. Planning is initiated for the third workshop (co-sponsored by FRA, NOWPAP and WESTPAC) to be held tentatively in February 2012, in Nagasaki, Japan (Decision 2011/S/2(iv)).

A component of the PICES/MAFF project conducted by the Section on *Ecology of Harmful Algal Blooms in the North Pacific* focuses on teaching country-specific training courses most required to ensure seafood safety in Pacific countries outside the PICES region. Planning is in progress for a training course on screening methods for testing shellfish for paralytic shellfish poisoning toxins and phytoplankton identification, to be held in February 2012, in Jakarta and Lombok Island, Indonesia (Decision 2011/S/2(iv)).

Travel grants

Financial support for the participation of students and early career scientists in PICES Annual Meetings and symposia co-sponsored by the Organization is normally provided from the Trust Fund. Contributions to the Fund are on a voluntary basis. Efforts are being made to keep the Trust Fund at the level of \$110,000 using transfers from the Working Capital Fund.

In 2010, the Megrey Student Fund was established within the Trust Fund by the family and friends of the late Dr. Bernard Megrey to provide travel awards to graduate students and early career scientists to attend PICES Annual Meetings and conferences co-sponsored by PICES with ICES and ESSAS, three major international organizations in which Dr. Megrey was actively involved.

Following the guidelines for operating the Trust Fund adopted in 2006 (Decision 2006/A/4(i)), the Executive Secretary provided a detailed report on applications received for support and their disposition at the F&A Committee meeting. A total of ~ \$27,000 was spent in 2011 (including ~\$9,200 from the Megrey Student Fund) to support participation of scientists from all PICES member countries in the PICES/ICES Zooplankton Production Symposium (March 2011, Pucón, Chile), ESSAS Open Science Meeting (May, 2011, Seattle, U.S.A.), and PICES-2011 (October 2011, Khabarovsk, Russia). Additionally, ~\$7,000 was spent from the MAFF Fund to support participation of students and early career scientists in the Seventh International Conference on “*Marine bioinvasions*” (August 2011, Barcelona, Spain).

In 2012, travel support from the Trust Fund will be provided to students and early career scientists to attend the PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (May 15–19, 2012, Yeosu, Korea, and the 2012 PICES Annual Meeting (October 12–21, 2012, Hiroshima, Japan).

Intern Program

The PICES Intern Program (<http://www.pices.int/projects/intern.aspx>) aims at the professional development of marine scientists and managers from member countries and increasing the capacity of the Secretariat to support the work of the Organization. The Program was approved in 1999 (Decision 1999/A/7) and commenced in 2000. In 11 years since its inception, 12 scientists and managers from three member countries (4 from China, 5 from Korea and 3 from Russia) have worked as interns at the PICES Secretariat. The Program requires about \$30,000–\$33,000 per year, and has been financed solely by voluntary contributions.

In 2011, the U.S. National Marine Fisheries Service (NMFS), the Korean Ministry of Land, Transport and Maritime Affairs (MLTM) and Fisheries and Oceans Canada (DFO) contributed \$15,000 US, \$10,000 US and \$10,000 CAD, respectively, to the Trust Fund for the Intern Program. This additional funding made it possible to extend the originally-offered 6-month term of the current intern, Ms. Jeongim Mok (Korea), to a full year.

The F&A Chairman pointed out that at the end of *FY* 2011, the Organization will be holding approximately \$23,000 for the Intern Program. This amount is sufficient to maintain the Program for about 9 months in 2012, and voluntary contributions are needed to keep it going. Council thanked the organizations that supported the Intern Program, and instructed the Executive Secretary to invite all Contracting Parties to make voluntary contributions to maintain the Program in 2012 and beyond (Decision 2011/A/8(i)). Korea and the United States confirmed their intention, indicated at the meeting of the F&A Committee, that they will provide funding at the typical level (\$10,000 and \$15,000 US, respectively) in the coming year. This would be sufficient to support the completion of the current intern’s term and for a full year of a new intern’s term.

Considering the current level of the stipend (\$2,000), funding available for the Program, and stated intentions for contributions by Contracting Parties, Council agreed to initiate the process to recruit the 2012/2013 intern, with the understanding that the intern’s term will start no earlier than June 2012 (Decision 2011/A/8(ii)). In accordance with the guidelines for application and selection of interns, it is expected that China will nominate an intern for the 2012/2013 term. China thanked the other Contracting Parties for their support of the Program and suggested that the intern will be nominated by December 16, 2011.

AGENDA ITEM 15

Improvement of participation in PICES activities

At PICES-2008, the Executive Secretary presented for the first time background graphic materials to better assess problems existing in PICES Contracting Parties with the participation of their scientists in the activities of the Standing Committees and their subsidiary bodies, and in the Annual Meetings of the Organization. At PICES-2009, Council requested that these files be updated and reviewed annually (Decision 2009/A/8(iii)). The request was re-iterated at the following Annual Meetings. At the recommendation of Canada, it was also

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agreed that information on the number of presentations (talks and posters) given by participating scientists from each country be added to these materials as a measure of quality of their involvement.

Preliminary information on the participation of Contracting Parties in PICES Annual Meetings for the period from 2006 to 2011 was included in the 2011 GC Briefing Book. Data as of August 27 on registration and abstract submission for PICES-2011 were used to create the graphs. These numbers are expected to be revised after the meeting based on actual attendance and presentations.

In the discussion that followed, the Executive Secretary indicated that all Contracting Parties have Committee or expert group members who never, or rarely, attend PICES Annual Meetings, but the problem is most serious with Chinese scientists. Mr. Yingren Li pointed out that limited participation of Chinese scientists in PICES activities is partially due to national- and agency-level restrictions on the overall number of delegations to international meetings and the number of members in one delegation. He assured Council that appropriate changes in national membership will be made to improve the involvement of Chinese experts.

Dr. John Stein informed Council that the United States has initiated a review of participation of its scientists on PICES Standing Committees and expert groups and will continue this practice in the future. He also shared his observation that at this year's Annual Meeting there were a number of first time participants in PICES and that this is a positive development for the future of the Organization.

Council instructed the Executive Secretary to continue regularly preparing and circulating to Contracting Parties information, including graphic materials, on the participation of their scientists in the Annual Meetings for the previous six years (Decision 2011/A/10(ii)).

Council also re-iterated the necessity for Contracting Parties to: (1) regularly review their national membership, and to provide the updated national membership list to the Secretariat by the first day of the calendar year (January 1), and (2) follow up on *Rule 1(ii)* of the PICES Rules of Procedure in providing the national delegation list for Annual Meetings (Decision 2011/A/10(i)). The national membership lists are required to maintain a historical record of PICES membership, and to assist in improving participation in the activities of the Organization. The national delegation lists are required to assist in better coordinating activities of the Standing Committees and their subsidiary bodies, and in better preparing the Annual Meeting.

AGENDA ITEM 16

Changes in PICES Rules of Procedure

The Executive Secretary reminded Council that the original PICES Rules of Procedure (RoP) and Financial Regulations (FR) were approved on March 24, 1992, the same day when the PICES Convention entered into force. Thorough review of both documents was undertaken by the Study Group on *Rules of Procedure and Financial Regulations* (SG-RPFR), and the revised RoP and FR were adopted (Decision 2006/A/5) at the 2006 inter-sessional Council meeting (Honolulu, U.S.A.). Additional changes in the RoP were introduced in 2009 (Decision 2009/A/5(i) and Decision 2009/A/5(ii)) and 2010 (Decision 2010/A/4). The latest version of the RoP is posted at http://www.pices.int/about/rules_procedure.aspx.

At PICES-2011, the F&A Committee discussed whether changes to the RoP were required, given that the updated PICES Strategic Plan mandates the preparation of 3-year Action Plans by Executive Committees, Scientific and Technical Committees, and the Secretariat. It appears that there is no need in further revisions as there is language in the Chairman's Handbook on "Roles and Responsibilities of Chairmen and Members of PICES Groups" that might suffice. The F&A Chairman will review the language in the Handbook and provide some alternatives for consideration by Council at PICES-2012.

AGENDA ITEM 17

Report of Science Board

The Science Board met from 12:30–14:00 on October 16, from 15:00–18:00 hours on October 21, and from 9:00–18:00 hours on October 22, under the chairmanship of Dr. Sinjae Yoo. Dr. Yoo presented the report to Council on October 23. The full report is included elsewhere in this Annual Report. The discussions on some issues can be found under agenda items 5, 6, 10–12 and 14. The decisions on scientific issues are summarized in *GC Appendix A* (Decisions 2011/S/1–2011/S/8) and *GC Appendix B*. The discussion on the supplementary chapter for the second North Pacific Ecosystem Status Report is reflected below.

In his presentation, Dr. Yoo reminded Council that at PICES-2010, Science Board instructed AP-CREAMS (POC/MONITOR Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas*) to prepare a chapter not included in the second version of the North Pacific Ecosystem Status Report (NPESR-II; PICES Special Publication No. 4, 2010) by the following Annual Meeting. It was expected that a review of the ecosystem status of the area focused on by this chapter will take place at the PICES-2011 workshop on “*Recent advances in monitoring and understanding of Asian marginal seas: 5-years of CREAMS/PICES EAST-I Program*”. He informed Council that after receiving the draft document, Science Board agreed that (1) the supplementary chapter developed by AP-CREAMS should be published as a valuable contribution to NPESR-II, and (2) SOFE and MONITOR should lead the review of the chapter before technical editing. Although Science Board was urged by Dr. Kyung-Ryul Kim to get the supplementary chapter published within 1 month, it was decided that quality should not be sacrificed, but that the chapter should be published as soon as possible. In response to a question from Mr. Masaki Sugamiya (Japan), Dr. Yoo confirmed that a tentative working title of the supplementary chapter is “*Marine Ecosystems of the North Pacific Ocean 2003–2008: Japan/East Sea*”.

In a very intense discussion, the following positions were expressed by Contracting Parties:

Japan

Japan thanked Science Board for all efforts made in drafting the chapter, and confirmed that they recognize its high scientific value. At the same time, Japan expressed its regret that the simultaneous use of both names still remains as the title of the chapter, notwithstanding Japan’s repeated objection. Japan also stated that the approval of the draft publication is unacceptable for them, considering that the Sea of Japan is the one and only internationally established name for the concerned sea area by the United Nations and other international organizations, and that PICES is as an intergovernmental organization.

Japan pointed out that the simultaneous use of both names is far from the established practice in PICES, referring to the fact that Japan has consistently opposed the use of the term every time it appeared. It was also emphasized that the first North Pacific Ecosystem Status Report (NPESR-I; PICES Special Publication No. 1, 2004) cannot be regarded as a precedent, as the PICES Chairperson indicated in the 2004 Governing Council report that “*I point out that this decision by Council concerns only this particular report. Even if no resolution of the name is achieved in other venues within the six-month period, and PICES reverts to its previous practice, this does not necessarily have permanent implications for future uses. It does, however, point out the need for this matter to be settled as soon as possible.*”

Republic of Korea

Korea re-iterated that (1) following instructions from Science Board at PICES-2010, AP-CREAMS completed a 300-pages supplement to NPESR-II, with great efforts of about 80 scientists, (2) Science Board unanimously endorsed the publication of the Supplement, and (3) all Contracting Parties, including Japan, agreed on the importance of this supplement to be published timely.

Korean stated that the title of the supplementary chapter, “*Marine Ecosystems of the North Pacific Ocean 2003-2008: Japan/East Sea*”, should be kept as the same title was adopted for NPESR-I, published in 2004. The Korean delegation distributed the collection of publications/newsletters as a proof that PICES has used the “Japan/East Sea” parallel designation during most of PICES’ history since 1995.

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Korea quoted the 2004 Governing Council report, reaffirming how much PICES Contracting Parties wanted to avoid a political contention concerned with a naming issue within PICES: *Chairman indicated that no retrospective discussion of the [naming issue] matter should take place, since the vote at the 2004 interim Council meeting had already settled the issue. She re-iterated that this sort of political question must be resolved outside the forum of a purely scientific organization such as PICES, where timely scientific contributions can otherwise be seriously impeded.*

Korea also stressed out that the Contracting Parties should respect the outcome of the decision made by both AP-CREAMS, which was instructed to complete the supplement, and Science Board, which agreed to have it published. It was pointed out that Contracting Parties must not be trapped by a naming issue, which falls outside the boundaries of PICES' competency.

The Korean delegation indicated that none of the Contracting Parties explicitly made a valid objection, and there was no motion tabled, against the Science Board's decision [recommendation] to publish the supplement. Accordingly, this decision [recommendation] should be respected and considered as approved. If the supplement—the Japan/East Sea Chapter—may not be published timely, that would be certainly an irreparable disappointment to the scientists whose research efforts have contributed to the growth of PICES.

Canada

Canada agreed that the supplementary chapter for NPESR-II is an important scientific product of PICES, and supported the recommendation of Science Board that this work should be published once editing is complete. The support for the publication should not though be interpreted as Canada is taking a position on disputed geographical names within this publication. Canada also indicated that as a science organization, PICES need to find a way to continue its work on scientific issues and to avoid becoming engaged in issues which should be addressed in other more appropriate venues. A hope was expressed that a mutually agreeable solution can be reached between the concerned countries.

People's Republic of China

China pointed out that as a regional marine scientific organization aimed to strengthen and promote the scientific cooperation among the Contracting Parties, PICES is not a proper place to settle diplomatic disputes, and confirmed its position that such issues as differences in the usage of geographical names should be solved by bilateral negotiation of the concerned countries. China agreed that the supplementary chapter for NPESR-II is an important product of PICES and its publication is necessary.

Russian Federation

Russia stated that the supplementary chapter for NPESR-II is an important scientific work of PICES scientists, and the appropriate form of publication must be found by all Contracting Parties. Russia re-iterated its opinion that as a scientific organization, PICES should avoid being involved in issues that are not scientific in nature, and expressed a hope that a compromise will be found by the concerned countries to allow the chapter to be published in the nearest future.

United States of America

The United States indicated that they view the supplementary chapter for NPESR-II as important for the scientific understanding of the ecosystems in the North Pacific and wish to see it published. The United States also concurred with the assessment that PICES should not engage in discussions on different opinions on geographical names that are not scientific in nature and fall outside of its competency. It was suggested that a decision by Council should include two major points as follows: (1) all member countries agree that this supplementary chapter is an important science product of PICES, and (2) all member countries agree to keep this agenda item open to allow member country governments to reflect further on this issue.

After deliberations, the following decision was approved by Council (Decision 2011/S/4(iv)):

All member countries consider that the supplementary chapter for the Second North Pacific Ecosystem Status Report (PICES Special Publication No. 4, 2010) developed by the Advisory Panel for a CREAMS/PICES

Program in East Asian Marginal Seas and endorsed for publication by Science Board, is an important scientific product of PICES, and agree to keep this agenda item open to allow member country governments to reflect further on this issue.

AGENDA ITEM 18

Report and recommendations of the Finance and Administration Committee

The Finance and Administration Committee met from 09:00–13:30 hours on October 19, 2011, under the chairmanship of Ms. Patricia Livingston. The full report is included elsewhere in this Annual Report. All recommendations were brought forward and adopted at the first session of Council (see *GC Appendix A*, Decisions 2011/A/1 – 2011/A/3 and Decisions 2011/A/7 – 2011/A/9).

AGENDA ITEM 19

Report of the Executive Committee for evaluating annual performance of the Executive Secretary

At the recommendation of the United States and in accordance with Financial Regulation 12(i), an Executive Committee of Council for evaluating the annual performance of the Executive Secretary was established at PICES-2007 (Decision 2007/A/7(i)). The terms of reference and membership of the Committee are listed in *2007 GC Appendix B*.

The Chairman informed Council that the Executive Committee reviewed the 2010 report submitted by the Executive Secretary, Dr. Alexander Bychkov, and evaluated his annual performance as “succeeded+” not only for his ongoing commitments but also for the key commitments specifically requested by the Committee. Following the general guidelines for executive positions in the Canadian Public Service system, it was decided that a performance pay equal to 12% of his salary would be appropriate for this period. The report on the performance evaluation of the Executive Secretary for 2010, with tasks for 2011, is appended as *GC Endnote 9*.

AGENDA ITEM 20

Other business –25th PICES Anniversary

The Executive Secretary reminded Council that the PICES Convention (<http://www.pices.int/about/convention.aspx>) entered into force on March 24, 1992, and the 1st PICES Annual Meeting was held October 12–17, 1992, in Victoria, Canada. If we have no deviations from our normal 6-year rotation cycle in hosting Annual Meetings (Decision 1994/A/6), the 25th Annual Meeting will take place in 2016 in the United States. Council agreed that an item on the celebration of the 25th Anniversary of the Organization be included in the agendas of Council, Science Board and F&A Committee meetings at PICES-2012.

GC Endnote 1

Governing Council participation list

Canada

David Gillis (GC and F&A member)
Laura Richards (GC and F&A member)
Darlene Smith (advisor)

Chul Park (GC and F&A member)
Gidong Yeo (advisor)
Ungyul Yi (advisor)

Japan

Taro Ichii (advisor, F&A member)
Yukimasa Ishida (alternate delegate)
Tetsuya Itani (advisor)
Masaki Sugamiya (GC member)

Russian Federation

Oleg Katugin (advisor)
Vladimir Radchenko (GC member)
Igor Shevchenko (advisor, F&A member)

People's Republic of China

Yieren Li (alternate delegate)
Yingren Li (advisor)
Gongke Tan (alternate delegate)

U.S.A.

John Stein (GC member)
Elizabeth Phelps (advisor)

Republic of Korea

Dosoo Jang (advisor)
Kyung-Chul Lee (advisor)
Hyun Taek Lim (GC and F&A member)

Other

Lev Bocharov (PICES Chairman)
Patricia Livingston (F&A Chairman)
Sinjae Yoo (Science Board Chairman, only Oct. 23)
Alexander Bychkov (Executive Secretary)
Skip McKinnell (Deputy Executive Secretary)

GC Endnote 2

Opening remarks by representatives of Contracting Parties

Dr. Laura Richards (Regional Director of Science, Pacific Region, Fisheries and Oceans Canada)

Mr. Chairman: On behalf of Canada and the Canadian delegation, I would like to thank the Russian Federal Agency for Fisheries and the government of the Khabarovsk Region for hosting PICES-2011 in Khabarovsk, Russia. We especially appreciate the hard work of the Pacific Research Institute of Fisheries and Oceanography (TINRO-Center), the Khabarovsk Branch of TINRO-Center and the Secretariat in making this meeting a success.

Now that we have almost completed the update of the PICES Strategic Plan, we need to follow through and ensure that all activities within PICES are aligned with this Plan, along with the priorities and information needs of Contracting Parties. In particular, we recognize that FUTURE is a complex program, and its implementation will be a challenge. We will need to stay focused to ensure that FUTURE can achieve its goals. We should also take opportunities to demonstrate the effectiveness of PICES, such as through collaboration with the proposed new North Pacific Regional Fisheries Management Organization.

Efficiencies are obviously important for any organization. Many of the world's economies are continuing to deal with the fall-out from the global economic situation. In Canada, my Department of Fisheries and Oceans just announced the completion of a 5-year Strategic Review which led to a budget reduction of 3%. An additional review is now in progress, and we anticipate further budget reductions next year which could be as high as 10%. While we will continue to support PICES, we may not be able to provide the same level of participation or voluntary contribution as in the past. None-the-less, we consider international collaboration to be an efficient approach to conducting multi-disciplinary research. I personally witnessed how my own staff benefited from presentations made by our Asian colleagues at this meeting.

Another major event in Canada over the past year has been the federal commission of inquiry into the record-low return of sockeye salmon to the Fraser River in 2009. Then, last year, in 2010, sockeye salmon returned to the Fraser River at the highest level in a century. This year, in 2011, the return is expected to be near average. PICES received a formal request for advice from the Canadian government and contributed evidence to the federal inquiry on ocean conditions possibly related to the poor 2009 sockeye salmon return. Several Canadian PICES scientists (including myself) were also called as expert witnesses. This inquiry is just one example of the importance of PICES work in the North Pacific and the need for close cooperation among PICES members as we attempt to understand and forecast the North Pacific ecosystem and its resources.

We recognize that this has also been a challenging year for Japan. We admire Japan's spirit in the face of adversity and look forward to visiting Hiroshima next year. Thank you.

Dr. Yukimasa Ishida (Director-General, Japan Sea National Fisheries Research Institute, Fisheries Research Agency, Japan)

Thank you, Mr. Chairman. First of all, on behalf of Japan and the Japanese delegation, I sincerely thank the Government of the Russian Federation and the Local Organizing Committee, including TINRO-Center and the Khabarovsk Branch of TINRO-Center for kindly hosting the 2011 PICES Annual Meeting in Khabarovsk. I also thank the PICES Secretariat for preparing for this event. I am sure that their excellent work made a fruitful meeting.

Next, I would like to express my deepest appreciation to all Contracting Parties, PICES scientists and the Secretariat for their support after the March 11 great earthquake and tsunami in northeastern Japan. I also would like to thank PICES and ICES for their joint donation. The Japanese Society of Fisheries Oceanography (JSFO) was identified as the recipient of the donation, and eleven research projects have been supported by this funding. Also the Topic Session on "*Effects of natural and artificial calamities on marine ecosystems and the scheme for their mitigation*" to be convened by Dr. Tokio Wada (PICES Past Chairman) and others at the 2012 PICES Annual Meeting in Hiroshima, will be based partially on the results from these projects.

Finally, there is a great concern about the environmental damage in the area impacted by the tsunami, and of radioactive leakage from the Fukushima nuclear power plant into the atmosphere and ocean. The Japanese Government and Japanese scientists are actively monitoring the affected area and taking appropriate measures to recover from this damage. I appreciate again the contribution and cooperation by PICES Contracting Parties for the quick recovery in Japan from the damages in various fields. Thank you very much.

Mr. Yieren Li (Vice-President, Chinese Academy of Fishery Sciences, Ministry of Agriculture, People's Republic of China)

Good morning everyone: Even though this is the first time for me to participate in the PICES Governing Council meeting, I have known PICES from the very beginning when I worked as a research manager at the Ministry of Agriculture. In the past year, we have witnessed the progress of PICES and achievements by scientists from all Contracting Parties. Here, I would like to express our appreciation for efforts made by Dr. Bocharov and other members of PICES for the development of the Organization, and thank all staff of the PICES Secretariat for their hard work. I also would like to express my special and sincere thanks to the Russian Federal Agency for Fisheries and TINRO-Center for their cooperation and support of PICES-2011. I wish to see a closer collaboration among our six countries next year. Thank you.

Mr. Hyun Taek Lim (Director, Marine Territory and Development Division, Ministry of Land, Transport and Maritime Affairs, Republic of Korea)

Thank you, Mr. Chairman. First of all, congratulations on your chairmanship! And I appreciate all the hard work of the PICES Secretariat and the Khabarovsk Branch of TINRO-Center for preparing this successful Annual Meeting.

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For the past 19 years, since its inauguration in 1992, PICES has made great achievements to better understand our seas through international scientific cooperation. Supporting PICES' goal, Korea has made sincere efforts keeping up to its commitments since 1995. On top of this, Korea did not hesitate to seize opportunities for additional contributions. I am sure that as we did in the past, we [Koreans] will be striving to support values of PICES and build up solidarity among our member countries in the future.

At present, PICES is coming of age. Confucius, a great ancient Chinese wise man, said that "trust holds a group together". I dearly wish that the trust among us will continue to enrich our understanding of the seas. In this regard, we are trying to use the Yeosu Project to support activities of international oceanographic organizations. I wish to see an application from PICES in the future, when the main stage of the Yeosu Project is launched.

In closing, I hope to see many of you at the Second PICES/ICES/IOC International Symposium on "*Effects of climate change in the world's oceans*" in Yeosu and at Expo-2012 Yeosu Korea. Thank you.

Dr. John Stein (Director, Northwest Fisheries Science Center, NOAA-Fisheries, U.S.A.)

Dear colleagues: First, on behalf of the United States, I want to acknowledge the hard work by the Local Organizing Committee and TINRO-Center for hosting a very successful meeting here in Khabarovsk. There were a number of scientists attending their first PICES Annual Meeting, and that is very encouraging for the future of the Organization.

Since this is my first meeting as US National Delegate, I look forward to working with all of you as we carry out the business of PICES. In that regard, as the former Chairman of the Science Board, I particularly look forward to implementing FUTURE so that it is highly productive and supports state-of-the-art science. I must note, however, that in the United States we foresee tight budgets over the next few years for agencies that support PICES activities, as was also mentioned to be the situation in other Contracting Parties. Nonetheless, the US recognizes the importance of international partnerships and scientific collaboration among PICES member countries to address pressing issues that we all face, such as climate change.

The value of international scientific collaboration is clear. For example, in the past year there were many harmful algal blooms in the eastern Pacific but only very few in the western Pacific. We do not know why and, by collaborating through PICES, we have the best opportunity to better understand such differences and begin to determine the processes and mechanisms that lead to such differences. Similarly, with Pacific salmon we have witnessed some the highest highs and some of the lowest lows in abundance in recent years, and through collaboration we are beginning to identify possible mechanisms and better understand how climate contributes to this variability. The scientific progress on the ecology and oceanography of harmful algal blooms and the influence of climate variability and change on marine fish are but two examples of the strength of PICES as a leading international science organization.

In closing, I look forward to serving as US National Delegate on the Governing Council and to a successful and productive meeting in Hiroshima next year.

Dr. Vladimir Radchenko (Deputy Director-General, Pacific Research Institute of Fisheries and Oceanography, Russian Federation)

Dear Mr. Chairman, national delegates, colleagues, guests, ladies, and gentlemen: On behalf of the Russian delegation, I am happy to greet you in the beautiful city of Khabarovsk, the venue of the PICES Twentieth Annual Meeting. Thank you for coming and sharing with us your knowledge, expertise, and experience.

The scientific part of our meeting has been completed. It was interesting and fruitful. As the Amur River supplies the Sea of Okhotsk and further, the Pacific Ocean, with plentiful nutrients, our meeting gave life to scientific ideas, data, and hypotheses, which can grow into new cooperative international and national

scientific programs and research projects bringing important results. I hope that the official part of our meeting will also go smoothly, similar to a calm flow of the Amur River behind the window of this gorgeous building, and in line with good weather conditions, which we had a chance to enjoy during the last week. Our work is highly important for the future development of the Organization, definition of proper scientific directions, and elaboration of recommendations for fisheries and ecosystem management.

I would like to express our sincere appreciation to the PICES Secretariat for their great efforts in organizing the meeting. With such a high level of preparation and execution, we may expect that our next meetings will also be productive and successful. Thank you.

GC Endnote 3

Governing Council meeting agenda

1. Welcome and opening remarks by representatives of Contracting Parties and the Chairman of PICES
2. Adoption of agenda and meeting procedures
3. Membership and observers from other countries
4. Report on administration for 2010–2011
5. Relations with relevant international and regional organizations/programs
6. Report of the PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science*
7. Report on the UN Regular Process (UNRP) for *Global Reporting and Assessment of the State of the Marine Environment*
8. Yeosu Declaration and Yeosu Project
9. Report of the Study Group on *Updating the PICES Strategic Plan*
10. Schedule, structure and financing of future Annual Meetings
11. Progress report on implementation of the second PICES integrative science program
12. PICES Advisory Report to the *Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River*
13. Progress report on the PICES project “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” supported by the Japanese Trust Fund
14. Capacity building activities, including the PICES Intern Program
15. Improvement of participation in PICES activities
16. Changes in PICES Rules of Procedure
17. Report and recommendations of Science Board
18. Report and recommendations of the Finance and Administration Committee
19. Report of the Executive Committee for evaluating annual performance of the Executive Secretary
20. Other business

GC Endnote 4

Report on Administration for 2010–2011

I. Managing the budget and implementing financial regulations of the Organization

- The *FY* 2010 operations were completed within budget and with pre-agreed parameters. The 2010 Auditor’s Report was completed on April 21, 2011 and circulated to all Contracting Parties on May 10, 2011. In the auditor’s opinion, the financial statements accurately represent the financial position of the Organization as at December 31, 2010, and the results of its operations and changes in fund balances for the year are in accordance with PICES Financial Regulations and Canadian generally accepted accounting principles. Details are reflected under *FA Agenda Item 3*. It is expected that the *FY* 2011 operations will be also completed within budget and with pre-agreed parameters. The audit for *FY* 2011 will be conducted in April 2012.
- According to *Regulation 5* of the PICES Financial Regulations, all national contributions to PICES are payable by the first day of the fiscal year (January 1) to which they relate. All Contracting Parties met their

financial obligations for *FY* 2011. Japan and the United States paid prior to the due date. The Canadian and Russian contributions arrived in early February 2011, and the Chinese contribution was received on June 30. The Korean contribution came in two instalments: 88.1% at the end of the first quarter, and the remainder on September 20. Details can be found under *FA Agenda Item 4*.

- As current funding constraints from an increase in annual contributions only at the rate of inflation in Canada can impede improvement and development of the Organization, fund-raising continues to be an important component of PICES activities. The level of external funding has increased significantly over the last several years. In 2010, the amount of funds from voluntary contributions, grants, and partnerships for various activities initiated or sponsored by PICES exceeded, for the first time, the total annual contributions by Contracting Parties. This situation repeated in 2011, indicating: (1) the desire of various organizations and programs to work with PICES due to its high reputation, and (2) the Organization's large dependence on outside funding. Special emphasis during the year was put on raising funds for the 5th International Zooplankton Production Symposium on "*Population connections, community dynamics, and climate variability*" (Pucón, Chile), 2nd International Symposium on "*Effects of climate change on the world's oceans*" (Yeosu, Korea), the North Pacific Continuous Plankton Recorder (CPR) survey, and capacity development activities. Details are reflected under *FA Agenda Item 5*.

II. Planning and organizing the 2011 PICES Annual Meeting

PICES Annual Meetings are crucial for the Organization to move forward in achieving its mandate "to promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned". These meetings, with their high scientific standards, wide variety of topics and good attendance, have become major irreplaceable international fora for marine sciences in the North Pacific.

- The 2011 PICES Annual Meeting (October 14–23, Khabarovsk, Russia) was hosted by the Russian Federal Agency for Fisheries in cooperation with the government of the Khabarovsk Region and in coordination with the PICES Secretariat. Local arrangements were made by the Pacific Research Fisheries Centre (TINRO-Centre) and the Khabarovsk branch of TINRO-Centre. The overall theme for PICES-2011 was "*Mechanisms of marine ecosystem reorganization in the North Pacific Ocean*", and the meeting covered a broad range of timely and very relevant marine science issues. About 330 scientists and managers from 17 countries and 28 international and regional organizations/programs attended 12 sessions, 4 workshops and 23 business meetings of our standing committees and their expert groups (see *Appendix 1* for the complete list) and presented about 200 talks and 140 posters.
- To get a more comprehensive picture on the Annual Meeting theme and to secure funding, several international and national organizations/programs were invited, and they subsequently agreed, to co-sponsor (by covering travel of additional invited speakers and/or convenors) the following Topic Sessions and workshops relevant to their scientific interests: "*Mechanisms of physical-biological coupling forcing biological hotspots*" (ICES), "*Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species*" (ICES), "*Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*" (NOWPAP), "*Linking migratory fish behavior to end-to-end models*" (ICES), "*How well do our models really work and what data do we need to check and improve them?*" (IMBER), "*Remote sensing techniques for HAB detection and monitoring*" (NOWPAP), and "*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*" (GESAMP, ICES and IOC).

III. Providing secretarial services to inter-sessional symposia/sessions/workshops/meetings

Through the organization of scientific meetings, PICES aims to facilitate exchange of ideas and information, and to develop international collaborations across disciplines, national boundaries and institutions.

- In 2011, logistical and financial arrangements were made for more than 20 inter-sessional events (symposia, sessions, workshops and meetings) convened at various locations around the North Pacific and the world-at-large (see *Appendix 2* for the complete list). A highlight of the year was the 5th International Zooplankton Production Symposium on "*Population connections, community dynamics, and climate variability*" held in March 2011, in Pucón, Chile. PICES was the major sponsor of this symposium, along with ICES and COPAS (Center for Oceanographic Research in the Eastern South Pacific), Universidad de Concepción. Although most of the Japanese contingent was unfortunately unable to make the meeting due

to the devastating earthquake and tsunami off Honshu just two days before the symposium, almost 300 scientists from 36 countries were in attendance and presented 159 talks and 203 posters, making this event an outstanding success.

- Preparations, arrangements or planning are in progress for several symposia/meetings to be convened in 2012. This includes landmark events such as the 2nd PICES/ICES Conference for Early Career Scientists on “*Oceans of change*” (April 24–27, 2012, Majorca, Spain), and the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea, in conjunction with the Ocean Expo-2012).

IV. Coordinating the publication program of the Organization

PICES publications are a record of the activities and scientific findings of the Organization. A dynamic and balanced publications program is needed for efficient communication with a highly varied audience.

- Publications produced since PICES-2010 include: 3 special issues of primary journals (peer-reviews are completed for 2 more special issues to be published in 2012), 2 reports in the PICES Scientific Report Series, 1 PICES Advisory Report, 2 issues of PICES Press, several Books of Abstracts, announcements and posters, and a special USB with all PICES scientific publications for the period from 1993–2011 (see *Appendix 3* for the complete list).
- Further progress was made in the implementation of the Action Plan resulting from the 2008 PICES Publications Review, especially with respect to establishing a License Agreement with ProQuest Science Journals database to ensure indexing of all PICES publications to the article level.

V. Intensifying the cooperation with other organizations/programs

As many of the scientific and capacity building issues addressed by PICES are not unique to the North Pacific and concern the entire world, it is crucial to expand cooperation with other international scientific organizations and programs of regional and global scale and with regional scientific and monitoring efforts (national and involving several PICES Contracting Parties) in the North Pacific.

- Progress made in the integration and coordination of PICES’ activities with some organizations and programs is reflected in *Appendix 4*.
- Twenty-eight international and regional organizations and programs (see *GC Endnote 5* for the complete list) accepted the invitation to be present as observers at PICES-2011 (compare this number with 32 in 2010, 30 in 2009, and 21 in 2008), and expressed their views on potential areas of collaboration with PICES (including specific proposals for 2012 and beyond) at the meetings of Science Board, Standing Committees and/or their subsidiary bodies. Several organizations and programs had posters on display highlighting their objectives and recent activities.
- The holding of co-sponsored symposia/sessions/workshops/training courses and the creation of joint expert groups were chosen as directions of actual collaboration. Details can be found under *GC Agenda Item 5*.

VI. Coordinating special projects

The staff of the Secretariat was involved in coordinating/leading several special projects:

- The Deputy Executive Secretary, Dr. Skip McKinnell, served as the Lead Author of the report on “*The decline of Fraser River sockeye salmon *Oncorhynchus nerka* (Steller, 1743) in relation to marine ecology*” for the Cohen Commission (see *GC Agenda Item 12* for details). To allow Dr. McKinnell to focus mostly on this project, his duties within the Secretariat were adjusted.
- The Executive Secretary, Dr. Alexander Bychkov, was responsible for the funding management and reporting for the 5-year project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” supported by the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan (see *GC Agenda Item 13* for details), and served as the co-coordinator (with Dr. Sonia Batten, SAHFOS) of a funding consortium to support the North Pacific Continuous Plankton Recorder (NP CPR) survey (see *FA Agenda Item 5* for details).

VI. Administrating the Secretariat

- To increase the capacity of the Secretariat, a funding of ~\$51,000 was secured to support a part-time contract position at the PICES Secretariat. This amount includes a contribution from the Korea Ocean Research and Development Institute (specifically for assisting the Science Board Chairman) and overheads for the 2011 ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” (May 22–26, 2011, Seattle, USA), and PICES projects on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” (funded by the Ministry of Agriculture, Forestry and Fisheries of Japan) and on “*The decline of Fraser River sockeye salmon *Oncorhynchus nerka* (Steller, 1743) in relation to marine ecology*” (funded by the Cohen Commission, Canada).
- The PICES Intern Program, approved in 1999 and commenced in 2000, has been a useful mechanism not only for the professional development of marine scientists and managers from PICES Contracting Parties, but also for increasing the capacity of the PICES Secretariat to support the work of the Organization. From May 2000 to December 2011, 12 scientists from three countries (4 from China, 5 from Korea and 3 from Russia) have worked as interns at the PICES Secretariat. Over the years the Intern Program has been financed solely by voluntary contributions. Since PICES-2010, Fisheries and Oceans Canada (\$10,000), the Ministry of Land, Transport and Maritime Affairs of Korea (\$10,000 US), and the U.S. National Marine Fisheries Service (\$15,000 US) contributed a total of ~\$34,500 to the Trust Fund for the Program. With these contributions, the amount of funds kept for the Intern Program is sufficient to maintain it for about 9 months in 2012. Details can be found under *GC Agenda Item 14*.

Appendix 1: Scientific sessions, workshops and business meetings convened at PICES-2011

Sessions

- ¾-day Science Board Symposium on “*Mechanisms of marine ecosystem reorganization in the North Pacific Ocean*”;
- 1-day BIO Contributed Paper Session;
- 1-day BIO/POC Topic Session on “*Mechanisms of physical-biological coupling forcing biological hotspots*” (co-sponsored by ICES);
- 1-day FIS Contributed Paper Session;
- ½-day FIS Topic Session on “*Population dynamics, trophic interactions and management of cephalopods in the North Pacific ecosystems*”;
- 1-day FIS/POC Topic Session on “*Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species*” (co-sponsored by ICES);
- ½-day MEQ Topic Session on “*Harmful algal blooms in a changing world*”;
- ½-day MEQ/FIS Topic Session on “*Identification and characterization of environmental interactions of marine aquaculture in the North Pacific*”;
- 1-day MEQ/FUTURE Topic Session on “*Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*” (co-sponsored by NOWPAP);
- 1-day POC Contributed Paper Session;
- ½-day POC/FIS Topic Session on “*Linking migratory fish behavior to end-to-end models*” (co-sponsored by ICES);
- 1-day MONITOR/POC/FUTURE Topic Session on “*How well do our models really work and what data do we need to check and improve them?*” (co-sponsored by IMBER).

Workshops

- 1½-day BIO Workshop on “*MEMIP-IV: Quantitative comparison of ecosystem models applied to North Pacific shelf ecosystems—humble pie or glee?*”;
- 1-day MEQ Workshop on “*Remote sensing techniques for HAB detection and monitoring*” (co-sponsored by NOWPAP);
- 1-day MEQ Workshop on “*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*” (co-sponsored by GESAMP, ICES and IOC);
- ¾-day POC/MONITOR/TCODE Workshop on “*Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program*”.

Business meetings

- ¼-day SB meeting (October 16) and 1½-day SB meeting (October 21 afternoon and October 22);
- 1½-hour overture meetings (October 16 evening) and ½-day meetings (October 19 afternoon) of Scientific (BIO, FIS, MEQ and POC) and Technical (MONITOR and TCODE) Committees;
- 1-day meeting of the POC/BIO Section on *Carbon and Climate* (S-CC);
- 1-day meeting of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB);
- 1½-day meeting of the MEQ Working Group on *Non-indigenous Aquatic Species* (WG 21), immediately after a 4-day PICES Rapid Assessment Survey (RAS-2011);
- ½-day meeting of the BIO Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23);
- ½-day meeting of the MEQ/FIS Working Group on *Environmental Interactions of Marine Aquaculture* (WG 24);
- ½-day meeting of the PICES-ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS);
- ½-day meeting of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim* (WG 26);
- 1-day meeting of the POC Working Group on *North Pacific Climate Variability and Change* (WG 27);
- ½-day meeting of the MEQ/BIO Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28);
- ½-day meeting of the BIO Advisory Panel on *Marine Birds and Mammals* (MBM-AP);
- ¼-day meeting of the MONITOR Advisory Panel on the *Continuous Plankton Recorder Survey in the North Pacific* (CPR-AP);
- ¼-day meeting of the POC/MONITOR Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas* (CREAMS-AP);
- ½-day concurrent meetings of the FUTURE Advisory Panels on *Anthropogenic Influences on Coastal Ecosystems* (AICE-AP), *Climate, Oceanographic Variability and Ecosystems* (COVE-AP) and *Status, Outlooks, Forecasts, and Engagement* (SOFE-AP);
- ½-day joint meeting of AICE-AP, COVE-AP and SOFE-AP.

Appendix 2: Inter-sessional symposia/workshops/meetings organized/sponsored after PICES-2010Symposia

- 5th International Zooplankton Production Symposium on “*Population connections, community dynamics and climate variability*” (primary sponsors: PICES, ICES and COPAS), March 14–18, 2011, Pucón, Chile;
- 2nd ESSAS (Ecosystem Studies of Sub-Arctic Seas) Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” (logistical and organizational support and travel support for early career scientists by PICES), May 22–26, 2011, Seattle, U.S.A.;
- 7th International Conference on Marine Bioinvasions (co-sponsored by PICES), August 23–25, 2011, Barcelona, Spain;
- 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (primary international sponsors: PICES, ICES and IOC), May 14–20, 2012, Yeosu, Korea.

Joint Theme Sessions at the 2011 ICES Annual Science Conference (September 19–23, 2011, Gdansk, Poland)

- *Atmospheric forcing of Northern hemisphere ocean gyres and their subsequent impact on the adjacent marine climate and ecosystems*, with Emanuele Di Lorenzo (U.S.A.) and Ichiro Yasuda (Japan) serving as PICES co-convenors;
- *Atlantic redfish and Pacific rockfish: comparing biology, ecology, assessment and management strategies for *Sebastes* spp.*, with Paul Spencer (U.S.A.) serving as a PICES co-convenor;
- *Recruitment processes: Early life history dynamics – from eggs to juveniles*, with Richard Brodeur (U.S.A.) serving as a PICES co-convenor.

Workshops and meetings

- FUTURE Workshop on “*Indicators of status and change within North Pacific marine ecosystems*”, April 26–28, 2011, Honolulu, U.S.A.;
- Inter-sessional Science Board meeting (ISB-2011), April 29–30, 2011, Honolulu, U.S.A.;
- Meeting of the PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in*

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- Northern Hemisphere Marine Science*, April 29, 2011, Honolulu, U.S.A., in conjunction with ISB-2011;
- Meeting of the Study Group on *Updating the PICES Strategic Plan*, May 1, 2011, Honolulu, U.S.A.;
 - ICES/PICES workshop on “*Reaction of northern hemisphere ecosystems to climate events: A comparison*”, May 2–6, 2011, Hamburg, Germany, with Sukgeun Jung (Korea) and Yoshiro Watanabe (Japan) serving as PICES co-convenors;
 - ICES/PICES workshop on “*Biological consequences of a decrease in sea ice in Arctic and sub-Arctic Seas*”, May 22, 2011, Seattle, U.S.A., in conjunction with the 2nd ESSAS Open Science Meeting, with Anne Hollowed (U.S.A.) serving as a PICES co-convenor;
 - Workshop on “*Comparative analyses of marine bird and mammal responses to climate change*”, May 22, 2011, Seattle, U.S.A., in conjunction with the 2nd ESSAS Open Science Meeting;
 - Meetings of the PICES-ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WGFCCIFS), in conjunction with the 2nd ESSAS Open Science Meeting and the 2011 ICES Annual Science Conference;
 - 45th CMOS (Canadian Meteorological and Oceanographic Society) Congress on “*Ocean, atmosphere and the changing Pacific*”, June 6–9, 2011, Victoria, Canada, with Shin-ichi Ito (Japan) serving as a PICES invited speaker;
 - International workshop on “*Development and application of Regional Climate Models*”, October 11–12, 2011, Seoul, Korea;
 - 2011 Rapid Assessment Survey for marine non-indigenous species, October 9–12, 2011, Vladivostok, Russia;
 - International NPAFC-led workshop on “*Explanations for the high abundance of pink and chum salmon and future trends*” (co-sponsored by PICES), October 30–31, 2011, Nanaimo, Canada, with Sanae Chiba (Japan) and William Crawford (Canada) serving as PICES members of the Scientific Steering Committee.

Capacity development events

- PICES/MAFF Demonstration Workshop for developing countries on “*Rapid assessment survey methodologies for detecting marine non-indigenous species*” July 19–21, 2011, Phuket, Thailand;
- 5th SOLAS Summer School (co-sponsored by PICES), August 29–September 10, 2011, Corsica, France;
- NOWPAP/PICES/WESTPAC training course on “*Remote sensing data analysis*”, October 8–12, 2011, Vladivostok, Russia;
- 2nd ICES/PICES Early Career Scientists Conference on “*Oceans of change*”, April 24–27, 2012, Majorca, Spain.

Appendix 3: PICES publications since PICES-2010

Primary journals

- Special issue of *ICES Journal of Marine Science* (Vol. 67, Issue 9, pp. 1825–2052) based on papers from the ICES/PICES/UNCOVER Symposium on “*Rebuilding depleted fish stocks: Biology, ecology, social science, and management strategies*” (Guest Editor: N. Daan; Convenors: C. Hammer, O.S. Kjesbu, G.H. Kruse, and P.A. Shelton) was published in December 2010 and includes the introduction, keynote and 26 papers co-authored by scientists from the EU, Canada, Russia and U.S.A.;
- Special issue of *ICES Journal of Marine Science* (Vol. 68, Issue 6, pp. 983–1383) based on selected papers presented at the 2010 PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries*” (Guest Editors: A.B. Hollowed, S.I. Ito, S. Kim, H. Loeng, and M. Peck) was published in July 2011 and includes the preface and 35 papers co-authored by scientists from around the globe;
- Special issue of *Fisheries Research* (Vol. 122, Issue 3, pp. 105–188) based on selected papers from the PICES-2009 Topic Session on “*Ecosystem-based approaches for the assessment of fisheries under data-limited situations*” (Guest Editors: P. Livingston, G. Kruse and L. Richards) was published in December 2011, and includes the preface and 8 papers co-authored by scientists from FAO, Japan, Korea and U.S.A.;
- Special issue of *ICES Journal of Marine Science* based on selected papers from the 2011 Zooplankton Production Symposium (Guest Editors: J. Keister, C. Johnson, D. Mackas, S. Chiba and D. Bonnet) is expected to be published by May 2012;
- Special issue of *Aquaculture Economics and Management* based on selected papers from the PICES-2010 Topic Session on “*Economic relation between marine aquaculture and wild capture fisheries*” (Guest Editors: M. Pang and P. Leung) is expected to be published in spring 2012.

PICES Scientific Report series

- Makino M. and Fluharty, D. (Eds.). Final report of the Study Group on *Human Dimensions* (PICES Sci. Rep. No. 39), December 2011;
- Foreman, M. and Yamanaka, Y. (Eds.). Final report of the Working Group 20 on *Evaluations of Climate Change Projections* (PICES Sci. Rep. No. 40), December 2011.

Special Publication

- McKinnell, S.M., Curchitser, E., Groot, C., Kaeriyama, M., and Myers, K.W. PICES Advisory Report on “*The decline of Fraser River sockeye salmon *Oncorhynchus nerka* (Steller, 1743) in relation to marine ecology*” was published in February 2011 as Technical Report No. 4 on the Cohen Commission website at <http://www.cohencommission.ca/en/TechnicalReports.php>;

PICES Press – newsletter

- Two regular issues: Vol. 19, No. 1 (winter 2011) and Vol. 19, No. 2 (summer 2011) were published in February and July 2011, respectively.

Other publications

- Book of Abstracts for the 5th International Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*” (March 14–18, 2011, Pucón, Chile);
- Book of Abstracts for the 2011 ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” (May 22–26, 2011, Seattle, U.S.A.);
- Announcement, poster and Book of Abstracts for PICES-2011 (October 14–23, 2011, Khabarovsk, Russia);
- Announcement and poster for the 2012 International Symposium on “*Effects of climate change on the world’s oceans*” (May 15–19, 2012, Yeosu, Korea).

Special USB

- A USB drive with PICES Scientific Publications from 1993–2011 was published in October 2011, and included in the PICES-2011 registration package.

Appendix 4: Relations with international scientific organizations and programsAsia-Pacific Fishery Commission (APFIC)

In 2010–2011, contacts were initiated between PICES and APFIC.

- PICES was represented as an observer at the Third Regional Consultative Forum (RCFM) of APFIC held September 1–4, 2010, in Jeju, Korea. Dr. Mitsutaku Makino, Chairman of the PICES Study Group on *Human Dimensions*, gave a presentation focused on human dimensions on the ecosystem approach, and Dr. Suam Kim, Co-Chairman of the joint PICES/ICES Working Group on *Forecasting Climate Change Impact on Fish and Shellfish* introduced activities of this Working Group to South Pacific colleagues.
- Dr. Simon Funge-Smith, Secretary Asia-Pacific Fishery Commission (APFIC), was present as an observer at PICES-2011.

Ecosystem Studies of Sub-Arctic Seas (ESSAS)

PICES and ESSAS (a regional program initiated by GLOBEC in 2005 and placed under IMBER in 2009) share the goal of using a comparative approach in developing predictions of how climate variability and change affect, and will affect, the sustainability of goods and services obtained from Sub-Arctic seas.

- PICES provided organizational support (this included: maintaining the meeting website, handling major finances, on-line registration and abstract submission, compiling the book of abstracts, and arranging the logistics for the venue) for the 2nd ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” (May 22–26, 2011, Seattle, U.S.A.). The meeting was attended by 195 scientists from 13 countries, and showcased the progress made in understanding the role of climate variability and change on the ecosystem structure and function within Sub-Arctic seas. A brief summary of the meeting was published in the summer 2011 issue of PICES Press (http://www.pices.int/publications/pices_press/volume19/v19_n2/pp_9-13_ESSAS_OSM.pdf).
- Two PICES expert groups convened workshops at the 2nd ESSAS Open Science Meeting: The PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* organized a 1-day workshop on “*Biological consequences of a decrease in sea ice in Arctic and Sub-Arctic seas*”; and the

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PICES Advisory Panel on *Marine Birds and Mammals* held a ½-day workshop on “*Comparative analyses of marine bird and mammal responses to climate change*”, which focused on how to best integrate ongoing and new research on marine birds and mammals into long-term PICES and ESSAS programs and objectives.

- The goal of the Marine Ecosystem Model Inter-comparison Project (MEMIP), initiated by PICES and ESSAS in 2008, is to compare the performance of various lower trophic level marine ecosystem simulation models in predicting the abundance and distribution of coastal zooplankton functional groups. A series of joint MEMIP workshops has been organized in conjunction with PICES Annual Meetings since 2008. The workshop, titled “*MEMIP-IV: Quantitative comparison of ecosystem models applied to North Pacific shelf ecosystems—humble pie or glee?*”, was held at PICES-2011.
- ESSAS was present as an observer at PICES-2011 and submitted a proposal for a joint PICES/ESSAS workshop on “*Arctic–sub-Arctic interactions*” to be held at PICES-2012.

Exxon Valdez Oil Spill Trustee Council (EVOSTC)

- EVOSTC joined a funding consortium to support the North Pacific Continuous Plankton Recorder (NP CPR) survey in 2010, and approved a grant for PICES in the amount of \$188,600 US for operations of the NP CPR project in 2010–2013 (project on “*Measuring Inter-annual Variability in the Herring’s Forage Base from the Gulf of Alaska*”), with the amount of \$58,300 US for 2011.

Food and Agriculture Organization of UN (FAO)

- FAO joined PICES and ICES as major international sponsors for the International Symposium on “*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” (April 25–29, 2010, Sendai, Japan).
- FAO agreed to co-sponsor the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea).

Global Ecology and Oceanography of Harmful Algal Blooms Program (GEOHAB)

PICES communicates with various international HAB programs, including GEOHAB, through the Section on *Ecology of Harmful Algal Blooms in the North Pacific* (HAB-S) established in 2003.

- Since 2005, a series of workshops has been conducted at PICES Annual Meetings to: (1) document the existing knowledge on the eco-physiology of HAB species that impact all, or most, countries in the North Pacific, and (2) review techniques for monitoring HAB species and the environmental factors associated with their occurrence. Dr. Raphael Kudela, GEOHAB SSC Chairman, was an invited speaker for the PICES-2011 on “*Remote sensing techniques for HAB detection and monitoring*”. He also served as a lecturer at the NOWPAP/PICES/WESTPAC training course on “*Remote sensing data analysis*” (October 8–12, 2011, Vladivostok, Russia).

Global Ocean Ecosystem Dynamics project (GLOBEC)

The PICES Climate Change and Carrying Capacity (CCCC) Program provided a mechanism for integrating national GLOBEC or GLOBEC-like research programs in the North Pacific and was a regional component of the international GLOBEC effort.

- Results from the CCCC Program were included in several chapters of the GLOBEC Synthesis Book on “*Marine Ecosystems and Global Change*” published in 2010. A special issue of *Progress in Oceanography* resulted from the PICES/GLOBEC Symposium on “*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*” (April 19–21, 2006, Honolulu, U.S.A.) and published in June 2008 (Vol. 77, Nos. 2–3, pp. 83–268; Guest Editors: H. Batchelder and S. Kim) is also considered as a part of GLOBEC’s synthesis effort.
- GLOBEC co-sponsored the PICES/ICES Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*” (March 14–18, 2011, Pucón, Chile) by providing travel support for early career scientists.

Global Ocean Observing System (GOOS)

- Dr. David Checkley represented PICES on a post-OceanObs’09 Task Team charged with developing a framework for planning and moving forward with an enhanced global sustained ocean observing system over the next decade. This framework is meant to help guide the many different global and regional organizations with a stake in an ocean observing system to work together in a voluntary collaborative way

for mutual gain. A Framework for Ocean Observing (FOO) developed by the Task Team was presented and discussed at the PICES-2011.

- GOOS agreed to co-sponsor the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea).

Group of Experts on Scientific Aspects of Marine Pollution (GESAMP)

- GESAMP co-sponsored, by supporting an additional convenor/speaker, the PICES-2011 workshop on “*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*”.

Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)

Issues in marine biogeochemistry and food webs are important components of the new integrative scientific program of PICES on *Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Ecosystems* (FUTURE).

- PICES and IMBER have convened joint Topic Sessions at every PICES Annual Meeting since 2008 (IMBER has provided travel funds for an additional invited speaker for each session):
 - “*End-to-end foodwebs: Impacts of a changing ocean*” (PICES-2008, Dalian, China);
 - “*Outlooks and forecasts of marine ecosystems from an earth system science perspective: Challenges and opportunities*” (PICES-2009, Jeju, Korea);
 - “*Anthropogenic forcing in North Pacific coastal ecosystems: Understanding changes in ecosystem structure and function*” (PICES-2010, Portland, U.S.A.);
 - “*How well do our models really work and what data do we need to check and improve them?*” (PICES-2011, Khabarovsk, Russia).
- PICES co-sponsored the IMBER-led Summer School on “*ClimECO2: Oceans, marine ecosystems, and society facing climate change - A multidisciplinary approach*” (August 23–27, 2010, Brest, France) by providing travel funds and arranging additional support (through national programs/agencies) for 9 early career scientists from all PICES member countries (1 from Canada, 1 from Japan, 2 from Korea, 2 from China, 1 from Russia, and 2 from U.S.A.).
- PICES co-sponsored the 2010 IMBER IMBIZO Conference on “*Integrating biogeochemistry and ecosystems in a changing ocean: Regional comparisons*” (October 10–14, 2010, Crete, Greece) by providing travel support for 3 invited speakers from the North Pacific.
- IMBER agreed to co-sponsor the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea) by providing travel support for invited speakers of the workshop on “*Effects of climate change on advective fluxes in high latitude regions*”.
- IMBER was present as an observer at PICES-2011 and submitted a proposal for PICES to co-sponsor a IMBER-led international ClimECO3 Summer School on “*A view towards Earth System models: Human-natural system interactions in the marine world*” to be held on July 23–28, in Ankara, Turkey.

Intergovernmental Oceanographic Commission of UNESCO (IOC)

- IOC co-sponsored the 5th International Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*” (March 14–18, 2011, Pucón, Chile) by providing travel support for scientists from countries with “economy in transition”.
- IOC and PICES are working together (with ICES as another major international sponsor) to organize the second International Symposium on “*Effects of climate change on the world’s oceans*” to be held May 14–20, 2012, in conjunction with the Ocean Expo in Yeosu, Korea.
- IOC co-sponsored, by supporting an additional convenor/speaker, the PICES-2011 workshop on “*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*”.
- In June 2005, PICES joined the IOC-led **Harmful Algal Event Database** (HAE-DAT), a partnership in systematically compiling, storing, and presenting on-line records on harmful algal events. Building a common data resource allows inter-comparison of HAB species composition and the magnitude of their environmental and economic impacts. Discussion on this joint project proceeds at each PICES Annual Meeting.
- PICES has partnered with IOC to implement the project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” supported by the Japanese Ministry of Agriculture, Forestry and Fisheries. The IOC network is used to determine countries which have the greatest need and a strong interest in improving HAB monitoring and testing, and a commitment to sustainability.
- IOC is normally present as an observer at PICES Annual Meetings.

International Council for the Exploration of the Sea (ICES)

The two major international marine science organizations in the Northern Hemisphere, ICES and PICES, are focused on different oceans but have many scientific issues in common. An MOU between the two organizations was signed in 1998. In the past 10 years, there have been significant increases in reciprocal exchanges, cooperative sponsorships of scientific meetings and projects.

- PICES and ICES served as major international sponsors for the 5th International Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*” (March 14–18, 2011, Pucón, Chile).
- PICES and ICES are working together to organize the 2nd ICES/PICES Early Career Scientists Conference on “*Oceans of change*” (April 24–27, 2012, Majorca, Spain), 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea) and International Symposium on “*Forage fish interactions: Creating the tools for ecosystem based management of marine resources*” (November 8–12, 2012, Nantes, France).
- PICES and ICES were both involved in co-sponsoring the 26th Lowell Wakefield Symposium on “*Ecosystems 2010: Global progress on ecosystem-based fisheries management*” (November 8–11, 2010, Anchorage, U.S.A.), and the 2nd ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” (May 22–26, 2011, Seattle, U.S.A.).
- ICES scientists were actively involved in the FUTURE Workshop on “*Indicators of status and change within North Pacific marine ecosystems*” (April 26–28, 2011, Honolulu, U.S.A.).
- Three joint inter-sessional workshops were organized in 2011: on “*Reaction of northern hemisphere ecosystems to climate events: A comparison*” (May 2–6, 2011, Hamburg, Germany), “*Biological consequences of a decrease in sea ice in Arctic and sub-Arctic Seas*” (May 22, 2011, Seattle, U.S.A.) and “*Development and application of Regional Climate Models*” (October 11–12, 2011, Seoul, Korea).
- Three joint Theme Sessions (“*Atmospheric forcing of Northern hemisphere ocean gyres and their subsequent impact on the adjacent marine climate and ecosystems*”, “*Atlantic redfish and Pacific rockfish: Comparing biology, ecology, assessment and management strategies for *Sebastes* spp*” and “*Recruitment processes: Early life history dynamics – from eggs to juveniles*”) were convened at the 2011 ICES Annual Science Conference (September 19–23, 2011, Gdansk, Poland).
- Three joint Topic Sessions (“*Mechanisms of physical-biological coupling forcing biological “hotspots”*”, “*Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species*” and “*Linking migratory fish behavior to end-to-end models*”) and the workshop (“*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*”) were convened at PICES-2011.
- In 2008, PICES and ICES established a joint Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish*. This Working Group will meet three times during 2011: in conjunction with the 2nd ESSAS Open Science Meeting in May (Seattle, U.S.A.), at the 2011 ICES Annual Science Conference in September (Gdansk, Poland), and at PICES-2011 in October (Khabarovsk, Russia).
- In 2009, PICES and ICES established a joint Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* to develop a formal framework to serve as the basis for linkages of science plans and longer-term strategic planning for the two organizations. The Study Group met in conjunction with the 2011 inter-sessional Science Board meeting (April 29, 2011, Honolulu, U.S.A.) and submitted the final report for consideration by the ICES SCICOM and the PICES Science Board.
- Drs. Mark Wells and Charles Trick, members of the Section on *Ecology of Harmful Algal Blooms*, represented PICES at the 2011 meeting of ICES WG on *Harmful Algal Bloom Dynamics* (April 5–8, 2011, Gothenberg, Germany).
- Two special issues of *ICES Journal of Marine Science* (IJMS) were published based on papers presented at joint symposia: the ICES/PICES/UNCOVER Symposium on “*Rebuilding depleted fish stocks: Biology, ecology, social science, and management strategies*” (December 2010, Vol. 67, Issue 9, pp. 1825–2052) and the 2010 PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries*” (July 2011, Vol. 68, Issue 6, pp. 983–1383).
- Drs. Manuel Barange (Chairman of the ICES SCICOM) and Adolf Kellermann (Head of the ICES Science Programme) participated in the 2011 inter-sessional Science Board meeting.

- ICES is normally represented as an observer at PICES Annual Meetings by the Head of the ICES Science Programme.

North Pacific Anadromous Fish Commission (NPAFC)

In 1998, NPAFC and PICES signed a Memorandum of Understanding (MOU), and scientists involved in the two organizations have been working together on problems of mutual interest for more than a decade, with a good record of joint activities.

- NPAFC co-sponsored the PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” (April 25–29, 2010, Sendai, Japan), and convened a workshop on “*Salmon workshop on climate change*” in conjunction with this symposium.
- PICES agreed to co-sponsor the NPAFC-led workshop on “*Production trends of pink and chum salmon: Why they can retain high abundance?*” to be held October 30–31, 2011, in Nanaimo, Canada. Drs. Sanae Chiba (Japan) and William Crawford (Canada) represented PICES on the Scientific Steering Committee.
- NPAFC agreed to co-sponsor the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea).
- NPAFC is normally represented as an observer at PICES Annual Meetings by the Chairman of the Committee on Scientific Research and Statistics (CSRS).

North Pacific Research Board (NPRB)

- NPRB joined the consortium to support the North Pacific Continuous Plankton Recorder (NP CPR) survey in 2009 and committed support for operations of the project at the level of \$50,000 US per year for 5 years (project #903 from June 1, 2009 to May 31, 2010; and project #1001 from June 1, 2010 to May 31, 2014).
- NPRB provided financial support for the 2010 PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” (\$30,000 US), 5th International Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*” (\$4,000 US), and 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (\$30,000 US).
- NPRB is normally represented as an observer at PICES Annual Meetings by the Executive Director.

Northwest Pacific Action Plan (NOWPAP)

NOWPAP’s focus on monitoring and assessment of environmental (anthropogenic) problems combined with the broad scientific mandate of PICES provides the two regional organizations with good potential for cooperation.

- NOWPAP was the very first international organization requested the *ex-officio* membership in PICES—Dr. Takafumi Yoshida (CEARAC) was appointed as an *ex-officio* member of the PICES Section on *Ecology of Harmful Algal Blooms in the North Pacific*.
- PICES and NOWPAP worked together (with IOC/WESTPAC as another partner) in organizing a training course on “*Remote sensing data analysis*” to be held October 8–12, 2011, Vladivostok, Russia.
- NOWPAP co-sponsored, by covering travel of additional invited speakers, the PICES-2011 Topic Session on “*Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*” and workshop on “*Remote sensing techniques for HAB detection and monitoring*”.

Scientific Committee on Oceanic Research (SCOR)

Continuing and extending collaboration between the two organizations is based on the recognition that PICES can play an important role in bringing a North Pacific perspective to the global activities of SCOR, and that by participating in these activities, PICES can advance its own scientific agenda. PICES contributes to SCOR-sponsored international large-scale ocean research projects (see GEOHAB, GLOBEC, IMBER, SOLAS), to ocean carbon activities supported by SCOR, and to several SCOR Working Groups.

- PICES appointed a liaison, Dr. George Boehlert (U.S. national delegate), to the SCOR Committee on Capacity Building, who attended the SCOR-led conference on “*Developing a global strategy for capacity building in the ocean sciences*” (August 16–18, 2010, Bremen, Germany), and the 2011 meeting of the SCOR Committee on Capacity Building (April 19–21, 2011, Izmir, Turkey).
- PICES joined a group of organizations (SCOR, POGO, IOC-UNESCO) that sponsor capacity development activities related to ocean science in providing information for a portal recently launched and maintained by the International Oceanographic Data and Information Exchange (IODE) of IOC, a single site where students and early career scientists can go to find out what is available (www.oceansummerschools.org).

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- SCOR continues to provide travel support for scientists from countries with “economies in transition” to attend SCOR-relevant sessions/workshops at PICES Annual Meetings and international symposia led/co-organized by PICES. In 2010–2011, \$5,000 US grants from the SCOR/NSF fund were provided for each of the following events: (1) PICES/ICES/FAO symposium on “*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” (April 25–29, 2010, Sendai, Japan), PICES-2010 (October 22–31, 2010, Portland, U.S.A.) and PICES-2011 (October 14–23, 2011, in Khabarovsk, Russia).
- PICES was actively involved in activities of SCOR WG 125 on *Global Comparisons of Zooplankton Time Series* and funded an associate member from the North Pacific (Dr. Harold Batchelder, Oregon State University, U.S.A.). In 2005–2008, this group carried out a variety of comparisons among many of the earlier and longer time series, and developed and applied new visualization and statistical tools. As a follow-up of this activity, a workshop on “*Updates and comparisons of zooplankton time series*” was held at the 5th International Zooplankton Production Symposium (March 14–18, 2011, Pucón, Chile). The workshop was intended to provide updates on recent progress, and also to develop new research directions, tools, and comparisons for the future. The workshop summary is published in the 2011 summer issue of PICES Press (www.pices.int/publications/pices_press/volume19/v19_n2/pp_25-27_ZPS_wsh-3.pdf).
- There are many phytoplankton data sets from diverse parts of the globe that warrant a comparative examination. PICES supported the establishment of SCOR WG 137 on *Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of Time-Series Observations* that was seen as a logical methodological continuation of SCOR WG 125, and appointed an associate member from the North Pacific (Dr. Sinjae Yoo, KORDI, Korea) to participate in its activities.
- The International Ocean Carbon Coordinated Project (IOCCP), co-sponsored by SCOR and IOC-UNESCO, promotes the development of a global network of ocean carbon observations for research through technical communication and communications services, international agreements on standards and methods, and advocacy and links to global observing systems. This should lead to the joint development of global data products and synthesis activities documenting the ocean carbon cycle. PICES, through its earlier Working Groups, and now through the Section on *Carbon and Climate* (CC-S; 2006–present), has been long acting as a regional coordinator for these activities. CC-S provides a channel of communication to IOCCP. IOCCP is normally represented as an observer at PICES Annual Meetings. Dr. Christopher Sabine (IOCCP SSC Chairman and CC-S member) serves as a liaison between these two groups.

Surface Ocean-Lower Atmosphere Study (SOLAS)

- The main areas for cooperation between PICES and SOLAS include:
 - the impact of iron on biogeochemistry and marine ecosystems [PICES Advisory Panel on *Iron Fertilization Experiment in the Subarctic Pacific Ocean* (1999–2007) and WG 22 on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (2007–2010) and SOLAS Implementation Group 1 on *Biogeochemical Interactions and Feedbacks between Ocean and Atmosphere*];
 - carbon cycle research studies [PICES WG 13 on *CO₂ in the North Pacific* (1998–2001), WG 17 on *Biogeochemical Data Integration and Synthesis* (2002–2005), and Section on *Carbon and Climate* (2006–present), and SOLAS Implementation Group 3 on *Air-Sea Flux of CO₂ and Other Long-Lived Radiatively-Active Gases*].
- Since 2006, several joint PICES/SOLAS workshops and Topic Sessions have been convened at PICES Annual Meetings (SOLAS provided travel funds for an additional invited speaker for each event):
 - “*Modeling iron biogeochemistry and ocean ecosystems*” (workshop at PICES-2006, Yokohama, Japan);
 - “*Natural supplies of iron to the North Pacific and linkages between iron supply and ecosystem responses*” (workshop at PICES-2009, Jeju, Korea);
 - “*Understanding the role of iron in regulating biogeochemical cycles and ecosystem structures in the North Pacific Ocean*” (session at PICES-2010, Portland, U.S.A.).
- PICES co-sponsored the 5th SOLAS Summer School (August 29–September 10, 2011, Cargèse, Corsica, France) by providing travel funds for 3 students/early career scientists from PICES member countries (Canada, PR China and U.S.A.).
- SOLAS is normally present as an observer at PICES Annual Meetings.

GC Endnote 5**List of organizations and programs present as observers at PICES-2011**

Alaska Ocean Observing System (AOOS)	Dr. Phillip Mundy
Asia-Pacific Fisheries Commission (APFIC)	Dr. Simon Funge-Smith
Bering Sea Ecosystem Study (BEST/BSIERP)	Dr. Gordon Kruse
Coastal and Estuarine Research Federation (CERF)	Dr. Steven Rumrill
Climate Variability and Predictability Program (CLIVAR)	Dr. Enrique Curchitser
Ecosystem Study of Sub-Arctic Seas (ESSAS)	Dr. George Hunt, Jr
Food and Agriculture Organization (FAO)	Dr. Simon Funge-Smith
Group of Experts on Scientific Aspects of Marine Pollution (GESAMP)	Dr. Peter Kershaw
Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB)	Dr. Raphael Kudela
Global Ocean Observing System (GOOS)	Dr. David Checkley
IOC Sub Committee for the Western Pacific (WESTPAC)	Dr. Suchana Chavanich
Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)	Dr. Sinjae Yoo
International Council for the Exploration of the Sea (ICES)	Dr. Adolf Kellermann
International Program for Deployment of Profiling Floats (Argo)	Dr. Howard Freeland
International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC)	Dr. Chi-Lu Sun
International Study of Marine Biogeochemical Cycles of Trace Elements and their Isotopes (GEOTRACERS)	Dr. Minhan Dai
International Whaling Commission (IWC)	Dr. Hidehiro Kato
North East Asian Regional GOOS (NEAR-GOOS)	Dr. Hee-Dong Jeong
North Pacific Anadromous Fish Commission (NPAFC)	Dr. Jin Yeong Kim
North Pacific Fishery Management Council (NPFMC)	Ms. Patricia Livingston
North Pacific Research Board (NPRB)	Dr. Cynthia Suchman
Northwest Association of Networked Ocean Observing Systems (NANOOS)	Dr. Jack Barth
Northwest Pacific Action Plan (NOWPAP)	Dr. Sangjin Lee
	Dr. Alexander Tkalin
Pacific Coast Ocean Observing System (PaCOOS)	Dr. Rosa Runcie
Sir Alister Hardy Foundation for Ocean Science (SAHFOS)	Dr. Sonia Batten
Southern California Coastal Ocean Observing System (SCCOOS)	Dr. Tony Koslow
Surface Ocean Low Atmosphere Study (SOLAS)	Dr. Minhan Dai
Yellow Sea Large Marine Ecosystem Project (YSLME)	Dr. Sinjae Yoo

GC Endnote 6**2011 Standing List of International and Regional Organizations and Programs**

* – priority for interaction

ACIA	Arctic Climate Impact Assessment Program (ACIA of AMAP)
AFSCAR	American Fisheries Society Program on Climate and Aquatic Resources
AMAP	Arctic Monitoring and Assessment Program
AOOS*	Alaska Ocean Observing System
APEC-MRC*	Marine Resources Conservation Working Group, Asia Pacific Economic Cooperation
APEC-FWG*	Fisheries Working Group, Asia Pacific Economic Cooperation
APFIC	Asia-Pacific Fisheries Commission
Argo*	International Program for deployment of profiling floats
BEST-BSIERP*	Bering Sea Ecosystem Study
CeNCOOS	Central and Northern California Ocean Observing System
CERF	Coastal and Estuarine Research Federation
CLIVAR*	Climate Variability and Predictability Program
ESSAS*	Ecosystem Studies of Sub-Arctic Seas
EVOSTC	<i>Exxon Valdez</i> Oilspill Trustee Council

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FAO	Food and Agriculture Organization
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GOOS*	Global Ocean Observing System
IAMSLIC	International Association of Marine Science Libraries
IASC	International Arctic Science Committee
IATTC	Inter-American Tropical Tuna Commission
ICES*	International Council for the Exploration of the Sea
IGBP*	International Geosphere-Biosphere Program
IHDP	International Human Dimensions Programme on Global Environmental Change
IMBER*	Integrated Marine Biogeochemistry and Ecosystems Research
IMO	International Maritime Organization
IOC*	Intergovernmental Oceanographic Commission
IOCCP*	International Ocean Carbon Coordinated Project
IODE	International Oceanographic Data and Information Exchange
IPCC*	Intergovernmental Panel on Climate Change
IPHC	International Pacific Halibut Commission
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
IWC	International Whaling Commission
NAFO	Northwest Atlantic Fisheries Organization
NANOOS	Northwest Association of Networked Ocean Observing Systems System
NASCO	North Atlantic Salmon Conservation Organization
NEAR-GOOS*	North East Asian Regional GOOS
NOWPAP*	Northwest Pacific Action Plan
NPAFC*	North Pacific Anadromous Fish Commission
NPFMC	North Pacific Fishery Management Council
NPRB*	North Pacific Research Board
PaCOOS*	Pacific Coast Observing System
PAG	Pacific Arctic Group
POGO	Partnership for Observing the Global Oceans
PSA	Pacific Science Association
PSC	Pacific Salmon Commission
PSG	Pacific Seabird Group
SAHFOS*	Sir Alister Hardy Foundation for Ocean Science
SAON	Sustaining Arctic Observing Networks
SCCOOS	Southern California Coastal Ocean Observing System
SCOPE	Scientific Committee on Problems of the Environment
SCOR*	Scientific Committee on Oceanic Research
SOLAS*	Surface Ocean Low Atmosphere Study
SPC	South Pacific Commission
SPREP	South Pacific Regional Environmental Program
START	South Asian Regional Committee for the System for Analysis, Research and Training
UNEP	United Nations Environment Program
WCPFC	Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean
WCRP	World Climate Research Programme
WESTPAC*	Cooperative Study of the Western Pacific, IOC Sub Committee for the Western Pacific
WPFMC	Western Pacific Fishery Management Council

GC Endnote 7**PICES Strategic Plan (approved October 22, 2011)**

The Nations surrounding the North Pacific Ocean depend on its waters for food, economic benefit, transportation, and recreation. The coastal areas support human habitation. Human activities both influence and are influenced by the North Pacific Ocean's living marine resources, and the abundance and productivity of these resources are also driven by natural processes and variability. Effective resource management by each Contracting Party requires comprehensive scientific understanding, including for example, the role of the ocean in climate variability and change. Furthermore, human populations residing in coastal regions are growing, and sustainable use of marine resources and the associated food security concern is a global priority. The potential for disrupting the marine ecosystems is increasing, but mitigation and effective use is possible with sufficient information on the effects of human activities. The North Pacific Marine Science Organization (PICES) has a role to advance scientific knowledge on the North Pacific Ocean, along with its marginal seas, and to make predictions that will improve human conditions and bring benefits to the Contracting Parties. Such a goal can only be achieved by multi-national scientific cooperation. PICES synthesizes and disseminates knowledge and designs multi-national research programs that respond to identified needs.

The PICES Mission

The Organization was created to:

- promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned and of its living resources, including but not necessarily limited to research with respect to the ocean environment and its interactions with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna and ecosystems, its uses and resources, and impacts upon it from human activities; and
- promote the collection and exchange of information and data related to marine scientific research in the area concerned.

The Organization will:

- Provide leadership on scientific issues and identify research priorities and appropriate approaches for their solution;
- Plan, coordinate and implement integrated, inter-disciplinary research programs and related activities to be undertaken through the national efforts of the participating partners;
- Promote the collection and exchange of data and information related to marine scientific research;
- Assess ecosystem status and trends and project future changes;
- Synthesize scientific information and make it available to a broad user community and the public;
- Respond to requests from the Contracting Parties and other organizations to provide advice on scientific issues;
- Develop capacity within the scientific communities of the Contracting Parties;
- Foster partnerships with other organizations and programs that share a common interest.

The PICES Strategy

To implement this mission, PICES has developed a strategy built upon five central themes: (A) Advance scientific knowledge; (B) Apply scientific knowledge; (C) Foster partnerships; (D) Develop capacity, and (E) Ensure a progressive organization. Specific goals are identified within each of these themes as explained below.

Theme A: Advance scientific knowledge**Goal 1: *Understand the functioning, resilience, and vulnerability of marine ecosystems***

PICES scientific activities are dedicated to understanding and quantifying the physical, chemical and biological processes of North Pacific ecosystems, which underlie ecosystem resilience and vulnerability. These processes are also key to understanding how the oceans respond to and are affected by climate change.

Goal 2: *Understand and quantify how marine ecosystems respond to human activities and natural forcing*

Being a part of the ecosystem, humans are affected by natural processes, and in turn impact marine ecosystems. This goal addresses ecosystem effects of climate variability and change, catastrophic events, and anthropogenic stressors in coastal and offshore regions.

Theme B: Apply scientific knowledge

Goal 3: *Provide scientific advice pertinent to North Pacific ecosystems*

For the scientific knowledge to be applied, it first must be made available. PICES provides periodic products on the status, trends and future state of North Pacific ecosystems and develops reports addressing critical and emerging issues. PICES also considers and responds to specific requests for scientific advice from Contracting Parties and other organizations as appropriate. This information provides a basis for user communities to modify their actions.

Goal 4: *Ensure that PICES products are relevant, timely, and broadly accessible*

PICES communicates the results of its scientific activities broadly, through high quality publications, the PICES web page and other electronic media, and production and dissemination of educational materials.

Theme C: Foster partnerships

Goal 5: *Collaborate with organizations and scientific programs relevant to PICES*

Collaboration and communication lies at the heart of creating scientific knowledge and using it effectively. PICES develops close relationships with scientific organizations and programs that have shared goals, by carrying out joint activities and exchanging observers.

Goal 6: *Strengthen communication and engagement with users of PICES scientific products*

For scientific products to be useful, PICES engages user communities from the early stage of the product development through dissemination of the final product.

Theme D: Develop capacity

Goal 7: *Advance methods and tools to improve and enhance scientific activities*

Investments in collecting, recording, managing and analyzing scientific data are enhanced if the observations made by scientists from the Contracting Parties are directly comparable. The quality of science benefits from harmonization of methods and techniques. PICES facilitates and provides opportunities for development of international standards, inter-calibration of methodology and sampling equipment, as well as collaborative opportunities to develop new, creative methodologies.

Goal 8: *Foster collaboration among scientists within PICES*

Capacity building will make it possible for scientists and institutions from all Contracting Parties to participate fully in, and benefit fully from, the cooperative programs that are developed by the Organization. PICES provides venues, organizes activities and develops procedures that facilitate the formation of new collaborations and maintenance of existing productive partnerships. PICES expedites the involvement of young scientists in PICES activities.

Goal 9: *Create education and training opportunities*

A central element of capacity building is education and training. PICES develops training courses to meet the interests and needs of its members in scientific areas such as, methods and skills in data management, modeling, and environmental monitoring.

Theme E: Ensure a progressive organization

Goal 10: *Provide an effective infrastructure to support PICES activities*

The activities in support of the primary mission of PICES require effective support and implementation, as well as broad participation from the scientific communities of the Contracting Parties. An efficient organizational structure and good internal communication ensure a vibrant science enterprise. An effective Secretariat that supports the mission and goals of the Organization is essential to its success.

Implementation

The actions and activities required to meet each of these goals will change over time, and will be implemented through Action Plans. Three-year Action Plans will be prepared for the Executive Committees, Scientific and Technical Committees, and the Secretariat. These plans will describe specific actions and tasks needed to achieve the goals identified above. To monitor performance, the Action Plans will be reviewed at each annual meeting, and revised if necessary.

The PICES Strategic Plan will be reviewed and updated, as required, every five years.

GC Endnote 8

Financial report for Year 4 (completed on March 31, 2011) of the PICES/MAFF project on “Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim”

BACKGROUND

In April 2007, the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan, through the Fisheries Agency of Japan (JFA), approved funding for a 5-year PICES project entitled “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*”. The goals of the project (to be completed by March 31, 2012) are to develop international systems to collect, exchange and store relevant data, and to foster partnerships with non-PICES member countries and related international organizations. The contribution is from the Official Development Assistance (ODA) fund, and involvement of developing Pacific Rim countries is required in activities under this project.

The following organizational principles, agreed upon by MAFF/JFA and PICES, apply to the project:

- The project has two distinct components, one on marine/estuarine non-indigenous species (MNIS) and the other one on harmful algal blooms (HABs), and is conducted by two PICES expert groups under the Marine Environmental Quality Committee (MEQ), Working Group on *Non-indigenous Aquatic Species* (WG 21) and Section on *Ecology of Harmful Algal Blooms in the North Pacific* (HAB-S). Each group oversees a specific sub-project.
- The Chairman of MEQ serves as the Project Scientific Coordinator and is responsible for reporting annually to PICES Science Board and MEQ on the scientific implementation of the project. This report should include a summary of the activities carried out for the year, with an evaluation on the progress made, and a workplan for the following year. [Dr. Glen Jamieson (Fisheries and Oceans Canada, E-mail: glen.jamieson@dfo-mpo.gc.ca) was the MEQ Chairman and the Project Scientific Coordinator from April 2007 to October 2009. Dr. Steven Rumrill (University of Oregon, U.S.A., E-mail: steve.rumrill@state.or.us) was elected as Chairman of MEQ at the 2009 PICES Annual Meeting. He has delegated Dr. Glen Jamieson to continue serving as the Project Scientific Coordinator.]

The scientific progress report for Year 4 was submitted as a separate document simultaneously with this financial report.

FINANCIAL PRINCIPLES AND BUDGET CATEGORIES

The following financial principles, agreed to by MAFF/JFA and PICES, apply to the project:

- A separate bank account shall be established to deposit the remitted funds;
- The interest earned by the fund shall be credited to the project and used in consultation with JFA;
- Any funds remaining after the completion of every fiscal year of the project shall be reported and disposed of in consultation with JFA;
- Transfers of up to 10% of allocations between the budget categories are allowed based solely on the decision by the PICES Executive Secretary. In special cases, transfers up to 20% between the budget categories can be authorized by JFA. All transfers shall be reported at the end of the fiscal year;
- A 13% overhead on the annual budget shall be retained by PICES to offset expenses related to the Secretariat's involvement in the project (based on communication with JFA in November 2008, the originally approved 10% overhead was changed to 13% starting from *Year 3*);
- The PICES Executive Secretary (Dr. Alexander Bychkov, E-mail: bychkov@pices.int) is responsible for the management of the fund and for reporting annually on its disposition to JFA and PICES Governing Council within 120 days after the close of each project year ending March 31.

The main elements of the budget are organized into the following categories:

- Travel and meetings
This category covers travel costs associated with project activities (organizational trips, field studies, *etc.*) and organization of project workshops and meetings.
- Contracts
This category covers fees to be paid to consultants and experts employed to implement the project. Tasks and deliverables for contractors have to be determined by the Scientific Coordinator, based on recommendations from a Principal Investigator of a specific sub-project or initiative. The Executive Secretary, in consultation with the Scientific Coordinator, is responsible for selecting contractors. To support the objectives of the project and to ensure that its activities have a minimal impact on the workload of the existing staff of the PICES Secretariat, the Executive Secretary can employ additional staff (*e.g.*, Project Assistant) as required.
- Equipment
This category covers purchases and shipment of equipment for laboratory/field sampling/data processing/analysis, computer hardware/software for development of database(s) and the project website.
- Miscellaneous
This category covers minor expenses associated with the project (mail and phone charges, bank charges, *etc.*) and includes contingencies such as fluctuations in currency exchange rates.

PROJECT BANK ACCOUNT AND PAYMENT HISTORY

The special account for the project was established at the bank used by PICES:

Bank name: TD Canada Trust
Bank number: 004
SWIFT Code: TDOMCATTOR
Branch name: Sidney
Branch number: 00721
Bank Address: 2406 Beacon Avenue, Sidney, BC, Canada V8L 1X4
Account number: 07210 004 8479 5209963
Account holder: North Pacific Marine Science Organization (PICES)

The following summarizes the fund transferring and project reporting to date:

- The set of documents requesting funding for *Year 1* (completed on March 31, 2008) was sent to JFA on June 20, 2007. Funds in the amount of \$184,980 were transferred to the PICES/MAFF bank account on July 27, 2007. The progress report and the financial report for *Year 1* were submitted to JFA on July 19 and July 23, 2008, respectively.

- The set of documents requesting funding for *Year 2* (completed on March 31, 2009) was sent to JFA on April 3, 2008 and, based on instructions from JFA, to the Consulate General of Japan in Vancouver (Canada) on June 2, 2008. Funds in the amount of \$161,466 were transferred to the PICES/MAFF bank account on July 17, 2008. The financial report for *Year 2* was submitted to JFA on July 21, 2009, and the progress report was sent on August 13, 2009.
- The set of documents requesting funding for *Year 3* (completed on March 31, 2010) was sent to the Consulate General of Japan in Vancouver (Canada) on June 10, 2009. Funds in the amount of \$187,505 were transferred to the PICES/MAFF bank account on July 15, 2009. The progress report and the financial report for *Year 3* were submitted to JFA on July 26, 2010.
- The set of documents requesting funding for *Year 4* (completed on March 31, 2011) was sent to the Consulate General of Japan in Vancouver (Canada) on May 28, 2010, and the suggested revisions were directed to JFA on June 24, 2010. Funds in the amount of \$187,505 were transferred to the PICES/MAFF bank account on July 12, 2010. The progress report and the financial report for *Year 4* are due by July 31, 2011.

BUDGET EXECUTION FOR FISCAL *YEAR 4*

The budget allocated for *Year 4* was \$187,505. The proposed budget breakdown and actual expenses for each of the budget categories, and the project account balance as of March 31, 2011 are shown in Table 1. Table 2 provides more details on actual expenses of the major categories. There is a surplus of \$48,664 in *Year 4*. Together with the *Year 3* surplus of \$13,337, the account balance at the *Year 4* fiscal year end is \$62,001 (see the next section, “Recommendation on the use of *Year 3* and *Year 4* combined surplus” for details).

TABLE 1 ALLOCATIONS AND EXPENSES FOR *YEAR 4*

Category	Allocations	Actual Expenses	Remainder
Travel & meetings	84,000	62,930	21,070
Contracts	48,500	33,294	15,206
Equipment	30,500	18,724	11,776
Miscellaneous	130	0	130
Overhead	24,375	24,375	0
Total	187,505	139,323	48,182
Interest earned			482
<i>Year 4</i> surplus			48,664
<i>Year 3</i> surplus			13,337
Account Balance			62,001

TABLE 2 BREAKDOWN OF EXPENSES FOR VARIOUS BUDGET CATEGORIES FOR YEAR 4.

Category/Activity	Expenses
Travel and meetings	62,930
Travel of PICES experts to the Cook Islands (Sept. 2010 and Apr. 2011) for preparation of the third PICES/MAFF HAB training course and to the Philippines (Mar. 2011) to review progress made since the first PICES/MAFF HAB training course	21,285
Participation of PICES experts in conferences and workshops to discuss training program strategy with other partners and present outcomes from the PICES/MAFF HAB project: - GEOHAB OSM on <i>Benthic Harmful Algal Blooms</i> (June 21–23, 2010, Honolulu, U.S.A.) - AOAC Conference on <i>Seafood Safety</i> (Sept. 27–28, 2010, Orlando, U.S.A.) - PICES Annual Meeting (Oct. 22–29, 2010, Portland, U.S.A.) - 14 th International Conference on <i>Harmful Algae</i> (Nov. 1–5, 2010, Crete, Greece) - Meetings of IPHAB (Paris, France) & ICES WG-HABD (Gothenberg, Germany) (Apr. 2011) - Ciguatoin detection training (Apr. 11–13, 2011, Alabama, U.S.A.)	4,640 1,238 3,236 1,745 2,441 466
PICES/MAFF demonstration workshop on “ <i>An introduction to rapid assessment survey methodologies for application in developing countries</i> ” (July 13–16, 2010, Marine Station of Kobe University’s Center for Inland Seas on Awaji Island, Japan)	12,921
Third PICES/MAFF rapid assessment survey (Oct. 18–21, 2010, Newport, OR, U.S.A.), held in conjunction with the 2010 PICES Annual Meeting (Portland, U.S.A.)	12,093
Travel support for NIS sub-project PI and WG 21 Co-Chairman to attend the 2010 Annual Meeting (Portland, Oct., 2010); and PI to attend the FUTURE Meeting (Seoul, Aug. 16–18, 2010)	2,045
Travel for the Project Scientific Coordinator to attend the 2010 Annual Meeting	820
Contracts	33,294
To design and layout a colour brochure describing achievements of the NIS initiative (KLT Communications and Carisse Graphic Design Inc.)	2,254
To select, order and test equipment/materials to be used for a HAB training program in developing countries (Mr. Julian Herndon, San Francisco State University)	5,574
To provide assistance to project Coordinators and sub-project Principle Investigators (Ms. Rosalie Rutka, Stranby Technical Services)	25,466
Equipment	18,724
Equipment and materials for a HAB training program in developing countries	13,712
Purchase and shipping of collectors and supplies to member countries for a NIS survey	5,012
Overhead	24,375

RECOMMENDATION ON THE USE OF YEAR 3 AND YEAR 4 COMBINED SURPLUS

The Year 3 surplus of \$13,337 was mainly due to unexpected substantial support provided by the host countries for two major events of that year, the second rapid assessment survey in Korea and the HAB training program in Guatemala.

The *Year 4* surplus of \$48,664 mainly came from: (1) unexpected substantial support provided by the host countries for the third rapid assessment survey in U.S.A. and the first PICES/MAFF demonstration workshop on “*An introduction to rapid assessment survey methodologies for application in developing countries*” in Japan, and (2) the re-scheduling of the third HAB training cause in the Southeast Pacific to 2012.

It is recommended that the major part of this combined surplus of \$62,001 be used for (1) conducting *Year 5* rapid assessment surveys and PICES/MAFF workshops on “*Rapid assessment survey methodologies for detecting non-indigenous marine species*” and (2) purchasing equipment for HAB training programs in developing countries.

AUDIT OF THE ACCOUNT

According to the PICES Financial Regulations (http://www.pices.int/about/financial_regulations.aspx; *Regulations 11 and 13*), all our accounts and financial statements are subject of an external audit. The auditing firm *Flader, Hale & Hughesman* (formerly *Flader & Hale*) has been serving as the PICES external auditor since 2003 (Decision 03/A/1(ii)). At the 2008 PICES Annual Meeting, Council agreed to retain this firm as the external auditor for *FYs* 2009–2011 (Decision 08/A/1(ii)).

The status of the MAFF account, for the period from April 1 to December 31, 2010, was assessed during the regular PICES audit for *FY 2010*. The financial statements were submitted to the auditor on March 23, 2011, and the audit was completed on April 21. The electronic copy of the Auditors’ Report was received and circulated to all Contracting Parties on May 10. In the auditor’s opinion, the financial statements are an accurate representation of the financial position of the Organization as of December 31, 2010, and the results of its operations and changes in the fund balances are in accordance with Canadian generally accepted accounting principles. The financial statements for the rest of *Year 4* of the MAFF project (January 1 to March 31, 2011) will be evaluated during the regular PICES audit for *FY 2011*.

GC Endnote 9

Report on the performance evaluation of the Executive Secretary for 2010

In accordance with Decision 2007/A/7(i) (Appendix 1), the Executive Committee of Council for evaluating the annual performance of the Executive Secretary (hereafter “Committee”) reviewed the 2010 annual performance of Dr. Alexander Bychkov, the Executive Secretary of the Organization, based on his report (available on request). The Committee determined his performance pay for this period, following the general guidelines for executive positions in the Canadian Public Service system, and also established his commitments for 2011. All discussions and decisions were made by correspondence among the Committee members. Before making the final decision, the Committee explained to Dr. Bychkov the rating for his performance in 2010, and the commitments for 2011, and he agreed with both.

Setting the criteria for rating and performance pay calculation

The salary of the Executive Secretary is based on the EX-2 level at the Department of Fisheries and Oceans (DFO), Canada. Therefore, the Committee set the ratings to define Dr. Bychkov’s performance and the criteria for his performance pay based on the current practice for executive positions in the Canadian Public Service system (Appendix 2).

Commitments in 2010

Dr. Bychkov’s commitments in 2010 were as follows:

- a. Managing the budget of the Organization and implementing the Organization’s financial regulations;
- b. Administrating the Secretariat personnel/office;
- c. Planning and organizing the Annual Meeting;
- d. Providing secretarial services to meetings/symposia/conferences approved by Council;

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- e. Coordinating the publication program of the Organization;
- f. Intensifying the cooperation with other organization/programs;
- g. Fund-raising for prioritized activities of the Organization in 2010 and beyond.

Items (a) to (e) are commitments routinely required of the Executive Secretary (“ongoing commitments”), and items (f) and (g) are additional commitments requested by the Committee in last year’s performance evaluation report of the Executive Secretary (“key commitments”).

Evaluation 2010 accomplishments

Dr. Bychkov’s accomplishments on the ongoing commitments (items (a)–(e)) fulfilled our expectations, even though many difficulties were encountered.

Besides the annual contributions from Contracting Parties, PICES funds to be managed include various grants and voluntary contributions. Dr. Bychkov appropriately managed and executed funds in accordance with PICES Financial Regulations and Canadian generally accepted accounting principles. The 2010 Annual Meeting (PICES-2010) in Portland, OR, USA, was very successful, with almost 430 participants from 16 countries and 33 organizations/programs present as observers. PICES also held or contributed to the planning and support for 15 inter-sessional events in 2010. Logistical and financial arrangements provided by the Secretariat were essential for the success of the Annual Meeting and inter-sessional events. The most important inter-sessional event was the symposium on “*Climate change effects on fish and fisheries*” in Sendai, Japan, which had almost 400 scientists from 37 countries. The publication that will result from this symposium will have a very large international scientific impact. Preparations, arrangements and planning for 5 other international symposia to be held in 2011–2012 were made by the PICES Secretariat. Dr. Bychkov was a very effective manager of the Secretariat staff, including the PICES interns. In addition, he implemented the publication program of the Organization. Significant progress was made in implementing the Action Plan for the PICES Publication Program, particularly in getting PICES branding at the article level in special issues of primary journals published by Elsevier, and in the development of a PICES digital document library on a remote server.

His performance was also significant for the additional commitments (items (f) and (g)). PICES cooperation with other organizations and programs is becoming very strong and is making PICES a much more visible and important contributor to international marine science programs. The cooperation developing with ICES is particularly notable and important in this regard. With respect to fund-raising, the amount of funds from voluntary contributions, grants, and partnerships of PICES exceeded, for the first time, the total annual contribution by Contracting Parties.

Based on his accomplishments in 2010 mentioned above, the Committee judged his overall performance as “Succeeded+”, in accordance with the practice of performance evaluation by the Canadian Government.

Setting the performance pay for 2010

In accordance with practice of the Canadian Public Service system, an executive is eligible for a maximum of 12% performance pay (“at-risk pay”), except for the candidate evaluated as “Did not meet”. In addition, if performance is evaluated as “Surpassed”, then the executive is eligible for a maximum of 3% bonus (Appendix 2). The Committee evaluated Dr. Bychkov’s overall performance for 2010 as “Succeeded+”. Because the Committee also considered that his tasks in 2010 were difficult, the Committee decided that a performance pay equal to 12% of his salary would be appropriate for this period.

Setting commitments for 2011

The Committee set Dr. Bychkov’s commitments in 2011 as follows. Items (a) to (e) are essential for the administration of the Organization in 2011 and correspond to Article 10 of the PICES Rules of Procedure as

the responsibility of the Executive Secretary. In addition, cooperation with other organizations and programs is important for developing the scientific ability of PICES. Under the current severe funding situation in Contracting Parties, fund-raising is an important task in order to sustain the Organization at the present level of activities. Therefore, the Committee added items (f) and (g).

- a. Managing the budget of the Organization and implementing the Organization's financial regulations;
- b. Administrating the Secretariat personnel/office;
- c. Planning and organizing the Annual Meeting;
- d. Providing secretarial services to meetings/symposia/conferences approved by Council;
- e. Coordinating the publication program of the Organization;
- f. Intensifying the cooperation with other organization/programs;
- g. Fund-raising for prioritized activities of the Organization in 2011 and beyond.

Appendix 1

Executive Committee of Council for evaluating the Executive Secretary performance

DECISION 2007/A/7:

- i. In accordance with Financial Regulations 12(i), Council established an Executive Committee to complete annual performance review of the Executive Secretary. Terms of reference and membership of the Executive Committee are listed in *GC Appendix B*.
- ii. At its first meeting, the Executive Committee will review achievements of the current Executive Secretary for the previous three years, in preparation for his possible re-appointment. As decision on re-appointment shall be made at least 12 months prior to the end of the term, Council agreed, in accordance with the Article VII of the Convention and Rule 4 of the Rules of Procedure, to vote on the results of the evaluation by correspondence before April 30, 2008.

2007 GC APPENDIX B:

Terms of reference

1. The Executive Committee will complete an annual review of the Executive Secretary performance by April 1 each year, following the general guideline for executive positions in the Canadian public service, and will report to Council at each Annual Meeting.
2. The review will include a written description of achievements for the previous year and tasks for the coming year, along with an overall evaluation of the achievements.
3. The evaluation will be used to set the level of performance pay, following the Canadian policy for executives.

Membership

The Executive Committee will be chaired by the PICES Chairman, with the Chairmen of Science Board and F&A Committee as members.

Appendix 2

Current criteria of rating the performance of and current levels of pay for the executive position of the Canadian Public Service

Ratings are based on results achieved (the *What*), as well as how they were achieved (the *How*). Overall performance is evaluated with the following possible results:

- **Surpassed:** Went well beyond performance expectations.
- **Succeeded+:** Exceeded the performance expectations. Or, fully succeeded in a position of greater scope and complexity in relation to those of other executive level jobs.
- **Succeeded:** Has fully achieved the performance expectations.
- **Succeeded-:** Did not fully succeed in meeting performance expectations. Or, while succeeded, it was in a position with performance expectations of less scope and complexity in relation to those of other executive level jobs.

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- **Did not Meet/Unable to Assess:** Did not achieve performance expectations or unable to assess the performance during the cycle (due to leave, training, special assignment).

The following table illustrates the range of performance awards available according to rating level and the executive’s level. Note that these awards do not affect the base salary.

Performance Level	Lump Sum Performance Awards	
	At-Risk Pay	* Bonus
0 (Unable to Assess)	x	x
1 (Did not meet)	x	x
2 (Succeeded-)	✓ EX 1-3: up to 12% of base salary	x
3 (Succeeded)		x
4 (Succeeded +)		x
5 (Surpassed)		✓ EX-1 to EX-3: up to an additional 3%

*GC Appendix A***2011 Governing Council decisions****2011/A/1: Auditor**

- i. Council accepted the audited accounts for *FY* 2010.
- ii. Council authorized the Executive Secretary to sign a new 3-year contract (for *FYs* 2012-2014) with the current auditor *Flader, Hale & Hughesman*.

2011/A/2: Annual contributions

- i. Council instructed the Executive Secretary to send a letter commending Contracting Parties for their performance in submitting annual contributions for *FY* 2011, and describing the difficulties that late and/or partial payment causes the Organization.
- ii. Council re-iterated that for planning of their funding requests for annual contributions, Contracting Parties should continue to use the guideline generally accepted at PICES-1999 (Decision 1999/A/2(ii)), which states that the annual contributions will increase at the rate of inflation in Canada.

2011/A/3: Budget and fund-raising

- i. Council accepted the estimated accounts for *FY* 2011.
- ii. Council approved the *FY* 2012 budget of \$838,000. The amount of \$118,600 will be transferred from the Working Capital Fund to balance the budget, setting the total annual contribution at \$719,400, and the 2012 annual fee at \$119,900 per Contracting Party.
- iii. Council approved a transfer from the Working Capital Fund to the Trust Fund to recover the 2011 expenses, and to restore the Trust Fund to the level of \$110,000 by the end of the fiscal year.
- iv. Council agreed that funds available from all completed projects in the Working Capital Fund as of December 31, 2011, be allocated for the development of the PICES integrative science program on “*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Ecosystems*” (FUTURE), with the provision that the funds should be used over the next three years.
- v. Council instructed the Executive Secretary to send a letter to the Contracting Parties providing information on planned activities for FUTURE and requesting contributions to these activities.
- vi. Council approved an additional lump sum employer contribution of \$20,000 to the International Fisheries Commission Pension Plan to pay down unfunded liabilities.

2011/A/4: PICES Strategic Plan

Council approved the PICES Strategic Plan developed by the Study Group on *Updating the PICES Strategic Plan* (SG-USP).

2011/A/5: Yeosu Declaration

Council accepted an invitation for PICES to be represented on the International Review Committee of the Yeosu Declaration pursued as part of the legacy of the Ocean Expo-2012 Yeosu Korea to be held from May 12 to August 12, 2012, under the theme of “*The Living Ocean and Coast: Diversity of Resources and Sustainable Activities*”.

2011/A/6: UN Regular Process (UNRP) for Global Reporting and Assessment of the State of the Marine Environment

Council instructed the Executive Secretary to inform the UN Division for Ocean Affairs and the Law of the Sea of PICES’ interest in conducting scientific peer review of UNRP regional assessments of North Pacific marine ecosystems, and in being involved in the regional workshops for the North Pacific and East Asian marginal seas.

2011/A/7: Future PICES Annual Meetings and 2012 inter-sessional Science Board meeting

- i. Council approved Japan’s request for \$40,000 to partially cover costs for PICES-2012 to be held from October 12–21, 2012, in Hiroshima. The theme of the meeting, “*Scientific challenge to the North Pacific ecosystem: Understanding and mitigation of the effects of natural and anthropogenic stress*”,

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was approved in principle at PICES-2010, and the theme description was finalized at the 2011 inter-sessional Science Board meeting.

- ii. Council accepted the offer of Canada to host PICES-2013 from October 11-20, 2013, in Nanaimo, British Columbia. Council approved in principle the proposed theme of the meeting, “*Communicating forecasts, uncertainty and consequences of ecosystem change to society*”, and instructed Science Board to finalize the theme description by the 2012 inter-sessional Science Board meeting.
- iii. Following the established 6-year rotation cycle, Council requested China to explore the possibility of hosting PICES-2014, and inform the Secretariat on this matter by March 31, 2012.
- iv. Council agreed to keep the same registration fee structure for PICES-2012 as for PICES-2010 and PICES-2011:

Type of registration fee	CDN \$
Regular	275
Early	200
Student	50
Spousal/guest	50

- v. Considering that most of the changes in the format of the Annual Meeting proposed in the final report of the Study Group on *Restructuring of the PICES Annual Meeting* (SG-RAM) are to be implemented at PICES-2011 and PICES-2012, Council agreed to discuss the effectiveness of the approved changes at the next Annual Meeting.
- vi. Council approved an inter-sessional Science Board meeting to be held in conjunction with a 3-day FUTURE implementation workshop to be hosted by Korea in Busan, immediately after the 2nd PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” in Yeosu, Korea.

2011/A/8: Intern Program

- i. Council instructed the Executive Secretary to invite Contracting Parties to provide voluntary contributions to support the Intern Program in 2012 and beyond.
- ii. Considering the current level of the stipend (\$2,000), funding available for the Intern Program, and stated intentions for contributions by Contracting Parties, Council agreed to initiate the process to recruit the 2012/2013 intern, with the understanding that the intern’s term will start no earlier than June 2012.

2011/A/9: Visiting Scientist Program

Council instructed the F&A Committee to review and revise, if necessary, the description of the PICES Visiting Scientist Program (inactive since its inception in 2002), in preparation for a discussion of the program at the 2012 inter-sessional Science Board meeting.

2011/A/10: Improvement of participation in PICES activities

- i. Council re-iterated the necessity for Contracting Parties to: (1) regularly review their national membership, and to provide the updated national membership list to the Secretariat by the first day of the calendar year (January 1), and (2) follow up on *Rule 1(ii)* of the PICES Rules of Procedure in providing the national delegation list for Annual Meetings. The national membership lists are required to maintain a historical record of PICES membership, and to assist in improving participation in the activities of the Organization. The national delegation lists are required to assist in better coordinating activities of the Standing Committees and their subsidiary bodies, and in better preparing the Annual Meeting.
- ii. In order to better assess problems existing in Contracting Parties with the participation of their scientists in the activities of the Standing Committees and their subsidiary bodies, and in the Annual Meetings of the Organization, Council instructed the Executive Secretary to continue to regularly preparing and circulate to Contracting Parties information, including graphic materials, on participation of their scientists in the Annual Meetings for the previous six years.

2011/S/1: 2012 PICES Annual Meeting

- i. The following scientific sessions are to be convened at PICES-2012:
 - ¾-day Science Board Symposium on “*Effects of natural and anthropogenic stressors in the North Pacific ecosystems: Scientific challenges and possible solutions*”;

- 1-day BIO Contributed Paper Session;
 - 1-day BIO/FIS Topic Session on “*Jellyfish in marine ecosystems and their interactions with fish and fisheries*” (co-sponsored by ICES);
 - ½-day BIO/FIS/POC Topic Session on “*Advances in understanding the North Pacific Subtropical Frontal Zone ecosystem*”;
 - ½-day BIO/MEQ Topic Session on “*Environmental contaminants in marine ecosystems: Seabirds and marine mammals as sentinels of ecosystem health*” (co-sponsored by JSPS);
 - ½-day BIO/MEQ/FUTURE Topic Session on “*Ecosystem responses to multiple stressors in the North Pacific*”;
 - 1-day FIS Contributed Paper Session;
 - ½-day FIS/MONITOR/POC Topic Session on “*Monitoring on a small budget: Cooperative research and the use of commercial and recreational vessels as sampling platforms for biological and oceanographic monitoring*”;
 - ½-day FIS/MEQ Topic Session on “*Abundance, ecological functions and ecosystem service of macrophyte vegetations as indicators of natural and anthropogenic stressors in coastal ecosystem and productivity*”;
 - ½-day MEQ Topic Session on “*Range extension, toxicity and phylogeny of epiphytic dinoflagellates*”;
 - 1-day MEQ/FUTURE Topic Session on “*Social-ecological systems on walleye pollock and other commercial gadids under changing environment: An inter-disciplinary approach*”;
 - ½-day MEQ/FUTURE Topic Session on “*Risk management in coastal zone ecosystems around the North Pacific*”;
 - 1-day MONITOR/POC Topic Session on “*Effects of natural and artificial calamities on marine ecosystems and the scheme for their mitigation*” (co-sponsored by JSFO and FRA);
 - 1-day POC Contributed Paper Session;
 - 1-day POC Topic Session on “*Challenges in understanding North Hemisphere climate variability and change*” (co-sponsored by CLIVAR and ICES);
 - ½-day POC/FIS Topic Session on “*Linking migratory fish behavior to end-to-end models II*”;
 - 1-day POC/TCODE Topic Session on “*Changing ocean biogeochemistry and its ecosystem impacts*” (co-sponsored by ICES and IMBER).
- ii. The following workshops are to be convened at PICES-2012:
- 1-day BIO Workshop on “*Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts*”;
 - 1-day BIO Workshop on “*Secondary production: Measurement methodology and its application on natural zooplankton community*”;
 - 1-day BIO Workshop on “*The feasibility of updating prey consumption by marine birds, marine mammals, and large predatory fish in the PICES regions*”;
 - 2-day BIO Workshop on “*Comparison of multiple ecosystem models in several North Pacific shelf ecosystems (MEMIP-IV)*”;
 - 1½-day MEQ Workshop on “*The contrasting cases of harmful algal blooms in the eastern and western Pacific in 2007 and 2011*”;
 - 1-day POC Workshop on “*Arctic–sub-Arctic interactions*” (co-sponsored by ESSAS).
- iii. The following business meetings are to be held at PICES-2012:
- ¼-day Science Board (SB) meeting (October 14) and ½-day SB meeting (October 19 afternoon and October 20);
 - 1½-hour overture meetings (October 14 evening) and ½-day meetings of Scientific and Technical Committees (October 17 afternoon);
 - 1-day meeting of the SB Section on *Human Dimensions of Marine Systems*;
 - 1-day meeting of the BIO/FIS/POC Section on *Climate Change Effects on Marine Ecosystems*;
 - 1-day meeting of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific*;
 - ½-day meeting of the POC/BIO Section on *Carbon and Climate*;
 - 1-day meeting of the MEQ Working Group on *Non-indigenous Aquatic Species*;
 - ½-day meeting of the FIS/MEQ Working Group on *Environmental Interactions of Marine Aquaculture*;
 - ½-day meeting of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim*;

- ½-day meeting of the POC Working Group on *North Pacific Climate Variability and Change*;
- 1-day meeting of the MEQ/BIO Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*;
- ½-day meeting of the POC Working Group on *Regional Climate Modeling*;
- 1-day meeting of the BIO Advisory Panel on *Marine Birds and Mammals*;
- ½-day meeting of the POC/MONITOR Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas*;
- ¼-day meeting of the MONITOR Advisory Panel on the *Continuous Plankton Recorder Survey in the North Pacific*;
- 1-day meeting of the MEQ Study Group on *Marine Pollutants*;
- ½-day concurrent meetings of the FUTURE Advisory Panels on *Anthropogenic Influences on Coastal Ecosystems, Climate, Oceanographic Variability and Ecosystems* and *Status, Outlooks, Forecasts, and Engagement*, preceded by ½-day joint meeting of these Panels.

2011/S/2: Inter-sessional symposia/sessions/workshops/meetings

The following inter-sessional events are to be convened/co-sponsored in 2012 and beyond:

- i. Symposia:
 - 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (primary international sponsors: PICES, ICES and IOC), May 15–19, 2012, Yeosu, Korea;
 - ICES/PICES International Symposium on “*Forage fish interactions: Creating the tools for ecosystem based management of marine resources*”, November 8–12, 2012, Nantes, France.
- ii. Joint Theme Sessions:
 - CLIOTOP special session “*Global science for global governance of oceanic ecosystems and fisheries*” (co-sponsored by PICES) at the Planet Under Pressure Conference, March 26–29, 2012, London, UK;
 - Theme Sessions on “*Understanding, measuring and projecting the limits of resilience in marine ecosystems*” (A), “*Multidisciplinary perspectives in the use (and misuse) of science and scientific advice in Marine Spatial Planning*” (I), “*Subarctic-Arctic Interactions: Ecological consequences*” (M), and “*Sustainability of aquaculture*” (Q) at the 2012 ICES Annual Science Conference, September 17–21, 2012, Bergen, Norway.
- iii. Workshops and meetings:
 - PICES/MAFF Project Synthesis Workshop, March 20–23, 2012, Newport, Oregon, U.S.A.;
 - MEMIP (*Marine Ecosystem Model Inter-comparison Project*) workshop, spring 2012, Corvallis, U.S.A.;
 - FUTURE Implementation Workshop, May 22–24, 2012, Busan, Korea;
 - Inter-sessional Science Board meeting, May 24–25, 2012, Busan, Korea;
 - ICES/PICES/GEOHAB workshop on “*Climate change and harmful algal blooms*”, in conjunction with the meeting of the ICES Working Group on *Harmful Algal Bloom Dynamics*, spring 2012, TBD;
 - GLOBEC/PICES workshop on “*Forecasting ecosystem indicators with climate-driven process models*”, summer 2012, Friday harbor, WA, U.S.A.;
 - SCOR WG 137 workshop on “*Global patterns of phytoplankton dynamics in coastal ecosystems: Comparative analysis of time series observations*” (co-sponsored by PICES), October 2012, prior to PICES-2012, Hiroshima, Japan.
- iv. Capacity development events:
 - PICES/MAFF Workshop on “*Introduction to Rapid Assessment Survey methodologies for detecting non-indigenous marine species*” (co-sponsored by FRA, NOWPAP and WESTPAC), February 8–9, 2012, Nagasaki, Japan;
 - PICES/MAFF training course on screening methods for testing shellfish for paralytic shellfish poisoning toxins and phytoplankton identification, February 17–22 (Jakarta) and February 23–24 (Lombok Island), 2012, Indonesia;
 - PICES/MAFF Harmful Algal Bloom workshop to review data collected by High Performance Liquid Chromatography and Mass Spectrometry methods, and to provide outreach for the project, March 5–9, 2012, Guatemala;
 - Second ICES/PICES Conference for Early Career Scientists on “*Oceans of Change*”, April 24–27, 2012, Majorca, Spain;

- IMBER Workshop on “Needs assessment for capacity development for integrated marine biogeochemistry and ecosystem research in the Asia-Pacific region” (co-sponsored by PICES), summer 2012, Shanghai, China;
- IMBER-led international ClimECO3 Summer School on “A view towards Earth System models: Human-natural system interactions in the marine world” (co-sponsored by PICES), July 23–28, Ankara, Turkey;
- PICES Summer School on “Ocean observing systems”, August 2013, Hatfield Marine Science Center, Newport, U.S.A.

2011/S/3: Travel and representation at the meetings of other organizations/programs

- i. 2012 PICES Annual Meeting:
 - Invited speakers for Science Board Symposium and Topic Sessions, with the normal allocation of approximately \$5,000 per Committee/Program; additional requests are subject to fund availability;
 - One invited speaker for each of the approved workshops (see 2011/S/1(ii)).
- ii. Inter-sessional events:
 - PICES (MEQ) representative to participate in the 3rd Intergovernmental Review Meeting of the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (January 25–27, 2012, Manila, Philippines);
 - PICES (TCODE) representative to attend the IODE SG-ODP (IOC/IODE Study Group for the Ocean Data Portal) meeting (February 20–22, 2012, Oostende, Belgium);
 - PICES representative to participate in the workshop on “Salmon ocean ecology” (March 20–22, 2012, Newport, U.S.A.);
 - PICES (MONITOR) representative to attend the ICES WGNARS (Working Group on the Northwest Atlantic Regional Sea) meeting (March 6–8, 2012, Falmouth, MA, U.S.A.);
 - PICES invited speaker for the CLIOTOP special session “Global science for global governance of oceanic ecosystems and fisheries” at the Planet Under Pressure Conference (March 26–29, 2012, London, UK);
 - PICES (TCODE) representative to attend the IODE GE-BICH (IOC/IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices) meeting (March 26–30, 2012, Oostende, Belgium);
 - PICES (S-HAB) representative to participate in the planning meeting for the ICES/PICES/GEOHAB workshop on “Climate change and harmful algal blooms” (early 2012, venue TBD);
 - PICES coordinators for the 2nd ICES/PICES Conference for Early Career Scientists on “Oceans of Change” (April 24–27, 2012, Majorca, Spain);
 - PICES (POC/WG 27) representative to attend the CLIVAR Pacific Implementation Panel meeting (April 29–May 1, 2012, Noumea, New Caledonia);
 - PICES convenor for the workshop on “Climate change projections for marine ecosystems: Best practice, limitations and interpretation” (May 13–14, 2012, Yeosu, Korea);
 - PICES representative to attend the 2012 IOC Executive Council Meeting (June 25–29, 2012, Paris, France);
 - PICES representatives and convenors for the joint sessions to participate in the ICES Annual Science Conference (September 17–21, 2012, Bergen, Norway);
 - PICES representative (S-CC) to participate in the 3rd International Symposium on “Oceans in high-CO₂ world” (September 24–27, 2012, Monterey, U.S.A.);
 - PICES representative to attend the NPAFC Annual Meeting (October 7–12, 2012, St. Petersburg, Russia);
 - PICES representative to attend the SCOR General Meeting (October 22–26, 2012, Halifax, Canada);
 - PICES convenor for the International Symposium on “Forage fish interactions: Creating the tools for ecosystem based management of marine resources” (November 8–12, 2012, Nantes, France).

2011/S/4: Publications

- i. The following publications are to be produced in primary journals in 2012–2013:
 - Special issue of *Aquaculture Economics and Management* based on selected papers from the PICES-2010 Topic Session on “Economic relation between marine aquaculture and wild capture fisheries” (Guest Editor: M. Pang) to be published in spring 2012;

- Special issue of *ICES Journal of Marine Science* based on selected papers from the 2011 PICES/ICES Zooplankton Production Symposium on “*Population connections, community dynamics and climate variability*” (Guest Editors: J. Keister, C. Johnson and D. Bonnet) to be published in summer 2012;
 - Review paper on Fraser River sockeye salmon and their marine environment in *Reviews in Fish Biology and Fisheries* (Lead Author: S. McKinnell) to be published in 2012;
 - Synthesis paper from the 2010 PICES/ICES/FAO Symposium on “*Forecasting climate change impacts on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” in *Nature* (Lead author: A. Hollowed) to be published in 2012;
 - Special issue of *Journal of Marine Systems* on modeling dedicated to Dr. Bernard Megrey (Guest Editors: E. Curchitser and S. I. Ito) to be published in May 2013;
 - Special issue of *ICES Journal of Marine Science* based on selected papers from the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” to be published in 2013.
- ii. The following publications are to be produced in PICES Scientific Report series in 2012:
- Final report of the Study Group on *Human Dimensions for Environmental Change* (Editor: M. Makino);
 - Final report of the Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (Editors: F. Chai and S. Takeda);
 - Final report of the Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (Editor: W. Peterson);
 - Final report of the Working Group on *Environmental Interactions of Marine Aquaculture* (Editors: K. Abo, I. Burgetz, B. Dumbauld and S. Johnson);
 - Final report of the Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (Editors: A. Hollowed and S. Kim);
 - PICES Advisory Report to the Cohen Commission on “*The decline of Fraser River sockeye salmon in relation to marine ecology*” (Editor: S. McKinnell) – reproduction of the web-based Cohen Commission Technical Report No. 4;
 - Final report of the Climate Change and Carrying Capacity Program (Editors: H. Batchelder).
- iii. Other publications to be produced in 2012 include:
- Atlas of non-indigenous marine and estuarine species in the North Pacific (Editors: H. Lee II and D. Reusser) to be published on the website;
 - Develop a chapter on the biology of anadromous coastal cutthroat trout for the NPAFC 20th anniversary publication project on updating the life histories of Pacific salmon (invitation by NPAFC);
 - Two regular issues of PICES Press to be published on the website and distributed electronically in January (Vol. 20, No. 1) and July (Vol. 20, No. 2) of 2012;
 - PICES E-news to be published on the website and distributed electronically bimonthly;
 - Brochures and slide shows for policy makers, managers, stakeholders and other interested members of society developed, under directions of the FUTURE Advisory Panel on *Status, Outlooks, Forecasts, and Engagement*, based (tentatively) on the final report of the MEQ Working Group on *Ecosystem-based Management Science and its Application to the North Pacific* (PICES Scientific Report, 2010, No. 37, 166 pp.), the Second North Pacific Ecosystem Status Report (PICES Special Publication, 2010, No. 4, 393 pp.) and the final report of the PICES/MAFF project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” (March 2012);
 - Book of Abstracts for the Second International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea);
 - Announcement, poster and Book of Abstracts for PICES-2012 (October 12–21, 2012, Hiroshima, Japan).
- iv. All member countries consider that the supplementary chapter for the Second North Pacific Ecosystem Status Report (PICES Special Publication No. 4, 2010) developed by the Advisory Panel for a CREAMS/PICES Program in East Asian Marginal Seas and endorsed for publication by Science Board, is an important scientific product of PICES, and agree to keep this agenda item open to allow member country governments to reflect further on this issue.

2011/S/5: Future of current PICES expert groups

- i. The following expert groups completed their terms of reference and should be disbanded:
 - BIO Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23; October 2007–October 2011);
 - FIS/POC Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (joint PICES/ICES WG-FCCIFS; October 2008–October 2011);
 - Science Board Study Group on *Human Dimensions for Environmental Change* (SG-HD; October 2009–October 2011);
 - PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* (SG-SP; October 2009–October 2011);
 - Study Group on *Updating the PICES Strategic Plan* (SG-USP; October 2009–October 2011);
 Final reports of the first three expert groups will be published in 2012 in the PICES Scientific Report series. The SG-SP final report and the approved new PICES Strategic Plan will be included in the 2011 PICES Annual Report.
- ii. To complete its terms of reference, the life span of the FIS/MEQ Working Group on *Environmental Interactions of Marine Aquaculture* (WG 24) was extended for 1 year (until October 2012). The draft of the WG 24 final report has to be completed by PICES-2012.
- iii. Following a review by the parent committee, the lifespan of the BIO Advisory Panel on *Marine Birds and Mammals* (MBM-AP) was extended for a 3-year term (until October 2014), with revised terms of reference as described in *GC Appendix B*;
- iv. Following a review by the parent committee, the lifespan of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB) was extended for a 3-year term (until October 2014), pending approval of revisions to terms of reference described in *GC Appendix B* at the 2012 inter-sessional Science Board meeting.

2011/S/6: New PICES expert groups

- i. The following new Working Groups, with terms of reference as described in *GC Appendix B*, were established in the interim period:
 - POC Working Group on *North Pacific Climate Variability and Change* (WG 27);
 - BIO/MEQ Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28).
- ii. The following new expert groups, with terms of reference as described in *GC Appendix B*, were established at PICES-2011:
 - POC Working Group on *Regional Climate Modeling* (WG 29);
 - BIO/FIS/POC Section on *Climate Change Effects on Marine Ecosystems* (S-CCME);
 - Science Board Section on *Human Dimensions of Marine Systems* (S-HD);
 - MEQ Study Group on *Marine Pollutants* (SG-MP).

2011/S/7: Chairmen/Vice-Chairmen for Standing Committees and Co-Chairmen for *ad hoc* expert groups

- i. The following reflects new appointments for *ad hoc* expert groups in the interim period:
 - Drs. Richard Brodeur (U.S.A.), Young-Shil Kang (Korea) and Shin-ichi Uye (Japan) were appointed as Co-Chairmen of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences*;
 - Drs. Michael Foreman (Canada), Emanuelle Di Lorenzo (U.S.A.) and Shoshiro Minobe (Japan) were appointed as Co-Chairmen of the POC Working Group on *North Pacific Climate Variability*.
 - Dr. Motomitsu Takahashi (Japan) was appointed as Co-Chairman of the BIO/MEQ Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*.
- ii. The following reflects changes in Chairmanship and Vice-Chairmanship for Standing Committees and new appointments for expert groups at PICES-2011:
 - Dr. Elizabeth Logerwell (U.S.A.) was elected FIS Chairman to replace Dr. Mikhail Stepanenko (Russia);
 - Dr. Xianshi Jin (China) was elected FIS Vice-Chairman to replace Dr. Gordon Kruse (U.S.A.);

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- Dr. Won-Duk Yoon (Korea) was appointed as Co-Chairman of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* to replace Dr. Young-Shil Kang (Korea);
- Drs. Changkyu Lee (Korea) and Vera Trainer (U.S.A.) were re-appointed as Co-Chairmen of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific* for a 3-year term;
- Drs. Rolf Ream (U.S.A.) and Yutaka Watanuki (Japan) were re-appointed as Co-Chairmen of the BIO Advisory Panel on *Marine Birds and Mammals* for a 3-year term.

2011/S/8: Relations with other organizations and programs

- i. Council approved the revised *Standing List of International and Regional Organizations and Programs* developed by Science Board and agreed with the identified priorities for interaction in 2011–2012.
- ii. Council approved in principle the report of the joint PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science*, and agreed with identified focal research and operational areas that can be enhanced by greater cooperation between the two organizations. The adopted framework will serve as the basis for linkages of PICES and ICES science plans and longer term strategic planning.
- iii. Council agreed to appoint an associate PICES member, Dr. Lisa Miller (Section on *Carbon and Climate, Canada*) to serve on the SCOR Working Group on *Biogeochemical Exchange Processes at the Sea-Ice Interfaces*.

GC Appendix B

Advisory Panel on *Marine Birds and Mammals* (MBM-AP)

Parent Committee: BIO

Duration: 3 years

Terms of Reference (updated and approved at PICES-2011)

1. Provide information and scientific expertise to the Biological Oceanography Committee and the FUTURE Program, and, when necessary, to other scientific and technical committees, with regard to the biology and ecological roles of marine mammals and seabirds in the PICES region;
2. Identify important problems, scientific questions, and knowledge gaps for understanding the impacts of climate change and anthropogenic factors on marine mammals and seabirds and ecosystems in the PICES region through Workshops, Theme Sessions and Scientific Reports;
3. Assemble information on the status and key demographic parameters of marine mammals and seabirds and contribute to the Status Reports and Outlooks;
4. Improve collaborative, interdisciplinary research with marine mammal and seabird experts and the PICES scientific community.

Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB)

Parent Committee: MEQ

Duration: 3 years

Terms of Reference (updated at PICES-2011 and under revision)

1. Continue PICES member country data entry into the joint ICES-PICES harmful algal event database to allow global comparison of changes in harmful algal bloom occurrences.
2. Convene workshops and sessions including joint sessions with other international organizations to evaluate and compare results and maintain an awareness of state-of-the-art advances outside the PICES community.

3. Convene a joint PICES/ ICES workshop to assess the purported links between climate change and HAB character, frequency and severity, and publish a comprehensive review paper that identifies the near- and long-term research priorities and the monitoring structures needed to effectively hindcast and forecast future HAB events.
4. Produce and post on the PICES website papers that document the unanimous HAB Section opinion on timely subjects related to HABs, including topics related to FUTURE such as how human activities (increased cultural eutrophication and climate changes including temperature, changes in stratification and ocean acidification) might affect harmful algal bloom incidence and magnitude.

Working Group on *North Pacific Climate Variability and Change* (WG 27)

Parent Committee: POC

Duration: 3 years

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 (approved at the 2011 inter-sessional Science Board meeting)

1. Develop conceptual frameworks and low-order models of North Pacific climate variability and change, which can be used by climate researchers to investigate the mechanisms of those variations and by ecosystem scientists to explore hypotheses linking ecosystem dynamics and physical climate.
2. Summarize the current understanding of mechanisms of Pacific climate variability and change, and evaluate the strengths of the underlying hypotheses with supporting evidence.
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 a method 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.

**Working Group on *Development of Ecosystem Indicators
to Characterize Ecosystem Responses to Multiple Stressors (WG 28)***

Parent Committees: BIO and MEQ

Duration: 3 years

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 PICES WG 22 on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (iron chemistry in low pH ocean, anthropogenic dust flux), PICES WG 23 on *Comparative Ecology of Krill in Coastal and Oceanic Waters Around the Pacific Rim* (hypoxia impact on euphausiids), and PICES WG 21 on *Non-indigenous Aquatic Species* (non-indigenous marine species) thereby highlighting the need for integrative studies.

Terms of Reference (approved at the 2011 inter-sessional Science Board meeting)

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; identify trends in these stressors, if possible.
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 2011 PICES FUTURE Inter-sessional 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/change, assessing their applicability to North Pacific ecosystems and identify 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 and evaluate the potential to identify vulnerable ecosystem components.
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. This WG will focus primarily on delivery of FUTURE Questions 3 and 1.

Working Group on *Regional Climate Modeling* (WG 29)

Parent Committee: POC

Duration: 3 years

Motivation

With the realization that physically-based future climate projections are the starting point for many socio-economic impact and adaptation considerations to future climate change and that global climate models, although they capture large scale climate behaviour, have limitations for regional assessments due to their coarse spatial resolutions, a working group is proposed to assess state-of-the-art regional climate modeling efforts, their implications for regional ecosystem studies and to further their development in the North Pacific Ocean and its marginal seas.

Terms of Reference (approved at PICES-2011)

1. Assemble a comprehensive review of existing regional climate modeling efforts.
2. Assess the requirements for regional ecosystem modeling studies (*e.g.*, how to downscale the biogeochemistry).
3. Continue the development of RCM implementations in the North Pacific and its marginal seas.
4. Convene special sessions and inter-sessional workshops dedicated to the RCM topic.
5. Publish report and/or review paper on best practices for regional coupled modeling.
6. Establish connections between PICES and climate organizations (*e.g.*, CLIVAR) and global climate modeling centers (*e.g.*, NCAR, JAMSTEC, CCCMA).
7. Collaborate with other PICES expert groups such as WG-27, S-CCME and the FUTURE Advisory Panels possibly by producing “Outlooks”.
8. Publish a final report summarizing results.

Section on *Climate Change Effects on Marine Ecosystems* (S-CCME)

(joint expert group with ICES Strategic Initiative on *Climate Change Effects on Marine Ecosystems*)

Parent Committees: BIO, FIS and POC

Duration: lifetime of FUTURE

S-CCME Goals (approved at PICES-2011)

- Define, coordinate and integrate the research activities needed to understand, assess and project climate change impacts on marine ecosystems;
- Plan strategies for sustaining the delivery of ecosystem goods and services, and when possible predictions should include quantifying estimations of uncertainty;
- Define and quantify the vulnerability and sustainability of marine ecosystems to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use;
- Build global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.

Core Elements of S-CCME Implementation Plan Phases (3 years in duration)

- Synthesis of existing knowledge;
- Advancement of new science and methodology;
- Communication of research findings.

Phase 1: 2012-2014

- **Synthesis of existing knowledge:**
 - Complete synthesis papers from the 2010 Sendai Symposium and 2012 Yeosu Symposium;
 - Interpret the vulnerabilities of marine ecosystems to changing climate.
- **Advancement of new science and methodology:**

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- Identify techniques for predicting climate change impacts in systems impacted by decadal variability;
- Define the vulnerability of commercial species to climate change and identify which species would be most likely to experience shifts in spatial distributions;
- Engage the global earth system modelling community in modelling climate change effects on marine ecosystems and identify opportunities for collaborations;
- Build response scenarios for how the human community will respond to climate change.
- **Communication and integration of science through international symposiums:**
 - Publish results in peer reviewed literature;
 - Serve as symposium/session co-convenors;
 - Assist in preparing and convening the PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (May 2012, Yeosu, Korea).

Phase 2: 2015-2017

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic sessions and workshops;
- Update and improve forecasts with IPCC AR5 scenarios;
- Convene an international symposium in 2016;
- Develop regional synthesis reports;
- Initiate inter-sessional training for projecting climate change impacts on marine ecosystems;
- Continue collaboration with global climate change research community.

Phase 3: 2018-2020

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic Sessions and workshops;
- Update and improve predictions with IPCC AR6 scenarios;
- Develop regional synthesis reports;
- Convene an international symposium in 2018.

Section on *Human Dimensions of Marine Systems* (S-HD)

Parent Committee: Science Board

Duration: lifetime of FUTURE

Objective

To better understand and communicate the societal implications of the conditions and future trends of North Pacific marine ecosystems (FUTURE vision), to provide a forum for the integration of FUTURE-related studies using social science approaches and tools, and to facilitate the close discussions and communications among researchers from both the natural and social sciences.

Terms of Reference (approved at PICES-2011)

Section on *Human Dimensions of Marine Systems* (S-HD) is the scientific body responsible for the promotion, coordination, integration and synthesis of research activities related to the contribution of the social sciences to the second PICES integrative science program on “*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Ecosystems*” (FUTURE), to PICES Scientific Committees, and to PICES as an organization.

1. S-HD will work towards SCIENTIFIC clarification of differences in societal objectives and needs among stakeholders in different sectors and countries. Based on that result, S-HD will develop an inventory of potential recipients, and their communication requirements for FUTURE and other PICES products, such as the state of the ocean reports (FUTURE Objective 2).

2. Based in part on the results of TOR 1, and with close coordination and communication with the Advisory Panel on *Status, Outlooks, Forecasts, and Engagement* (SOFE-AP) and other expert groups within PICES, S-HD will SCIENTIFICALLY explore the consequences to and responses of human social systems to factors such as climate-induced changes in marine ecosystems (FUTURE key question 3.4). Social science tools summarized in Table 3.1 of the final report of the Study Group on *Human Dimensions* will be applied to such an analysis.
3. S-HD will contribute a Human Dimension Chapter to the next North Pacific Ecosystem Status Report (FUTURE Objective 2).
4. S-HD will facilitate academic cooperation with other international research activities such as ICES, IMBER, LOICZ, *etc.*, and organize a symposium on the study of the human dimensions of marine ecosystems.

Study Group on *Marine Pollutants*

Parent Committee: MEQ

Duration: 1 year

Description and Statement of Purpose

The purpose of the proposed Study Group on *Marine Pollutants* (SG-MP) is to identify novel or promising approaches to monitoring pollutant trends over space and time, and to evaluate impacts on biota at the population level. The Study Group will establish a list of priority substances and pollutant indicators in PICES member countries using a series of case studies (*e.g.*, microplastics in seawater, seabird egg monitoring for persistent organic pollutants (POPs) over time; risk-based ranking of complex pollutant mixtures in sediments). This will help identify those methods or approaches that would benefit from harmonization (*e.g.*, characterization of heterogenous microplastic content in seawater or biota), and improve data delivery and scientific advice to managers and stakeholders.

While the Study Group will focus on impacts to biota, linkages will be established with those efforts that describe socio-economic impacts of pollution (*e.g.*, fisheries closures, consumption guidelines, impacts on endangered species, special vulnerability of coastal and indigenous peoples). Input from regional and international bodies such as ICES (International Council for the Exploration of the Sea), GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) and NOWPAP (Northwest Pacific Action Plan), will increase efficiencies and the scientific value of the SG-MP outcome.

The establishment of SG-MP is consistent with the FUTURE Science Plan component 3 (*How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?*), and contribute insight into the structure, function and resilience of ecosystems as in components 1 and 2. This will provide a critical evaluation of highly complex pollutant mixtures, clarify priority concerns in the North Pacific, and provide a platform to evaluate the relative importance of pollutants compared to other stressors.

Terms of Reference

1. Identify novel or promising approaches to operational marine pollution assessment in PICES member countries by:
 - a. establishing a list of priority pollutant concerns for each of the PICES member countries;
 - b. identifying useful indicators of status, trends and effects; and
 - c. identifying those issues or methods that would benefit from harmonization.
2. Identify interactions within PICES scientific committees and expert groups that will complement the Study Group and will be consistent with the ecosystem approach espoused by FUTURE.
3. Explore potential partnerships with other professional or multilateral organizations (*e.g.*, ICES, GESAMP, NOWPAP) which could lead to joint activities (working group, sessions, publications), improve efficiencies and strengthen scientific outcomes.
4. Develop recommendations for a possible PICES Working Group on marine pollutants.

GC Appendix A

2011 Governing Council decisions

2011/A/1: Auditor

- i. Council accepted the audited accounts for *FY* 2010.
- ii. Council authorized the Executive Secretary to sign a new 3-year contract (for *FYs* 2012-2014) with the current auditor *Flader, Hale & Hughesman*.

2011/A/2: Annual contributions

- i. Council instructed the Executive Secretary to send a letter commending Contracting Parties for their performance in submitting annual contributions for *FY* 2011, and describing the difficulties that late and/or partial payment causes the Organization.
- ii. Council re-iterated that for planning of their funding requests for annual contributions, Contracting Parties should continue to use the guideline generally accepted at PICES-1999 (Decision 1999/A/2(ii)), which states that the annual contributions will increase at the rate of inflation in Canada.

2011/A/3: Budget and fund-raising

- i. Council accepted the estimated accounts for *FY* 2011.
- ii. Council approved the *FY* 2012 budget of \$838,000. The amount of \$118,600 will be transferred from the Working Capital Fund to balance the budget, setting the total annual contribution at \$719,400, and the 2012 annual fee at \$119,900 per Contracting Party.
- iii. Council approved a transfer from the Working Capital Fund to the Trust Fund to recover the 2011 expenses, and to restore the Trust Fund to the level of \$110,000 by the end of the fiscal year.
- iv. Council agreed that funds available from all completed projects in the Working Capital Fund as of December 31, 2011, be allocated for the development of the PICES integrative science program on “*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Ecosystems*” (FUTURE), with the provision that the funds should be used over the next three years.
- v. Council instructed the Executive Secretary to send a letter to the Contracting Parties providing information on planned activities for FUTURE and requesting contributions to these activities.
- vi. Council approved an additional lump sum employer contribution of \$20,000 to the International Fisheries Commission Pension Plan to pay down unfunded liabilities.

2011/A/4: PICES Strategic Plan

Council approved the PICES Strategic Plan developed by the Study Group on *Updating the PICES Strategic Plan* (SG-USP).

2011/A/5: Yeosu Declaration

Council accepted an invitation for PICES to be represented on the International Review Committee of the Yeosu Declaration pursued as part of the legacy of the Ocean Expo-2012 Yeosu Korea to be held from May 12 to August 12, 2012, under the theme of “*The Living Ocean and Coast: Diversity of Resources and Sustainable Activities*”.

2011/A/6: UN Regular Process (UNRP) for Global Reporting and Assessment of the State of the Marine Environment

Council instructed the Executive Secretary to inform the UN Division for Ocean Affairs and the Law of the Sea of PICES’ interest in conducting scientific peer review of UNRP regional assessments of North Pacific marine ecosystems, and in being involved in the regional workshops for the North Pacific and East Asian marginal seas.

2011/A/7: Future PICES Annual Meetings and 2012 inter-sessional Science Board meeting

- i. Council approved Japan’s request for \$40,000 to partially cover costs for PICES-2012 to be held from October 12–21, 2012, in Hiroshima. The theme of the meeting, “*Scientific challenge to the North Pacific ecosystem: Understanding and mitigation of the effects of natural and anthropogenic stress*”,

- was approved in principle at PICES-2010, and the theme description was finalized at the 2011 inter-sessional Science Board meeting.
- ii. Council accepted the offer of Canada to host PICES-2013 from October 11-20, 2013, in Nanaimo, British Columbia. Council approved in principle the proposed theme of the meeting, “*Communicating forecasts, uncertainty and consequences of ecosystem change to society*”, and instructed Science Board to finalize the theme description by the 2012 inter-sessional Science Board meeting.
 - iii. Following the established 6-year rotation cycle, Council requested China to explore the possibility of hosting PICES-2014, and inform the Secretariat on this matter by March 31, 2012.
 - iv. Council agreed to keep the same registration fee structure for PICES-2012 as for PICES-2010 and PICES-2011:

Type of registration fee	CDN \$
Regular	275
Early	200
Student	50
Spousal/guest	50

- v. Considering that most of the changes in the format of the Annual Meeting proposed in the final report of the Study Group on *Restructuring of the PICES Annual Meeting* (SG-RAM) are to be implemented at PICES-2011 and PICES-2012, Council agreed to discuss the effectiveness of the approved changes at the next Annual Meeting.
- vi. Council approved an inter-sessional Science Board meeting to be held in conjunction with a 3-day FUTURE implementation workshop to be hosted by Korea in Busan, immediately after the 2nd PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” in Yeosu, Korea.

2011/A/8: Intern Program

- i. Council instructed the Executive Secretary to invite Contracting Parties to provide voluntary contributions to support the Intern Program in 2012 and beyond.
- ii. Considering the current level of the stipend (\$2,000), funding available for the Intern Program, and stated intentions for contributions by Contracting Parties, Council agreed to initiate the process to recruit the 2012/2013 intern, with the understanding that the intern’s term will start no earlier than June 2012.

2011/A/9: Visiting Scientist Program

Council instructed the F&A Committee to review and revise, if necessary, the description of the PICES Visiting Scientist Program (inactive since its inception in 2002), in preparation for a discussion of the program at the 2012 inter-sessional Science Board meeting.

2011/A/10: Improvement of participation in PICES activities

- i. Council re-iterated the necessity for Contracting Parties to: (1) regularly review their national membership, and to provide the updated national membership list to the Secretariat by the first day of the calendar year (January 1), and (2) follow up on *Rule 1(ii)* of the PICES Rules of Procedure in providing the national delegation list for Annual Meetings. The national membership lists are required to maintain a historical record of PICES membership, and to assist in improving participation in the activities of the Organization. The national delegation lists are required to assist in better coordinating activities of the Standing Committees and their subsidiary bodies, and in better preparing the Annual Meeting.
- ii. In order to better assess problems existing in Contracting Parties with the participation of their scientists in the activities of the Standing Committees and their subsidiary bodies, and in the Annual Meetings of the Organization, Council instructed the Executive Secretary to continue to regularly preparing and circulate to Contracting Parties information, including graphic materials, on participation of their scientists in the Annual Meetings for the previous six years.

2011/S/1: 2012 PICES Annual Meeting

- i. The following scientific sessions are to be convened at PICES-2012:
 - ¾-day Science Board Symposium on “*Effects of natural and anthropogenic stressors in the North Pacific ecosystems: Scientific challenges and possible solutions*”;

- 1-day BIO Contributed Paper Session;
 - 1-day BIO/FIS Topic Session on “*Jellyfish in marine ecosystems and their interactions with fish and fisheries*” (co-sponsored by ICES);
 - ½-day BIO/FIS/POC Topic Session on “*Advances in understanding the North Pacific Subtropical Frontal Zone ecosystem*”;
 - ½-day BIO/MEQ Topic Session on “*Environmental contaminants in marine ecosystems: Seabirds and marine mammals as sentinels of ecosystem health*” (co-sponsored by JSPS);
 - ½-day BIO/MEQ/FUTURE Topic Session on “*Ecosystem responses to multiple stressors in the North Pacific*”;
 - 1-day FIS Contributed Paper Session;
 - ½-day FIS/MONITOR/POC Topic Session on “*Monitoring on a small budget: Cooperative research and the use of commercial and recreational vessels as sampling platforms for biological and oceanographic monitoring*”;
 - ½-day FIS/MEQ Topic Session on “*Abundance, ecological functions and ecosystem service of macrophyte vegetations as indicators of natural and anthropogenic stressors in coastal ecosystem and productivity*”;
 - ½-day MEQ Topic Session on “*Range extension, toxicity and phylogeny of epiphytic dinoflagellates*”;
 - 1-day MEQ/FUTURE Topic Session on “*Social-ecological systems on walleye pollock and other commercial gadids under changing environment: An inter-disciplinary approach*”;
 - ½-day MEQ/FUTURE Topic Session on “*Risk management in coastal zone ecosystems around the North Pacific*”;
 - 1-day MONITOR/POC Topic Session on “*Effects of natural and artificial calamities on marine ecosystems and the scheme for their mitigation*” (co-sponsored by JSFO and FRA);
 - 1-day POC Contributed Paper Session;
 - 1-day POC Topic Session on “*Challenges in understanding North Hemisphere climate variability and change*” (co-sponsored by CLIVAR and ICES);
 - ½-day POC/FIS Topic Session on “*Linking migratory fish behavior to end-to-end models II*”;
 - 1-day POC/TCODE Topic Session on “*Changing ocean biogeochemistry and its ecosystem impacts*” (co-sponsored by ICES and IMBER).
- ii. The following workshops are to be convened at PICES-2012:
- 1-day BIO Workshop on “*Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts*”;
 - 1-day BIO Workshop on “*Secondary production: Measurement methodology and its application on natural zooplankton community*”;
 - 1-day BIO Workshop on “*The feasibility of updating prey consumption by marine birds, marine mammals, and large predatory fish in the PICES regions*”;
 - 2-day BIO Workshop on “*Comparison of multiple ecosystem models in several North Pacific shelf ecosystems (MEMIP-IV)*”;
 - 1½-day MEQ Workshop on “*The contrasting cases of harmful algal blooms in the eastern and western Pacific in 2007 and 2011*”;
 - 1-day POC Workshop on “*Arctic–sub-Arctic interactions*” (co-sponsored by ESSAS).
- iii. The following business meetings are to be held at PICES-2012:
- ¼-day Science Board (SB) meeting (October 14) and ½-day SB meeting (October 19 afternoon and October 20);
 - 1½-hour overture meetings (October 14 evening) and ½-day meetings of Scientific and Technical Committees (October 17 afternoon);
 - 1-day meeting of the SB Section on *Human Dimensions of Marine Systems*;
 - 1-day meeting of the BIO/FIS/POC Section on *Climate Change Effects on Marine Ecosystems*;
 - 1-day meeting of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific*;
 - ½-day meeting of the POC/BIO Section on *Carbon and Climate*;
 - 1-day meeting of the MEQ Working Group on *Non-indigenous Aquatic Species*;
 - ½-day meeting of the FIS/MEQ Working Group on *Environmental Interactions of Marine Aquaculture*;
 - ½-day meeting of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim*;

- ½-day meeting of the POC Working Group on *North Pacific Climate Variability and Change*;
- 1-day meeting of the MEQ/BIO Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*;
- ½-day meeting of the POC Working Group on *Regional Climate Modeling*;
- 1-day meeting of the BIO Advisory Panel on *Marine Birds and Mammals*;
- ½-day meeting of the POC/MONITOR Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas*;
- ¼-day meeting of the MONITOR Advisory Panel on the *Continuous Plankton Recorder Survey in the North Pacific*;
- 1-day meeting of the MEQ Study Group on *Marine Pollutants*;
- ½-day concurrent meetings of the FUTURE Advisory Panels on *Anthropogenic Influences on Coastal Ecosystems, Climate, Oceanographic Variability and Ecosystems* and *Status, Outlooks, Forecasts, and Engagement*, preceded by ½-day joint meeting of these Panels.

2011/S/2: Inter-sessional symposia/sessions/workshops/meetings

The following inter-sessional events are to be convened/co-sponsored in 2012 and beyond:

- i. Symposia:
 - 2nd International Symposium on “*Effects of climate change on the world’s oceans*” (primary international sponsors: PICES, ICES and IOC), May 15–19, 2012, Yeosu, Korea;
 - ICES/PICES International Symposium on “*Forage fish interactions: Creating the tools for ecosystem based management of marine resources*”, November 8–12, 2012, Nantes, France.
- ii. Joint Theme Sessions:
 - CLIOTOP special session “*Global science for global governance of oceanic ecosystems and fisheries*” (co-sponsored by PICES) at the Planet Under Pressure Conference, March 26–29, 2012, London, UK;
 - Theme Sessions on “*Understanding, measuring and projecting the limits of resilience in marine ecosystems*” (A), “*Multidisciplinary perspectives in the use (and misuse) of science and scientific advice in Marine Spatial Planning*” (I), “*Subarctic-Arctic Interactions: Ecological consequences*” (M), and “*Sustainability of aquaculture*” (Q) at the 2012 ICES Annual Science Conference, September 17–21, 2012, Bergen, Norway.
- iii. Workshops and meetings:
 - PICES/MAFF Project Synthesis Workshop, March 20–23, 2012, Newport, Oregon, U.S.A.;
 - MEMIP (*Marine Ecosystem Model Inter-comparison Project*) workshop, spring 2012, Corvallis, U.S.A.;
 - FUTURE Implementation Workshop, May 22–24, 2012, Busan, Korea;
 - Inter-sessional Science Board meeting, May 24–25, 2012, Busan, Korea;
 - ICES/PICES/GEOHAB workshop on “*Climate change and harmful algal blooms*”, in conjunction with the meeting of the ICES Working Group on *Harmful Algal Bloom Dynamics*, spring 2012, TBD;
 - GLOBEC/PICES workshop on “*Forecasting ecosystem indicators with climate-driven process models*”, summer 2012, Friday harbor, WA, U.S.A.;
 - SCOR WG 137 workshop on “*Global patterns of phytoplankton dynamics in coastal ecosystems: Comparative analysis of time series observations*” (co-sponsored by PICES), October 2012, prior to PICES-2012, Hiroshima, Japan.
- iv. Capacity development events:
 - PICES/MAFF Workshop on “*Introduction to Rapid Assessment Survey methodologies for detecting non-indigenous marine species*” (co-sponsored by FRA, NOWPAP and WESTPAC), February 8–9, 2012, Nagasaki, Japan;
 - PICES/MAFF training course on screening methods for testing shellfish for paralytic shellfish poisoning toxins and phytoplankton identification, February 17–22 (Jakarta) and February 23–24 (Lombok Island), 2012, Indonesia;
 - PICES/MAFF Harmful Algal Bloom workshop to review data collected by High Performance Liquid Chromatography and Mass Spectrometry methods, and to provide outreach for the project, March 5–9, 2012, Guatemala;
 - Second ICES/PICES Conference for Early Career Scientists on “*Oceans of Change*”, April 24–27, 2012, Majorca, Spain;

- IMBER Workshop on “Needs assessment for capacity development for integrated marine biogeochemistry and ecosystem research in the Asia-Pacific region” (co-sponsored by PICES), summer 2012, Shanghai, China;
- IMBER-led international ClimECO3 Summer School on “A view towards Earth System models: Human-natural system interactions in the marine world” (co-sponsored by PICES), July 23–28, Ankara, Turkey;
- PICES Summer School on “Ocean observing systems”, August 2013, Hatfield Marine Science Center, Newport, U.S.A.

2011/S/3: Travel and representation at the meetings of other organizations/programs

- i. 2012 PICES Annual Meeting:
 - Invited speakers for Science Board Symposium and Topic Sessions, with the normal allocation of approximately \$5,000 per Committee/Program; additional requests are subject to fund availability;
 - One invited speaker for each of the approved workshops (see 2011/S/1(ii)).
- ii. Inter-sessional events:
 - PICES (MEQ) representative to participate in the 3rd Intergovernmental Review Meeting of the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (January 25–27, 2012, Manila, Philippines);
 - PICES (TCODE) representative to attend the IODE SG-ODP (IOC/IODE Study Group for the Ocean Data Portal) meeting (February 20–22, 2012, Oostende, Belgium);
 - PICES representative to participate in the workshop on “Salmon ocean ecology” (March 20–22, 2012, Newport, U.S.A.);
 - PICES (MONITOR) representative to attend the ICES WGNARS (Working Group on the Northwest Atlantic Regional Sea) meeting (March 6–8, 2012, Falmouth, MA, U.S.A.);
 - PICES invited speaker for the CLIOTOP special session “Global science for global governance of oceanic ecosystems and fisheries” at the Planet Under Pressure Conference (March 26–29, 2012, London, UK);
 - PICES (TCODE) representative to attend the IODE GE-BICH (IOC/IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices) meeting (March 26–30, 2012, Oostende, Belgium);
 - PICES (S-HAB) representative to participate in the planning meeting for the ICES/PICES/GEOHAB workshop on “Climate change and harmful algal blooms” (early 2012, venue TBD);
 - PICES coordinators for the 2nd ICES/PICES Conference for Early Career Scientists on “Oceans of Change” (April 24–27, 2012, Majorca, Spain);
 - PICES (POC/WG 27) representative to attend the CLIVAR Pacific Implementation Panel meeting (April 29–May 1, 2012, Noumea, New Caledonia);
 - PICES convenor for the workshop on “Climate change projections for marine ecosystems: Best practice, limitations and interpretation” (May 13–14, 2012, Yeosu, Korea);
 - PICES representative to attend the 2012 IOC Executive Council Meeting (June 25–29, 2012, Paris, France);
 - PICES representatives and convenors for the joint sessions to participate in the ICES Annual Science Conference (September 17–21, 2012, Bergen, Norway);
 - PICES representative (S-CC) to participate in the 3rd International Symposium on “Oceans in high-CO₂ world” (September 24–27, 2012, Monterey, U.S.A.);
 - PICES representative to attend the NPAFC Annual Meeting (October 7–12, 2012, St. Petersburg, Russia);
 - PICES representative to attend the SCOR General Meeting (October 22–26, 2012, Halifax, Canada);
 - PICES convenor for the International Symposium on “Forage fish interactions: Creating the tools for ecosystem based management of marine resources” (November 8–12, 2012, Nantes, France).

2011/S/4: Publications

- i. The following publications are to be produced in primary journals in 2012–2013:
 - Special issue of *Aquaculture Economics and Management* based on selected papers from the PICES-2010 Topic Session on “Economic relation between marine aquaculture and wild capture fisheries” (Guest Editor: M. Pang) to be published in spring 2012;

- Special issue of *ICES Journal of Marine Science* based on selected papers from the 2011 PICES/ICES Zooplankton Production Symposium on “*Population connections, community dynamics and climate variability*” (Guest Editors: J. Keister, C. Johnson and D. Bonnet) to be published in summer 2012;
 - Review paper on Fraser River sockeye salmon and their marine environment in *Reviews in Fish Biology and Fisheries* (Lead Author: S. McKinnell) to be published in 2012;
 - Synthesis paper from the 2010 PICES/ICES/FAO Symposium on “*Forecasting climate change impacts on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” in *Nature* (Lead author: A. Hollowed) to be published in 2012;
 - Special issue of *Journal of Marine Systems* on modeling dedicated to Dr. Bernard Megrey (Guest Editors: E. Curchitser and S. I. Ito) to be published in May 2013;
 - Special issue of *ICES Journal of Marine Science* based on selected papers from the 2nd International Symposium on “*Effects of climate change on the world’s oceans*” to be published in 2013.
- ii. The following publications are to be produced in PICES Scientific Report series in 2012:
- Final report of the Study Group on *Human Dimensions for Environmental Change* (Editor: M. Makino);
 - Final report of the Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (Editors: F. Chai and S. Takeda);
 - Final report of the Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (Editor: W. Peterson);
 - Final report of the Working Group on *Environmental Interactions of Marine Aquaculture* (Editors: K. Abo, I. Burgetz, B. Dumbauld and S. Johnson);
 - Final report of the Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (Editors: A. Hollowed and S. Kim);
 - PICES Advisory Report to the Cohen Commission on “*The decline of Fraser River sockeye salmon in relation to marine ecology*” (Editor: S. McKinnell) – reproduction of the web-based Cohen Commission Technical Report No. 4;
 - Final report of the Climate Change and Carrying Capacity Program (Editors: H. Batchelder).
- iii. Other publications to be produced in 2012 include:
- Atlas of non-indigenous marine and estuarine species in the North Pacific (Editors: H. Lee II and D. Reusser) to be published on the website;
 - Develop a chapter on the biology of anadromous coastal cutthroat trout for the NPAFC 20th anniversary publication project on updating the life histories of Pacific salmon (invitation by NPAFC);
 - Two regular issues of PICES Press to be published on the website and distributed electronically in January (Vol. 20, No. 1) and July (Vol. 20, No. 2) of 2012;
 - PICES E-news to be published on the website and distributed electronically bimonthly;
 - Brochures and slide shows for policy makers, managers, stakeholders and other interested members of society developed, under directions of the FUTURE Advisory Panel on *Status, Outlooks, Forecasts, and Engagement*, based (tentatively) on the final report of the MEQ Working Group on *Ecosystem-based Management Science and its Application to the North Pacific* (PICES Scientific Report, 2010, No. 37, 166 pp.), the Second North Pacific Ecosystem Status Report (PICES Special Publication, 2010, No. 4, 393 pp.) and the final report of the PICES/MAFF project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” (March 2012);
 - Book of Abstracts for the Second International Symposium on “*Effects of climate change on the world’s oceans*” (May 14–20, 2012, Yeosu, Korea);
 - Announcement, poster and Book of Abstracts for PICES-2012 (October 12–21, 2012, Hiroshima, Japan).
- iv. All member countries consider that the supplementary chapter for the Second North Pacific Ecosystem Status Report (PICES Special Publication No. 4, 2010) developed by the Advisory Panel for a CREAMS/PICES Program in East Asian Marginal Seas and endorsed for publication by Science Board, is an important scientific product of PICES, and agree to keep this agenda item open to allow member country governments to reflect further on this issue.

2011/S/5: Future of current PICES expert groups

- i. The following expert groups completed their terms of reference and should be disbanded:
 - BIO Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23; October 2007–October 2011);
 - FIS/POC Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (joint PICES/ICES WG-FCCIFS; October 2008–October 2011);
 - Science Board Study Group on *Human Dimensions for Environmental Change* (SG-HD; October 2009–October 2011);
 - PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* (SG-SP; October 2009–October 2011);
 - Study Group on *Updating the PICES Strategic Plan* (SG-USP; October 2009–October 2011);Final reports of the first three expert groups will be published in 2012 in the PICES Scientific Report series. The SG-SP final report and the approved new PICES Strategic Plan will be included in the 2011 PICES Annual Report.
- ii. To complete its terms of reference, the life span of the FIS/MEQ Working Group on *Environmental Interactions of Marine Aquaculture* (WG 24) was extended for 1 year (until October 2012). The draft of the WG 24 final report has to be completed by PICES-2012.
- iii. Following a review by the parent committee, the lifespan of the BIO Advisory Panel on *Marine Birds and Mammals* (MBM-AP) was extended for a 3-year term (until October 2014), with revised terms of reference as described in *GC Appendix B*;
- iv. Following a review by the parent committee, the lifespan of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB) was extended for a 3-year term (until October 2014), pending approval of revisions to terms of reference described in *GC Appendix B* at the 2012 inter-sessional Science Board meeting.

2011/S/6: New PICES expert groups

- i. The following new Working Groups, with terms of reference as described in *GC Appendix B*, were established in the interim period:
 - POC Working Group on *North Pacific Climate Variability and Change* (WG 27);
 - BIO/MEQ Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28).
- ii. The following new expert groups, with terms of reference as described in *GC Appendix B*, were established at PICES-2011:
 - POC Working Group on *Regional Climate Modeling* (WG 29);
 - BIO/FIS/POC Section on *Climate Change Effects on Marine Ecosystems* (S-CCME);
 - Science Board Section on *Human Dimensions of Marine Systems* (S-HD);
 - MEQ Study Group on *Marine Pollutants* (SG-MP).

2011/S/7: Chairmen/Vice-Chairmen for Standing Committees and Co-Chairmen for *ad hoc* expert groups

- i. The following reflects new appointments for *ad hoc* expert groups in the interim period:
 - Drs. Richard Brodeur (U.S.A.), Young-Shil Kang (Korea) and Shin-ichi Uye (Japan) were appointed as Co-Chairmen of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences*;
 - Drs. Michael Foreman (Canada), Emanuelle Di Lorenzo (U.S.A.) and Shoshiro Minobe (Japan) were appointed as Co-Chairmen of the POC Working Group on *North Pacific Climate Variability*.
 - Dr. Motomitsu Takahashi (Japan) was appointed as Co-Chairman of the BIO/MEQ Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*.
- ii. The following reflects changes in Chairmanship and Vice-Chairmanship for Standing Committees and new appointments for expert groups at PICES-2011:
 - Dr. Elizabeth Logerwell (U.S.A.) was elected FIS Chairman to replace Dr. Mikhail Stepanenko (Russia);
 - Dr. Xianshi Jin (China) was elected FIS Vice-Chairman to replace Dr. Gordon Kruse (U.S.A.);

- Dr. Won-Duk Yoon (Korea) was appointed as Co-Chairman of the BIO Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* to replace Dr. Young-Shil Kang (Korea);
- Drs. Changkyu Lee (Korea) and Vera Trainer (U.S.A.) were re-appointed as Co-Chairmen of the MEQ Section on *Ecology of Harmful Algal Blooms in the North Pacific* for a 3-year term;
- Drs. Rolf Ream (U.S.A.) and Yutaka Watanuki (Japan) were re-appointed as Co-Chairmen of the BIO Advisory Panel on *Marine Birds and Mammals* for a 3-year term.

2011/S/8: Relations with other organizations and programs

- i. Council approved the revised *Standing List of International and Regional Organizations and Programs* developed by Science Board and agreed with the identified priorities for interaction in 2011–2012.
- ii. Council approved in principle the report of the joint PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science*, and agreed with identified focal research and operational areas that can be enhanced by greater cooperation between the two organizations. The adopted framework will serve as the basis for linkages of PICES and ICES science plans and longer term strategic planning.
- iii. Council agreed to appoint an associate PICES member, Dr. Lisa Miller (Section on *Carbon and Climate*, Canada) to serve on the SCOR Working Group on *Biogeochemical Exchange Processes at the Sea-Ice Interfaces*.

GC Appendix B

Advisory Panel on Marine Birds and Mammals (MBM-AP)

Parent Committee: BIO

Duration: 3 years

Terms of Reference (updated and approved at PICES-2011)

1. Provide information and scientific expertise to the Biological Oceanography Committee and the FUTURE Program, and, when necessary, to other scientific and technical committees, with regard to the biology and ecological roles of marine mammals and seabirds in the PICES region;
2. Identify important problems, scientific questions, and knowledge gaps for understanding the impacts of climate change and anthropogenic factors on marine mammals and seabirds and ecosystems in the PICES region through Workshops, Theme Sessions and Scientific Reports;
3. Assemble information on the status and key demographic parameters of marine mammals and seabirds and contribute to the Status Reports and Outlooks;
4. Improve collaborative, interdisciplinary research with marine mammal and seabird experts and the PICES scientific community.

Section on Ecology of Harmful Algal Blooms in the North Pacific (S-HAB)

Parent Committee: MEQ

Duration: 3 years

Terms of Reference (updated at PICES-2011 and under revision)

1. Continue PICES member country data entry into the joint ICES-PICES harmful algal event database to allow global comparison of changes in harmful algal bloom occurrences.
2. Convene workshops and sessions including joint sessions with other international organizations to evaluate and compare results and maintain an awareness of state-of-the-art advances outside the PICES community.

3. Convene a joint PICES/ ICES workshop to assess the purported links between climate change and HAB character, frequency and severity, and publish a comprehensive review paper that identifies the near- and long-term research priorities and the monitoring structures needed to effectively hindcast and forecast future HAB events.
4. Produce and post on the PICES website papers that document the unanimous HAB Section opinion on timely subjects related to HABs, including topics related to FUTURE such as how human activities (increased cultural eutrophication and climate changes including temperature, changes in stratification and ocean acidification) might affect harmful algal bloom incidence and magnitude.

Working Group on *North Pacific Climate Variability and Change* (WG 27)

Parent Committee: POC

Duration: 3 years

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 (approved at the 2011 inter-sessional Science Board meeting)

1. Develop conceptual frameworks and low-order models of North Pacific climate variability and change, which can be used by climate researchers to investigate the mechanisms of those variations and by ecosystem scientists to explore hypotheses linking ecosystem dynamics and physical climate.
2. Summarize the current understanding of mechanisms of Pacific climate variability and change, and evaluate the strengths of the underlying hypotheses with supporting evidence.
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 a method 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.

**Working Group on Development of Ecosystem Indicators
to Characterize Ecosystem Responses to Multiple Stressors (WG 28)**

Parent Committees: BIO and MEQ

Duration: 3 years

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 PICES WG 22 on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (iron chemistry in low pH ocean, anthropogenic dust flux), PICES WG 23 on *Comparative Ecology of Krill in Coastal and Oceanic Waters Around the Pacific Rim* (hypoxia impact on euphausiids), and PICES WG 21 on *Non-indigenous Aquatic Species* (non-indigenous marine species) thereby highlighting the need for integrative studies.

Terms of Reference (approved at the 2011 inter-sessional Science Board meeting)

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; identify trends in these stressors, if possible.
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 2011 PICES FUTURE Inter-sessional 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/change, assessing their applicability to North Pacific ecosystems and identify 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 and evaluate the potential to identify vulnerable ecosystem components.
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. This WG will focus primarily on delivery of FUTURE Questions 3 and 1.

Working Group on Regional Climate Modeling (WG 29)

Parent Committee: POC

Duration: 3 years

Motivation

With the realization that physically-based future climate projections are the starting point for many socio-economic impact and adaptation considerations to future climate change and that global climate models, although they capture large scale climate behaviour, have limitations for regional assessments due to their coarse spatial resolutions, a working group is proposed to assess state-of-the-art regional climate modeling efforts, their implications for regional ecosystem studies and to further their development in the North Pacific Ocean and its marginal seas.

Terms of Reference (approved at PICES-2011)

1. Assemble a comprehensive review of existing regional climate modeling efforts.
2. Assess the requirements for regional ecosystem modeling studies (*e.g.*, how to downscale the biogeochemistry).
3. Continue the development of RCM implementations in the North Pacific and its marginal seas.
4. Convene special sessions and inter-session workshops dedicated to the RCM topic.
5. Publish report and/or review paper on best practices for regional coupled modeling.
6. Establish connections between PICES and climate organizations (*e.g.*, CLIVAR) and global climate modeling centers (*e.g.*, NCAR, JAMSTEC, CCCMA).
7. Collaborate with other PICES expert groups such as WG-27, S-CCME and the FUTURE Advisory Panels possibly by producing “Outlooks”.
8. Publish a final report summarizing results.

Section on Climate Change Effects on Marine Ecosystems (S-CCME)

(joint expert group with ICES Strategic Initiative on *Climate Change Effects on Marine Ecosystems*)

Parent Committees: BIO, FIS and POC

Duration: lifetime of FUTURE

S-CCME Goals (approved at PICES-2011)

- Define, coordinate and integrate the research activities needed to understand, assess and project climate change impacts on marine ecosystems;
- Plan strategies for sustaining the delivery of ecosystem goods and services, and when possible predictions should include quantifying estimations of uncertainty;
- Define and quantify the vulnerability and sustainability of marine ecosystems to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use;
- Build global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.

Core Elements of S-CCME Implementation Plan Phases (3 years in duration)

- Synthesis of existing knowledge;
- Advancement of new science and methodology;
- Communication of research findings.

Phase 1: 2012-2014

- **Synthesis of existing knowledge:**
 - Complete synthesis papers from the 2010 Sendai Symposium and 2012 Yeosu Symposium;
 - Interpret the vulnerabilities of marine ecosystems to changing climate.
- **Advancement of new science and methodology:**

- Identify techniques for predicting climate change impacts in systems impacted by decadal variability;
- Define the vulnerability of commercial species to climate change and identify which species would be most likely to experience shifts in spatial distributions;
- Engage the global earth system modelling community in modelling climate change effects on marine ecosystems and identify opportunities for collaborations;
- Build response scenarios for how the human community will respond to climate change.
- **Communication and integration of science through international symposiums:**
 - Publish results in peer reviewed literature;
 - Serve as symposium/session co-convenors;
 - Assist in preparing and convening the PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (May 2012, Yeosu, Korea).

Phase 2: 2015-2017

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic sessions and workshops;
- Update and improve forecasts with IPCC AR5 scenarios;
- Convene an international symposium in 2016;
- Develop regional synthesis reports;
- Initiate inter-sessional training for projecting climate change impacts on marine ecosystems;
- Continue collaboration with global climate change research community.

Phase 3: 2018-2020

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic Sessions and workshops;
- Update and improve predictions with IPCC AR6 scenarios;
- Develop regional synthesis reports;
- Convene an international symposium in 2018.

Section on *Human Dimensions of Marine Systems* (S-HD)

Parent Committee: Science Board

Duration: lifetime of FUTURE

Objective

To better understand and communicate the societal implications of the conditions and future trends of North Pacific marine ecosystems (FUTURE vision), to provide a forum for the integration of FUTURE-related studies using social science approaches and tools, and to facilitate the close discussions and communications among researchers from both the natural and social sciences.

Terms of Reference (approved at PICES-2011)

Section on *Human Dimensions of Marine Systems* (S-HD) is the scientific body responsible for the promotion, coordination, integration and synthesis of research activities related to the contribution of the social sciences to the second PICES integrative science program on “*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Ecosystems*” (FUTURE), to PICES Scientific Committees, and to PICES as an organization.

1. S-HD will work towards SCIENTIFIC clarification of differences in societal objectives and needs among stakeholders in different sectors and countries. Based on that result, S-HD will develop an inventory of potential recipients, and their communication requirements for FUTURE and other PICES products, such as the state of the ocean reports (FUTURE Objective 2).

2. Based in part on the results of TOR 1, and with close coordination and communication with the Advisory Panel on *Status, Outlooks, Forecasts, and Engagement* (SOFE-AP) and other expert groups within PICES, S-HD will SCIENTIFICALLY explore the consequences to and responses of human social systems to factors such as climate-induced changes in marine ecosystems (FUTURE key question 3.4). Social science tools summarized in Table 3.1 of the final report of the Study Group on *Human Dimensions* will be applied to such an analysis.
3. S-HD will contribute a Human Dimension Chapter to the next North Pacific Ecosystem Status Report (FUTURE Objective 2).
4. S-HD will facilitate academic cooperation with other international research activities such as ICES, IMBER, LOICZ, *etc.*, and organize a symposium on the study of the human dimensions of marine ecosystems.

Study Group on *Marine Pollutants*

Parent Committee: MEQ

Duration: 1 year

Description and Statement of Purpose

The purpose of the proposed Study Group on *Marine Pollutants* (SG-MP) is to identify novel or promising approaches to monitoring pollutant trends over space and time, and to evaluate impacts on biota at the population level. The Study Group will establish a list of priority substances and pollutant indicators in PICES member countries using a series of case studies (*e.g.*, microplastics in seawater, seabird egg monitoring for persistent organic pollutants (POPs) over time; risk-based ranking of complex pollutant mixtures in sediments). This will help identify those methods or approaches that would benefit from harmonization (*e.g.*, characterization of heterogenous microplastic content in seawater or biota), and improve data delivery and scientific advice to managers and stakeholders.

While the Study Group will focus on impacts to biota, linkages will be established with those efforts that describe socio-economic impacts of pollution (*e.g.*, fisheries closures, consumption guidelines, impacts on endangered species, special vulnerability of coastal and indigenous peoples). Input from regional and international bodies such as ICES (International Council for the Exploration of the Sea), GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) and NOWPAP (Northwest Pacific Action Plan), will increase efficiencies and the scientific value of the SG-MP outcome.

The establishment of SG-MP is consistent with the FUTURE Science Plan component 3 (*How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?*), and contribute insight into the structure, function and resilience of ecosystems as in components 1 and 2. This will provide a critical evaluation of highly complex pollutant mixtures, clarify priority concerns in the North Pacific, and provide a platform to evaluate the relative importance of pollutants compared to other stressors.

Terms of Reference

1. Identify novel or promising approaches to operational marine pollution assessment in PICES member countries by:
 - a. establishing a list of priority pollutant concerns for each of the PICES member countries;
 - b. identifying useful indicators of status, trends and effects; and
 - c. identifying those issues or methods that would benefit from harmonization.
2. Identify interactions within PICES scientific committees and expert groups that will complement the Study Group and will be consistent with the ecosystem approach espoused by FUTURE.
3. Explore potential partnerships with other professional or multilateral organizations (*e.g.*, ICES, GESAMP, NOWPAP) which could lead to joint activities (working group, sessions, publications), improve efficiencies and strengthen scientific outcomes.
4. Develop recommendations for a possible PICES Working Group on marine pollutants.

REPORT OF THE FINANCE AND ADMINISTRATION COMMITTEE

The Finance and Administration (hereafter F&A) Committee met from 09:00–13:30 hours on October 19, 2011, under the chairmanship of Ms. Patricia Livingston.

AGENDA ITEM 1

Opening remarks

The Chairman called the meeting to order, welcomed the participants and requested an introduction of members for each delegation. All Contracting Parties were present at the meeting (*F&A Endnote 1*). China was requested to clarify the status of the designated F&A Committee members who no longer attend PICES Annual Meetings.

AGENDA ITEM 2

Adoption of agenda

The Committee reviewed and approved the provisional agenda (circulated on August 2, 2011) without modification, although it was agreed to have a discussion of the PICES Visiting Scientist Program under Agenda Item 15 (*F&A Endnote 2*).

AGENDA ITEM 3

Audited accounts for FY 2010

The FY 2010 financial statements were submitted to *Flader, Hale & Hughesman* (formerly *Flader and Hale*, PICES external auditor for FYs 2009–2011) on March 23, 2011, and the Auditor's Report was completed on April 21, 2011. The report (*F&A Endnote 3*) was electronically circulated to all Contracting Parties on May 10, 2011. In the auditor's opinion, the financial statements are an accurate representation of the financial position of the Organization as of December 31, 2010, and the results of its operations and changes in the fund balances are in accordance with Canadian generally accepted accounting principles. The Committee noted that the auditing process was in line with the PICES Financial Regulations (*Regulation 11(ii)* and *Regulation 13*) and recommended that the Auditor's Report be approved by Council.

The Committee also discussed the procedure for selecting an external auditor for FYs 2012–2014 and recommended that Governing Council (hereafter Council) authorize the Executive Secretary to sign a new 3-year contract with the current auditor, given their familiarity with PICES operations.

AGENDA ITEM 4

Annual contributions

As stated in *Regulation 5(ii)* of the PICES Financial Regulations, all national contributions to PICES “shall be considered due as of the first day of the financial year (January 1) to which they relate”. The Executive Secretary pointed out that a letter commending Contracting Parties for their performance in submitting annual contributions for FY 2010, and describing difficulties that late and/or partial payment causes the Organization (Decision 2010/A/2(i)) was sent on November 15, 2010, simultaneously with a request for payment of the 2011 annual fees. He also reported on the 2011 annual fee payment dates, and provided information on the payment of national contributions for the period from 2005 to 2011 (*Endnote 4*). The Committee noted that all Contracting Parties met their financial obligations for FY 2011. Even though only Japan and the United States paid prior to the due date (January 1, 2011), the timeliness of payment from most other Contracting Parties is stable.

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The Committee confirmed its previous recommendation that for planning purposes, Contracting Parties should continue to use the guideline generally accepted at PICES-1999 (Decision 1999/A/2(ii)), which states that “*the annual contributions will increase at the rate of inflation in Canada*”. This should assist Contracting Parties in preparing timely funding requests to cover annual contributions, and assist the Executive Secretary in developing future budgets. The Committee discussed the method for computing the Consumer Price Index (CPI) and recommended that the average of the monthly values from July of the previous year to July of the current year be used for determining the rate of increase in the future.

AGENDA ITEM 5

Fund-raising activities

Annual contributions increasing only at the rate of inflation in Canada can impede improvement and development of the Organization. Therefore, fund-raising continues to be an important component of PICES activities. All types of contributions are equally valuable to PICES.

The level of external funding has increased significantly over the last several years. In 2010, the amount of funds from voluntary contributions, grants, and partnerships for various activities initiated or sponsored by PICES exceeded, for the first time, the total annual contributions by Contracting Parties. In 2011, these two numbers are expected to be close, indicating the Organization’s large dependence on outside funding.

The Executive Secretary reported on fund-raising efforts for the period since PICES-2010 and pointed out that special emphasis was put on fund raising for the 2011 Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*” (Pucón, Chile), 2012 PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (Yeosu, Korea), the North Pacific Continuous Plankton Recorder (NP CPR) survey, and capacity building activities (*F&A Endnote 5*). With respect to the NP CPR program, it was noted that it appears to have relatively secure funding until 2013 and some funding available into 2016. It was also indicated that the report on the program’s achievements is useful to Contracting Parties as they seek to obtain continued funding for the program. There was discussion about the interest of Contracting Parties who are not currently supporting the program in expanding or revising the program to include transects that might encourage their involvement in and support of the program. Contracting Parties agreed that they would report to the Committee at PICES-2012 about their interests and what the conditions might be for funding the program in the future.

AGENDA ITEM 6

Encumbered funds

The Executive Secretary provided information on the amount of funds in the Working Capital Fund restricted for specific purposes (encumbered funds) at the beginning of *FY* 2011, and the estimated amount of the encumbered funds for the fiscal year end. It was indicated that the residual funds from the 2010 Sendai Symposium on “*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*” that had been allocated for funding the 2012 PICES/ICES Early Career Scientists (ECS) Conference (Decision 2010/A/3(vii)), were instead, after consultation with ICES colleagues, donated for the recovery of the fisheries and marine sciences in the Tohoku region impacted by the March 11 Great East Japan Earthquake and tsunami. This donation was used as a core contribution to a fund established by the Japanese Society of Fisheries Oceanography (JSFO). To compensate for that, \$45,000 of the PICES-2010 Fund surplus were transferred to the 2012 ESC Conference Fund.

AGENDA ITEM 7

Financing of high priority projects

At PICES-2007, the Committee discussed the use of the encumbered funds designated for high-priority PICES projects and suggested that \$40,000 be earmarked for the development of the new PICES integrative scientific program, FUTURE (*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems*), and the remainder (\$103,092) be assigned for the preparation of the next North Pacific Ecosystem Status Report (Decision 07/A/3(v)). In 2008, additional funds for both these activities became available. A transfer of \$21,996 from the High Priority Projects Fund to the FUTURE fund was made in 2010 (Decision 2010/A/3(v)). Given current plans, the North Pacific Ecosystem Status Report appears to have sufficient financial support in the near-term. However, the balance remaining for the development of FUTURE activities is small (\$7,189). There was some discussion about the financial needs of FUTURE. Last year, it was recommended that a 3-year workplan be developed for FUTURE in order to assist the F&A Committee with making funding recommendations to Council and to assist Contracting Parties in identifying activities for which they may wish to provide additional funding. Receipt of this workplan continues to be a priority in order to make informed decisions about the use of PICES funds in the coming years. Korea indicated that they are aware that FUTURE Advisory Panels submitted a set of three proposals for the Yeosu project funding that were not successful and indicated that there may be another opportunity to resubmit proposals in early 2012. Given the current lack of funding allocated specifically to FUTURE, the Committee recommended the approval by Council for the available balance of funds from completed projects in the Working Capital Fund as of December 31, 2011 be allocated to FUTURE, with the provision that the funds should be used over the next three years.

Capacity-building activities requiring funding support were discussed. It did not appear that additional funding was needed for any activities, except for the usual level of travel support that is provided to students and early career scientists out of the Trust Fund. If there are Summer Schools that have FUTURE-related goals, those could be funded by FUTURE.

The Committee reviewed the current status of the Intern Program. It is estimated that at the end of FY 2011, the Organization will be holding about \$23,000 for the Program. With the current stipend level of \$2,000 per month (Decision 07/A/6(iii)), this amount is sufficient to maintain the Program for only 9 months in 2012. Contracting Parties were invited to provide voluntary contributions to support the Program in 2012. Korea and the United States indicated their intention to provide funding at the typical level (\$10,000 and \$15,000, respectively) in the coming year, pending availability of funds. This would be sufficient to support the completion of the current intern's term and for a full year of a new intern's term. Thus, given that it is China's turn for an intern, they are expected to submit the necessary paperwork in order to begin the process, subject to Council's approval. The next term of the new PICES intern was requested to begin no earlier than June 2012, given the Secretariat's involvement in the Yeosu symposium just prior to that time. The Committee also recommended that Council instruct the Executive Secretary to invite voluntary contributions from Contracting Parties in support of the Intern Program for 2012 and beyond.

AGENDA ITEM 8

Schedule, structure and financing of future Annual Meetings

PICES-2012 will be held from October 12-21, 2012, in Hiroshima, Japan. The Japanese delegation confirmed that they will be requesting \$40,000 from PICES to partially cover meeting costs. The Committee supports provision of this amount from the PICES budget.

Canadian representatives reported on the status of preparations for PICES-2013. Planning appears to be well underway for this meeting, and Canada will be asked next year about their needs with respect to additional funding from PICES that may be required in order to host the meeting. The Committee recommended that

F&A 2011

Council accept the offer of Canada to host PICES-2013 from October 11-20, 2013, at the Vancouver Island Conference Centre in Nanaimo, British Columbia.

The Committee recommended that, in keeping with the 6-year rotation cycle (Decision 1994/A/6), Council invite China to explore the possibility of hosting PICES-2014, and inform the Secretariat on this matter by March 31, 2012.

At PICES-2001 (Victoria, Canada), Council approved the charging of a registration fee for future Annual Meetings of the Organization and indicated that the registration fee structure should be reviewed annually (Decision 2001/A/4(iv)). The Committee discussed the current registration fee structure that was changed in 2010 to include an increase in the regular and early registration categories and recommended there be no change in these for 2012.

Type of registration fee	CDN \$
Regular	275
Early	200
Student	50
Spousal	50

There was some discussion about adding a 1-day registration fee. The Committee does not recommend that this fee be instituted. Allowing a 1-day registration fee would: 1) not provide much savings to individuals attending the meetings, 2) fragment participation at meetings, and 3) possibly result in reduced registration fee revenue for the Organization.

At PICES-2009, Council adopted (Decision 2009/A/6(i)) the final report of the Study Group on *Restructuring of the PICES Annual Meeting* (SG-RAM). Most of the proposed changes in the format of the Annual Meeting, with the exception of the number of concurrent sessions (3 instead of 4) due to the limited capacity of the venue in Khabarovsk, were implemented at PICES-2011. It is expected that the structure of PICES-2012 will be in accordance with the entire suite of SG-RAM recommendations. The Committee recommended that Council discuss the effectiveness of the approved changes at this and the next Annual Meeting.

At PICES-2005 (Vladivostok, Russia), Council re-iterated its support for the concept of inter-sessional Science Board meetings with the participation of Council members, but suggested that the need for such a meeting should be evaluated each year and that, given meeting costs (including time commitment of the members), an inter-sessional meeting should be held only if the agenda is substantive. The Committee confirmed these views in 2011.

Science Board has already indicated the importance of having an inter-sessional meeting in 2012, to be held in conjunction with a FUTURE workshop. The Committee supported this request and recommended it to Council for approval. Russia has indicated its willingness to host ISB-2012.

AGENDA ITEM 9

Financial issues related to the Pension Plan for PICES employees

The Committee received a report from the Executive Secretary about the deficiency in the pension funds for PICES employees and the recommendations of the International Fisheries Commissions (IFC) Pension Society for addressing these. Last year, it was agreed that additional employer contributions to the IFC Pension Plan in 2010 and beyond be made in advance in order to reduce future payments. An additional lump sum employer contribution of \$20,000 to the IFC Pension was approved to pay down the unfunded liabilities (Decision 2010/A/3/(ix)). Given the projected growth in the deficits seen in the 2011 Actuarial Report of the IFC Pension Plan released in April, the Committee recommended that Council approve the additional employer contribution of \$20,000 to the IFC Pension Plan be made from the PICES 2012 budget to pay down unfunded liabilities.

AGENDA ITEM 10

BudgetEstimated accounts for FY 2011 (Agenda Item 10a)

The Committee reviewed the estimated accounts for FY 2011 and recommended their acceptance by Council, noting that the expenses for “foreign exchange loss/gain” are only estimates at this time.

Interest and other income (Agenda Item 10b)

In FY 2010, the total income was \$1,057,820. This amount includes \$857,561 in voluntary contributions and grants (\$804,859 credited to the Working Capital Fund and \$52,702 credited to the Trust Fund). In FY 2011, the estimated total income is \$772,980. This amount includes \$592,710 in voluntary contributions and grants (\$546,457 credited to the Working Capital Fund and \$46,253 credited to the Trust Fund).

Relocation and Home Leave Fund (Agenda Item 10c)

At PICES-2007, Council approved the F&A Committee recommendation that the level of the Relocation and Home Leave Fund (RHLF) be allowed to fluctuate between \$90,000 and \$110,000 to minimize the need for small transfers between funds (Decision 2007/A/3(iii)). Given the estimated fund balance of \$100,841 on December 31, 2011, a transfer is not necessary this year. There appear to be sufficient funds to maintain the balance through 2012, when home-leave expenses for the Executive Secretary will be utilized.

Trust Fund (Agenda Item 10d)

In FY 2011, the total Trust Fund (TRF) income is estimated at \$46,274 and estimated expenses are \$76,484. The Committee recommended that Council approve a transfer from the Working Capital Fund to recover the 2011 expenses and restore the Trust Fund to the level of \$110,000.

In addition to the contributions of agencies/institutions and organizations to the Trust Fund, there is now a special fund established by Dr. Bernard Megrey’s family and friends with a purpose to provide travel awards to graduate students and early career scientists to attend PICES Annual Meetings and conferences co-sponsored by the Organization. For accounting purposes, these funds are not included in the \$110,000 total.

Japanese Trust Fund (Agenda Item 10e)

The Committee reviewed the financial report for *Year 4* (April 1, 2010 to March 31, 2011) of the project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” supported by the voluntary contribution from the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan. This report was submitted to the Fisheries Agency of Japan on July 28, 2011, and the notice on report acceptance was received on August 3, 2011.

The status of the MAFF account, for the period from April 1 to December 31, 2010, was assessed during the regular PICES audit for FY 2010. The financial statements for the rest of *Year 4* (January 1 to March 31, 2011) and for part of *Year 5* (April 1 to December 31, 2011) of the MAFF project will be evaluated during the regular PICES audit for FY 2011.

The current funding expires on March 31, 2012, and cannot be renewed for the same purpose. Japanese representatives indicated that a proposal for MAFF funding has been submitted for a new project related to ecosystem fishery management in coastal regions, and it has not yet been approved.

Working Capital Fund (Agenda Item 10f)

After all approved inter-fund transfers, the amount of funds available in the Working Capital Fund (WCF) on January 1, 2011, was \$759,650. This includes \$515,000 in encumbered funds and \$244,650 in “reserve operating” funds. In FY 2011, the total WCF income and expenses are estimated at a level of \$725,865 (\$546,457 are in extra-budgetary contributions and grants) and \$663,948, respectively. After the recommended inter-fund transfers, the amount of funds available in WCF at the fiscal year end is estimated at \$674,995. This includes \$411,750 in encumbered funds, and \$263,245 in “reserve operating” funds.

F&A 2011

Budget for FY 2012 and forecast budget for FY 2013 (Agenda Item 10g)

The Committee reviewed the proposed FY 2012 budget of \$838,000 (*F&A Endnote 6*) and recommended its approval by Council. The Committee also recommended a transfer of \$118,600 from the Working Capital Fund to balance the budget, setting the total annual contribution at \$719,400, and the 2012 fees at \$119,900 per Contracting Party. These are a 3.2% increase from the FY 2011 level and the increase is based on the average CPI from March to August of 2011 reported by Statistics of Canada.

The Committee also discussed the option of having a “step” increase in the annual contributions from each Contracting Party, as was recently approved in another international organization with most of the same Contracting Parties as PICES. Participants indicated that such an increase was difficult to consider at the present time.

The Executive Secretary presented the forecast FY 2013 budget of \$852,000 and noted that this budget is prepared based on preliminary information available as of August 15, 2011, and is approximately 1.7% higher than the FY 2012 budget.

AGENDA ITEM 11

Changes in PICES Rules of Procedure

The Committee reviewed the updated PICES Strategic Plan and discussed whether changes to the Rules of Procedure were required, given the Plan mandates the preparation of 3-year Action Plans by Executive Committees, Scientific and Technical Committees, and the Secretariat. After discussion, it appears that there is language in the Chairman’s Handbook on “Roles and Responsibilities of Chairmen and Members of PICES Groups” that might partly suffice. The F&A Chairman offered to review the language in the Handbook and provide some alternatives for consideration by the Committee after PICES-2011.

AGENDA ITEM 12

Progress report on implementation of the PICES Publication Program Action Plan

The Committee reviewed the progress on implementing the Action Plan for the PICES Publication Program and discussed the options regarding publication of the PICES newsletter given the proposal for a more frequent PICES electronic newsletter to be provided via email. The Committee recommended that Council approve electronic publishing of the PICES newsletter. The option for obtaining hard copies of the PICES Annual Meeting abstract book should continue for at least one more year.

AGENDA ITEM 13

Administrative matters

The Committee discussed the progress reported on the status of negotiations regarding the possibility of obtaining an *ex gratia grant* from the British Columbia government to PICES equal to the amount of the provincial personal income taxes remitted and encouraged the Executive Secretary to continue his efforts to request this tax rebate. Canadian members of the F&A Committee will investigate whether they might be able to assist in this process.

AGENDA ITEM 14

Space, facilities and services for the PICES Secretariat office

PICES has a Headquarters Agreement with the Government of Canada that entered into force on December 15, 1993. In accordance with this agreement, Fisheries and Oceans Canada (DFO) hosts the PICES Secretariat at

the Institute of Ocean Sciences (IOS) in Sidney, British Columbia, Canada. The Executive Secretary provided a report on current arrangements between PICES and DFO/IOS and local companies on general administrative services. There appears to be no change in the current arrangements at this time.

AGENDA ITEM 15

Other business

The Committee discussed the PICES Visiting Scientist Program and reasons for inactivity since its inception in 2002. The Committee members expressed an interest in reviewing the language regarding the rationale, objectives, *etc.* of the program to see if those might need revision given the current PICES structure and needs, particularly with respect to the FUTURE program. It was recommended that the Committee review the program language inter-sessionally and prepare a revised description of the program to present at ISB-2012 and determine potential tasks for a visiting scientist and initiate advertisement, if appropriate, after ISB-2012. Further, it was noted that assignment of a visiting scientist could be done either virtually (*i.e.*, the scientist remain in their host country) or by actual relocation to the Secretariat.

AGENDA ITEM 16

Adoption of the F&A report and recommendations to Governing Council

The draft report was circulated and approved by all F&A members. All recommendations to Council were brought forward by Ms. Livingston at the first session of Council on October 22, 2011.

F&A 2011

F&A Endnote 1

F&A participation list

Canada

David Gillis (F&A member)
Laura Richards (F&A member)
Darlene Smith (advisor)

Japan

Taro Ichii (F&A member)
Yukimasa Ishida (advisor)

People's Republic of China

Yingren Li (alternate F&A member)
Gongke Tan (advisor)

Republic of Korea

Dosoo Jang (advisor)
Hyun Taek Lim (F&A member)
Chul Park (F&A member)

Russian Federation

Igor Shevchenko (F&A member)

U.S.A.

Elizabeth Phelps (alternate F&A member)

Other

Patricia Livingston (F&A Chairman)
Alexander Bychkov (Executive Secretary)

F&A Endnote 2

F&A Committee meeting agenda

1. Welcome and opening remarks
2. Adoption of agenda and meeting procedures
3. Audited accounts for *FY* 2010
4. Annual contributions
5. Fund-raising activities
6. Encumbered funds for PICES activities
7. Financing of high priority PICES projects
 - a. PICES integrative science program, FUTURE
 - b. Capacity building
8. Schedule, structure and financing of future Annual Meetings
9. Financial issues related to the Pension Plan for PICES employees
10. Budget
 - a. Estimated accounts for *FY* 2011
 - b. Interest and other income
 - c. Relocation and Home Leave Fund
 - d. Trust Fund
 - e. Japanese Trust Fund
 - f. Working Capital Fund
 - g. Proposed budget for *FY* 2012 and forecast budget estimates for *FY* 2013
11. Changes in PICES Rules of Procedure
12. Progress report on implementation of the PICES Publication Program Action Plan
13. Administrative matters
14. Space, facilities and services for the Secretariat office
15. Other business
 - a. PICES Visiting Scientist Program
16. 2011 F&A report and recommendations to Governing Council

F&A Endnote 3

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
FINANCIAL STATEMENTS
DECEMBER 31, 2010**

INDEPENDENT AUDITORS' REPORT

To the Council of the
North Pacific Marine Science Organization

We have audited the accompanying financial statements of the North Pacific Marine Science Organization, which comprise the statement of financial position as at December 31, 2010 and the statement of operations and changes in fund balances for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with Canadian standards for not-for-profit organizations and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained in our audit is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, these financial statements present fairly, in all material respects, the financial position of the North Pacific Marine Science Organization as at December 31, 2010, and the results of its operations and changes in fund balances for the year then ended.

Sidney, B.C.
April 21, 2011

Flader Hale Hughesman
Chartered Accountants

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
STATEMENT OF FINANCIAL POSITION
AS AT DECEMBER 31, 2010**

ASSETS

	2010	2009
CURRENT ASSETS		
Cash and short term deposits (note 5)	\$ 1,319,408	\$ 1,271,519
Accounts receivable	237,835	46,182
Prepaid expenses	1,337	3,215
	\$ 1,558,580	\$ 1,320,916

LIABILITIES

CURRENT LIABILITIES

Accounts payable	\$ 126,046	\$ 119,426
Megrey Student Fund (note 3)	5,771	-
Funds held for Contracting Parties (note 4)	232,400	229,000
	364,217	348,426

FUND BALANCES

WORKING CAPITAL FUND (note 5)	876,450	684,770
TRUST FUND	110,000	110,000
RELOCATION AND HOME LEAVE FUND	100,000	101,529
MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES FUND	107,913	76,191
	1,194,363	972,490
	\$ 1,558,580	\$ 1,320,916

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
STATEMENT OF OPERATIONS AND CHANGES IN FUND BALANCES
FOR THE YEAR ENDED DECEMBER 31, 2010**

	General Fund	Working Capital Fund	Trust Fund	Relocation and Home Leave Fund	Ministry of Agriculture, Forestry and Fisheries Fund	2010 Total	2009 Total
FUND BALANCES, beginning of year	\$ -	\$ 684,770	\$ 110,000	\$ 101,529	\$ 76,191	\$ 972,490	\$ 851,749
SOURCES OF FUNDS							
Contributions from Contracting Parties	687,000	-	-	-	-	687,000	695,525
Budgeted transfer to General Fund (note 6)	110,000	(110,000)	-	-	-	-	-
Voluntary contributions and grants (note 7)	-	804,859	46,931	-	187,505	1,039,295	527,809
Interest and other income (note 8)	-	199,653	101	505	306	200,565	212,407
	797,000	894,512	47,032	505	187,811	1,926,860	1,435,741
FUND BALANCES, before expenditures	797,000	1,579,282	157,032	102,034	264,002	2,899,350	2,287,490
EXPENDITURES							
Personnel services	518,014	17,464	-	-	-	535,478	526,305
Annual Meeting	21,256	-	-	-	-	21,256	51,555
Special meetings/travel	130,719	-	36,455	-	-	167,174	164,739
Publications	48,465	-	-	-	-	48,465	65,631
Communication	35,605	-	-	-	-	35,605	33,289
Office and administration	24,335	-	-	-	-	24,335	18,705
Projects (note 9)	-	666,819	-	-	-	666,819	215,617
Intern program	-	-	28,238	-	-	28,238	30,587
Relocation	-	-	-	9,097	-	9,097	-
MAFF Fund expenditures (note 10)	-	-	-	-	156,089	156,089	189,435
Foreign exchange loss (note 11)	12,431	-	-	-	-	12,431	19,137
	790,825	684,283	64,693	9,097	156,089	1,704,987	1,315,000
NET FUNDS AVAILABLE	6,175	894,999	92,339	92,937	107,913	1,194,363	972,490
TRANSFER TO							
WORKING CAPITAL FUND (note 5)	(6,175)	6,175	-	-	-	-	-
INTERFUND TRANSFERS (note 6)	-	(24,724)	17,661	7,063	-	-	-
FUND BALANCES, end of year	\$ -	\$ 876,450	\$ 110,000	\$ 100,000	\$ 107,913	\$ 1,194,363	\$ 972,490

NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2010

1. PURPOSE OF ORGANIZATION

The North Pacific Marine Science Organization (PICES) is an intergovernmental non-profit scientific Organization whose present members include Canada, Japan, the People's Republic of China, the Republic of Korea, the Russian Federation and the United States of America. The purpose of the Organization is to promote and coordinate marine scientific research in order to advance scientific knowledge of the North Pacific and adjacent seas.

2. ACCOUNTING POLICIES

The financial statements are prepared in accordance with the North Pacific Marine Science Organization's Financial Regulations and are prepared in accordance with Canadian generally accepted accounting principles. The following is a summary of the significant accounting policies used in the preparation of these financial statements:

(a) Fund Accounting

The Working Capital Fund represents the accumulated excess of contributions provided from Contracting Parties over expenditures in the General Fund. The purposes of the General Fund and Working Capital Fund are established by Regulation 6 of the Organization Financial Regulation.

The Trust Fund was established in 1994 for the purpose of facilitating participation of a broad spectrum of scientists in activities of the Organization.

The Relocation and Home Leave Fund was established in 1995 to pay relocation and home leave expenses of new employees and their dependents to the seat of the Secretariat and removal after period of employment has ended, and to provide home leave for international staff. The fund balance must be maintained between \$90,000 and \$110,000.

The Ministry of Agriculture, Forestry and Fisheries Fund was established in 2007. The Ministry of Agriculture, Forestry and Fisheries of Japan, through the Fisheries Agency has provided voluntary contributions for a project dedicated to the development of the prevention systems for harmful organisms in the Pacific Rim.

(b) Capital Assets

Capital assets acquired by the Organization are expensed in the year of acquisition. During the current year the Organization purchased \$45,170 of capital assets.

(c) Contributions

Contributions from Contracting Parties are recorded in the year in which they relate to. All other contributions and grants are recorded in the year received. Refer to Note 4 for contributions restricted for specific designated projects.

(d) Income Tax

The Organization is a non-taxable Organization under the Privileges and Immunities (International Organizations) Act (Canada).

NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2010

(e) Foreign Exchange

Transactions originating in foreign currencies are translated at the exchange rate prevailing at the transaction dates. Assets and liabilities denominated in foreign currency are translated to equivalent Canadian amounts at the current rate of exchange at the statement of financial position date.

(f) Financial Instruments

The Organization's financial instruments consist of cash and short term deposits, accounts receivable and accounts payable. Unless otherwise noted, it is management's opinion that the Organization is not exposed to significant interest, currency or credit risks.

(g) Use of Estimates

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that effect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

3. MEGREY STUDENT FUND

During the year the organization received \$5,771 to establish the Megrey Student Fund which are trust funds held to cover student travel.

4. FUNDS HELD FOR CONTRACTING PARTIES

The funds held for Contracting Parties are advance contributions from Japan in the amount of \$116,200 and the U.S.A. in the amount of \$116,200.

5. WORKING CAPITAL FUND

Of the total amount in the Working Capital Fund, \$515,000 of cash and short term deposits is restricted for specific designated projects.

Pursuant to decision 2010/A/3(ii) and (iii) of the Governing Council, \$116,800 of the funds held in the Working Capital Fund will be transferred to the General Fund at the beginning of the 2011 fiscal year to balance the budget, setting the total annual contribution at \$697,200, and the 2011 annual fee at \$116,200 per Contracting Party.

Pursuant to Financial Regulation 6 (iii), the Working Capital Fund is to be increased/decreased by the surplus/deficit in the General Fund.

NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2010

6. INTERFUND TRANSFERS

The Governing Council approved the transfer of \$110,000 at the beginning of 2010 from the Working Capital Fund to the General Fund (Decision 09/A/3/ii) to balance the budget, setting the total annual contribution at \$687,000, and the 2010 annual fee at \$114,500 per Contracting Party.

The Governing Council approved the transfer of funds from the Working Capital Fund to restore the Trust Fund to \$110,000 by the end of 2010 (Decision 2010/A/3/iii). The amount of the transfer was \$17,661.

The Governing Council approved the transfer of funds from the Working Capital Fund to restore the Relocation and Home Leave Fund to \$100,000 (Decision 2010/A/3/iii). The amount of the transfer was \$7,063.

7. VOLUNTARY CONTRIBUTIONS AND GRANTS

	Working Capital Fund	Trust Fund
Contributions for the 2010 Climate Forecasting Symposium:		
DFO (Canada)	20,000	-
FAO	20,575	-
World Bank	20,460	-
IOC	7,582	-
SCOR	5,284	-
Australian Marine Adaptation Network	3,656	-
Registration fees	90,311	-
Contributions for the North Pacific CPR Project		
DFO (Canada)	87,500	-
NPRB (U.S.A.)	33,125	-
EVOS (U.S.A.)	42,310	-
Contributions for PICES 2010:		
Department of State (U.S.A.)	62,400	-
NMFS (U.S.A.)	31,001	-
NPFMC (U.S.A.)	-	5,025
SCOR Travel grant	-	4,969
Contributions for the 2011 Zooplankton Production Symposium:		
DFO (Canada)	10,000	-
NMFS (U.S.A.)	52,135	-
NPRB (U.S.A.)	4,031	-
Registration fees	48,125	-
Contributions for the 2011 ESSAS Open Science Meeting:		
NPRB (U.S.A.)	30,153	-
ADFG (U.S.A.)	5,214	-
NPFMC (U.S.A.)	7,635	-
Registration fees	145	-
Contributions to the 2012 Climate Change Symposium (Yeosu, Korea):		
Expo-2012 Organizing Committee	44,539	-
Contributions to the 2012 PICES/ICES ECS Conference:		
NMFS (U.S.A.)	52,125	-

NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2010

Contributions to the FUTURE Program::		
KORDI	37,200	-
Contributions to the Cohen Commission (Canada report)	89,353	-
Contributions to the Intern Program:		
DFO (Canada)	-	10,000
MLTM (Korea)	-	10,230
NMFS (U.S.A.)	-	15,007
Voluntary contributions:	-	1,700
	\$ 804,859	\$ 46,931

8. INTEREST AND OTHER INCOME

	Working Capital Fund	Trust Fund	Relocation and Home Leave Fund	Ministry of Agriculture, Forestry and Fisheries Fund
Interest income	\$ 4,210	\$ 101	\$ 505	\$ 306
Income tax levies	75,357	-	-	-
Overhead from Cohen Commission	10,922	-	-	-
Overhead from MAFF project	24,376	-	-	-
PICES 2010 registration fees	84,788	-	-	-
	\$ 199,653	\$ 101	\$ 505	\$ 306

9. PROJECTS

The expenditures in the Working Capital Fund for projects funded by voluntary contributions designated for the respective projects are as follows:.

	2010	2009
2008 Climate Change Symposium	\$ -	\$ 16,681
2010 Climate Change Symposium	219,968	4,498
Development of FUTURE	27,991	30,515
North Pacific CPR Project	159,500	109,706
North Pacific Ecosystem Status Report	113,455	51,029
PICES 2010	98,227	3,188
Cohen Commission Report	20,388	-
2011 ESSAS Open Science Meeting	17,099	-
2011 Zooplankton Production Symposium	10,191	-
	\$ 666,819	\$ 215,617

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2010**

10. MINISTRY OF AGRICULTURE, FORESTRY AND FISHERIES FUND EXPENDITURES

	2010	2009
Special meetings	\$ 68,195	\$ 68,693
Contractual services	26,649	65,205
Equipment	36,526	14,915
Overhead to PICES	24,376	40,522
Miscellaneous	343	100
	\$ 156,089	\$ 189,435

11. FOREIGN EXCHANGE GAIN / LOSS

At year end all funds held in foreign currency (US \$65,457) are converted to Canadian dollars using the December 31st exchange rate. A foreign exchange loss has been reported on the current year financial statements; this amount is an unbudgeted item which has been caused by the ongoing fluctuations in the US dollar (2010 = 0.9946, 2009 = 1.0466), and not by the actual purchase or sale of any foreign currencies.

12. UNFUNDED PENSION LIABILITY

The Organization holds a pension plan for its employees with the International Fisheries Commissions Pension Society. An actuarial valuation report was prepared as at January 31, 2008 and showed an unfunded pension liability for PICES of \$208,000. This liability is being paid in monthly installments over a period of 15 years. The total amount payable for 2011 is \$25,200.

A new actuarial valuation report will be prepared in 2011 to determine the new unfunded pension liability. The unfunded pension liability along with the repayments are expected to increase as a result of this new actuarial report. This new payment schedule will begin January 2012.

No amount has been recorded in the financial statements with regards to the total unfunded liability.

13. FINANCIAL STATEMENTS

A statement of cash flows has not been presented, as the required information is readily apparent from the other financial statements presented and the notes to the financial statements.

F&A Endnote 4

PAYMENT SCHEDULE OF ANNUAL FEES, 2005–2011¹

	<i>Canada</i>	<i>China</i>	<i>Japan</i>	<i>Korea</i>	<i>Russia</i>	<i>USA</i>
2005	Dec. 24, 04	Sept. 22, 05²	Mar. 2, 05	Mar. 30, 05	Mar. 31, 05³	Jan. 10, 05
2006	Dec. 28, 05	Aug. 1, 06	Dec. 15, 05	Feb. 8, 06	Feb. 28, 06	Jan. 30, 06
2007	Jan. 23, 07	July 3, 07	Dec. 5, 06	Apr. 3, 07	Feb. 13, 07	Jan. 10, 07
2008	Jan. 16, 08	May 15, 08	Dec. 20, 07	Feb. 15, 08	Feb. 13, 08	Jan. 7, 08⁴
2009	Jan. 5, 09	June 3, 09	Dec. 11, 08	Apr. 1, 09	Mar. 27, 09	Dec. 24, 08
2010	Apr. 1, 10	Aug. 5, 10	Dec. 14, 09	Mar. 2, 10	Mar. 26, 10	Dec. 11, 09
2011	Feb. 8, 11	June 30, 11	Dec. 3, 10	Mar. 25, 11⁵	Feb. 9, 11	Dec. 7, 10

¹ Payments made later than the first quarter of the PICES fiscal year or partial payments are indicated in bold

² Partial (86%) payment, remainder paid December 30, 2005

³ Partial (96.6%) payment, remainder paid April 25, 2005

⁴ Partial (92.3%) payment, remainder paid on May 22, 2009

⁵ Partial (88.1%) payment, remainder paid on September 20, 2011

F&A Endnote 5

External funding and voluntary contributions received since PICES-2010

For the period since PICES-2010, the following external funding and voluntary contributions were committed and/or received for various activities of the Organization:

Special projects

- The Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan, through the Fisheries Agency of Japan (JFA), contributed \$164,641CAD for *Year 5* (to be completed by March 31, 2012) of the project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*”.
- A contract with the Canadian *Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River* (Cohen Commission) for PICES to develop a technical report on “*The decline of Fraser River sockeye salmon *Oncorhynchus nerka* (Steller, 1743) in relation to marine ecology*” was amended to a total amount of \$109,666 CAD instead of the original \$100,275 CAD.
- In October 2007, PICES initiated a funding consortium to support the North Pacific Continuous Plankton Recorder (NP CPR) survey. The following organizations have committed their resources for the project:
 - Fisheries and Oceans Canada, a member of the consortium since 2008, provided \$50,000 CAD for the period from April 1, 2010 to March 31, 2011. This support is intended to continue for another 3 years (until March 2014) at the level of \$50,000 CAD per year.
 - The North Pacific Research Board (USA) joined the consortium in 2009 and committed support for operations of the NP CPR project at the level of \$50,000 US per year for 5 years (project #903 from June 1, 2009 to May 31, 2010; and project #1001 from June 1, 2010 to May 31, 2014).
 - The *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) approved funding of \$188,600 US for operations of the NP CPR project in 2010–2013 (project on “*Measuring Interannual Variability in the Herring’s Forage Base from the Gulf of Alaska*”), with the amount of \$58,300 US for 2011.
 - The Japanese Society for Promotion of Science (JSPS) provided a 5-year (2009–2013) grant for CPR work to Dr. Sanae Chiba (JAMSTEC). While funds are not passed to the PICES consortium, this project provides in-kind support by taking over the analysis of samples from the western Pacific and is equivalent to a financial contribution of about \$37,500 US per year.
 - To ensure that as much money as possible go into sampling, the Sir Alister Hardy Foundation for Ocean Science (SAHFOS, UK) continued to cover the salary for the Principle Investigator in 2011.

At PICES-2010, the F&A Committee agreed that maintaining full funding of this project beyond 2013 will require communication of its benefits to Contracting Parties and recommended that an annual status report on the NP CPR survey be presented at future meetings so that the results and benefits would be more apparent. The 2011 report by Dr. Sonia Batten, NP CPR project Principle Investigator, is included in this section.

Symposia/sessions/workshops

- The following organizations/programs/agencies/institutions provided financial support for the 5th Zooplankton Production Symposium on “*Population connections, community dynamics, and climate variability*”, held March 14–18, 2011, in Pucón, Chile (funds marked by * were handled by PICES):
 - EUR-OCEANS Consortium (2011) – 5,000 €*
 - Fisheries and Oceans Canada (2010) – \$10,000 CAD*
 - Global Ocean Ecosystem Dynamic (2011) – 3,000 €
 - Institut de Recherche pour le Développement, France (2011) – 3,000 €*
 - Intergovernmental Oceanographic Commission of UNESCO (2011) – \$4,000 US*
 - International Council for the Exploration of the Sea (ICES) – 10,000 €*+ publication in *IJMS*
 - National Marine Fisheries Service of NOAA, USA (2010) – \$50,000 US*
 - North Pacific Research Board, USA (2010) – \$4,000 US*
 - University of Concepción, Chile – ~\$15,000 US (covered many local services but the exact amount is not known)
- The following organizations/programs/agencies/institutions provided financial support for the 2nd ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ecosystems: Progress in observation and prediction*”, held May 22–26, 2011, in Seattle, USA (funds marked by * were handled by PICES):
 - Alaska Department of Fish and Game, USA (2010) – \$5,000 US*
 - Arctic Section, NOAA, USA (2011) – \$10,000 US
 - Global Ocean Observing System (2011) – \$10,000 US*
 - Integrated Marine Biogeochemistry and Ecosystem Research (2011) – \$14,000 US
 - International Council for the Exploration of the Sea (2011) – 10,000 €*+ publication in *IJMS*
 - National Science Foundation, USA (2011) – \$31,200 US* (only part of this grant was handled by PICES)
 - National Marine Fisheries Service, NOAA, USA (2011) – \$10,000 US*
 - North Pacific Fisheries Management Council, USA (2010) – \$7,500 US*
 - North Pacific Research Board, USA (2010) – \$30,000 US*
 - School of Aquatic and Fishery Sciences, University of Washington, USA (2011) – \$5,000 US
- Several international organizations/programs were invited, and subsequently agreed, to co-sponsor (by covering travel of additional invited speakers and/or convenors for these events) the following sessions and workshops relevant to their scientific interests: “*Mechanisms of physical-biological coupling forcing biological hotspots*” (ICES), “*Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species*” (ICES), “*Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems*” (NOWPAP), “*Linking migratory fish behavior to end-to-end models*” (ICES), “*How well do our models really work and what data do we need to check and improve them?*” (IMBER), “*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*” (GESAMP, ICES and IOC).
- The following organizations/agencies/institutions provided financial support for the 2nd PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*”, to be held May 15–19, 2012, in Yeosu, Korea, as one of the official events related to the Ocean Expo-2012:
 - Expo-2012 Organizing Committee – 100,000,000 KRW (\$44,539 CAD in 2010 and \$44,414 CAD in 2011)
 - Fisheries and Oceans Canada – \$15,000 CAD
 - International Pacific Halibut Commission – \$6,000 US
 - National Marine Fisheries Service of NOAA, USA – \$50,000 US
 - North Pacific Research Board, USA – \$15,000 US

A number of organizations/programs/agencies/institutions committed funds for the symposium:

 - Food and Agriculture Organization – \$10,000 US
 - Global Ocean Observing System – \$10,000 US

F&A 2011

- Integrated Marine Biogeochemistry and Ecosystem Research – \$5,000 US
- Intergovernmental Oceanographic Commission of UNESCO – \$10,000 US
- International Council for the Exploration of the Sea (2011) – 10,000 €+ publication in *IJMS*
- Korea Meteorological Administration – \$5,000 US
- Korea Ocean Research and Development Institute – symposium dinner
- Korean East Asian Seas Time Series Research Project – \$20,000 US
- Ministry of Land, Transport and Maritime Affairs, Korea – symposium welcome reception
- National Aeronautics and Space Administration, USA – \$20,000–30,000 US (through a grant system)
- National Fisheries Research and Development Institute, Korea – \$5,000 US
- North Pacific Anadromous Fish Commission – amount will be decided in October
- Pukyong National University, Korea – \$5,000 US
- Pusan National University, Korea – \$5,000 US
- Scientific Committee on Oceanic Research – \$5,000 US
- United Nations Environment Programme – amount will be decided in October
- World Climate Research Programme – 10,000 CHF
- Fisheries and Oceans Canada allocated \$50,000 CAD for the PICES Annual Meeting to be held October 11–20, 2013, in Nanaimo, British Columbia, Canada.

Capacity building

- Several contributions were received/committed for the Trust Fund in support of the PICES Intern Program:
 - Fisheries and Oceans Canada – \$10,000 CAD;
 - Ministry of Land, Transport, and Maritime Affairs, Korea – \$10,000 US;
 - National Marine Fisheries Service of NOAA, USA – \$15,000 US;
- The Scientific Committee on Oceanic Research (SCOR) provided a grant of \$5,000 US to support participation of scientists from countries with “economies in transition” in SCOR-relevant sessions and/or workshops at PICES-2011.

Operations of the PICES Secretariat

- Korea Ocean Research and Development Institute contributed \$20,000 US to support a part-time contract position at the PICES Secretariat for assisting the Science Board Chairman.
- A 13% overhead (\$21,403) of the *Year 5* budget (\$164,641) for the PICES/MAFF project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” was retained to offset expenses related to the Secretariat’s involvement in the project.
- Due to the agreed amendments to the contract, the overhead (13%) retained to offset expenses related to the Secretariat’s involvement in the Cohen Commission project increased to \$11,830 CAD.
- A 13% overhead (\$9,239) of the registration fee revenue (\$71,760) was retained to compensate for the Secretariat’s involvement in providing organizational support (this included: maintaining the meeting website, handling major finances, on-line registration and abstract submission, compiling the book of abstracts, and arranging the logistics for the venue) for the 2nd ESSAS Open Science Meeting on “*Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observation and prediction*” (May 22–26, 2011, Seattle, USA).

PROPOSED FY 2012 BUDGET

Sources for General Fund (GNF)		Amount
National contributions		719,400
Transfer from Working Capital Fund	(\$119,900 per Contracting Party)	118,600
Total		838,000

Category	GNF Allotment	WCF Allotments
Personnel Services	554,000	35,000 (benefits adjustments and additional contribution to the IFC Pension Plan)
Annual Meeting	40,000	registration fee revenue as needed/available
Special Meetings/Travel	150,000	encumbered funds as needed/available
Publications	40,000	
Communications	30,000	
Office/Administrative	24,000	encumbered funds as needed/available
Projects		
Total	838,000	

Guaranteed revenue	90,000
Net income tax levies	75,000
Tax (GST, PST) rebate	5,000
Interest	10,000
Additional income	75,000
Registration fees for PICES-2011	75,000

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 80th 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 21st 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

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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 Radashkevsky (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

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7th 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-Il 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-Il 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) 5th session in Oostende, Belgium in January 2011 and Dr. Garcia being elected Co-Chair of GE-BICH;
- Dr. Suzuki attending the 21st 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 50th 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 Bergh, 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).

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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 2nd 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.

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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 ¹³⁷Cs.

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. Jacquelynn 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.

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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)

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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.

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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.

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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

Report of Science Board

Science Board met on three different occasions in Khabarovsk, Russia. The first meeting was held from 12:30–14:00 on October 16, 2011 to adopt the draft agenda and review those items set for discussion at the luncheon meeting. Science Board Chairman, Dr. Sinjae Yoo, welcomed participants to the meeting and introductions were made (*SB Endnote 1*). One detail from the agenda item on proposed inter-sessional workshops/symposia was moved forward for discussion and agenda items on relations with specific international programs/organizations and report of the PICES/ICES SG on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* were deferred until the third meeting due to time constraints (*SB Endnote 2*). The second meeting was held after the Closing Session, from 15:00–18:00 on October 21, 2011. The agenda item on PICES-2012 was moved forward to be included in the second meeting. The third meeting was held from 9:00–18:00 on October 22, 2011 to complete the rest of the agenda.

AGENDA ITEM 2

Review of procedures for Science Board Symposium and session awards

Procedures and protocols for determining best presentations for the Science Board Symposium and Topic/Paper sessions sponsored by each Committee/FUTURE Advisory Panel were discussed. Each Committee was responsible for judging its own sponsored session/workshop for the best oral or poster presentation. For multiple-sponsored sessions/workshops, the Science Board Chairman assigned one of the co-sponsoring Committees or FUTURE Advisory Panels to be responsible. Although the FUTURE Advisory Panels were tasked with judging an MEQ/FUTURE-sponsored topic session (S7), this was reassigned to the primary sponsor, MEQ, and it was agreed that FUTURE would not be presenting a certificate for a FUTURE-sponsored topic session this year. Assignments for judging were developed from what was proposed in the Science Board briefing book. Each chairman was responsible for judging (or delegating to judges) the eligible presentations made at the sessions/workshops relevant to his Committee/ FUTURE. Science Board agreed that, should the pool of eligible oral and poster presentations be small, or not of sufficient quality, there was no obligation to select a presentation for an award.

Science Board agreed that business meeting reports from Committees and their subsidiary bodies would be submitted to the Secretariat one month after the meeting.

AGENDA ITEM 3

Relations with specific international programs/organizations

ICES was represented by Dr. Adolf Kellermann (Head, ICES Scientific Program) who apprised Science Board of ICES decisions and events related to PICES. ICES agreed to co-sponsor 3 topic sessions at PICES-2012 in Hiroshima, Japan (*Jellyfish in marine ecosystems and their interactions with fish and fisheries*, *Comparison of impact of multi-decadal climate variability in North Pacific and North Atlantic ecosystems and corresponding teleconnection patterns* [later rejected as a topic session by Science Board], *Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas* [later merged with *Trends in hypoxia and ecosystem impacts in the North Pacific to Changing ocean biogeochemistry and its ecosystem impacts*; see Agenda Item 10]), with the stipulation that PICES broaden the term “North Pacific” in the title and description for the latter topic session. PICES was invited to review ICES-approved theme sessions for its ASC in 2012, and 5 ICES-sponsored symposia scheduled for 2013 and 2014 for possible PICES co-sponsorship.

Two new working groups were selected by SCOR from a number of SCOR proposals in 2011 (Working Group on *Organic Ligands – A Key Control on Trace Metal Biogeochemistry in the Ocean* [WG 2.3.2] and Working Group on *Biogeochemical Exchange Processes at the Sea-Ice Interfaces (BEPSII)* [WG 2.3.7]). Science Board

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members were requested to review them and discuss potential PICES affiliate membership at their Committee meetings (October 19) and provide feedback at the second Science Board meeting.

Science Board reviewed SCOR WG 137's request to hold a 3-day workshop at PICES-2012 and a request for PICES sponsorship by providing funding so the WG could complete the last 2 years of its 5-year term. Science Board agreed with the workshop but not with funding WG 137.

PICES received an invitation to participate in the 3rd Intergovernmental Review Meeting of the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities to be held January 25–27, 2012 in Manila, the Philippines. Science Board agreed that sending a participant was in the interest of PICES, given the potential for collaboration.

Recommendation:

- Science Board supports 3-day SCOR WG 137 co-sponsored workshop at PICES-2012.
- Science Board recommends Professor Ik Kyo Chung (MEQ) represent PICES at the 3rd Intergovernmental Review Meeting

AGENDA ITEM 4

Status of proposed inter-sessional workshops/symposia

Science Board discussed the feasibility of sending a scientist to participate in an IMBER/CLIOTOP special session on “*Global science for global governance of oceanic ecosystems and fisheries*” to be held at the Planet Under Pressure Conference in London in 2012. There was concern that PICES does not have an expert on top predators or the expertise in managerial governance. However, it was agreed that PICES was capable of offering scientific advice to management and that this event was a good opportunity to showcase FUTURE and PICES' activities on human dimensions. Science Board nominated Dr. Ian Perry (Canada) to represent PICES at the session, with Dr. Mitsutaku Makino (Japan) being an alternate choice

Friday, October 21, 2011

AGENDA ITEM 5 (CONTINUED)

Status of proposed inter-sessional workshops/symposia

CLIOTOP

Dr. Mitsutaku Makino agreed to present at the IMBER/CLIOTOP special session on “*Global science for global governance of oceanic ecosystems and fisheries*” in place of Dr. Ian Perry who would be unavailable to attend. Dr. Makino informed Science Board that the tentative theme and abstract prepared by Drs. Yoo and Thomas Therriault to meet the September 2011 abstract submission deadline was satisfactory, and requested that the author placeholder for the abstract be changed to be co-authored by Drs. Makino and Perry.

See Agenda 15 for discussion on IMBER ClimECO3.

AGENDA ITEM 6

Status of proposed publications

Science Board reviewed the status of the proposed list of PICES or PICES-sponsored publications and recommended that the Science Board Chairman request the U.S. national delegate, Dr. John Stein, to find out the reason for the delay in publishing the summary of activities of the Climate Forcing and Marine Ecosystem Response Task Team (CFAME) from the editor, Dr. Karim Aydin, and what could be done to move the

process forward. Science Board agreed it would be of value to the Organization to have both the CFAME and Climate Change and Carrying Capacity (CCCC) Program final reports published in order to document the history and progress PICES has made; a less desirable alternative would be to publish the materials that were already available.

SOFE-AP Chairman, Mr. Robin Brown, questioned if SOFE was responsible for peer reviewing such material as PICES Scientific reports. Science Board agreed that the reports were a record of expert groups, and acted as a historical archive for PICES, but decided that they could be published without peer review. Science Board approved publication of the final report of the Study Group on Human Dimensions (PICES Scientific Report No. 39) by editors Drs. Mitsutaka Makino and David Fluharty.

CREAMS-AP member, Dr. Kyung Rhul Kim, presented an overview of the CREAMS-AP supplementary chapter to the North Pacific Ecosystem Status Report, 2003–2008 prepared by a CREAMS-AP *ad hoc* committee formed specifically for this purpose, seeking approval for its publication. Science Board agreed that the supplement should be published as a valuable contribution to NPESR and that SOFE and MONITOR should review the chapters before the technical editing process. Although Science Board was urged to get the supplement published in 1 month, it was decided that quality would not be sacrificed for time, and that the timeline would be open-ended but would be published as soon as possible.

Mr. Brown informed Science Board that SOFE-AP was committed to publishing the brochures on *Ecosystem-based management science and its application to the North Pacific* and the North Pacific Ecosystem Status Report, 2003–2008 by ISB-2012. An English version of the NPESR brochure would be distributed to SOFE members for review, then other versions would be prepared for distribution to member countries. The successes and failures using this approach will be recorded.

Action:

- Science Board Chairman to talk to U.S. national delegate, Dr. John Stein, about status of CFAME final report and to former CCCC Co-Chairman, Dr. Harold Batchelder, about the status and editor responsible for completing the CCCC final report.

Recommendation: Science Board recommends publication of the CREAMS supplement to the NPESR.

AGENDA ITEM 7

Implementation of Science Board recommendations and Governing Council decisions from PICES-2010

Science Board looked at the outcome from the list of its recommendations from PICES-2010 approved by Council and noted three cases of cancellation (an Annual Meeting topic session, HAB training session venue, special issue of a primary journal) due to lack of interest/submissions. Other recommendations that did not take place or were delayed were discussed to determine the reasons (see Agenda Item 6)

AGENDA ITEM 8

Reports from Scientific and Technical Committees

Reports by Committee Chairmen were presented and specific details can be found in the Committee reports in the 2011 Annual Report. Only specific highlights are reported here.

BIO

BIO Committee Chairman, Dr. Atsuka Tsuda, informed Science Board that BIO:

- approved the terms of reference of the Advisory Panel on Marine Birds and Mammals, revised to align with FUTURE goals, and recommended extending MBM-AP for 3 years; Science Board agreed with the recommendation.

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- recommended the establishment of a study group on the feasibility of updating PICES Publication 14 on Prey Consumption by marine birds and mammals, with addition of prey consumption by large predatory fish in the PICES regions; Science Board did not accept the proposal for a study group, but instead, recommended that the proposed co-chairs for the study group, Drs. George Hunt and Hirohito Kato, hold a workshop to update data and to determine prey consumption by large predatory fish.
- Science Board recommended seeking IWC approval to accept a PICES observer (Hirohito Kato) ..

BIO Chairman, Dr. Atsushi Tsuda noted a number of points of concern to BIO. Specifically, he:

- requested TCODE and Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23) to discuss methods for setting up a website where published papers could be posted and references shared;
- questioned why BIO was asked to co-sponsor ½-day Topic Session on “*Ecosystem responses to multiple stressors in the North Pacific*” at PICES-2012 when there was no BIO member appointed to Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responders to Multiple Stressors* (WG 28). SOFE Chairman, Mr. Robin Brown, added that BIO membership was underrepresented in FUTURE (only a single member across all three FUTURE Advisory Panels);
- expressed concern that terms of reference of WG 28 were too broad and ambitious for a 3-year term, and should be more focused. AICE Chairman, Dr. Thomas Therriault, highlighted the challenges in finalizing the Terms of Reference for this Working Group;
- requested better communication between FUTURE and BIO;
- stated that since BIO did not receive notification from POC about the establishment of a new Working Group on *Regional Climate Models* (WG 29) under POC and BIO, the Committee suspended its decision on supporting this group.

In regard to PICES affiliate membership in SCOR Working Groups 2.3.2 and 2.3.7 (see Agenda Item 3), Dr. Tsuda proposed to ask a Japanese SCOR member to report to PICES on SCOR activities.

Recommendations:

- extend MBM-AP for 3 years;
- the proposal to establish a study group on updating Publication 14 be dealt with by having a workshop at PICES-2012.

Action:

- BIO to provide comments on WG 28 terms of reference at the inter-sessional FUTURE SSC meeting;
- revisit potential co-sponsorship by BIO in POC-sponsored WG 29 at ISB-2012.

FIS

FIS Committee Chairman, Dr. Mikhail Stepanenko, reported that the FIS Committee received no proposals for working groups but strongly supported BIO's recommendation to form a study group on predator-prey interactions. FIS also strongly supported the proposal for FIS to co-sponsor the new Section on *Climate Change Effects on Marine Ecosystems* (S-CCME), given the strong ties of this work to FIS. FIS supported the extension of Working Group on *Environmental Interactions on Marine Aquaculture* (WG 24) for 1 year to complete its final report due to a number of challenges the Working Group has faced in trying to meet its terms of reference. It was agreed to form a small FIS subcommittee, composed of Drs. Libby Logerwell and Gordon Kruse, to revise and update the 2007 FIS Action Plan in order to align it with FUTURE goals.

MEQ

MEQ Committee Chairman, Dr. Steven S. Rumrill, summarized activities of the Working Group on *Non-indigenous Aquatic Species* (WG 21). It has been in existence for 6 years and is wrapping up its NIS database project and global atlas. The atlas was peer reviewed and MEQ recommended its publication but requested

input from Science Board as to what format it should take. It was agreed that the atlas should be electronic and that SOFE-AP would highlight it in a brochure as a FUTURE product. Dr. Rumrill stated that the USGS was willing to host the NIS database, but suggested that this be done jointly with PICES. Another suggestion was that TCODE (or IODE) work with Dr. Deborah Reusser to resolve the interface–end user stabilization issue.

HAB-S was making progress on compiling a PICES/ICES HAE-DAT, but complained that China was the only PICES country not submitting HAE-DAT reports, and requested PICES help identify a new contact person in China in order to acquire data. An action item at ISB-2011 was for HAB-S to revise its terms of reference by PICES-2011 to better align its goals with FUTURE. However, MEQ and Science Board agreed that they need further revision to broaden its scope and meet FUTURE requirements as the update provided at PICES-2011 was inadequate.

MEQ supported the extension of WG 24 for 1 year to complete its terms of reference and to hold a final business meeting at PICES-2012.

MEQ proposed the establishment of a Study Group on *Marine Pollutants* to identify novel or promising approaches to monitoring pollutant trends over space and time, and to evaluate impacts on biota at the population level in PICES member countries.

Recommendations:

- extend WG 24 for 1 year to complete its TOR;
- publication of an electronic NIS Atlas; SOFE-AP to produce an accompanying brochure

Action:

- HAB-S to have its terms of reference further revised by the end of 2011 for review at ISB-2012.

POC

POC Committee Chairman, Dr. Kyung-Il Chang, proposed the establishment of a Working Group on *Regional Climate Modeling* to assess state-of-the-art regional climate modeling efforts, their implications for regional ecosystem studies and to further their development in the North Pacific Ocean and its marginal seas. Science Board felt this working group would be a good match with FUTURE and would feed into the proposed Section on *Climate Change Effects on Marine Ecosystems*, and thus supported the proposal. Science Board also suggested that the working group be discussed again at ISB-2012 in order for BIO to voice its opinion if it would like to act as a co-sponsor. Science Board also supported POC's request to publish a special issue dedicated to the late Dr. Bernard Megrey (formerly a member of CCCC program, MODEL Task Team and Chairman of TCODE) in the Journal of Marine Systems for 2013.

In regard to PICES affiliate membership in SCOR Working Groups 2.3.2 and 2.3.7 (see Agenda Item 3), Dr. Chang proposed to ask SCOR WG 2.3.7 member, Dr. Lisa Miller, to report to PICES on SCOR activities.

Action: POC Chairman to ask Dr. Lisa Miller to report to PICES on SCOR WG 2.3.7 activities.

MONITOR

MONITOR Committee Chairman, Dr. Hiroya Sugisaki, reviewed MONITOR events of the past year and reported that MONITOR was in active communication with Dr. David Checkley, representing PICES on the Framework for Ocean Observing Task Team (TT-FOO). Although the TT focuses mainly on physical and lower trophic level biological EOVs (essential ocean variables), as measured in pelagic locations, MONITOR suggested that Dr. Checkley encourage the TT to also focus on developing biological and chemical EOVs in benthic-to-surface locations that are relevant to understanding productivity of higher trophic level organisms.

SB-2011

MONITOR recommended that PICES continue to support and participate in the Framework for Ocean Observing.

Dr. Sugisaki stated that there was little communication between ICES-GOOS related working groups (Working Group on *Oceanic Hydrography* and Working Group on *Operational Oceanographic Products for Fisheries and the Environment*) and MONITOR so far, but that the Committee was open to sending a representative to their meetings.

TCODE

TCODE Committee Chairman, Dr. Toru Suzuki, informed Science Board that TCODE was engaged in communications with several international organizations relevant to TCODE, including OBIS (Ocean Biogeographic Information System) and has extended an invitation to IODE's Study Group/Group of Experts on OBIS for a member to become an *ex-officio* member of TCODE.

Dr. Suzuki requested funds to continue renting a remote server for PICES TCODE geo-spatial portal site. As requested by the BIO and MEQ Chairmen, to work with WG 23 and WG 21, respectively, Dr. Suzuki agreed that TCODE would discuss methods or provide advice to WG 23 for setting up a website for the Group to share data and publications, and to work with Dr. Deborah Ruesser (WG 21) to try to establish a simplified user/database interface for the NIS Atlas.

Action:

- TCODE to discuss setting up a website with WG 23
- TCODE to work with Dr. Ruesser on the NIS atlas/database interface

Additional Science Board recommendations

As a result of further discussions at the meeting, a summary of Science Board recommendations to Governing Council is provided below.

Changes in Chairmanship

- Dr. Won-Duk Yoon (Korea) to replace Dr. Young-Shil Kang as Co-Chair (Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* (WG 26))
- Dr. Libby Logerwell (USA) to replace Dr. Mikhail Stepanenko as FIS Chair
- Dr. Xianshi Jin (China) to replace Dr. Gordon Kruse as FIS Vice-Chair

Proposed new expert groups

- Study Group on *Marine Pollutants* (Parent Committee: MEQ);
- Working Group on *Regional Climate Models* (WG 29) (Parent Committee: POC (and possibly BIO))
- Section on *Human Dimensions of Marine Systems* (Parent: Science Board)
- Section on *Climate Change Effects on Marine Ecosystems* (Parent: Science Board [later changed to Parent Committees of BIO, FIS and POC])

Inter-sessional symposia/sessions/workshops/meetings

Joint theme sessions at the ICES Annual Science Conference, September 17–21, 2012, Bergen, Norway

- Theme Session A: “*Understanding, measuring and projecting the limits of resilience in marine ecosystems*”;
- Theme Session I: Multidisciplinary perspectives in the use (and misuse) of science and scientific advice in Marine Spatial Planning
- Theme Session Q: “*Sustainability of aquaculture*”.
- Theme Session M: “*Subarctic-Arctic interactions: Ecological consequences*”.

Workshops/meetings

- PICES/MAFF Project Synthesis Workshop, March 21–23, 2012 Newport, OR, USA;
- Marine Ecosystem Model Inter-comparison Project (MEMIP) Workshop, spring 2012, Corvallis, U.S.A.;
- FUTURE Implementation Workshop, May 22–24, 2012, Busan, Korea;
- Inter-sessional Science Board Meeting, May 24–25, 2012, Busan, Korea;
- ICES/PICES/GEOHAB workshop on “*Climate change and harmful algal blooms*”, in conjunction with the meeting of the ICES Working Group on *Harmful Algal Bloom Dynamics*, spring 2012, TBD;
- SCOR WG 137 workshop on “*Global patterns of phytoplankton dynamics in coastal ecosystems: Comparative analysis of time series observations*” (co-sponsored by PICES), October 2012, prior to PICES-2012, Hiroshima, Japan.

Capacity building

- PICES/MAFF Workshop on “*Introduction to Rapid Assessment Survey methodologies for detecting non-indigenous marine species*” (co-sponsored by FRA, NOWPAP and WESTPAC), February 8–9, 2012, Nagasaki, Japan;
- PICES/MAFF training course on screening methods for testing shellfish for paralytic shellfish poisoning toxins and phytoplankton identification, February 17–22 (Jakarta) and February 23–24 (Lombok Island), 2012, Indonesia;
- PICES/MAFF Harmful Algal Bloom workshop to review data collected by High Performance Liquid Chromatography and Mass Spectrometry methods, and to provide outreach for the project, March 5–9, 2012, Guatemala;
- Second ICES/PICES Conference for Early Career Scientists on “*Oceans of Change*”, April 24–27, 2012, Calvià, Majorca, Spain;
- IMBER Workshop on “*Needs assessment for capacity development for integrated marine biogeo-chemistry and ecosystem research in the Asia-Pacific region*” (co-sponsored by PICES), June 2012, Shanghai, China;
- IMBER-led international ClimECO3 Summer School on “*A view towards Earth System models: Human-natural system interactions in the marine world*” (co-sponsored by PICES), July 23–28, Ankara, Turkey.

Priority items with funding implications

PICES-2012, October 12–21, 2012, Hiroshima, Japan

- Invited speakers for Science Board Symposium and Topic Sessions, with the normal allocation of approximately \$5,000 per Committee/Program;
- 1 invited speaker for each of the PICES-2012 workshops.

Inter-sessional events

- MEQ representative to participate in the 3rd Intergovernmental Review Meeting of the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, January 25–27, 2012, Manila, Philippines;
- TCODE representative to attend the IODE SG-ODP (IOC/IODE Study Group for the Ocean Data Portal) meeting, February 20–22, 2012, Oostende, Belgium;
- PICES representative to participate in the workshop on “*Salmon ocean ecology*”, March 20–22, 2012, Newport, U.S.A.;
- PICES invited speaker for the CLIOTOP special session “*Global science for global governance of oceanic ecosystems and fisheries*” at the Planet Under Pressure Conference, March 26–29, 2012, London, UK;
- TCODE representative to attend the IODE GE-BICH (IOC/IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices) meeting, March 26–30, 2012, Oostende, Belgium;
- S-HAB representative to participate in the planning meeting for the ICES/PICES/GEOHAB workshop on “*Climate change and harmful algal blooms*”, early 2012, venue TBD;
- POC/WG 27 representative to attend the CLIVAR Pacific Implementation Panel meeting, April 29–May 1, 2012, Noumea, New Caledonia;

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- PICES convenor for the workshop on “*Climate change projections for marine ecosystems: Best practice, limitations and interpretation*”, May 13–14, 2012, Yeosu, Korea;
- PICES representatives/convenors for the joint sessions to participate in the ICES Annual Science Conference, September 17–21, 2012, Bergen, Norway;
- PICES representative (S-CC) to participate in the 3rd International Symposium on “Oceans in high-CO₂ world”, September 24–27, 2012, Monterey, U.S.A.;
- PICES convenor for the International Symposium on “*Forage fish interactions: Creating the tools for ecosystem based management of marine resources*” (November 8–12, 2012, Nantes, France).

Facilities

- Renew rent of a remote server for PICES TCODE geo-spatial portal site

Publications

Special issues of primary journals (2012–2013)

- *Aquaculture Economics and Management* (2012, Guest Editor: M. Pang) selected papers for a special issue from the PICES-2010 Topic Session on “*Economic relation between marine aquaculture and wild capture fisheries*”;
- *ICES Journal of Marine Science* (2012, Guest Editors: J. Keister, C. Johnson, and D. Bonnet), special issue based on selected papers from the 2011 PICES/ICES Zooplankton Production Symposium on “*Population connections, community dynamics and climate variability*”;
- *Reviews in Fish Biology and Fisheries* (2012, Lead Author: S. McKinnell), review paper on “The decline of Fraser River sockeye salmon in relation to marine ecology”;
- *Nature* (2012, Lead author: A. Hollowed), synthesis paper from the 2010 PICES/ICES/FAO Symposium on “*Forecasting climate change impacts on fish and fisheries: Forecasting impacts, assessing ecosystem responses, and evaluating management strategies*”;
- *Journal of Marine Systems* special issue on modeling dedicated to Dr. Bernard Megrey (May 2013, Guest Editors: E. Curchitser and S.I. Ito);
- *ICES Journal of Marine Science* (2013, Guest Editors: TBD) selected papers for a special issue from the 2012 Second International Symposium on “*Effects of climate change on the world’s oceans*”.

PICES Scientific Report series

- Final report for the Climate Change and Carrying Capacity Program (Editor: H. Batchelder);
- PICES Advisory Report to the Cohen Commission on “The decline of Fraser River sockeye salmon in relation to marine ecology” (Editor: S. McKinnell) – to be reproduced from web-based Cohen Commission Technical Report No. 4;
- Final report of the Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (Editors: A. Hollowed and S. Kim);
- Final report of the Study Group on *Human Dimensions* (Editors: M. Makino and D.L. Fluharty);
- Final report of the Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (Editors: F. Chai and S. Takeda);
- Final report of the Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (Editor: W. Peterson);
- Final report of the Working Group on *Environmental Interactions of Marine Aquaculture* (Editors: K. Abo, I. Burgetz, B. Dumbauld and S. Johnson)

Other publications

- Atlas of non-indigenous marine and estuarine species in the North Pacific (Editors: H. Lee II and D. Reusser) to be a web publication;
- Brochures and slide decks based on the final report of the MEQ Working Group on *Ecosystem-based Management Science and its Application to the North Pacific* (PICES Scientific Report, 2010, No. 37, 166 pp.), the Second North Pacific Ecosystem Status Report (PICES Special Publication, 2010, No. 4, 393 pp.) and the final report of the PICES/MAFF project on “*Development of the prevention systems for harmful organisms’ expansion in the Pacific Rim*” (March 2012);

- Supplementary chapter for the Second North Pacific Ecosystem Status Report 2003–2008 (PICES Special Publication No. 4).

Saturday, October 22, 2011

AGENDA ITEM 9

Report on Study Group on *Human Dimensions*

The Chairman of the Study Group on *Human Dimensions* (SG-HD), Dr. Mitsutaku Makino, presented the outcome of PICES sending an observer to attend the Land-Ocean Interactions in the Coastal Zone (LOICZ) Open Science Conference September 12–15, 2011 in Yanti, China. SG-HD member, Dr. Masahito Hirota, attended the meeting on behalf of PICES to collect information about how LOICZ deals with the human dimension on its coastal issues, and to seek possible collaborations with the organization. In October 2011, Drs. Makino and Hirota met with SSC member, Dr. Masumi Yamamuro to discuss how LOICZ and PICES might work together.

Dr. Makino felt that collaboration with LOICZ would allow PICES to obtain information and suggestions for “comparing” and “scaling up” North Pacific ecosystem studies to global scales, would benefit early career scientists in both organizations to communicate and interact with each other, and would allow PICES to draw on the rich source of anthropologists from LOICZ as potential members of the proposed Section on *Human Dimensions of Marine Systems*. Science Board agreed that if the Section were formed, LOICZ expertise would act as a good supplement, and that time could be saved in FUTURE by tying in with ongoing LOICZ activities.

Recommendation: Science Board supports collaboration with LOICZ and the establishment of a Section on *Human Dimensions of Marine Systems*

AGENDA ITEM 10

PICES-2012, Hiroshima, Japan, theme and description, draft schedule of scientific sessions and workshops

Science Board agreed, in principle, with the proposed theme for PICES-2012, “*Effects of natural and anthropogenic stressors in the North Pacific ecosystems: Scientific challenges and possible solutions*”, to be held in Hiroshima, Japan, from October 12–21, 2012. The following sessions and workshops, by order of Committee, were recommended to be convened.

¾-day Science Board Symposium

Effects of natural and anthropogenic stressors in the North Pacific ecosystems: Scientific challenges and possible solutions

1-day BIO Contributed Paper Session

1-day BIO/FIS Topic Session

Jellyfish in marine ecosystems and their interactions with fish and fisheries [co-sponsored by ICES]

1-day BIO/POC/FIS/MEQ Topic Session [revised to ½ day and later co-sponsored by BIO/FIS/POC]

Advances in understanding the North Pacific Subtropical Frontal Zone ecosystem

1-day BIO/MEQ Topic Session [revised to ½ day]

Environmental contaminants in marine ecosystems: seabirds and marine mammals as sentinels of ecosystem health

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1-day BIO/MEQ Topic Session [revised to ½ day]

Ecosystem responses to multiple stressors in the North Pacific

1-day BIO Workshop

Secondary production: measurement methodology and its application on natural zooplankton community

½-day BIO Workshop (co-sponsored by ESSAS) [revised to 1 day]

Subarctic–Arctic interactions

1-day BIO Workshop

Prey consumption by marine birds, marine mammals, with the addition of prey consumption by large predatory fish in the PICES regions

1-day BIO/MEQ Workshop

Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts

1-day FIS Contributed Paper Session

½-day FIS Topic Session

Monitoring on a small budget: Cooperative research and the use of commercial and recreational vessels as sampling platforms for biological and oceanographic monitoring

½-day FIS/MEQ Topic Session

Abundance, ecological functions and ecosystem service of macrophyte vegetations as indicators of natural and anthropogenic stressors in coastal ecosystem and productivity

1-day MEQ/FIS Topic Session

Social-ecological systems on walleye pollock under changing environment: an inter-disciplinary approach [later renamed to “*Social-ecological systems on walleye pollock and other commercial gadids under changing environment: An inter-disciplinary approach*”]

½-day MEQ Topic Session

Range extension, toxicity and phylogeny of epiphytic dinoflagellates

1-day MEQ/ FUTURE Topic Session [later revised to ½ day]

Risk management in coastal zone ecosystems around the North Pacific

1½-day MEQ Workshop

The contrasting cases of HABs in the eastern and western Pacific in 2007 and 2011

1-day POC Contributed Paper Session

1-day POC/FUTURE Topic Session (co-sponsored by CLIVAR [changed later to POC/CLIVAR/ICES])

Challenges in understanding North Pacific climate variability and change [later changed to “*Challenges in understanding Northern Hemisphere ocean climate variability and change*”]

½-day POC/FIS Topic Session

Linking migratory fish behavior to End-to-End models II

½-day BIO/POC/FIS Workshop (co-sponsored by ESSAS)

Marine Ecosystem Model Intercomparison Project [revised to 2 days and renamed as “*Comparison of multiple ecosystem models in several North Pacific shelf ecosystems (MEMIP-IV)*”]

½-day POC/BIO/TCODE Topic Session

Trends in hypoxia and ecosystem impacts in the North Pacific [later merged with POC/BIO proposal on “*Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas to become a 1-day Topic Session on Changing ocean biogeochemistry and its ecosystem impacts*”]

1-day MONITOR Topic Session

Effects of natural and artificial calamities on marine ecosystems and the scheme for their mitigation

AGENDA ITEM 11

Report of the PICES/ICES Study Group on Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science

A draft report prepared by the members of the PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* was sent by the Secretariat to Governing Council and Science Board September 21, 2011, with an explanation that the draft had been discussed at the SCICOM meeting held during the 2011 ICES Annual Science Conference (with PICES Study Group members, Drs. Sinjae Yoo and Skip McKinnell attending the meeting) and then had been circulated with ICES for further comments. Because there was little time for Science Board to review the report before the PICES Annual Meeting, the Science Board Chairman requested the Secretariat to send a reminder to all Committee and FUTURE Chairmen to circulate the report to their members for review and comments by mid-November. Any comments or changes received from Governing Council and Science Board would then be reviewed by PICES SG-SP members (Drs. Yoo, McKinnell, Hiroaki Saito and Thomas Therriault) who would then make the appropriate changes. The new version or the report will then be placed on the PICES website for one last review by the broader PICES scientific community before finalization.

Action: Committee Chairmen and their members to review draft report, and provide comments by mid-November

AGENDA ITEM 12

Status of planning for PICES-2013

In keeping with the 6-year rotation of PICES member countries (Decision 94/A/6), Canada agreed to host PICES-2013 in Nanaimo, Canada. The title of the theme “*Communicating forecasts, uncertainty and consequences of ecosystem change to society*” was provided to Science Board at the Annual Meeting. A description of the theme will be provided at a later date.

AGENDA ITEM 13 (CONTINUED)

Relations with specific international programs/organizations

Science Board reviewed the 2010–2011 standing list of international and regional organizations and programs and agreed with the Secretariat’s decision to remove or add certain names. The Yellow Sea Large Marine Ecosystem Project has terminated and Science Board recommended its removal.

AGENDA ITEM 14

Possible PICES-sponsored conferences/symposia in 2013 and beyond

No decisions were made regarding possible PICES-sponsored conferences/symposia in 2013 and beyond except for a potential FUTURE Open Science Meeting (see FUTURE SSC Agenda Item 3).

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AGENDA ITEM 15

Capacity building/Plan for PICES summer schools

PICES/ICES Early Career Scientists Conference

Dr. Skip McKinnell, PICES Coordinator for the 2012 PICES/ICES Early Career Scientists Conference on “*Oceans of change*” (April 24–27, 2012, Calvià, Majorca, Spain) reported that preparations were progressing well. The Scientific Steering Committee, composed of 3 PICES and 4 ICES early career scientists, had selected invited speakers. Participation will be by invitation only from the SSC, based on specific eligibility criteria, and it is anticipated that 90 to 110 early career scientists will be invited.

PICES Summer School

Dr. Rumrill announced that two proposals for a PICES Summer School in 2012 were submitted by the U.S. delegation to the PICES Secretariat for discussion and approval by Science Board and Governing Council. The venue will be held at the Hatfield Marine Science Center at Oregon State University. Science Board recommended that the proposal on ocean observing systems and on time-series datasets be combined into a 1-week-long session. Dr. Rumrill added that the organizers were looking into the possibility of getting NOAA ship time for a field cruise.

PICES-sponsored Summer School

Science Board reviewed IMBER’s request for PICES to co-fund a third IMBER Summer School, ClimECO3 on “*A view towards integrated earth system models – Human-nature interactions in the marine world*” to take place July 23–28, 2012 in Ankara, Turkey, which will include the human dimension in end-to-end food web modelling. Science Board agreed to give its support, as the summer school theme was well aligned with PICES’ interests. However, Science Board wanted to ensure that PICES receives a product, such as an article in the PICES Press newsletter, if it is to co-sponsor the summer school.

IMBER-sponsored workshop on capacity building

Science Board reviewed the proposal to PICES on an International Workshop on “*Needs assessment for capacity development for integrated marine biogeochemistry and ecosystem research in the Asia-Pacific region*” to be held in June 2012 in Shanghai, China. Science Board agreed the request for \$5,000 was reasonable and assigned moderate importance to its support.

Recommendations:

- Science Board supports the proposal for a PICES Summer School to be held in the USA
- Science Board supports co-sponsoring ClimECO3 as a moderate priority, to be based on the availability of funds
- Science Board supports the IMBER-sponsored workshop in Shanghai, China, as moderate importance

AGENDA ITEM 16

Venue and dates of ISB-2012

Science Board agreed that there was a need to hold an inter-sessional Science Board meeting in 2012 because of the increase in PICES business, including Science Board duties as a Scientific Steering Committee for FUTURE. Science Board agreed that a third FUTURE workshop should be held in conjunction with the inter-sessional meeting after the PICES/ICES/FAO Symposium on “*Effects of climate change on the world’s oceans*” (Yeosu, Korea, May 15–19, 2012) at a venue close by.

Recommendation: Science Board to hold a 4-day FUTURE workshop and ISB-2012 meeting in Busan after the Yeosu symposium.

AGENDA ITEM 17

Other business

MONITOR Chairman, Dr. Hiroya Sugisaki informed Science Board that Japan wished to express its gratitude for funds collected by PICES, ICES and JSFO that were donated to the Japanese government for fisheries and oceanographic research on the recovery from the Great East Japan Earthquake. Eleven projects were able to be developed from the donations.

FUTURE SSC AGENDA ITEM 1

Presentation and discussion of current status of the FUTURE Advisory Panels

AICE-AP Chairman, Dr. Thomas Therriault, and SOFE-AP Chairman, Mr. Robin Brown, presented their reports to Science Board (COVE-AP Chairman, Dr. Hiroaki Saito, was unable to attend the Annual Meeting). Dr. Therriault stated that FUTURE still faced a number of challenges, one of which was the lack of participation at the AICE-AP business meeting for a second year in a row (although two members were unable to attend this year due to logistical reasons). Although SOFE-AP had good representation and participation, both Chairmen suggested a review of FUTURE membership, as Chinese attendance was still lacking in AICE, and there was underrepresentation from BIO Committee members. China's representative at the meeting, Prof. Mingyuan Zhu, offered to present a list of Chinese candidates recommended by AICE and SOFE to SOA/CAFS leadership for consideration. Dr. Therriault also stressed the challenge of FUTURE having better communication with Committees. One way might be for expert groups to report to joint FUTURE Advisory Panel meetings, then to the individual Advisory Panel meetings, after which a summary report would be prepared for discussion at the Committee level.

Dr. Therriault also felt a framework or "roadmap" would be highly desirable to develop a detailed plan for FUTURE to follow. As more working groups continue to be added, it will become necessary for FUTURE to have a clear plan when it begins to compile data arising from them over the next few years. FUTURE could also take the opportunity to listen to experts who come to the Annual Meeting to identify emerging issues. It was agreed that a roadmap would be developed at the inter-sessional Science Board meeting. Committee Chairmen were advised to work with their Committees on providing draft Action Plans for the proposed Inter-sessional Science Board meeting in the spring of 2012. Mr. Brown requested all Committees and their subsidiary bodies think about what products they wanted to assemble for status, outlooks, forecasting and engagement in order for FUTURE to evaluate what was going well and what needs working on.

Action:

- AICE, SOFE Chairmen to provide Prof. Mingyuan Zhu with a list of potential Chinese candidates for membership;
- Committees and their subsidiary bodies to consider specific products to be assembled for FUTURE for discussion at the FUTURE workshop in Busan;
- Secretariat to compile an attendance list history of FUTURE AP members for Advisory Panel Chairmen to review.

FUTURE SSC AGENDA ITEM 2

Status of new expert groups

Expert groups established since PICES-2010 include the Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28; approved at ISB-2011 and established by Council June 2011), Working Group on *North Pacific Climate Variability and Change* (WG 27; approved at ISB-2011 and established by Council June 2011), Section on *Climate Change and Marine Ecosystems* (S-CCME; approved at PICES-2011), and Section on *Human Dimensions of Marine Systems* (S-HD; approved at PICES-2011). As it was too early to review the status of any of these groups, it was agreed to

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include them as key participants in development of the FUTURE roadmap at ISB-2012. However, in the meantime, S-HD would be particularly well suited to helping SOFE-AP identify audiences for FUTURE products.

FUTURE SSC AGENDA ITEM 3

Potential FUTURE inter-sessional workshop

For discussion and recommendation on a FUTURE inter-sessional workshop, see Agenda Item 16. In addition to holding a workshop, Science Board also debated where and when to hold a FUTURE Open Science Meeting (OSM) to showcase its products to date. Two options were put forth: (1) hold the OSM as a standalone meeting or (2) hold it as an extension of the Science Board Symposium at PICES-2013. As the benefits and consequences for each option still needed to be looked at more closely, Science Board opted to deal with this topic at ISB-2012.

Action: Science Board to decide OSM time and venue at ISB-2012

FUTURE SSC AGENDA ITEM 4

FUTURE website

As FUTURE matures, Science Board discussed the need for a well designed website to showcase FUTURE products. The website would make products available both to the public as well as serving members internally. Dr. Yoo asked TCODE to establish a rudimentary website, and assist the Secretariat with the technical aspects of running it. Once designed, the Secretariat would maintain it. However, it was pointed out that if the Secretariat is to be involved, requirements of Secretariat must be clearly articulated in order not to overload its limited capacity. Mr. Brown stated that he would ask the North Pacific Research Board to help with the design. TCODE member, Dr. Igor Shevchenko, had indicated that he would act as the contact between SOFE-AP and TCODE to effect smooth transition of information. Science Board recommended that he gather information/comments from Committees and subsidiary bodies on structure, contents, organization, and what they would like to see posted. Once the survey has been conducted a FUTURE website can then be constructed.

Action: Dr. Shevchenko to conduct website survey among Committees/subsidiary bodies and have results ready for discussion at ISB-2012

FUTURE SSC AGENDA ITEM 5

Report of Study Group on Updating the PICES Strategic Plan

The FUTURE SSC recommended that all Standing Committees have their Action Plans prepared for review at ISB-2012.

FUTURE SSC AGENDA ITEM 6

Other business

None.

SB Endnote 1**Science Board participation list**Members

Robin Brown (SOFE-AP)
 Kyung-Il Chang (POC)
 Steve Rumrill (MEQ)
 Mikhail Stepanenko (FIS)
 Hiroya Sugisaki (MONITOR)
 Toru Suzuki (TCODE)
 Thomas Therriault (AICE-AP)
 Atsushi Tsuda (BIO)
 Sinjae Yoo (Science Board Chairman)
 Mingyuan Zhu (alternate, China)

Secretariat

Alexander Bychkov (PICES)
 Skip McKinnell (PICES)

Observers

Masahito Hirota (SG-HD)
 Adolph Kellermann (ICES)
 Kyung-Rhul Kim (CREAMS-AP)
 Mitsutaka Makino (SG-HD)

SB Endnote 2**Science Board meeting agenda**

Sunday, October 16, 2011 (12:30 – 14:00)

1. Welcome and adoption of agenda (Yoo)
2. Review of procedures for Science Board Symposium and Session awards, and Closing Session (Yoo, McKinnell)
3. Relations with specific international programs/organizations (Yoo, international organization representatives)
4. Status of proposed inter-sessional workshops/symposia

Friday, October 21, 2011 (15:00 – 18:00)

5. Status of proposed inter-sessional workshops/symposia (continued)
6. Status of proposed publications (Secretariat)
7. Implementation of Science Board recommendations and Governing Council decisions from PICES-2010 (Yoo)
8. Reports from Scientific and Technical Committees (Committee Chairs)

Saturday, October 22, 2011 (09:00 – 18:00)

9. Report on Study Group on *Human Dimensions* (Makino)
10. PICES-2012, Hiroshima, Japan, theme and description, draft schedule of scientific sessions and workshops (All)
11. Report of the PICES/ICES SG on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* (Yoo/McKinnell)
12. Status of planning for PICES-2013 (Secretariat)
13. Relations with specific international programs/organizations (continued, Yoo, international organization representatives)
14. Possible PICES-sponsored conferences/symposia in 2013 and beyond
15. Capacity building/Plan for PICES summer schools in 2012 and 2013 (Yoo and McKinnell)
16. Venue and dates of ISB-2012 (Secretariat)
17. Other business

SB-2011

- FUTURE SSC 1. Presentation and discussion of current status of the FUTURE APs
- FUTURE SSC 2. Status of new expert groups (All)
- FUTURE SSC 3. Potential FUTURE inter-sessional workshop
- FUTURE SSC 4. FUTURE website
- FUTURE SSC 5. Report of Study Group on Updating the PICES Strategic Plan (SG-USP) – Alignment with FUTURE (Yoo, Bychkov)
- FUTURE SSC 6. Other business (All)

Report of the Biological Oceanography Committee

The Biological Oceanography Committee (BIO) held its meeting from 18:00–19:30 h on October 16 and 14:00–18:00 h on October 19, 2011 in Khabarovsk, Russia. The Chairman, Dr. Atsushi Tsuda, called the meeting to order and welcomed the participants (*BIO Endnote 1*). The proposed agenda was reviewed and is provided in *BIO Endnote 2*.

AGENDA ITEM 3

Oral and Poster awards

Procedure to select the awards was confirmed as follows: Each Committee member was to list two top candidates for Best Oral Presentation by an early career scientist in Topic Session S2 and BIO Contributed Paper Session and provide the names to the BIO Chairman. For Best Poster, open to anyone, each Committee member was to list two top candidates and provide the names to the BIO Chairman by email. Rankings would then be compiled by the Chairman, and the highest ranked candidate's name provided to the Secretariat for award certificate preparation.

AGENDA ITEM 4

Reports from subsidiary bodies

Brief highlights are given for the following subsidiary bodies reporting to BIO. Their full meeting reports can be found at http://www.pices.int/publications/annual_reports/.

Advisory Panel on *Marine Birds and Mammals* (MBM-AP)

A report summarizing the meeting of AP-MBM, held October 16, 2011, was presented by Dr. Yutaka Watanuki. This detailed presentation included a description of the revised Terms of Reference (*AP-MBM Endnote 4*), the proposed three-year Activity Plan (*AP-MBM Endnote 5*), and a summary of the AP-MBM Topic Session (S2) on “hot spots” (see Session Summaries in the 2011 Annual Report at http://www.pices.int/publications/annual_reports/Ann_Rpt_10/2010-Session-sum.pdf) held on October 18. An additional issue discussed was a proposal by Dr. George Hunt for a study group to evaluate the feasibility of updating PICES Scientific Report No. 14 (2000), *Predation by marine birds and mammals in the subarctic North Pacific Ocean*. BIO actions were: 1) approval of the IWC accepting a PICES observer, 2) approval of a study group for revising PICES Scientific Report No. 14, and 3) approval of the continuation of AP-MBM for 3 more years. These actions will be brought forward to Science Board for approval. (The proposed new study group was later changed to a proposed workshop (*AP-MBM Endnote 7*) at PICES-2012 in Hiroshima, Japan, at the recommendation of Science Board.)

Section on *Carbon and Climate* (CC-S)

An oral presentation summarizing the business meeting of the Section on *Carbon and Climate*, held on October 15, was given by S-CC Co-Chairman, Dr. James Christian.

Working Group on *Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean* (WG 22)

WG 22, co-chaired by Drs. Fei Chai (USA) and Shigenobu Takeda (Japan) completed its activities at PICES-2010 and plans to submit its final report in March 2012. Its final business meeting report can be found elsewhere in the PICES 2010 Annual Report.

Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23)

WG 23, co-chaired by Drs. William Peterson (USA) and Song Sun (China), has a 4-year term from 2007–2011.

BIO-2011

A summary of the final meeting of WG 23, held on October 16, 2011, was presented by Dr. Peterson. The target date for completion of the final report of this Working Group was given as April 2012. Some potential new directions were briefly discussed, including establishing a new working group which will be proposed at the next Annual Meeting in Hiroshima.

Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* (WG 26)

WG 26, co-chaired by Drs. Shin-ichi Uye, Young-Shil Kang and Richard Brodeur has a 3-year term from 2010–2012. A summary of the WG 26 meeting, held on October 15, 2011, was presented by Dr. Jennifer Purcell. There were 14 members present at this first meeting, which was primarily an overview of research projects in each PICES member country.

Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28)

WG 28, co-chaired by Dr. Motomitsu Takahashi, has a 3-year term from 2011–2013. A report summarizing the meeting of WG 28, held on October 15, 2011, was presented by Dr. Takahashi, who discussed the background of this new Working Group. There was some discussion about why BIO was asked to co-sponsor a Topic Session proposed by WG 28 for PICES-2012 when no BIO member was included in the Group. There was also concern that the Group's Terms of Reference were still too broad and ambitious for a 3-year period, and needed to be better focused. It was recommended that these concerns, including those on communication between FUTURE-related activities and BIO, be presented at the Science Board meeting.

Marine Ecosystem Inter-comparison Project (MEMIP)

An oral report summarizing the MEMIP-IV workshop, W1 on "*Quantitative comparison of ecosystem models applied to North Pacific shelf ecosystems – humble pie or glee?*" held on October 14–15, was given by Dr. Harold (Hal) Batchelder. The presentation was followed by discussion about 1) a MEMIP presentation to the broader PICES community at the 2012 Annual Meeting, 2) the final goals of MEMIP, and 3) the importance and challenge of including jellyfish in ecosystem models. BIO commented positively about the progress of MEMIP and fully endorsed its plan for the next year (*BIO Endnote 3*).

AGENDA ITEM 5

Topic Sessions and workshops completed at PICES-2011, and inter-sessional meeting

- S2: *Mechanisms of physical-biological coupling forcing biological "hotspots."*
- BIO Paper session,
- W1: Marine ecosystem model inter-comparison (MEMIP) workshop on "*Quantitative comparison of ecosystem models applied to North Pacific shelf ecosystems – humble pie or glee?*".

Written reports will be submitted by the convenors of each session and workshop to BIO for inclusion in Session Summaries of the 2011 Annual Report.

- A short report on the ESSAS Open Science Meeting, held in April 2011 and co-sponsored by PICES, was presented by Dr. Hunt.

AGENDA ITEM 6

Proposed new working groups

A Working Group on *Regional Climate Modeling* was proposed by Dr. Enrique Curchitser (POC) (*POC Endnote 3*). As BIO was not proposed to be a parent Committee for this new Working Group, and due to the shortage of time, BIO did not discuss supporting this Group. [BIO was later requested to be a parent Committee with POC at the Science Board Meeting.] BIO will discuss this issue and a decision will be made by the inter-sessional Science Board meeting.

AGENDA ITEM 7
Proposed Topic Sessions and Workshops at PICES-2012

Topic Session

Contact	Title	Mother body	Sponsorship	Duration	Conveners	Invited speakers	Rank	Financial request
Atsushi Tsuda	BIO Paper Session	BIO	BIO	1 day	Atsushi Tsuda (Japan), Michael Dagg (USA), Hiroaki Saito (Japan)	None	1	
Michael Seki	North Pacific Subtropical Frontal System ecosystem		BIO/POC/FIS/MEQ	1 day	Michael Seki (USA), Taro Ichii (Japan), Skip McKinnell (PICES)	TDB	3	
Shin-ichi Uye	Jellyfish in marine ecosystems and their interactions with fish and fisheries	WG 26	BIO/FIS/ICES	1 day	Shin-ichi Uye (Japan), Richard Brodeur (USA), Song Sun (China), Won-Duk (Korea), Chris Lynam (UK)	Reiji Masuda (Japan), Monty Graham (USA), Hermes Mianzan (Argentina), Chris Lynam (UK)	2	
Yutaka Watanuki	Spatial patterns of anthropogenic stressors: predators as sentinels of marine ecosystem health	MBM	BIO/MEQ/JSPS	1 day	Peter Ross (Canada), Yutaka Watanuki (Japan)	Hideshige Takeda (Japan), A. Watanab (Japan), J.A. Franeker (Netherlands)	5	
Elizabeth Logerwell	Science needs for offshore oil and gas development in the North Pacific		FIS/BIO/MEQ/POC	1 day	Elizabeth Logerwell (USA), Ken Lee (Canada), TBD (Russia)	TBD	6	
Kenneth Drinkwater	Subarctic-Arctic interactions	ESSAS	ESSAS/POC/BIO/FIS/FUTURE/MONITOR	1 day	Kenneth Drinkwater (Norway), Jackie Grebmeier (USA), James Overland (USA), Sei-Ichi Saitoh (Japan)	TBD	7	
Motomitsu Takahashi	Ecosystem responses to multiple stressors in the North Pacific	WG28	BIO/MEQ	0.5 day	Motomitsu Takahashi (Japan), Ian Perry (Canada), Vladimir Kulik (Russia)	Natalie Ban (Australia), Benjamin Halpern (USA)	4	
James Christian	Anthropogenic CO ₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas	S-CC	POC/BIO	1 day	Masao Ishii (Japan), Lisa Miller (Canada)	TBD	8	
Tony Koslow	Trends in hypoxia and ecosystem impacts in the North Pacific	TCODE	POC/BIO/TCODE	0.5 day	Tony Koslow (USA), Tsuneo Ono (Japan)	Brad Seibel (USA), Frank Whitney (Canada), Tsuneo Ono (Japan) or Y.W. Watanabe (Japan)	Not ranked	

Workshop

Toru Kobari	Secondary production: measurement methodology and its application on natural zooplankton community		BIO	1 day	William Peterson (USA), Toru Kobari (Japan)	Lidia Yebra (Spain)		Invited speaker
Hal Batchelder	Skill assessment and comparison of multiple region results	MEMIP	BIO	2 days	Hal Batchelder (USA)			0.5 from US
Motomitsu Takahashi	Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts	WG28	BIO/MEQ	1 day	Yutaka Watanuki (Japan), Rolf Ream (USA)			
George Hunt	Workshop on the feasibility of updating PICES Publication 14 on Prey Consumption by marine birds, marine mammals, with the addition of prey consumption by large predatory fish in the PICES regions	MBM	BIO	1 day	George Hunt (USA), Hidehiro Kato (Japan)			1 fish expert

Inter-sessional Workshop (Spring, 2012)

Harold Batchelder	MEMIP meeting in Corvallis	MEMIP	BIO	5 days	Harold Batchelder			
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BIO-2011

Proposals for Topic Sessions and workshops for the 2012 PICES Annual Meeting were summarized and can be found in *WG 28 Endnotes 3 and 4* and *BIO Endnote 3*. There was some proposed modification to the workshop list. BIO endorsed the final summary.

This year, a new system for proposals of Topic Sessions was employed, but BIO felt there were some difficulties remaining. The Committee recommends that the call for Topic Session and Workshop proposals to the Annual Meeting be widely advertised to the PICES community perhaps by announcing it on the PICES website or/and by e-mail to previous PICES meeting participants.

AGENDA ITEM 8

Additional financial requests

None

AGENDA ITEM 9

Revision of BIO Action Plan

The BIO Action Plan has not been revised since 2007 and a new PICES Strategic Plan was presented after the establishment of the FUTURE program. The BIO Committee discussed an outline of the Action Plan. A new BIO Action Plan will be prepared according to the new PICES Strategic Plan by the next inter-sessional Science Board meeting, using e-mail discussion.

AGENDA ITEM 10

Report from FUTURE Advisory Panels

A summary of each FUTURE Advisory Panel meeting and joint FUTURE Advisory Panel meeting was provided by AP-SOFE Chairman, Mr. Robin Brown. BIO recommended that mechanisms for communication from the FUTURE APs to the parent Committees be improved. The Committee felt that a single BIO member appointed to the FUTURE Advisory Panels was not enough to keep BIO members informed and engaged in FUTURE activities. There was brief discussion about the idea of a FUTURE Open Science meeting to be held separately from the PICES Annual Meeting, but BIO did not have a resolution on this issue. There was a request from the SOFE Chairman for comments on the mechanisms for continuation of the North Pacific Ecosystem Status Reports. BIO strongly supports this activity in some form. Considerations included: the need for more rapid reporting than can be achieved with a 5-year report; printed versus web-based reporting; the need for an annual meeting to ensure good synthesis of the annual data; and the need for uniformity across all PICES member countries.

AGENDA ITEM 11

Report from joint PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish*

A report summarizing the actions and requests related to PICES/ICES WG-FCCIFS was presented by Juergen Alheit. PICES (BIO) approval is being requested for continuation/renewal. BIO was concerned about being asked to endorse and approve this Working Group when the Committee had not previously reviewed the Implementation Plan or received other information such as the Terms of Reference, although detailed information had been presented to the FUTURE APs. BIO recommended that mechanisms for communication from the FUTURE APs to the parent Committees be improved. BIO recognized the importance of WG-FCCIFS for FUTURE and for PICES/ICES collaboration, but BIO had only a limited interest about participation on working group that focuses on fish and shellfish issues.

AGENDA ITEM 12

SCOR Working Groups

A report summarizing the activities of SCOR WG 137 (SCOR/ICES/PICES Working Group on “Global Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of the Time Series Analysis”) was given by Dr. Sinjae Yoo who indicated the importance and under-representation of coastal phytoplankton time series in the PICES region. The requests were for BIO/FUTURE endorsement of: 1) continued ICES/PICES/SCOR collaborations on this coastal theme, 2) co-sponsorship (with ICES) after 2012 when SCOR funding ends, and 3) an ICES/PICES workshop next year’s Annual Meeting in Hiroshima. BIO supported the requests.

For Working Groups on “Organic Ligands – A Key Control on Trace Metal Biogeochemistry in the Ocean” and “Biogeochemical Exchange Processes at the Sea-Ice Interfaces (BEPSII) Volkman”, BIO did not recommend sending an affiliated member to these Working Groups.

AGENDA ITEM 13

Other items

None

AGENDA ITEM 14

Adjourn

The meeting was adjourned at 18:00 hr.

BIO Endnote 1

BIO participation list

Members

Yuqu Chen (China)
 Michael Dagg (USA, Vice-Chairman)
 Se-Jong Ju (Korea)
 Alexei Orlov (Russia)
 Angelica Peña (Canada)
 William Peterson (USA)
 Vladimir Radchenko (Russia)
 Atsushi Tsuda (Japan, Chairman)
 Atsushi Yamaguchi (Japan)
 Mingyuan Zhu (China)

Observers

Juergen Alheit (ICES)
 Harold Batchelder (USA)
 James Christian (Canada)
 Elliot Hazen (USA)
 George Hunt (ESSAS)
 Ken-Ichi Ishida (Japan)
 Stewart Johnson (Canada)
 Maurice Levasseur (Canada)
 Jennifer Purcell (USA)
 Robert Suryan (USA)
 William Sydeman (USA)
 Motomitsu Takahashi (Japan)
 Shin-ici Uye (Japan)
 Yutaka Watanuki (Japan)
 Sinjae Yoo (Science Board Chairman)

BIO-2011

BIO Endnote 2

BIO meeting agenda

1. Welcome, introductions
2. Meeting agenda
3. Oral and Poster awards
4. Reports from subsidiary bodies
5. Topic sessions and workshops (completed) at PICES-2011, and inter-sessional meeting
6. Proposed new working groups
7. Proposed workshop and Topic Sessions for the 2012 PICES Annual Meeting in Hiroshima, Japan
8. Additional financial requests
9. Revision of BIO Action Plan
10. Report from FUTURE APs
11. Report from WG-FCCIFS (ICES/PICES)
12. SCOR working groups
13. Other items
14. Adjourn

BIO Endnote 3

Proposals for Topic Sessions and Workshops at PICES-2012

2-day BIO Workshop on

“Comparison of multiple ecosystem models in several North Pacific shelf ecosystems (MEMIP-IV)”

Workshop Chairs: Hal Batchelder (USA), Shin-Ichi Ito (Japan), Angelica Peña (Canada), Yvette Spitz (USA)

This workshop will be the first MEMIP workshop where we have completed model comparisons within single shelf systems; *e.g.*, within the Northern California Shelf, Gulf of Alaska shelf and Oyashio shelf and offshore, individually. The workshop tasks will be to undertake quantitative assessment of the successes and shortcomings of individual models within regions and across regions. This formal skill assessment is a key activity to enable MEMIP to identify which, if any, of the various ecosystem models have broad skill spatially and temporally in multiple North Pacific shelf ecosystems. The observations (nutrients, chlorophyll and zooplankton biomass) from the key years of simulation (2000-2003) have been compiled to enable model-data comparisons for each of the three regions. To our knowledge this will be the first multiple model skill assessment that extends to zooplankton, *e.g.*, beyond phytoplankton, and the first that focuses on ecosystem models applied to coastal systems. We anticipate one or several peer-reviewed scientific papers and a MEMIP report to result from this workshop.

Invited speakers: none requested

Travel support request: 0.5 of one travel from US to Japan for Co-chair Yvette Spitz

½-day BIO/MEQ Topic Session on “*Spatial patterns of anthropogenic stress: predators as sentinels of marine ecosystem health*”

[renamed as “*Environmental contaminants in marine ecosystems: Seabirds and marine mammals as sentinels of ecosystem health*”]

Co-sponsored by JSPS

Co-Convenors: Peter Ross (Canada), Yutaka Watanuki (Japan)

Urban and industrial developments in the world’s coastal regions have led to the release of a large number of pollutants (heavy metals, POPs, plastics, oils, radioactive substances) into the marine environment. In some cases, these have detrimental effects on variety of marine resources in coastal and offshore areas. It is increasingly important to identify sources, subsequent transport through marine physical systems and resulting spatial patterns of these anthropogenic stressors. Compared to river-lake systems, knowledge of anthropogenic stressors in marine systems is less understood due to difficulties with detection over wide areas and in offshore regions. As top predators such including many marine mammals and seabirds bio-magnify some of these pollutants, these organisms can be used as bio-indicators of coastal, marine and/or food web contamination. The utility of these ‘sentinels’ was discussed at the MEQ Workshop at PICES-2011. Our proposed 2012 session will 1) identify spatial patterns and geographic areas of concern (high concentrations) of pollutants or other stressors in the PICES region using bio-indicator species, 2) examine mechanisms of transport, and ultimate disposition, of contaminants in marine ecosystems, and 3) discuss health risks for certain predators and human consumers. Review papers, case studies, and innovative methods papers on anthropogenic stressors in marine predators will be invited, as will papers that distinguish between the effects of natural and anthropogenic stressors. In particular, studies linking predator habitat use with spatial aspects of stressors in the environment and in predators will be encouraged.

Proposed invited speakers: H. Takada (Japan), A. Watanab (Japan), J.A. Franeker (The Netherlands)

**1-day BIO/FIS Topic Session on
“*Jellyfish in marine ecosystems and their interactions with fish and fisheries*”**

Co-sponsored by ICES

Co-Convenors: Shin-Ichi Uye (Japan), Richard Brodeur (USA), Song Sun (China), Won-Duk Yoon (Korea), Chris Lynam (UK)

Evidence is accumulating that gelatinous zooplankton populations have increased substantially in many regions of the world, most likely through anthropogenic stresses, but we have insufficient understanding of how these blooms affect fish and, more broadly, marine ecosystems. Some benefits of jellyfish to marine fish include provisioning of food for some species and shelter for juvenile stages of several others. There is also a relatively minor human benefit in that some jellyfish are both commercially fished and cultured for human consumption in several countries. However, the negative effects of jellyfish population outbursts are thought to greatly exceed any positive ones and their effects on ecosystems and the economies that depend on them can be profound. These effects have been examined through field studies, controlled laboratory experiments, and estimated using quantitative ecosystem models. Jellyfish are generally detrimental to fish because they feed on zooplankton and ichthyoplankton, and so are both predators and potential competitors of fish. Relatively little of the energy consumed by gelatinous zooplankton ends up at higher trophic levels of interest to humans compared to krill and forage fishes. Jellyfish blooms also directly impact commercial fisheries through filling or clogging trawls and fouling fixed gear and aquaculture net pens, resulting in enormous economic losses worldwide. This session will focus on empirical field, laboratory, or modeling studies that examine the effects jellyfish have on marine ecosystems, fish species and fisheries, and relevant ecosystem-based management issues important to the needs of society over wide-ranging space and time-scales up to and including climate variations.

Proposed invited speakers: Reiji Masuda (Japan), Monty Graham (USA), Hermes Mianzan (Argentina), Chris Lynam (UK)

BIO-2011

1-day BIO Workshop on “*Secondary production: Measurement methodology and its application on natural zooplankton community*”

Co-Convenors: William Peterson (USA) and Toru Kobari (Japan)

Zooplankton communities play important roles on the transfer of primary production to higher trophic levels of marine ecosystems. In the past two decades, the quantitative evaluation of the energy flow has been emphasized for better understanding how marine ecosystems respond to climate change and global warming. To date, primary production can be globally estimated with remote sensing techniques and validated with in situ experiments using radio or stable isotope. Although secondary production has been estimated with various methods (natural cohort, artificial cohort, molting rate, egg production, nucleic acids ratio, enzyme activity and empirical models), there is little information which method is relevant for natural zooplankton population or community. Thereby, we have little knowledge or confidence of secondary production measurements compared with that of primary production. In this workshop, we review current methodologies to measure secondary production. Through published reports of secondary production on natural zooplankton population or community, this workshop will clarify the assumptions, advantages and disadvantages for each method. We also discuss new techniques (nucleic acids ratio, enzyme activity, chitobiase, or other methods) and challenges in the calibration between the estimates using different methods.

Invited speaker: Lidia Yebra (Spain)

Report of the Fishery Science Committee

The meeting of the Fishery Science Committee (FIS) was held from 18:00-19:30 h on October 16, and 14:00-18:00 h on October 19, 2011. Chairman, Dr. Mikhail Stepanenko, and Vice-Chairman, Dr. Gordon Kruse, called the meeting to order and welcomed the participants. The meeting was attended by 12 FIS members plus 12 observers (*FIS Endnote 1*). Dr. Kruse served as rapporteur. The agenda was adopted without modification (*FIS Endnote 2*).

AGENDA ITEM 3

Discussion about need for a FIS Vice-Chairman

A FIS Vice-Chairman position was established in 2008. All other PICES committees have a Vice-Chairman. There was no further discussion of this topic.

AGENDA ITEM 4

Election of officers

The PICES Executive Secretary reminded members of the rules of election. Chairman, Dr. Stepanenko, announced that he was not seeking a second 3-year term. FIS Committee Vice-Chairman, Dr. Kruse, nominated Dr. Libby Logerwell as the next FIS Chair. No other nominations were proposed. Dr. Logerwell accepted the nomination and was unanimously elected to be the next FIS Chair. Dr. Stepanenko nominated Dr. Xianshi Jin (China) as Vice-Chairman. Dr. Jin, who was not in attendance, had accepted the nomination by email prior to the meeting. No other nominations were received. Dr. Jin was unanimously elected to be the FIS Vice-Chairman. The 3-year terms of both officers will begin immediately following PICES-2011. FIS thanks Drs. Logerwell and Jin for accepting these leadership positions in PICES.

AGENDA ITEM 5

2011 FIS Best Oral Presentation and Poster awards

Volunteers were sought to select recipients of the FIS Committee awards to be given during PICES-2011. Drs. Stepanenko and Kruse agreed to select Best Oral Presentation by an early career scientist at a FIS-sponsored Topic Session. The award was given to Soojeong Lee for her presentation, titled "*Population ecological parameters of elkhorn sculpin (Alcichthys alcicornis) along the Uljin area of Korea*" (FIS Paper). Drs. Jacquelyne King and Laura Richards agreed to select the FIS Best Poster award and the result was a tie. One was awarded to Osamu Tamaru for his poster, titled "*Fishery income fluctuation by selecting fishing ground in the Japanese coastal squid jigging fishery*" (S3). The other was awarded to Chiyuki Sassa for his poster, titled "*Reproductive biology of Benthosema pterotum (Pisces: Myctophidae) in the shelf region of the East China Sea*" (FIS Paper). The award recipients were chosen from Topic Sessions S3, S6, and the FIS Contributed Paper Session.

AGENDA ITEM 6

FIS Chairman's report: Implementation of PICES-2010 decisions

PICES-2011 Sessions

At PICES-2011, FIS sponsored the following Topic Sessions:

- S1 Science Board Symposium (October 17, ¾ day). *Mechanisms of marine ecosystem reorganization in the North Pacific Ocean*. Co-Convenors: Sinjae Yoo (SB), Atsushi Tsuda (BIO), Mikhail Stepanenko

FIS-2011

- (FIS), Steven Rumrill (MEQ), Hiroya Sugisaki (MONITOR), Kyung-II Chang (POC), Toru Suzuki (TCODE), Thomas Therriault (AICE), Hiroaki Saito (COVE), Robin Brown (SOFE), Fangli Qiao (China).
- S3 FIS Topic Session (October 21, ½ day). *Population dynamics, trophic interactions and management of cephalopods in the North Pacific ecosystems*. Co-Convenors: John Field (USA), Yasunori Sakurai (Japan), Mikhail Zuev (Russia).
 - S4 FIS/POC Topic Session (October 20, 1 day). *Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species*. Co-Convenors: James Overland (U.S.A.), Akihiko Yatsu (Japan), Skip McKinnell (PICES).
 - S6 MEQ/FIS Topic Session (October 18, ½ day). *Identification and characterization of environmental interactions of marine aquaculture in the North Pacific*. Co-Convenors: Katsuyuki Abo (Japan), Brett Dumbauld (USA), Galina Gavrilova (Russia).
 - S8 POC/FIS Topic Session: co-sponsored ICES (October 21, 1/2 day). *Linking migratory fish behavior to End-to-End models*. Co-Convenors: Enrique Curchitser (USA), Geir Huse (Norway), Shin-ichi Ito (Japan), Michio Kishi (Japan), Skip McKinnell (PICES).

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

International symposia

FIS supported the following international symposium:

“*Ecosystems 2010: Global progress on ecosystem based fisheries management*”, which was convened November 8–11, 2010, in Anchorage, USA.

The symposium was sponsored by PICES, ICES, FAO, and a number of regional organizations. Steering Committee members from PICES included Gordon Kruse (USA, Steering Committee Chair), Patricia Livingston (USA), Chang Ik Zhang (Korea) and Glen Jamieson (Canada). The symposium was attended by 109 participants from 19 countries. A summary of the symposium was published in 2011 in PICES Press 19(1):24–26 and in the ICES Symposium Reports for 2010. A peer-reviewed publication of accepted papers will be published by Alaska Sea Grant in late 2011 or early 2012. Further details about this symposium, including the program, copies of presentations, and book of abstracts are available on the symposium website at: <http://seagrant.uaf.edu/conferences/2010/wakefield-ecosystems/index.php>.

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

- ESSAS Open Science Meeting on *Comparative studies of climate effects on polar and sub-polar ocean ecosystems: progress in observation and prediction* in Seattle, USA, May 22–26, 2011.
- International Workshop on *Reaction of Northern Hemisphere ecosystems to climate event (regime shifts): a comparison*, Hamburg, Germany, May 2–6, 2011. FIS supported travel for two Asian co-convenors for the Workshop.

The following progress was made on FIS-related PICES publications:

- Report of the ICES/PICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish (WGFCCIFS)*. ICES Report.
- Report on the ICES/PICES Workshop on “*Biological Consequences of a Decrease in Sea Ice in the Arctic and Sub-Arctic Seas (WKBCASAS)*” held May 22, 2011. ICES Report.
- Thirty-five papers from the highly successful PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries*” (April 25–30, 2010, Sendai, Japan) were published in a special issue: *Climate Change Effects on Fish and Fisheries: Forecasting Impacts, Assessing Ecosystem Responses, and Evaluating Management Strategies*. ICES Journal of Marine Science 68(6).
- Work has been completed on a special issue of the journal *Fisheries Research* stemming from the PICES 2009 Topic Session S2 on *Ecosystem Based Approaches for the Assessment of Fisheries under Data Limited Situations*. Editors are Patricia Livingston (USA), Gordon Kruse (USA), and Laura Richards (Canada). The volume was printed in late 2011.

AGENDA ITEM 7

Update on FUTURE activities and preview of FUTURE meeting

Dr. Jacquelynne King (FIS and AP-COVE member) gave a progress report on FUTURE activities. A workshop on *Indicators of Status and Change within North Pacific Marine Ecosystems* was held in association with the inter-sessional Science Board meeting in Honolulu, USA in April 2011. Two new working groups, *WG 27: North Pacific Climate Variability* and *WG 28: Ecosystem Indicators of Multiple Stressors*, started in 2011 with strong ties to FUTURE. Also, 8 topic sessions and 3 workshops at PICES-2011 had strong FUTURE connections. Two new expert groups (sections) are currently proposed under FUTURE: strategic initiative on Climate Change Effects on Marine Ecosystems and one on Human Dimensions. Two additional expert groups are under consideration: *Regional Climate Modeling and Downscaling* and *End-to-End Modeling*.

A FUTURE Open Science Meeting is being considered for 2013, and FUTURE sought input from the FIS Committee. FIS discussed this idea briefly and given that PICES-2011 had 8 topic sessions and 3 workshops that were highly relevant to FUTURE, it is seeking clarification about how the proposed Open Science Meeting would differ from a PICES Annual Meeting.

Finally, several issues and challenges confronting FUTURE were presented and discussed. One of the major challenges is communication, given the additional complexity caused by the creation of FUTURE Advisory Panels that are not subordinate to the standing committees. It was pointed out that some Committee members hear the same reports up to five times, owing to their participation at various levels in PICES, whereas most other Committee members received some reports only once, upon request at the FIS Committee meeting. FUTURE sought FIS input on ways to improve communication and information exchange.

AGENDA ITEM 8

Reports of FIS-sanctioned Groupsa. Joint PICES/ICES WG on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS)

Co-Chair of WG-FCCIFS, Dr. Anne Hollowed, provided a summary of the activities of the joint Working Group in 2010–2011. A more comprehensive report of WG-FCCIFS's activities can be found in the annual *Report of ICES/PICES Working Group on Forecasting Climate Change Impacts on Fish and Shellfish* that is published in this Annual Report.

This Working Group was extremely active in 2011. WG-FCCIFS held four working group meetings, produced two reports, and held three inter-sessional workshops. WG-FCCIFS members co-convened 5 Topic/Theme Sessions at PICES/ICES annual meetings.

The 3 workshops convened by WG-FCCIFS in 2011 were: *Reaction of Northern Hemisphere ecosystems to climate events: A comparison*, in Hamburg, Germany in May; *Biological consequences of a decrease in sea ice in arctic and subarctic seas* in Seattle, USA in May, and *Basin-wide impact of Atlantic multidecadal oscillation*, Woods Hole, USA, in June.

In 2011, a major milestone was the ICES/PICES WG-FCCIFS publication of the special issue on “*Climate change effects on fish and fisheries: forecasting impacts, assessing ecosystem responses, and evaluation management strategies*” in the July issue of the ICES Journal of Marine Science, volume 68(6). The special issue provides a valuable assessment of current knowledge of the effects of climate change on fish and fisheries.

Members of the WG-FCCIFS met in October 2010 in Portland and in May 2011 in Seattle to discuss on-going activities of the group. During these meetings, the WG discussed the need to develop a long-term strategic initiative on Climate Change Effects on Marine Ecosystems (SICCME). The WG-FCCIFS ends December

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2011. PICES and ICES recognized that great strides in new sciences have emerged from collaborative work between two organizations and requested the formation of a Science Plan that outlines a structure for continued collaboration focused on climate change. A Science Plan for SICCME was delivered to ICES and PICES in the spring 2011. ICES agreed to the formation of SICCME and PICES and ICES asked WG members to develop an Implementation Plan. These documents were provided to FIS members in advance of the meeting.

Planning of the upcoming PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*” (May 15–19, 2012, Yeosu, Korea) is proceeding as planned.

Dr. Hollowed described WG-FCCIFS’s request to form a new PICES Section on *Climate Change Effects on Marine Ecosystems* (S-CCME). She described their desire for FIS co-sponsorship of this activity. In making this request, she noted that the current co-sponsorship by FIS has worked extremely well.

FIS congratulated Dr. Hollowed and her colleagues for the outstanding work of WG-FCCIFS. FIS strongly supports the proposal for FIS committee co-sponsorship of SICCME, given the strong direct ties of this work to FIS and the need to maintain past excellent levels of communication with FIS.

b. MEQ/FIS Working Group on *Environmental Interactions Marine Aquaculture* (WG-24)

Dr. Katsuyuki Abo, Co-Chairman of WG 24, provided an oral report on the activities of the WG in 2011. Prior to the meeting, Dr. Brett Dumbauld provided a draft written report. This WG began in 2008 with a first face-to-face meeting during PICES-2009 in Jeju, Korea, resulting in all PICES member countries sharing information on the key production methods and species, upon which subsequent work is planned. The WG was not very active in 2010.

Dr. Abo described a plan to accomplish the three terms of reference in the coming year. The first TOR addresses modeling and assessing interactions on marine aquaculture. This involves a review of long- and short-term, near- and far-field effects of aquaculture on benthic communities, including chemical and physical changes, and rate of ecosystem recovery. Dr. Abo is leading this effort. Each country is to review approaches related to their primary forms of culture. First drafts are due by April 1, 2011. The second TOR will address risk assessment methods. Work to be done includes updating and finalizing an overview of risk assessment approaches and relative legislative frameworks for sustainable marine aquaculture. Beyond this, there are no additional plans for work under this TOR. The third TOR addresses aquatic animal disease of aquaculture concern. This will involve listing the diseases of concern, description of diagnostic programs, identification and detection methods, former and ongoing research efforts, and ongoing issues and risks. Dr. Laurie Gustafson (USA) is leading this effort. Overviews will be developed for each country. The final report is to be completed in September 2012.

Dr. Abo outlined some of the challenges that faced WG 24. They included:

- Challenges to meet TORs,
- Differences in each country’s mariculture polices and maturity of their respective industries which may be partly responsible,
- Need for future mariculture activities to be more closely tied to country interests.

Unfortunately, these obstacles prevented the WG from finalizing their report at this meeting. Therefore, FIS supports the WG 24’s request for a 1-year extension to complete the final working group report.

FIS discussed potential ways to address the last challenge (above) concerning the need for future mariculture activities to more closely match country interests. It was suggested that models for carrying capacity could be one focus for a FUTURE mariculture effort. The development of models, and their regional applications, could be undertaken under varying conditions for each country. These models could consider environmental impacts, disease transmission and other factors.

The FIS Committee looks forward to the successful completion of the terms of reference of WG 24 as well as their advice on approaches to incorporate aquaculture science of PICES in the future. A proposal for a Study Group may be submitted at PICES 2012.

AGENDA ITEM 9

Relations with other programs and organizations

a. *BEST-BSIERP, Bering Sea program*

Dr. Kruse presented a report on the BEST-BSIERP program. This program focuses on understanding the key processes regulating the production, distribution and abundance of marine organisms in the Bering Sea. Field work was completed in 2010. Modeling continues and synthesis and reporting will be completed in 2012. Papers stemming from BEST-BSIERP research have been published as separate journal articles and in a special issue of *Deep-Sea Research II*, expected to be published in December 2011 or January 2012. A second special issue is now accepting manuscripts.

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

Dr. Jin Yeong Kim, FIS member and also Chair of the Committee on Scientific Research and Statistics (CSRS), presented a report from the North Pacific Anadromous Fish Commission (NPAFC). The NPAFC developed a new Science Plan for 2011–2015. It is a plan for international cooperative research involving five research components: (1) migration and survival mechanisms of juvenile salmon in ocean ecosystems, (2) climate impacts on Pacific salmon production in the Bering Sea (BASIS) and adjacent waters, (3) winter survival of Pacific salmon in North Pacific Ocean ecosystems, (4) biological monitoring of key salmon populations, and (5) development and applications of stock identification methods and models for management of Pacific salmon. The NPAFC is planning an International Workshop on “*Explanations for the high abundance of pink and chum salmon: Future trends*” October 30–31, 2011, in Nanaimo, Canada.

c. *FAO Regional Office for Asia and the Pacific, Asia-Pacific Fishery Commission (APFIC)*

Dr. Simon Funge-Smith presented a report on the Asia-Pacific Fishery Commission (APFIC), which was established in 1948. APFIC monitors fishery resources, formulates management measures, promotes programs and projects, such as aquaculture and fisheries enhancement, encourages training and capacity building, and disseminates relevant information. APFIC faces many challenges in tropical small-scale fisheries associated with data-limited situations. Dr. Funge-Smith proposed some key areas for collaborations with PICES. He pointed out that most PICES countries are already members of APFIC. He proposed collaboration on the science, even if the APFIC region is outside the PICES area. Common issues may include illegal, unreported and unregulated fishing activities, overfishing, ecosystem approaches, bycatch and trawling effects, strengthening assessments to support fisheries and aquaculture, methods for data-poor fisheries, spatial management of aquaculture, and potential effects of climate change on aquaculture and fisheries. Another area of potential collaboration could be the development of training materials for an ecosystem approach to fisheries.

d. *ISC – IATTC Office*

Dr. Chi-Lu Sun attended the FIS Committee meeting but did not present a formal report since FIS received a full report last year. So, he provided a very brief update. Dr. Sun suggested that stock assessment methodology would be one important way in which ISC and PICES could collaborate.

e. *ESSAS*

Dr. George Hunt gave a presentation on ESSAS activities for the past year. Their 2nd Open Science Meeting on “*Comparative Studies of Climate Effects on Polar and Sub-polar Ecosystems*”, held in Seattle, USA, was very successful. There were 195 participants from 15 countries. Several publications are planned.

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AGENDA ITEM 10

FIS Topic Sessions for PICES-2012

PICES-2012 Topic Sessions

FIS wishes to comment on the new procedure for committees to prioritize topic session proposals in advance of the PICES Annual Meeting. Whereas FIS supports this approach in principle, FIS formally requests that Science Board share the priority lists from other committees with FIS for final ranking at the Annual Meeting. FIS provided clear ranking of proposals prior to PICES-2011. However, if some highly ranked FIS topic session proposals receive weak support from co-convening committees, then FIS would appreciate the opportunity to reconsider its final ranking of proposals to select revised priorities with a greater chance of acceptance.

The top priority for PICES-2012 is a 1-day FIS Contributed Paper Session. FIS also prioritized the following Topic Sessions:

1. *Abundance, ecological functions and ecosystem service of macrophyte vegetations as indicators of natural and anthropogenic stressors in coastal ecosystem and productivity* (FUTURE/FIS/MEQ, ½ day). Proposed convenors are Jun Shoji (Japan), Ik-Kyo Chung (Korea), and Steve Rumrill (USA). (*FIS Endnote 3*)

2. *Jellyfish in marine ecosystems and their interactions with fish and fisheries*. (BIO/FIS, 1 day). Proposed convenors: Richard Brodeur (USA), Shin-Ichi Uye (Japan), Song Sun (China), Won-Duk Yoon (Korea), Chris Lynam (UK). Potential invited speakers include: Reiji Masuda (Japan), Monty Graham (USA), Hermes Mianzan (Argentina) and Chris Lynam (UK). (*BIO Endnote 3*)

3. *Science needs for offshore oil and gas development in the North Pacific* (FIS/BIO/MEQ/POC, 1 day). Convenors: Libby Logerwell (USA), Ken Lee (Canada), Tatyana Belan (Russia). [Science Board did not support this proposal for PICES-2012.]

4. *Monitoring on a small budget: Cooperative research and the use of commercial and recreational vessels as sampling platforms for biological and oceanographic monitoring* (FIS/POC, ½ day). Convenors: Steve Barbeaux (USA), Jennifer Boldt (Canada), Martin Dorn (USA), Jae Bong Lee (Korea). (*FIS Endnote 4*)

5. *Linking migratory fish behavior to end-to-end models* (FIS/POC, ½ day). Convenors: Skip McKinnell (Canada), Enrique Curchitser (USA), Michio Kishi (Japan), Shin-Ichi Ito (Japan), and Geir Huse (ICES). Potential invited speakers are Wei Hao (China), Robert Humston (USA), Michio Yoneda (Japan). (*POC Endnote 4*)

6. *Comparison of impact of multi-decadal climate variability in North Pacific and North Atlantic ecosystems and corresponding teleconnection patterns*. (FIS/POC, co-sponsored by ICES, 1 day). Convenors: Shoshiro Minobe (Japan), William Peterson (USA), Juergen Alheit (Germany), Svein Sundby (Norway). [Science Board did not support this proposal for PICES-2012.]

7. *Inter-basin comparisons of ecology and recruitment processes of gadoids in the North Pacific*. (FIS/POC, 1 day). Convenor: Sukgeun Jung (Korea). [FIS did not support this proposal for PICES-2012.]

Subsequently, PICES requested FIS to provide only the top three priorities. Therefore, the top three here are proposed. Topic session 3 was originally proposed as a 1-day session, and FIS recommended a ½ day session in hopes that FIS might be able to hold additional topic sessions. However, given the restriction to three FIS topic sessions, FIS wishes to recommend topic session 3 as a 1-day session. During or just prior to the FIS meeting, two other proposed topic sessions were presented. George Hunt proposed a full-day theme session on subarctic-arctic interactions, and Mitsutaku Makino proposed a topic session on pollock. Unfortunately, they were not provided within the previous deadline for all other proposals and while FIS is supportive of these topic session ideas, the Committee stands by its prioritization provided above. If one of the top three FIS topic sessions is not approved by Science Board, FIS requests consideration of its fourth priority, "*Monitoring on a small budget*".

AGENDA ITEM 11

Proposals for new FIS expert groups

The FIS Committee received no new proposals for working groups. During the meeting, FIS received a request to consider a new study group on predator-prey interactions, submitted by AP-MBM and supported by BIO. Hunt *et al.* (2000) was published as a PICES Scientific Report (No. 14) which summarized consumption of prey by seabirds and marine mammals. The question posed to FIS is whether to include predatory fishes in the update. FIS strongly supports the formation of a study group to update this consumption report and to consider including large predatory fishes. The study group should consider what constitutes a “large predatory fish.”

AGENDA ITEM 12

Proposals for new meetings/conferences with PICES as organizer

PICES had previously agreed to co-sponsor a symposium entitled “*Forage fish interactions: Creating the tools for ecosystem based management of marine resources*” to be held from November, 8–12, 2012 in Nantes, France. Dr. Vladimir Radchenko (Russia) was previously proposed to be a Co-Convenor. If funding is available, PICES may be able to partially support an invited speaker, as well.

AGENDA ITEM 13

High priority projects

None

AGENDA ITEM 14

Other priority items with funding implications

Dr. Hollowed presented an outline of a budget in support of the proposed strategic initiative with ICES on climate change and marine ecosystems. FIS supports the proposed budget for this very important FIS activity.

AGENDA ITEM 15

Proposed publications

One new publication was proposed for the coming year: A special issue resulting from the 2nd International Symposium on “*Effects of Climate Change on the World’s Oceans*” in Yeosu, Korea, in May 2012.

AGENDA ITEM 16

Inter-sessional activities, meetings and requests for travel support

No new requests.

AGENDA ITEM 17

FIS Action Plan

The FIS Action Plan has not been changed since 2007 in anticipation of a new PICES Strategic Plan. A revised Strategic Plan is being considered for adoption at PICES-2012. Dr. Kruse reviewed the major changes in the Plan and noted that it should be a relatively simple effort to reformat the FIS Action Plan to be consistent with the new Strategic Plan. Also, FIS activities since 2007 can be reviewed to determine which portions of the

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Action Plan have already been accomplished and can now be deleted. However, additional work is needed to propose new actions to meet emerging issues and the vision, as described in FUTURE, and the PICES Strategic Plan. Dr. Kruse offered the following proposal.

It was proposed and agreed by the Committee that FIS should form a small group to revise and update the FIS 2007 Action Plan. Proposed steps are to:

1. Reformat the Action Plan to follow the outline in the new PICES Strategic Plan (new themes and goals);
2. Delete tasks that are already completed or are no longer relevant;
3. Add new tasks consistent with emerging issues and new orientation and emphasis by PICES (*e.g.*, new tasks consistent with the objectives of the strategic initiative on climate change and marine ecosystems).

The group should provide a new draft FIS Action Plan inter-sessionally, showing deleted tasks and new tasks. Other FIS members could provide input by email. The FIS Action Plan should be finalized at PICES-2012. The subcommittee will be composed of Dr. Kruse and Logerwell, with potential addition of other members.

AGENDA ITEM 18

Other business

None

FIS Endnote 1

FIS participation list

Members

Elena Dulepova (Russia)
John Field (USA)
Toyomitsu Horii (Japan)
Sukgeun Jung (Korea)
Jin Yeong Kim (Korea)
Jacquelynne King (Canada)
Gordon Kruse (USA, Vice-Chairman)
Libby Logerwell (USA)
Laura Richards (Canada)
Mikhail Stepanenko (Russia, Chairman)
Akihiko Yatsu (Japan)
Chang Ik Zhang (Korea)

Observers

Katsuyuki Abo (Japan)
Keith Criddle (USA)
Simon Funge-Smith (APFIC)
Yasahito Hirato (Japan)
Anne Hollowed (USA)
George Hunt (ESSAS)
Masahide Kaeriyama (Japan)
Sukyung Kang (Korea)
Jae Bong Lee (Korea)
Patricia Livingston (USA)
Chi-Lu Sun (IATTC)
Peng Sun (China)
Jongjiu Zu (Japan)

FIS Endnote 2

FIS meeting agenda

Sunday, October 16, 2011, 18:00–19:30

1. Welcome of new members, introductions, and nomination of a rapporteur
2. Adoption of agenda
3. Discussion about need for a FIS vice chairman
4. Election of new FIS chairman (and vice chairman, if approved)
5. Volunteers for Award Committees for 2011

- a. FIS Best Presentation Award
- b. FIS Best Poster

Wednesday, October 19, 2011, 14:00–18:00

- 6. FIS Chairman's Report
- 7. Update on FUTURE activities and preview of FUTURE meeting on October 16
- 8. Status reports of FIS-sanctioned groups
 - a. WG-FCCIFC (FIS/POC) Joint ICES/PICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (Anne Hollowed)
 - b. WK-BCASAS Joint ICES/PICES Workshop on *“Biological consequences of a decrease in sea ice in arctic and sub-arctic seas”* (Anne Hollowed)
 - c. WG 24 (FIS/MEQ) on *Environmental Interactions Marine Aquaculture* (Brett Dumbauld)
- 9. Relations with other programs/organizations
 - a. BEST-BSIERP, Bering Sea Project (Dr. Gordon Kruse)
 - b. North Pacific Anadromous Fish Commission, NPAFC (Dr. Jin Yeong Kim)
 - c. FAO Regional Office for Asia and the Pacific (Dr. Simon Funge-Smith)
 - d. ISC – IATTC Office (Dr. Chi-lu Sun) – no formal presentation, available to answer questions
- 10. Status report on FIS topic sessions and workshops for PICES 2012
- 11. Proposals for new FIS Working Groups, Study Groups and Special Projects
- 12. Proposals for new meetings/workshops/conferences with PICES as organizer
 - a. Co-convenor and SSC member for the Symposium on *“Forage fish interactions: Creating the tools for ecosystem based management of marine resources”* to be held from November 8–12, in Nantes, France
- 13. High priority projects and activities with financial/policy implications
- 14. Priority items with funding implications (meetings/workshops/conferences)
- 15. Proposed publications (PICES Scientific Report series and primary journals)
- 16. Inter-sessional activities and meetings, travel support requests
- 17. Discussion FIS Action Plan
- 18. Other business

FIS Endnote 3

Proposal for a ½-day FUTURE/FIS/MEQ [later revised to FIS/MEQ] Topic Session at PICES-2012 on *“Abundance, ecological functions and ecosystem service of macrophyte vegetations as indicators of natural and anthropogenic stressors in coastal ecosystem and productivity”* [later renamed as *“Ecological functions and services associated with marine macrophyte communities as indicators of natural and anthropogenic stressors in nearshore zones of the North Pacific”*]

Macrophyte vegetations consist of seagrass, salt marsh and seaweed along the coast of PICES countries. These macrophytes are important primary producers and support valuable important commercial harvests in coastal ecosystems. In addition, these macrophytes support commercially valuable herbivores, such as abalone, and provide important structured habitats for various life stages of other commercially important fish and invertebrates. The flux and reflux of macrophyte vegetations lead to various interactions with the environment. For instance, large macrophytes provide important sources of carbon to nearshore environments. Physical and chemical conditions, such as water temperature, nutrients, ocean currents, and solar radiation, regulate the formation and abundance of macrophyte vegetations. In turn, the vegetation can also affect local environmental conditions and nearshore communities through their primary production and physical structure. These interactions are called ecosystem functions and services, which are influenced not only by natural forces but recently by anthropogenic stressors. The session is interested especially in the macrophyte vegetation flux and reflux as an indicator of marine productivity fluctuation and/or anthropogenic forces on coastal ecosystems and the impacts on ecological functions and ecosystem services.

Proposed Convenors: Jun Shoji (Japan), Ik kyo Chung (Korea), and Steve Rumrill (USA)

FIS Endnote 4

**Proposal for a ½-day FIS/POC [later revised to FIS/MONITOR/POC] Topic Session at PICES-2012
on “Monitoring on a small budget: Cooperative research and the use of commercial and recreational
vessels as sampling platforms for biological and oceanographic monitoring”**

Long-term monitoring is a key component of an ecosystem-based approach to fisheries management. Data time series enable the examination of changes in oceanographic and community metrics. Government funding sources for long-term monitoring of biological and oceanographic processes has dwindled in recent years while the mandate for this type of information has increased. If data driven ecosystem-based management continues to be goal then methods for reducing the costs of data collection must be found while data quality is maintained. An example of this type of innovative approach can be found in Alaska walleye pollock (*Theragra chalcogramma*) fishery where researchers have teamed with commercial fishers to deploy inexpensive temperature and depth data storage tags on trawl nets. At the same time data on fish density and distribution are being collected using the fishing vessels' own acoustic systems. These data are being used to validate oceanographic models, to assess the effects of oceanographic conditions on bycatch in the walleye pollock fishery, and evaluate the effects of oceanographic conditions on walleye pollock density and distribution. This session will explore ways in which cooperative research with other seagoing stakeholders and the use of commercial and recreational vessels as sampling platforms for biological and oceanographic monitoring can be integrated into ocean monitoring systems. With sufficient interest by the contributors, a special issue of *Fisheries Research* will be sought.

Proposed Co-Conveners: Steve Barbeaux (USA), Jennifer Boldt (Canada), Martin Dorn (USA), Jae Bong Lee (Korea)

Proposed primary publication: Special issue of *Fisheries Research*

Report of the Marine Environmental Quality Committee

The business meetings of the Marine Environmental Quality Committee (MEQ) were held on October 16, 2011 (18:00 to 19:30 hrs) and on October 19, 2011 (14:00 to 18:00 hrs) in Khabarovsk, Russia. Chairman, Dr. Steven Rumrill, called the meetings to order and offered a welcome to all participants. The MEQ members and observers were asked to introduce themselves and to provide a brief statement about their interests and expertise.

AGENDA ITEM 2

Meeting agenda and key MEQ tasks

The agenda for the MEQ business meeting was reviewed and approved by the membership of MEQ (*MEQ Endnote 1*). Dr. Rumrill (USA) and Vice-Chairman, Dr. Mitsutaku Makino (Japan), reviewed key MEQ activities including sponsorship of workshops and topic sessions during the PICES-2011, consideration of proposals for new topic sessions, discussion of project updates by the MEQ expert groups, and discussion of PICES issues related to international cooperation and collaboration.

AGENDA ITEM 3

Implementation of PICES-2010 decisions

MEQ sponsored or co-sponsored the following topic sessions and workshops at PICES-2011 in Khabarovsk, Russia:

- ¾-day Science Board Symposium (S1) on *Mechanisms of ecosystem reorganization in the North Pacific Ocean* (October 17);
- ½-day MEQ Topic Session (S5) on *Harmful algal blooms in a changing world* (October 18);
- ½-day MEQ/FIS Topic Session (S6) on *Identification and characterization of environmental interactions of marine aquaculture in the North Pacific* (October 18);
- 1-day MEQ/FUTURE Topic Session (S7) on *Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems* (October 20);
- 1-day MEQ Workshop (W3) on *Pollutants in a changing ocean: Refining indicator approaches in support of coastal management* (October 14);
- 1-day MEQ Workshop (W2) *Remote sensing techniques for harmful algal bloom detection and monitoring* (October 15).

AGENDA ITEM 4

Relations with other organizations and programs

ICS/SCOR

Dr. Sinjae Yoo, Chairman of Science Board, gave a presentation on SCOR Working Group 137 (*Global Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of Time-series Observations*) which operates within the International Council for Science (ICS), Scientific Committee on Oceanic Research (SCOR). The purpose of the presentation was to allow MEQ members to become familiar with the focus area for SCOR WG 137, to seek possible cooperation between PICES and SCOR in the investigation of phytoplankton dynamics, and to solicit interest in participation by PICES as a potential member of WG 137. The overarching objective for WG 137 is to identify and characterize the effects of anthropogenic nutrient inputs and climate change impacts on estuarine and coastal phytoplankton communities. The topic issue encompassed by WG 137 is of interest to the membership of MEQ, and the Committee agreed that it will be in the interest to both PICES and SCOR to continue to discuss potential joint cooperation and collaborations, including a possible workshop at PICES-2012. MEQ offered that was most appropriate to consider a member of the WG 137 from S-HAB.

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Group of Experts on Scientific Aspects of Marine Pollution

Dr. Peter Kershaw presented a report on the objectives and activities of GESAMP and potential areas of collaboration with PICES.

Northwest Pacific Action Plan

Dr. Sangjin Lee presented a report on the objectives and activities of the NOWPAP and potential areas of collaboration with PICES.

AGENDA ITEM 5

Status reports from MEQ expert groups

Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB) (Agenda Items 5-9):

Dr. Vera Trainer, S-HAB Co-Chair, and S-HAB member, Dr. Shigeru Itakura, provided a summary of the activities of the Section over the past year. D-HAB is currently focused on harmonization of datasets, anthropogenic forcing of HAB events, the linked physical-biotic transport of HAB species by onshore and offshore processes, and mitigation for HAB events. The S-HAB workshop (W2) on “*Incorporation of satellite remote-sensing into monitoring of harmful algal bloom events*” at PICES-2011 (October 15) focused was attended by 19 scientists representing Japan, Korea, Russia, China, and the USA. The workshop offered practical demonstrations to contribute to improved understanding of how to gain access to satellite remote sensing data for HAB detection, exploration of the limitations of satellite data, and new programs to aid with data estimations from satellite imagery. The S-HAB meeting (October 16) was attended by 24 scientists representing all PICES member countries (and a representative from GEOHAB), and each country presented a 1-page written report. S-HAB-Section a ½-day Topic Session (S5) on “*Harmful algal blooms in a changing world*” (October 18; ten presentations) which was attended by 35 scientists. S-HAB also developed revised terms of reference (see *S-HAB Endnote 3*), and discussed progress made toward development of the Harmful Algal Event Database (HAE-DAT) and ways to improve web-based access to it. With financial support from the Ministry of Agriculture, Forestry and Fisheries of Japan, representatives from the Section held a planning meeting in Indonesia (September 2011) to identify HAB training needs and to assess the regional level of capacity for HAB detection, and to assess the level of governmental support to sustain HAB activities in the coming years. The HAB training workshop in Indonesia is scheduled to occur in 2012 and will focus on toxin analysis, nutrient analyses, and taxonomic identification of toxic phytoplankton.

Working Group on *Aquatic Non-Indigenous Species* (WG 21) (Agenda items 10-12):

Ms. Darlene Smith, Co-Chair WG 21, presented a summary of WG 21 activities over the past year. The Working Group held their 6th meeting on October 14–15 with 8 members representing 4 PICES countries. Highlights of accomplishments for 2011 include co-sponsorship of the 7th International Conference on Marine Bioinvasions (August 23–25, 2011; Barcelona, Spain), and a demonstration workshop on the Rapid Assessment Survey methodology held at Phuket, Thailand (July 19–21, 2011) which was attended by 30 participants from 8 nations. WG 21 also held the Vostok Bay Rapid Assessment Survey (October 8–14) which was hosted by the Vladivostok Institute of Marine Biology and attended by representatives from all PICES member countries. During the RAS workshop the participants identified over 300 species of marine organisms, and the Working Group is currently completing the taxonomic comparisons to identify native, non-indigenous, and cryptic species. Progress was also made on the WG 21 NIS Database Project, and new database features include the mapping of indigenous and non-indigenous species at a global scale using the MEOW ecoregions and the ability to generate custom NIS atlases. The framework for the PICES-NIS database and atlas was recently published as:

- Reusser, D., and H. Lee, II. 2011. *Evolution of natural history information in the 21st century – developing an integrated framework for biological and geographical data*. *Journal of Biogeography* 38: 1225–1239.

WG 21 plans to hold a third NIS Rapid Assessment Survey demonstration workshop in Nagasaki, Japan, in February 2012 in collaboration with NOWPAP and WESTPAC.

Working Group on *Environmental Interactions of Marine Aquaculture (WG24)* (Agenda items 13-15):

Dr. Katsuyuki Abo, Co-Chair WG 24, presented a summary of the WG 24 activities over the past year. The Working Group held a ½-day Topic Session (S6) on “*Identification and characterization of environmental interactions of marine aquaculture*” (October 18) which included 2 invited speakers, 8 oral and 3 poster presentations. Specific progress was made over the year by WG 24 toward TOR-1 (Evaluation of approaches currently used to assess and model interactions of marine aquaculture) by gathering summary reports prepared by the member countries that focus on the environmental interactions of aquaculture. Summary reports were received from Japan, Korea, Russia, and Canada. The summary report for TOR-2 (Risk assessment methodologies) is in preparation by Co-Chair, Ms. Ingrid Burgetz, and the summary report for TOR-3 (Diseases of concern for marine aquaculture) is also in preparation. Working Group members held a discussion to identify the issues and hurdles that have been associated with achieving the terms of reference, and they identified the following challenges: (1) both PICES Working Groups (WG 18 and WG 24) on aquaculture have faced similar challenges meeting their terms of reference; (2) major differences between participating countries in the maturity of their aquaculture activities and the legislation/policies governing aquaculture may be partially responsible for these challenges; and (3) future aquaculture activities within PICES should be closer tied to the interests, areas of research and needs of the participating countries. WG 24 requested a 1-year extension to the timetable for completion of their final report, and the WG-24 co-chairs will work with Dr. Stewart Johnson (Canada) to complete the final report by September 2012. The members of WG 24 will also develop plans for the possible future development of a specific study group (SG) and accompanying terms of reference for a PICES expert group that will continue to focus on marine aquaculture.

Study Group on *Human Dimensions (SG-HD)* (Agenda items 16-18):

Dr. Mitsutaku Makino presented a summary of the final report completed by SG-HD. The report contains a review of the primary role of social science practices as applied to decision-making for ecosystem-based fisheries management (EBFM) around the world. The final report specifically addresses practical and theoretical implications of EBFM and addresses the following TORs for the Study Group: (1) Review how social science has been used/applied globally and regionally in EBFM; (2) Review the social science tools and information available for EBFM in PICES member countries; (3) Develop an inventory of practices for use of social economic information appropriate to the circumstances in each of PICES member countries; and (4) Summarize the scope of activities and findings of the group and make recommendations on the desirability of establishing an expert group related to socio-economic sciences within PICES. The scope of activities that would be undertaken by a new multi-year Section on *Human Dimensions (S-HD)* was presented. The proposal submitted to the Japanese Trust Fund/MAFF to support the new PICES expert group on Human Dimensions over the period of 2012–2016 was successful, and Dr. Makino discussed the scope of activities that will be supported by the new grant funds.

Working Group on *Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors (WG-28)*

Members of WG 28 held a meeting in Khabarovsk on October 15, 2011. The meeting was attended by 16 participants from 5 PICES member countries. During the meeting, Co-Chairman, Dr. Motomitsu Takahashi, facilitated a review and discussion of the terms of reference for WG 28, a revision of the timeline for work products, and the contributions that can be made by the Working Group toward FUTURE Science Plan goals. WG 28 also discussed progress made during the inter-sessional FUTURE workshop held in Honolulu (April 2011), and formulated proposals for a 1-day workshop (*Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts*) and a ½-day topic session (*Ecosystem responses to multiple stressors in the North Pacific*) to be held at PICES-2012.

AGENDA ITEM 6

Proposed Study Group on *Marine Pollutants (SG-MP)*

Drs. Olga Lukyanova and Peter Ross convened workshop (W3) on “*Pollutants in a changing ocean: Refining indicator approaches in support of coastal management*” at PICES-2011 October 14) with contributed support from GESAMP, ICES, and IOC. The workshop included presentations by 4 invited

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speakers, a series of brief “power-talks”, discussions sessions, and presentation of 6 posters. During the workshop, participants discussed the role and scope of international collaborative work on the issue of marine pollutants and contaminants, and they developed a proposal for a Study Group to report through the MEQ Committee. It is widely recognized that pollution of the North Pacific marine environment has affected fish and wildlife in some regions at the population level, and has led to socio-economic impacts such as commercial fishing closures, barriers to commercial trade, and restrictions on seafood consumption. Improving approaches to pollution assessments among the PICES member countries may help to alleviate many of these problems, and could better inform managers and stakeholders in addressing emerging pollution issues. The purpose of the proposed Study Group is to identify novel or promising approaches to monitoring pollutant trends over space and time, and to evaluate impacts on biota at the population level. The Study Group will establish a list of priority substances and pollutant indicators in PICES member countries using a series of case studies (e.g., microplastics in seawater, seabird egg monitoring for POPs over time; risk-based ranking of complex pollutant mixtures in sediments). This will help identify those methods or approaches that would benefit from harmonization (e.g., characterization of heterogeneous microplastic content in seawater or biota), and improve data delivery and scientific advice to managers and stakeholders. The terms of reference for the proposed Study Group on *Marine Pollutants* are presented in *MEQ Endnote 3*.

AGENDA ITEM 7

Suggested theme for PICES-2013

MEQ members voiced their support for the suggested theme for the next Annual Meeting on “*Communicating forecasts, uncertainty and consequences of ecosystem change to society.*”

AGENDA ITEM 8

Items with financial implications

*Proposed Topic Sessions and Workshops for PICES-2012**

MEQ reviewed and ranked the following proposals for 7 topic sessions and 3 workshops to occur as an integral component of the PICES-2012:

Rank (1-high ... 5-low)	Proposed Topic Sessions
1	<p><u>Title:</u> <i>Social-ecological systems on walleye pollock under changing environment: an interdisciplinary approach (MEQ Endnote 4)</i></p> <p><u>Sponsors:</u> MEQ, FIS, SG-HD</p> <p><u>Duration:</u> 1 day</p> <p><u>Convenors:</u> Mitsutaku Makino (Japan), Keith Criddle (USA), Ian Perry (Canada), Suam Kim (Korea), Anatoly Velikanov (Russia), Yasunori Sakurai (Japan)</p> <p><u>Request for Support:</u> 2 invited speakers</p>
2	<p><u>Title:</u> <i>Ecosystem responses to multiple stressors in the North Pacific (WG 28 Endnote 4)</i></p> <p><u>Sponsors:</u> BIO, MEQ</p> <p><u>Duration:</u> ½ day</p> <p><u>Convenors:</u> M, Takahashi, I. Perry, V. Kulik, J. Samhouri, J. Lee, C. Li</p> <p><u>Request for Support:</u> 1 invited speaker</p>

3	<p><u>Title:</u> <i>Marine macrophyte vegetation as indicators of natural and anthropogenic stressors in coastal ecosystems: A comparison of ecological functions and ecosystem services between the east and west Pacific (FIS Endnote 3)</i></p> <p><u>Sponsors:</u> FIS, MEQ, AICE-AP</p> <p><u>Duration:</u> 1 day</p> <p><u>Convenors:</u> Jun Shoji (Japan), Ik Kyo Chung (Korea), Steve Rumrill (USA)</p> <p><u>Request for Support:</u> 2 invited speakers</p>
4	<p><u>Title:</u> <i>Risk management in coastal zone ecosystems around the North Pacific (MEQ Endnote 5)</i></p> <p><u>Sponsors:</u> AICE-AP, FIS, MEQ, SOFE</p> <p><u>Duration:</u> 1 day</p> <p><u>Convenors:</u> Thomas Therriault (Canada), Masahide Kaeriyama (Japan)</p> <p><u>Request for Support:</u> 2 invited speakers</p>
5	<p><u>Title:</u> <i>Spatial patterns of anthropogenic stress: predators as sentinels of marine ecosystem health (BIO Endnote 3)</i></p> <p><u>Sponsors:</u> BIO (MBM-AP), MEQ, FUTURE</p> <p><u>Duration:</u> 1 day</p> <p><u>Convenors:</u> Peter Ross (Canada), Yutaka Watanuki (Japan)</p> <p><u>Request for Support:</u> 1 invited speaker</p>
6	<p><u>Title:</u> <i>Range extension, toxicity and phylogeny of epiphytic dinoflagellates (S-HAB Endnote 4)</i></p> <p><u>Sponsors:</u> HAB-S / MEQ</p> <p><u>Duration:</u> ½ day</p> <p><u>Convenors:</u> William Cochlan (USA), Satoshi Nagai (Japan)</p> <p><u>Request for Support:</u> 2 invited speakers</p>
7	<p><u>Title:</u> <i>Science needs for offshore oil and gas development in the North Pacific [Science Board did not support this proposal for PICES-2012]</i></p> <p><u>Sponsors:</u> FIS, BIO, MEQ, POC</p> <p><u>Duration:</u> 1 day</p> <p><u>Convenors:</u> Libby Loggerwell (USA), Ken Lee (Canada)</p> <p><u>Request for Support:</u></p>

Rank (1-high ...5-low)	Proposed Workshops
1	<p><u>Title:</u> <i>Identifying multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts (WG 28 Endnote 3)</i></p> <p><u>Sponsors:</u> BIO / MEQ</p> <p><u>Duration:</u> 1 day</p> <p><u>Convenors:</u> M. Takahashi, J. Boldt, V. Kulik, J. Samhouri, C. Zhang, C. Li</p> <p><u>Request for Support:</u> 2 invited speakers</p>

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2	<p><u>Title:</u> <i>Harmful algal blooms in a changing world</i> <u>Sponsors:</u> MEQ/PICES, ICES, GeoHAB, NSF(?), NOAA(?) <u>Duration:</u> Plan A – 3 days (Workshop at WG-HABD annual mtg) / Plan B – 5 days (Workshop with NSF/NOAA funding) <u>Convenors:</u> Mark Wells (USA), Bengt Karlson (ICES WG-HABD) <u>Request for Support:</u> 1. PICES travel support for 1 person for workshop planning meeting (late 2011/early 2012) 2. PICES travel support for 4 persons from PICES nations to attend workshop (likely spring 2013)</p>
3	<p><u>Title:</u> <i>The contrasting cases of HABs in the eastern and western Pacific in 2007 and 2011 (S-HAB Endnote 5)</i> <u>Sponsors:</u> MEQ / FUTURE <u>Duration:</u> 2 days <u>Convenors:</u> Changkyu Lee (Korea), Mark Wells (USA) <u>Request for Support:</u> HAB-S request full support for 1 (ideally Japanese) student rapporteur in HAB field with fluency in English writing</p>

* Workshop proposal on “*Harmful algal blooms in a changing world*” is inter-sessional.

Other requests for PICES support

Section on *Harmful Algal Blooms in the North Pacific*

- request funding for 4 PICES members to attend Joint ICES/PICES/GEOHAB/NSF/ NOAA sponsored workshop on Climate Change and HABs in Spring 2012 or 2013.
- Full travel support for 1 person for a joint ICES/PICES/GEOHAB/NSF/NOAA workshop planning meeting in late 2011 or early 2012.
- New HAB-S member requests: Korea – Myeong Soo Han (Hanyang University), Tae Gyu Park (NFRDI); China – Chunjiang Guan (cjguan@nmemc.gov.cn) and HAE-DAT focal point Douding Lu (SOA)
- Travel support for an IOC representative to attend next PICES Annual Meeting to discuss HAE-DAT, country maps and decadal reports (Henrik Enevoldsen, Monica Lion)
- Travel support for 1 Canadian S-HAB member and 1 Russian S-HAB member to attend PICES-2012.
- PICES China delegate to contact the International Cooperation Dept. to request HAB data (from Liqi Chen) for HAE-DAT entry

Inter-sessional activities and meetings

Working Group on *Non- indigenous Species* (WG 21)

- February 8–9, 2012 : a third demonstration RAS workshop in Nagsaki, Japan, in collaboration with NOWPAP and WESTPAC
- March 20–22, 2012: Synthesis workshop to review and revise WG 21 MAFF and Terms of Reference Reports (Newport, OR; Oregon State University – Hatfield Marine Science Center)

Section on *Harmful Algal Blooms in the North Pacific*

- February 2012 S-HAB Training class / Seafood Safety project to take place in Indonesia; PICES/MAFF Funds
- Joint ICES/PICES/GEOHAB/NSF/NOAA workshop planning meeting (late 2011 or early 2012); request full travel support for 1 person

ICES Symposia considered for PICES sponsorship

MEQ provided the following ranking:

1. Ecological Basis of Risk Analysis for Marine Ecosystems (May 2014, Helsinki, Finland),
2. Effects of Fishing on Benthic Fauna and Habitat (May 2014, Tromsø, Norway),
3. Fishery Dependent Information – Making the Most of Fisheries Information (March 2014, Rome, Italy),
4. Gadoid Fisheries: The Ecology and Management of Rebuilding (June 2013, St. Andrew's, Canada),
5. Fifth International Otolith Symposium (October 2014, Palma de Majorca, Spain).

AGENDA ITEM 9

Review and revision of MEQ Action Plan

The current MEQ Action Plan (2006) includes a diversity of topic areas with a specific emphasis on contaminants in the marine environment, harmful algal blooms, environmental aspects of mariculture, and non-indigenous species. Additional activities such as ecosystem-based management and the human dimensions of ecosystem-based fishery management are also included in the scope of MEQ but are not encompassed by the current MEQ Action Plan. The revised MEQ Action Plan for 2012-2016 must include a new mission statement and work-plan to identify and incorporate new and emerging MEQ elements, to support progress toward achievement of the FUTURE Science Plan, and to correspond with the new organizational vision for PICES described by the new PICES Strategic Plan.

Dr. Rumrill presented a new draft mission statement for MEQ (see *MEQ Endnote 6*) and discussed the need to gain input and ideas over the next year to develop all of the new components of the revised MEQ Action Plan.

AGENDA ITEM 10

Report on FUTURE

Dr. Thomas Therriault, Chairman of AP-AICE, provided a progress report on FUTURE activities.

AGENDA ITEM 11

Other business

None

MEQ Endnote 1**MEQ participation list**Members

Ik Kyo Chung (Korea)
 Shigeru Itakura (Japan)
 Kunio Kohata (Japan)
 Changkyu Lee (Korea)
 Olga Lukyanova (Russia)
 Mitsutaku Makino (Japan, Co-Chairman)
 Steven Rumrill (USA, Chairman)
 Darlene Smith (Canada)
 John Stein (USA)
 Thomas Therriault (Canada)

Observers

Katsuyuki Abo (Japan)
 Peter Kershaw (GESAMP)
 Sangjin Lee (NOWPAP)
 Peter Ross (Canada)
 Shigeru Itakura (Japan)
 Alexander Tkalin (NOWPAP)
 Vera Trainer (USA)
 Sinjae Yoo (Science Board Chairman)
and others

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MEQ meeting agenda

1. Welcome / introduction of MEQ Committee members and observers
2. Approval of MEQ meeting agenda
3. Implementation of PICES-2010 decisions
4. Relations with other organizations and programs
 - SCOR WG-137 Global Patterns of Phytoplankton Dynamics (at request of Dr. Sinjae Yoo; Korea)
 - GESAMP (Dr. Peter Kershaw)
 - NOWPAP (Drs. Sangjin Lee/Alexander Tkalin)
5. Status reports from MEQ expert groups
 - Section on *Harmful Algal Blooms* (Dr. Vera Trainer; USA / Dr. Changkyu Lee; Korea)
 - Working Group on *Aquatic Non-Indigenous Species* (Ms. Darlene Smith; Canada)
 - Working Group on Environmental Interactions of Marine Aquaculture (Dr. Ingrid Burgetz, Canada/Dr. Brett Dumbauld, USA./Dr. Katsuyuki Abo, Japan)
 - Study Group on *Human Dimensions* (Dr. Mitsutaku Makino, Japan)
 - Working Group on *Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*
6. Discussion of MEQ marine contaminants and microplastics issue and Terms of Reference for potential MEQ Study Group on *Marine Pollutants* (SG-MP; Dr. Olga Lukyanova, Russia; Dr. Peter Ross, Canada)
7. Suggested for theme for PICES 2013 / Nanaimo, Canada
8. Items with financial implications for 2012
 - a) Review & rank proposed topics sessions & workshops
 - b) Proposed inter-sessional meetings
 - b) Travel support requests
 - c) Review of 5 ICES symposia for possible PICES sponsorship
 - d) Other items
9. Review and revision of MEQ Action Plan / Mission Statement (Dr. Steven Rumrill, USA)
10. Report on FUTURE (Dr. Tom Therriault, Canada; AP-AICE)
11. Other MEQ business
12. Annual MAFF Progress Report on S-HAB and WG 21 activities (Dr. Glen Jamieson, Canada)

MEQ Endnote 3

Terms of Reference for the Study Group on Marine Pollutants (SG-MP)

1. Identify novel or promising approaches to operational marine pollution assessment in PICES member nations by:
 - a. establishing a list of priority pollutant concerns for each of the PICES countries;
 - b. identifying useful indicators of status, trends and effects; and
 - c. identifying those issues or methods that would benefit from harmonization.
2. Identify interactions within PICES scientific committees, Advisory Panels, working groups, and sections that will complement the SG and will be consistent with the ecosystem approach espoused by FUTURE.
3. Explore potential partnerships with other professional or multilateral organizations (e.g. NOWPAP, ICES, GESAMP) which could lead to joint activities (working group, sessions, publications), improve efficiencies and strengthen scientific outcomes.
4. Develop recommendations for a possible PICES WG on marine pollutants.

MEQ Endnote 4**Proposal for a 1-day MEQ/FIS [later changed to MEQ/FUTURE] Topic Session on
Social-ecological systems on walleye pollock under changing environment: an inter-disciplinary approach
at PICES-2012**

In order to build bridges between scientists, decision-makers, stakeholders, and across sectors, there is a need for more in-depth and concrete inter-disciplinary research framework in the context of the PICES integrative science program FUTURE. One of the typical groundfish resources in the North Pacific, pollock is highlighted to facilitate such academic discussions under the PICES framework. Research on walleye pollock from the perspectives of ecology, biology, stock dynamics, harvesting, fisheries management, history, marketing, processing, international trade, consumption, culture will be presented. Inter-relationships among these varied perspectives, information needs, potential values for other disciplines, etc., will be discussed during this topic session. An expected outcome of this session will be a holistic framework for the inter-disciplinary research, which could be applied to other species.

MEQ Endnote 5**Proposal for a ½-day FUTURE/FIS/MEQ Topic Session on
“Risk management in coastal zone ecosystems around the North Pacific” at PICES-2012**

Currently, approximately 60% of the world’s population lives within 60 km of the coast and this number is expected to reach 75% within the next two decades due to increased population growth. The coastal zone is an extremely complex environment that includes both coastal, nearshore marine and estuarine ecosystems and the adjacent terrestrial area. Human populations around the North Pacific rely heavily on this zone for their livelihood but growing pressures from increasingly diverse human activities coupled with climate change and natural catastrophes (e.g., earthquake and tsunami) threaten the sustainability and productivity of coastal ecosystems. Risk management based on adaptive management and precautionary principles, is one way to prioritize, identify, and potentially mitigate impacts resulting from diverse human activities in coastal zones. This session will focus on the following issues:

- 1) Preparation and countermeasures to respond to natural catastrophes
- 2) Protection of coastal zone ecosystems from human-mediated impacts (e.g., habitat loss, pollution, harmful algal events, invasive species)
- 3) Institution and protection of marine protected areas (MPAs)

MEQ Endnote 6**Draft MEQ Mission Statement for 2012–2016**

The PICES Marine Environmental Quality Committee (MEQ) serves as the Scientific Committee that encourages, facilitates, and conducts multi-national investigations of the status, conditions, and trends in the environmental characteristics of coastal, nearshore, and offshore North Pacific marine ecosystems. The primary scope of responsibility for the MEQ Committee is to promote and coordinate marine environmental quality and interdisciplinary research to gain a better understanding of the sources and fates of contaminants in the marine environment, the ecology of harmful algal blooms, marine environmental quality aspects of mariculture, the transport and introduction of non-indigenous species and stocks, and to foster increased appreciation regarding the human dimensions and societal importance of changes in North Pacific marine and coastal ecosystems.

During the planning period of 2012-2016, the MEQ will provide organizational support, guidance, and a forum for discussion, cooperation, and collaboration on a variety of issues related to the status, condition, and quality of marine ecosystems. More specifically, the MEQ will serve as the standing PICES Scientific Committee that

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provides support for the Harmful Algal Blooms – Section (HAB-S), the Working Group on Marine Non-Indigenous Species (WG-21), the Working Group on Marine Aquaculture (WG-24), the Working Group on Multiple Stressors in the Marine Environment (WG-28), the Study Group on Human Dimensions (SG-HD; HD-Section), and the proposed Study Group on Marine Contaminants (SG-MC). In addition, the MEQ also serves as the organizational liaison for cooperation and collaboration with other PICES Scientific and Technical Committees, PICES Advisory Panels, the PICES Science Board, and the PICES Governing Council. Marine environmental quality is a complex concept that has many interpretations, and these understandings may incorporate qualitative and quantitative information as well as multiple indices generated by the natural and social sciences. Consequently, it is important to note that the PICES member nations have may have different, complementary, or opposing perspectives and approaches to the assessment and management of marine and coastal environmental quality issues. These different perspectives and approaches will influence the scope, direction, and relative priorities placed on research needs and generation of scientific recommendations. It is also important that the efforts undertaken by the PICES MEQ are focused to generate findings, work products, and recommendations that are of direct utility to organization as a whole and to the member countries.

Report of the Physical Oceanography and Climate Committee

An overture meeting of the Physical Oceanography and Climate Committee (POC) took place from 18:00-19:30 h on October 16, 2011. Overture meetings were recommended by the Study Group on *Restructuring of the PICES Annual Meeting* at PICES-2010 and became effective from the PICES-2011. The POC Chairman, Dr. Kyung-II Chang, called the meeting to order and circulated a draft agenda. Committee members discussed key issues and any addition of items to the agenda for the formal POC meeting. Several changes were made to the draft agenda to accommodate a request for a new working group on Regional Climate Modelling in Agenda Item 5, SOFE's request for FUTURE activities and NPESR in Agenda Item 8, requests for inter-sessional meetings and requests for 2012 and beyond in Agenda Item 11, a notification of documenting sessions and workshops in Agenda Item 13, and the discussion of ICES symposia and Annual Science Conference in Agenda Item 14.

The formal meeting of the POC Committee was held from 14:00–18:00 h on October 19, 2011. The Chairman called the meeting to order and welcomed members and observers (*POC Endnote 1*). Dr. Michael Foreman agreed to act as rapporteur. Dr. Enriquet Curchitser was introduced as a new POC member from USA, replacing Dr. Nathan Mantua. The revised agenda decided at the overture POC meeting was adopted (*POC Endnote 2*).

AGENDA ITEM 4

Completion of PICES-2010 decisions

1. Travel support request for 2 invited scientists to attend the “*International Workshop on Development and Application of Regional Climate Models*” Seoul, Korea, October 11–12, 2011, was approved.
2. Travel support request for an Asian PICES scientist (Shin-ichi Ito) to give a plenary talk at the annual meeting of the Canadian Meteorological and Oceanographic Society, “*Ocean, Atmosphere and the Changing Pacific*”, Victoria, Canada, June 6–9, 2011, was approved.
3. A travel support request by AP-CREAMS for 4 students or early career scientists to attend the NOWPAP/IOC-WESTPAC/PICES training course on “*Remote Sensing data analysis*” in Vladivostok, Russia, October 8–12, 2011, was approved (3 trainees and 1 lecturer).
4. Travel support request of WG-FCCIFS for Drs. Ichiro Yasuda and Emanuele Di Lorenzo to co-convene the ICES/PICES theme session “*Atmospheric forcing on Northern hemisphere ocean gyres and their subsequent impact on the adjacent marine climate and ecosystems*” at the ICES Annual Science Conference in Gdansk, Poland, September 19–23, 2011, was approved.
5. A travel support request by WG-FCCIFS for 2 Asian scientists to attend their workshop on “*Biological consequences of a decrease in sea ice in Arctic and sub-Arctic Seas*” at the ESSAS Open Science Meeting in Seattle, USA, May 22, 2011, was approved.
6. Travel support request of ESSAS for 4 PICES Asian scientists (2 students/early career scientists) to attend their 2nd Open Science Meeting in Seattle, USA, May 22–26, 2011, was approved (2 early-career scientists).
7. Travel support request of WG-FCCIFS for 2 Asian co-conveners to attend a workshop on the “*Reaction of Northern Hemisphere ecosystems to climate events: A comparison*” in Hamburg, Germany, May 2–6, 2011, was approved.
8. A proposal for an AP-CREAMS/POC/MONITOR/BIO ¾-day Workshop, “*Recent advances in monitoring understanding of Asian marginal seas: 5-year of CREAMS/PICES EAST-I Program*” was approved for PICES-2011 (2 invited speakers).
9. A proposal for a POC/FIS ½-day Topic Session, “*Linking migratory fish behaviour to end-to-end models*” was approved for PICES-2011 (2 invited speakers, co-sponsored by ICES).
10. A proposal for a BIO/POC 1-day Topic Session, “*Mechanisms of physical-biological coupling forcing biological hotspots*” was approved for PICES-2011 (4 invited speakers, co-sponsored by ICES).

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11. A proposal for a FIS/POC 1-day Topic Session “*Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species*” was approved for PICES-2011 (2 invited speakers, co-sponsored by ICES).
12. A proposal for a MONITOR/POC/FUTURE 1-day Topic Session “*How well do our models really work and what data do we need to check and improve them?*” was approved for PICES-2011 (5 invited speakers, co-sponsored by IMBER).
13. A proposal for a POC Contributed Paper Session was approved for PICES-2011.

AGENDA ITEM 5

Reports of existing subsidiary bodies and plans for new ones

Section on *Carbon and Climate* (S-CC)

Dr. James Christian, Co-Chairman of S-CC, reported the Section’s 2011 activities and 2012–2013 plans. Drs. Dong-Jin Kang from Korea and Burke Hales from USA are new members and Drs. Steve Emerson (USA) and Kyung-Ryul Kim (Korea) are no longer members. The Korean and Chinese translations of PICES Special Publication 3 “Guide to best practices for ocean CO₂ measurements” have been completed. A joint SOLAS/IMBER/IOCCP Carbon Synthesis meeting was held September 14–16, 2011 at UNESCO, Paris. The meeting aimed to bring together scientists working on global ocean carbon synthesis projects, such as CARINA, PACIFICA, GLODAP2, SOCAT. Six S-CC members, Drs. Masao Ishii, Akihiko Murata, Toru Suzuki, Richard Feely, Christopher Sabine, and Alexander Kozyr, attended the meeting. The PACIFICA dataset will be opened by February 2012 at the latest. S-CC has proposed a POC/BIO topic session for PICES-2012 on “*Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas*” with a consideration of a publication. S-CC requested co-sponsorship by FUTURE for this topic session and funding for one invited speaker. S-CC showed an interest in a proposed POC/BIO/TCODE topic session on “*Trends in hypoxia and ecosystem impacts in the North Pacific*”, and suggested a possible merger of two sessions if one of them was not be approved by Science Board. Dr. Christian suggested the replacement of word “hypoxia” with “low-oxygen content” in the title and description of the topic session. Following the Annual Meeting, it was decided to merge the two, and the combined session description has been rewritten (see *POC Endnote 5*). Other requests were made for a ½-day business meeting at PICES-2012, and for PICES to become a co-sponsor for the SOLAS summer school in Xiamen, China, in 2013. POC approved all requests from S-CC and decided to request Science Board approval. A travel request was also made for one early career PICES scientist to attend *p*CO₂ inter-comparison experiment in Japan in 2012, but it turned out the experiment will not take place in 2012. The full report of S-CC appears elsewhere in the PICES 2011 Annual Report.

Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas* (AP-CREAMS)

Dr. Kyung-Il Chang, a member of AP-CREAMS, gave a brief report of the Panel on its activities in 2011 and plans for 2012 and beyond. AP-CREAMS meetings were held twice in 2011, on April 18–19 in Hangzhou, China, and on October 14, 2011 in Khabarovsk, Russia, at PICES-2011. Research activities both in the EAST-I and EAST-II regions in 2011 included cruises in the southern and southwestern Japan/East Sea, and a China-Japan-Korea joint *Nakasaki-maru* cruise in the East China Sea in July 2011. The second phase of the Korean EAST-I program was launched in 2011 for another 5 years, from 2011 to 2015. A NOWPAP/PICES/IOC-WESTPAC joint training course on remote sensing data analysis was successfully completed. The training course held in Vladivostok, Russia on October 8–12 was well attended with 25 trainees from seven countries and 11 lecturers from five countries. AP-CREAMS decided to approve the Supplementary to the 2010 NPESR – Japan/East Sea prepared by the *ad hoc* committee and to publish it as the PICES special publication within 6 months of its approval at the Science Board meeting at PICES-2011, taking into account comments recommended at the POC/MONITOR/TCODE Workshop (W4) “*Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program*”. The preparation of the Supplementary was charged to AP-CREAMS by Science Board at PICES-2010. Eighty-three scientists from Japan, Korea, and Russia contributed to the Supplementary of 314 pages. An observer, Dr. Olga Trusenkova,

suggested an inclusion of more physical oceanography in a subsection of the Supplementary - Straits. In 2012, two joint cruises are scheduled both in EAST-I and EAST-II regions. A request was made to provide travel support for 2 invited speakers to the PEACE 2012 Symposium in Japan in December 2012. The Panel will have its next meeting in spring 2012 in Yeosu, Korea. The full AP-CREAMS report can be found elsewhere in the PICES 2011 Annual Report.

Working Group on *North Pacific Climate Variability and Change* (WG 27)

Dr. Emanuele Di Lorenzo, Co-Chairman of WG 27, gave a brief report of the Working Group business meeting on October 15. WG 27 was established following the April 2011 Inter-sessional Science Board Meeting. Sixteen of 19 members attended the WG 27 business meeting, and each participant made a presentation outlining their research which was relevant to the terms of reference. The meeting then reviewed the TORs, and a list of members interested in directing some of their research to the TORs together with action items for each of the TORs was made. Dr. Di Lorenzo suggested that the Working Group have its own web page to facilitate communications among the group members and presented a prototype of the web page (<http://wg27.pices.int>). Requests were made for funding 2 invited speakers for each of 2 topic sessions for PICES-2012, POC/COVE/CLIVAR Topic Session, “*Challenges in understanding North Pacific climate variability and change*”, and FIS/POC/SCCME/WG25/WG27 Topic Session, “*Comparison of impact of multi-decadal climate variability in North Pacific and North Atlantic ecosystems and corresponding teleconnection patterns*”. POC decided to support the request with high priority and submit the request at the Science Board Meeting.

PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS)

Dr. Michael Foreman, a member of WG-FCCIFS, gave a brief report summarizing activities of the Working Group in 2011 including those during 2011 ICES Annual Science Conference and 2011 PICES Annual Meeting. The Working Group had business meetings in May and September in 2011, and co-chaired and convened several sessions and workshops. The Group’s term ends in December 2011, and its major TORs culminated in the publication of a special issue of ICES Journal of Marine Science based on 35 scientific papers from the 2010 PICES/ICES/FAO Symposium on “*Climate change effects on fish and fisheries: Forecasting impacts, assessing ecosystem responses and evaluating management strategies*” held April 26–29, 2011 in Sendai, Japan. The volume will serve as a key reference for scientists developing international or national climate change impact assessments. The Working Group proposed establishing a new PICES/ICES Section on *Climate Change Effects on Marine Ecosystems* (S-CCME) as a successor. The draft plan was reviewed by the POC Committee at PICES-2010 before submitting the proposal for approval at PICES-2011. According to its plan for Phase 1 during 2012–2014, S-CCME will work with newly formed WG 27 to foster integration and synthesis of ideas between those two expert groups. It is also anticipated S-CCME will collaborate closely with a new Working Group on *Regional Climate Modeling* that POC proposed at PICES-2011 to address one of S-CCME’s key questions, *How will the physical, chemical and biological components of regional marine ecosystems of the northern hemisphere change under future climate scenarios?* The POC Committee decided to support the S-CCME Science Plan. The Group requested support for a FIS/POC/S-CCME/WG27 Topic Session on “*Comparison of impact of multi-decadal climate variability in North Pacific and North Atlantic ecosystems and corresponding teleconnection patterns*” at PICES-2012. POC decided to support the request with high priority and submit the request at the Science Board Meeting.

Proposal for a new Working Group on *Regional Climate Modeling*

Drs. Enrique Curchitser and Michael Foreman prepared a proposal for a new working group and Dr. Curchitser presented the proposal at the POC meeting (*POC Endnote 3*). Following an international PICES/ICES workshop on “*Development and Application of Regional Climate Models (RCM)*” held October 11–12, 2011 in Seoul, Korea, many issues and ideas were raised concerning the use of RCMs for regional ecosystem studies. This is an emerging capability and a pivotal component for the success of FUTURE. PICES can lead research efforts on this topic with great benefit to its community because of work that was presented at the workshop. Important issues included in the TORs are (i) to assemble a comprehensive review of existing regional climate modeling efforts, (ii) to assess the needs for regional ecosystem modeling studies, and (iii) to publish a report

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on best practices for regional coupled modeling. The POC Committee unanimously approved this proposal and decided to put it forth to Science Board after revising the TORs to accommodate Committee members' suggestions such as the linkage to FUTURE and model development to interface with a new database like PACIFICA.

AGENDA ITEM 6

Relations with other international organizations/programs

The following four brief presentations were given.

1. Dr. Howard Freeland, representing Argo, reviewed the current status of the Argo program, noting the relatively low density of Argo floats in some parts of the North Pacific, and asking PICES members for help in the deployment of floats during their future surveys. Also asked was to provide high-quality CTD data for the purpose of quality control of Argo profile data. Interested parties should contact Mathieu Belbeoch (belbeoch@jcommops.org).
2. Dr. Hee-Dong Jeong, representing NEAR-GOOS as a NEAR-GOOS Coordinating Committee member, gave an overview of NEAR-GOOS activities over the past year focusing on an establishment of Real-Time (RTDB) and Delayed Mode (DMDB) Data Bases in China, Japan, Korea and Russia. The NEAR-GOOS Coordinating Committee showed its interest in developing regional forecasting and reanalysis systems.
3. Dr. Enrique Curchitser, a member of CLIVAR Pacific Implementation Panel, introduced CLIVAR, its Pacific Panel and Working Group on Ocean Model Development. The CLIVAR Pacific Panel is willing to co-sponsor or support sessions, symposia and workshops with PICES. Dr. Curchitser presented an e-mail from Dr. Toshio Suga, a member of the CLIVAR Pacific Implementation Panel, to invite a PICES representative to the next Panel meeting planned for April 2012 in Noumea, New Caledonia. The POC Committee decided to request travel support for 1 POC member to attend this meeting.
4. Dr. George Hunt, member of the ESSAS Scientific Steering Committee, gave a brief report on the 2nd ESSAS Open Science Meeting "*Comparative studies of climate effects on polar and sub-polar ecosystems: Progress in observation and prediction*" in Seattle, USA in May 2011. The OSM with 8 theme sessions, was well attended by 195 participants from 15 countries. Dr. Hunt requested travel supports for 2 invited speakers for a PICES-2012 topic session or workshop (POC/BIO/FIS/FUTURE/MONITOR/MBMAP) on "Subarctic-Arctic Interactions". The theme was also listed in 2012 ICES ASC. The POC Committee decided to support the request.

AGENDA ITEM 7

POC Action Plan

PICES Strategic Plan was updated and approved at the 2011 PICES Annual Meeting on October 22, 2011, in Khabarovsk Russia. The POC Committee will start to review its Action Plan to revise it to align with the updated PICES Strategic Plan and to prepare a final revised draft plan for review at the Inter-sessional Science Board Meeting in 2012.

AGENDA ITEM 8

Update on FUTURE

Dr. Steven Bograd, member of the FUTURE Advisory Panel on *Anthropogenic Influences on Coastal Ecosystems* (AP-AICE), introduced a combined report from the three FUTURE Advisory Panels focusing on results from their Joint Meeting on October 16, 2011. The following issues were discussed by the POC Committee members' opinions and decisions:

1. Regarding the 2 newly proposed expert groups linked to FUTURE, Section on *Climate Change Effects on Marine Ecosystems* (S-CCME) and Section on *Human Dimensions of Marine Systems* (S-HD), the POC Committee fully supports S-CCME, but has no opinion about S-HD.

2. The POC Committee plans to propose a new working group linked to FUTURE on regional downscaling, and to have a “start-up” workshop/meeting for the new working group in Korea, possibly in conjunction with the 2012 Yeosu Symposium, if it is approved at PICES-2011. Even if the new working group is not approved at PICES-2011, the Committee has decided to request a workshop to make any necessary updates and revisions of the proposal in preparation for re-submitting the proposal at PICES-2012. Existing and newly proposed expert groups have already shown their interest in, and acknowledged the necessity of, the new working group.
3. It was suggested that a FUTURE Open Science Meeting (OSM) be held in 2013 at the Joint Meeting of the 3 FUTURE Advisory Panels. Most POC Committee members regarded that it would be premature to have an OSM because FUTURE expert groups have just started to work or have only recently been proposed. The major opinion of the POC Committee is that it is more urgent to establish a detailed and concrete FUTURE roadmap linked to its major goals. To look at the progress of FUTURE, it would be a good idea to invite external reviewers to PICES-2012 where they can observe overall PICES activities.
4. The POC Committee reviewed a draft proposal for producing North Pacific Ecosystem Status Report (NPESR) prepared by Dr. Phillip Mundy, member of Advisory Panel on Status, Forecasts, and Engagement (AP-SOFE). Contents of the proposal include: updating reports annually on a suite of agreed variables, submitting it via the web, reviewing and editing the reports by regional lead author supported by regional peer reviewers, and formatting it into an NPESR by database managers after being passed by senior editors. The senior editors would provide a preface of highlights that would serve as a press release and would organize a synthesis on five- or six-year intervals. The POC Committee’s opinion on this proposal is as follows. There were no opinions and suggestions to revise the current rule of producing the NPESR in terms of frequency and contents. Although Dr. Mundy’s proposal is desirable, the difficulty lies in who is going to do the work and how to support it. It would especially be a lot of work for lead authors initially. However, the situation would be better once a procedure is established like the “State of the Ocean” reports prepared annually in Canada and Japan.

AGENDA ITEM 9

Planning for PICES-2012

1. In addition to a POC Paper Session, nine Topic Sessions were proposed for PICES 2012 (*POC Endnote 4*).
2. Half-day business meetings for CC-S, WG 27, CREAMS-AP, S-CCME, and the new working group, if it is approved, were proposed.
3. Five scientists were recommended as invited speakers for the Science Board Symposium, Dr. Ian Perry (Canada), Dr. Akihiko Yatsu (Japan), Dr. Kitack Lee (Korea), Dr. Benjamin Halpern (USA), and Dr. Daniel Pauly (USA).

AGENDA ITEM 10

Theme for PICES-2013

The 2013 Annual Meeting will be held in Nanaimo, Canada, with the theme “*Communicating forecasts, uncertainty and consequences of ecosystem change to society*” at the time of the 2011 POC meeting.

AGENDA ITEM 11

Items with financial implications

Inter-sessional travel requests in 2012

The Committee agreed to put forward to Science Board the following ranked list of travel support requests:

1. Two invited speakers for the new working group on the regional downscaling during the 2012 Inter-sessional Science Board Meeting or 2012 Inter-sessional FUTURE Workshop.

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2. Dr. Enrique Curchitser to attend the 2012 Yeosu Symposium (May 15–19, 2012) as one of the convenors of the workshop on “*Climate change projections for marine ecosystems: Best practice, limitations and interpretation*”.
3. One POC Committee member as a PICES representative to attend the CLIVAR Pacific Panel Meeting held in Noumea, New Caledonia in April 2012.
4. One S-CC member to attend 3rd International Symposium on “*The ocean in a high-CO₂ world*” held in Monterey, USA from September 24–27, 2012.
5. One invited speaker to attend the PICES/ICES Symposium on “*Forage fish interactions*” held in Nantes, France from November 12–14, 2012.

Funding requests associated with PICES-2012

1. See requests in *POC Endnote 4*.
2. Topic Session on “*Subarctic-Arctic Interactions*” could be turned into a workshop if it is not approved as topic session. In any case, ESSAS requested travel support for 2 invited speakers.

Proposed publications for 2011 and beyond

1. Drs. Shin-ichi Ito and Enrique Curchitser, POC Committee members, are planning to publish a special volume of Journal of Marine Systems on “*Modeling of marine ecosystem dynamics and the use of observations for improving models*” in 2013. This special volume will be dedicated to Dr. Bernard Megrey.
2. WG-FCCIFS published a special issue of ICES Journal of Marine Sciences based on selected papers from the 2010 PICES/ICES/FAO Symposium on “*Climate Change Effects on Fish and Fisheries: Forecasting Impacts, Assessing Ecosystem Responses and Evaluating Management Strategies*” in June 2011.
3. Final report of WG 20 on “*Evaluation of Climate Change Projections*” and recommendation for FUTURE was submitted to PICES in May 2011.
4. Review paper from the POC Workshop “*Exploring the predictability and mechanisms of Pacific low frequency variability beyond inter-annual time scales*” convened by E. Di Lorenzo and S. Minobe at PICES-2010 has not yet been published.

AGENDA ITEM 12

POC Best Presentation and Poster awards

Drs. Kyung-Il Chang, Enrique Curchitser, Shin-ichi Ito, Hee-Dong Jeong, Michael Foreman, and Yury Zuenko were judges for the best early career scientist presenters and best poster at the POC Paper Session and Topic Sessions S4 and S8. The POC Best Presentation award was given to Hanna Na (Korea) for “*Decadal variability of the upper-ocean heat content in the Northwestern Pacific*” presented at the POC Paper Session. The POC Best Poster award was given to Rong-shuo Cai (China) for “*Possible impacts of tropical El Niño Modoki on SST of China’s offshore and its adjacent waters*” presented at the POC Poster Session (see Session Summaries elsewhere in the 2011 Annual Report).

AGENDA ITEM 13

Documenting Topic Sessions and Workshops

The following POC Committee members were allocated to document Topic Sessions and Workshops at the 2011 PICES Annual Meeting and 2011 Inter-sessional Events:

- POC Paper Session and business meeting by Dr. Kyung-Il Chang,
- Topic Session S4 by Drs. Enrique Curchitser and Shin-ichi Ito,
- Topic Session S8 by one of the convenors,
- Inter-sessional Workshop on Regional Climate Models by Dr. Kyung-Il Chang.

All were asked to include the title, convenors, background, a brief summary of major themes, and discussions and recommendations in preparing the reports.

AGENDA ITEM 14

Other business

POC Committee members reviewed proposals for the 2012 ICES Annual Science Conference (as of October 7, the proposals were not revised) and 5 ICES symposia that will be convened in 2012–2014, and discussed the relevance of them to POC's interests. Dr. Yury Zuenko showed an interest in Items 6 and 22 of the ICES ASC on Subarctic-Arctic Interactions. As ESSAS also proposed a similar theme as a Topic Session at PICES-2012, the POC Committee agreed to support the ESSAS proposal, and no further discussion was made on this issue. POC members expressed little interest in co-sponsoring any ICES ASC proposals or ICES symposia.

Two new working groups were selected by SCOR from a number of SCOR proposals in 2011: Organic Ligands (SCOR 2.3.2) and Biogeochemical Exchange Processes at the Sea-Ice Interface (SCOR 2.3.7). The POC committee reviewed the proposals, as requested by Science Board, to recommend associate members to those 2 working groups, if any members are interested in them. Dr. James Christian suggested nominating Dr. Lisa Miller as a PICES representative, as she is already an associate member. The Committee decided to leave this decision to the Science Board.

AGENDA ITEM 15

Adoption of report and recommendations to Science Board

This POC report was circulated among, and approved by, all Committee members. All recommendations were brought by Dr. Kyung-Il Chang to Science Board meeting on October 21–22, 2011.

POC Endnote 1**POC participation list**Members

Steven Bograd (USA)
 Kyung-Il Chang (Korea, Chairman)
 James Christian (Canada)
 Enrique Curchitser (USA)
 Michael Foreman (Canada, Vice-Chairman)
 Shin-ichi Ito (Japan)
 Chan Joo Jang (Korea)
 Hee-Dong Jeong (Korea)
 Elena Ustinova (Russia)
 Yury Zuenko (Russia)

Observers

Robin Brown (AP-SOFE)
 Emanuele Di Lorenzo (WG 27)
 Howard Freeland (Argo)
 George Hunt (ESSAS)
 Shoshiro Minobe (WG 27)
 Olga Trusenkova (Russia)
 Sinjae Yoo (Science Board)

POC Endnote 2**POC meeting agenda (revised after the overture POC meeting)**

1. Welcome, introductions, opening remarks
2. Membership changes
3. Changes to, adoption of agenda and appointment of rapporteur
4. Completion of PICES-2010 decisions
5. Reports of existing subsidiary bodies and plans for new ones
 - i) Progress report of the renewed Section on *Carbon and Climate* (James Christian)

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- ii) Progress report of the Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas* (Kyung-II Chang)
 - iii) Progress report of its first meeting of WG 27 on *North Pacific Climate Variability and Change* (Emanuele Di Lorenzo)
 - iv) Progress report and future plans of PICES/ICES WG on *Forecasting Climate Change Impacts on Fish and Shellfish* (Michael Foreman)
 - v) Proposal for a new working group on *Regional Climate Modeling* for approval at the PICES-2011 (Enrique Curchitser)
6. Relations with other international organizations/programs
- i) Argo (Howard Freeland)
 - ii) NEAR-GOOS (Hee-Dong Jeong)
 - iii) WCRP/CLIVAR (Enrique Curchitser)
 - iv) ESSAS (George Hunt)
7. POC Action Plan
8. Update on FUTURE
- i) New expert groups linked to FUTURE
 - ii) POC new Working Group on *Regional Climate Modeling* and related workshop in 2012
 - iii) FUTURE Open Science Meeting
 - iv) Draft proposal for producing North Pacific Ecosystem Status Report
9. Planning for PICES-2012
- i) Topic/Paper sessions
 - a. POC Paper Session
 - b. Nine Topic Sessions
 - ii) Business meetings for subsidiary bodies
 - iii) Invited speakers for the Science Board Symposium
10. Theme for PICES-2013 in Nanaimo, Canada
11. Items with financial implications
- i) Proposed inter-sessional meetings for 2012 and beyond
 - a. 2nd PICES/ICES/IOC Symposium on “*Effects of climate change on the world’s oceans*”, Yeosu, Korea, May 13–20, 2012 in conjunction with Ocean Expo-2012
 - b. 3rd International Symposium on “*The ocean in a high-CO₂ world*”, Monterey, USA, September 24–27, 2012
 - c. ICES/PICES Early Career Scientist Conference on “*Oceans of change*”, Palma de Mallorca, Spain, April 24–27, 2012
 - d. ICES/PICES Symposium on “*Forage fish interactions: Creating the new tool for ecosystem-based management of marine resources*”, Nantes, France, November 12–14, 2012
 - e. 2012 ICES Annual Science Conference
 - f. CLIOTOP/IMBER special session on “*Global science for global governance of oceanic ecosystem and fisheries*”. Planet Under Pressure Conference, London, U.K., March 26-29, 2012
 - g. IMBER’s 3rd summer school, ClimECO3, “*A view towards integrated earth system models – Human-nature interactions in the marine world*”, Ankara, Turkey, July 23–28, 2012
 - h. Regional Climate Models workshops in 2013 and 2014
 - i. Summer school in 2014 on “*Ecosystem modeling*” (tentative) (AP-CREAMS)
 - j. Others
 - ii) Publications for 2010 and beyond
 - a. WG-FCCIFS: Special issue of ICES Journal of Marine Sciences published in June 2011
 - b. Review paper from the PICES 19 POC Workshop “*Exploring the predictability and mechanisms of Pacific low frequency variability beyond inter-annual time scales*” (Lorenzo and Minobe)
 - c. Final report of WG 20 on *Evaluation of Climate Change Projections* and recommendation for FUTURE submitted to PICES in May 2011.
 - d. Special volume Dedicated to Dr. Bernard A. Megrey in 2013
 - iii) Travel support requests
 - iv) Other items

12. 2009 POC Best Presentation and Poster awards (Judges were appointed at the POC committee overture meeting and will give their recommendations just before the Closing Session.)
13. Documenting sessions and workshops
14. Other business
15. Adoption of POC report and recommendations to Science Board

POC Endnote 3

Proposal for a new Working Group on *Regional Climate Modeling*

Motivation

- Physically based future climate projections are the starting point for many socio-economic impact and adaptation considerations to future climate change.
- Global climate models capture large scale climate behaviour but due their coarse spatial resolution have limitations for regional assessments.
- A joint PICES/ICES regional climate modeling workshop, with an emphasis on techniques and ecosystem applications, was held in Seoul, October 11–12, 2011.
- Several PICES members are at the leading edge of this emerging field.
- A new WG could be of great benefit to PICES and FUTURE.

Draft Terms of Reference

1. Assemble a comprehensive review of existing regional climate modeling efforts.
2. Assess the requirements for regional ecosystem modeling studies (*e.g.*, how to downscale the biogeochemistry).
3. Continue the development of RCM implementations in the North Pacific and its marginal seas.
4. Convene special sessions and inter-sessional workshops dedicated to the RCM topic.
5. Publish report and/or review paper on best practices for regional coupled modeling.
6. Establish connections between PICES and climate organizations (*e.g.*, CLIVAR), and global climate modeling centers (*e.g.*, NCAR, JAMSTEC, CCCMA).
7. Collaborate with other PICES groups such as WG 27, S-CCME and the FUTURE Advisory Panels possibly by producing “Outlooks”.
8. Publish a final report summarizing results.

Proposed Co-Chairs: Enrique Curchitser (USA), Chan Joo Jang (Korea)

Membership Suggestions

Canada: James Christian, Michael Foreman, Angelica Peña

China: Fangli Qiao, Zhenya Song (suggested by Chinese delegation at the Science Board meeting)

Japan: Yasuhiro Hasumi, Shin-ichi Ito, Hiroyuki Tsujino

Korea: Yang-Ki Cho, Byoung-Ju Choi, Chan Joo Jang

Russia: Nikolay Diansky, Dimitry Stepanov, Olga Trusenkova

USA: Neil Banas, Enrique Curchitser, Jerome Fiechter

POC Endnote 4

Proposal for Paper and Topic Sessions for PICES-2011

1. *Contributed Paper Session*

Co-convenors: Kyung-Il Chang (Korea) and Michael Foreman (Canada)

Sponsoring Committee: POC

Duration: 1 day

Invited speakers: none

Description: Papers are invited on all aspects of physical oceanography and climate in the North Pacific and its marginal seas

2. *POC- ranked Topic Sessions*

2-1. **Title:** Challenges in Understanding North Pacific Climate Variability and Change

Duration: 1 day

Sponsoring Committee (& Advisory Panel): POC, COVE

Description: Physical climate variability and change exert substantial impacts on marine ecosystems, particularly on longer timescales because of the longer ocean memory compared with the atmosphere, and the cumulative effects on marine ecosystems. On a centennial scale, climate changes due to anthropogenic forcings may dominate over natural variability, but variations on decadal or shorter timescales may be mainly due to natural climate variability. Furthermore, natural climate variability can be modified via climate changes. Therefore, a correct understanding of the mechanisms underlying climate variability and change should be the basis for understanding and predicting future conditions of the North Pacific. At present, there is no widely accepted consensus on the mechanisms governing decadal-to-multidecadal climate variability over the North Pacific, and this mainly reflects the uncertainty of how, or even whether, the mid-latitude ocean influences the atmosphere. Some linkages between processes, such as oceanic memory due to Rossby wave propagation, are generally accepted, and predictability associated with these processes may also be important for understanding marine ecosystem impacts. Also, it is important to share ideas about what physical parameters are important for specific marine ecosystems between researchers of marine ecosystems and physical oceanography and climate.

Through collaboration between PICES and CLIVAR, this session invites contributions exploring important developments in the research field of the North Pacific Climate Variability and Change, including physical environmental variations and their predictability, and linkages between physical conditions and marine ecosystems.

Scientists willing to serve as PICES convenor: Shoshiro Minobe (Japan), Emanuele Di Lorenzo (USA), Michael Foreman (Canada) and Hiroaki Saito (Japan)

Co-sponsoring Organization: CLIVAR

Nominations for CLIVAR convenor: Toshio Suga (Japan)

Primary Publication: No

Requests: We propose to invite speakers from both the climate (1–2 speakers from CLIVAR) and ecosystem (1–2 speakers PICES) science community. The climate speakers would be asked to provide a more general and interdisciplinary introduction/review of the status and challenges of climate research. This will allow a more active engagement from the participating ecosystem scientists. We would also invite one or two leading ecosystem scientists to provide an overview of the most important types of long-term ecosystem observations available and the challenges of interpreting these observations in the context of climate variability and change. These invited talks would set an important basis for the developments of WG 27 on *North Pacific Climate Variability and Change* group activities and for accomplishing the FUTURE goal as they foster a direct and explicit connection between the climate and ecosystem scientists in the WS. We request travel support for the 3–4 invited speakers.

2-2. **Title:** Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas [later merged with “Trends in hypoxia and ecosystem impacts in the North Pacific” to become “Changing ocean biogeochemistry and its ecosystem impacts” co-sponsored by POC and TCODE] See *POC Endnote 5*.

Duration: 1 day

Sponsoring Committees: POC, BIO

Description: Anthropogenic CO₂ has been accumulating in the upper ocean for the past two centuries, and is beginning impact ecosystems in ways that will likely become more profound and ubiquitous in the coming decades. The North Pacific is a key area of concern because of naturally shallow carbonate saturation horizons and relatively low buffering capacity. Anthropogenic CO₂ alters the oceanic carbonate system, the main chemical equilibrium that gives seawater its buffering capacity. The added carbon drives down the pH and reduces the saturation state of carbonate minerals like calcite and aragonite in a process known as “ocean acidification”. Anthropogenic changes are not only seen in the open ocean, but can be even more significant in coastal regions and marginal seas. Anthropogenic CO₂ affects calcifying organisms, but its biological impacts are not limited to these organisms and are felt across ecosystems. We invite papers on the changing distribution of anthropogenic CO₂ in the upper ocean, its impacts on organisms and ecosystem function, and emergent impacts on biogeochemical cycles related to the interaction of ocean acidification with climate change and other anthropogenic impacts.

Scientists willing to serve as PICES convenor: Masao Ishii (Japan), Lisa Miller (Canada)

Primary Publication: No

Requests: 1 invited speaker

2-3. **Title:** Comparison of impact of multi-decadal climate variability in North Pacific and North Atlantic ecosystems and corresponding teleconnection patterns

Duration: 1 day

Sponsoring Committee(s): FIS, POC, S-CCME/WG 25, WG 27

Description: Regime shifts have been observed in northern hemisphere marine ecosystems in the Atlantic and the Pacific including: the Baltic Sea, the North Sea, the Mediterranean Sea, the Bering Sea, the Gulf of Alaska/Northern California Current, the Oyashio-Kuroshio System and the western Pacific marginal seas which all have important small pelagic resources. Retrospective studies indicate these regime shifts may be linked to climatic teleconnection patterns suggesting that time trends in ecosystems shifts may be temporally synchronous even though the systems are widely separated from each other. This Topic Session seek oral presentations and posters that evaluates the mechanisms underlying decadal shifts in climate forcing and the response of small pelagic species to shifting ecosystem conditions. We seek papers that compare responses of small pelagic species to shifting ecosystem conditions between large marine ecosystems. These studies will yield further insight as to whether temporal periods of climate forcing can be characterized or whether they are best described as a continuous process. In any one geographical ecosystem the expression of changes resulting from climatic forcing may take on different patterns reflecting the detailed mechanisms and local processes that are influential within the constraints of the larger scale forcing. With sufficient interest by the contributors, a special issue will be sought.

Scientists willing to serve as PICES convenor: Shoshiro Minobe (Japan), William Peterson (USA)

Co-sponsoring Organization: ICES

Nominations for ICES convenor: Jürgen Alheit (Germany), Svein Sundby (Norway)

Primary Publication: Special issue (Anticipated)

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2-4. **Title:** Linking migratory fish behavior to End-to-End models II

Duration: ½ day

Sponsoring Committees: POC, FIS

Description: In order to understand ecosystem response to climate impacts, End-to-End modeling (E2E) approaches are essential. One of the most difficult parts for E2E is the modeling of fish behavior migration. Fish behavior can be very complex; It is a consequence of genetics, physical, chemical and biological environments and their interaction. Learned behavior may also be a factor. To model fish behavior, integrated studies are needed including laboratory experiments, tagging and acoustic observations, and modeling skills. The purpose of this session is to understand the current state of development in laboratory experiments, field observations and modeling to understand fish behavior and discuss future potential collaborations to improve fish migration models. Presentations related to laboratory experiments, field observations and modeling works related to fish behavior are welcome.

Scientists willing to serve as PICES convenors: Skip McKinnell (Canada), Enrique Curchitser (USA), Michio Kishi, and Shin-ichi Ito (Japan)

Nomination for ICES convenor: Geir Huse (Norway)

Primary Publication: No

Requests: 3 potential invited speakers, Robert Humston (USA), Hao Wei (China), Michio Yoneda (Japan)

2-5. **Title:** Trends in hypoxia and ecosystem impacts in the North Pacific later merged with “Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas” to become “Changing ocean biogeochemistry and its ecosystem impacts” co-sponsored by POC and TCODE] See *POC Endnote 5*.

Duration: ½ day

Sponsoring committees: POC, BIO, TCODE

Description: Declining oxygen levels have been reported from mid-ocean depths in the tropical oceans and across the North Pacific. Global climate models predict that dissolved oxygen concentrations in the deep ocean will decline by 20-40% over the coming century or so as global warming enhances stratification of the upper mixed layer and reduces ventilation of the deep ocean. This session will examine current trends in oxygen concentration in the North Pacific, the factors contributing to observed trends, and their ecosystem impacts. Studies examining time series for oxygen concentration in the deep ocean; the physical, chemical and biological factors underlying observed trends; and the physiological, ecological and biogeochemical impacts of hypoxia on the water column and benthos are invited. Examples of impacts on the distribution and abundance of deepwater fish stocks or the midwater micronekton, their predators and prey, are particularly encouraged. The session is especially interested in papers that examine the impact of hypoxia on ecosystem structure, the biogeochemistry of the carbon cycle, and the vulnerability of ecosystems to climate change.

Scientists willing to serve as PICES convenors: Tony Koslow (USA), Tsuneo Ono (Japan)

Primary Publication: No

Requests: 4 potential invited speakers, Brad Seibel (USA), Frank Whitney (USA), IOS (Canada); Tsuneo Ono or Y.W. Watanabe (Japan)

POC Suggestion: Add 2 more convenors, Arthur Chen (*ex-officio* member of S-CC) and Steven Bograd (USA, POC member)

2-6. **Title:** Subarctic-Arctic interactions**Duration:** 1 day**Sponsoring Committee(s):** POC, POC, BIO, FISH, FUTURE, MONOTOR, and AP-MBM

Description: Exchanges of water masses and their associated flora and fauna strongly link the marine Arctic and the Subarctic. Both regions have undergone significant warming and there has been reduced sea-ice in recent years in some regions. Climate change scenarios indicate that these regions are likely to experience even greater warming and transformation in the future. To improve understanding of how climate variability and change will affect these marine ecosystems from biogeochemical processes, through the food web to the highest trophic levels, it is essential to improve our knowledge of the role of physical and biological fluxes between the Subarctic and Arctic and the fate of the transported organisms. Therefore, this theme session will examine of the influence of the warm Subarctic inflows on the physical conditions and biology in the Arctic basin and shelves, as well as the role of fluxes of water from the Arctic basin onto the surrounding shallow shelves and into the Subarctic. Papers that cover multiple trophic levels or investigate biophysical coupling are especially sought. Also, we seek presentations on the observed changes that are occurring as well as those on possible scenarios under climate change. Relevant experimental studies, field programmes and modelling of Arctic-Subarctic interactions will be considered. Emphasis will be on the Arctic-Pacific Ocean linkages but those considering the exchanges in the Atlantic are also welcome.

Scientists willing to serve as PICES convenor: James Overland (USA), Sei-Ichi Saitoh (Japan)**Co-sponsoring Organization:** ICES**Nomination for ICES convenor:** Ken Drinkwater (Norway), Jackie Grebmeier (USA)**Primary Publication:** No**Requests:** 2 invited speakers2-7. **Title:** Inter-basin comparisons of ecology and recruitment processes of Pacific cod (*Gadus macrocephalus*) in the North Pacific [FIS did not support this proposal for PICES-2012]**Duration:** 1 day**Sponsoring Committees:** FIS, POC

Description: Recently commercial catch of Pacific cod (*Gadus macrocephalus*) in the Yellow Sea, the Korea Strait and the southwestern Japan/East Sea has steadily increased from 1998 to 2010, which is contrary to the recent declining trend since 1997 in the Russian coast of the Japan/East Sea and the eastern North Pacific areas (Gulf of Alaska and Bering Sea). Although most cods in the North Pacific show similar biological characteristics, those in the Yellow Sea have often been considered as a distinct stock because of their earlier maturation and relatively small size compared with other cods in the North Pacific. Despite these distinctive biological characteristics, cod recruitment in the Yellow Sea seems to be synchronized with the Korean Strait and the southwestern Japan/East Sea. The changes in cod recruitment in the western Pacific are tentatively related to changes in climate and oceanographic conditions such as the Arctic Oscillation and cold-water penetration from deep ocean. In addition, annual catch of Pacific herring (*Clupea pallasii*), a dietary component of cod, also has dramatically increased from 2002 to 2010 in Korean waters, indicating that biological factors may also play a role, for example, possible match-mismatch or a common prerequisite between herring and cod for successful recruitment. It is uncertain whether the cod stocks in the Yellow Sea are genetically connected or isolated from those in the Korea Strait and the Japan/East Sea. Regional comparisons of biology, ecology and recruitment processes are expected to provide insights into the common roles of hydrographical changes and biological controls in recruitment processes of Pacific cod in the western vs. eastern North Pacific. This session will exchange information and ongoing research results among regional scientists who have interested or involved in the phylogenetics, early-life history, larval cultivation, ecology and recruitment of Pacific cod. The session is especially interested in papers that examine regional climatology,

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oceanography and trophodynamics in relation to cod recruitment fluctuation. With sufficient interest by the contributors, a special issue of a scientific journal will be sought.

Scientists willing to serve as PICES convenor: Sukgeun Jung (Korea), TBD

Primary Publication: Special issue of *Fisheries Research* (Anticipated).

2-8. **Title:** Science needs for offshore oil and gas development in the North Pacific
[Science Board did not support this proposal for PICES-2012.]

Duration: 1 day

Sponsoring committees: FIS, BIO, MEQ, POC

Description: PICES is well-suited to provide a suite of information needed to advise agencies and institutions involved in offshore Oil and Gas (O&G) development, regulation, clean-up, damage assessment and restoration. Many of the information needs are similar to those needed for management of fisheries, aquaculture and pollution. For example: baseline data on population distribution, abundance and habitat use; climate change and shifting baselines; current and wind transport models. The purpose of this session is to introduce the PICES community to the processes of O&G development, response and damage assessment; and to demonstrate how current and future research by PICES scientists could contribute to these processes.

Presentations on the following topics would be of interest:

- Current and wind transport models
- Biological baseline data
 - Distribution, abundance, habitat use, population trends
 - Zooplankton, fish, marine mammals, seabirds, benthos
- O&G development, permitting and regulation
- Response (clean-up)
 - Technologies and techniques (Ken Lee, Bedford DFO, invited speaker)
 - Physical and biological information needed for response
- Damage assessment and restoration
 - Processes of natural resource damage assessment
 - Biological information needed for damage assessment and restoration planning
- Models of oil fate and impacts
- Toxicology of oil to marine organisms
- Climate change and shifting baseline
- Impacts on human communities and use of TEK

Scientists willing to serve as PICES convenor: Libby Logerwell (USA), Ken Lee (Canada), and TBD (Russia)

POC Endnote 5**Merged POC/TCODE Topic Session on “*Changing ocean biogeochemistry and its ecosystem impacts*”****Co-sponsored by ICES and IMBER****Co-Convenors:** Silvana Birchenough (ICES), Steven Bograd (USA), Arthur Chen (IGBP), Tony Koslow (USA), Tsuneo Ono (Japan)

Ocean biogeochemistry is undergoing rapid and growing anthropogenic change. A significant fraction of anthropogenic CO₂ is taken up by the ocean, which drives down pH and reduces the saturation state of carbonate minerals like calcite and aragonite, a process known as “ocean acidification”. Global climate models also predict that dissolved oxygen concentrations in the deep ocean will decline by 20–40% over the coming century or so as global warming enhances stratification of the upper mixed layer and reduces ventilation of the deep ocean. Declining oxygen levels have now been reported from mid-ocean depths in the tropical oceans and across the North Pacific. Both processes are of particular concern in the North Pacific, where the water is naturally ‘old’ and has shallow carbonate saturation horizons, relatively low buffering capacity, and extensive oxygen minimum zones. It is anticipated that these anthropogenic influences on the global ocean will increase in coming decades as atmospheric CO₂ levels and global temperatures continue to rise. We invite papers on the changing biogeochemistry of the global ocean, its impacts on organisms and ecosystem function, and emergent impacts on biogeochemical cycles related to the interaction of ocean acidification and declining oxygen with climate change and other anthropogenic impacts.

Report of Technical Committee on Data Exchange

The meeting of the Technical Committee on Data Exchange (hereafter TCODE) was held from 18:00 to 19:30 h on October 16 and from 14:00 to 18:00 h on October 19, 2011. Dr. Tony Koslow, new member from U.S.A, was introduced and two observers attended on behalf of members of China (*TCODE Endnote 1*). Several changes were made to the draft agenda. The revised agenda was adopted (*TCODE Endnote 2*).

AGENDA ITEM 3

Report of POC/MONITOR/TCODE workshop

TCODE Chairman, Dr. Toru Suzuki, a Co-convenor of the POC/MONOTOR/TCODE Workshop on “*Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program*”, gave a summary report. The workshop was held on October 14, 2011, and consisted of 13 oral presentations (including 2 invited talks) plus 7 posters. The workshop was completed successfully. TCODE was responsible for judging the posters to determine the Best Poster award for a TCODE-sponsored workshop.

Unfortunately, the TCODE E-Poster Session on “Data and data systems for validation of numerical models” had to be cancelled because no presentations were submitted.

AGENDA ITEM 4

Review of proposed topic session for PICES-2012 in Hiroshima, Japan

Dr. Koslow, Co-convenor of the proposed topic session on “*Trends in hypoxia and ecosystem impacts in the North Pacific*” (*TCODE Endnote 3*) explained the background for the topic. Dr. Suzuki, also a member of the Section on *Carbon and Climate* (S-CC), reported that S-CC agreed to support the session and that the POC Committee recommended adding two more co-conveners. Dr. Suzuki suggested that it might be a good idea to merge the topic session with the S-CC-proposed topic session on “*Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas*” co-sponsored POC and BIO. TCODE members supported the suggestion.

AGENDA ITEM 5

Report of POMA 2011

Dr. Suzuki reported on behalf of Dr. Hernan Garcia that Dr. Garcia has added a new POMA nomination to the existing list of nominations, bringing the total to four. Science Board members elected the recipient of POMA 2011 *in camera* at the inter-sessional Science Board meeting in April 2011 in Honolulu. TCODE members confirmed the other three nominations to be rolled over to 2012 and will encourage scientists to submit new nominations, especially from China and Russia.

AGENDA ITEM 6

Review progress on TCODE workplan for 2010/2011

a) Continue to support, coordinate, and identify of PICES data and information products

i) Dr. Thomas Royer reported that the second North Pacific Ecosystem Status Report (NPESR II) was published in 2010 and that NPESR III will be proposed by the FUTURE Advisory Panel on *Status, Outlooks, Forecasts and Engagement* (AP-SOFE). He also said that NPESR III should not be as large but serve as an update and should be primarily electronic allow users to obtain figures from the text.

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ii) Mr. Robin Brown stated the HAE-DAT database has encountered problems in obtaining data and buy-in.

iii) Dr. Suzuki reported on the progress of PACIFICA, the ocean carbon and its related data synthesis project of S-CC. The PACIFICA database will be released as a beta version by the end of November and finalized by the end of February 2012.

v) Dr. Suzuki noted that the data of the CREAMS/PICES EAST-I project are important not only for AP-CREAMS but also for other PICES expert groups, so it should be encouraged to be publicly available.

vi) AP-CRP's database, established by SAHFOS (Sir Alister Hardy Foundation for Ocean Science), continues to mature.

vii) The status of AP-MBM and other expert groups was unclear. TCODE members agreed to continue this item in next year's workplan.

b) Cooperation with other data management groups and activities

Dr. Georgiy Moiseenko reported on the status of ICES WGDIM (Working Group on Data and Information Management) and announced that he would not continue as a member of WGDIM next year. Dr. Suzuki reported that Dr. Helge Sagen, Co-Chair of WGDIM, invited him to be on the WGDIM mailing list in order to exchange information between the Working Group and TCODE.

Dr. Suzuki reported that he attended an IODE international conference celebrating its 50th anniversary on March 21–22, 2011, in Liège, Belgium. There were nearly 100 participants, 24 oral presentations and many posters. Dr. Suzuki also attended IODE-XXI session of the IOC Committee on IODE held on March 23–26, 2011 as a representative of PICES. The participants of the session were 91, including participants from all PICES member countries. His plans are to attend the next session, to be held in Cancún, [later changed to Ensenada] Mexico.

Dr. Suzuki reported on behalf of Dr. Hernan Garcia, who was not able to attend the meeting, that the IODE GE-BICH (Group of Experts on Biological and Chemical Data Management and Exchange Practices) 5th meeting was held on January 17-20, 2011 in Oostende, Belgium, and that Dr. Garcia was nominated for long-term membership and elected co-chair. Dr. Suzuki also nominated for long-term membership. He also reported that a universal quality flag scheme was proposed to IODE Ocean Data Standard pilot project and a second international quality control workshop on chemical oceanographic data will be held March 26–30, 2012. Dr. Garcia and he will attend this workshop as GE-BICH members.

Dr. Suzuki introduced the IODE ODP (Ocean Data Portal) which aims at providing seamless access to collections and inventories of marine data from NODCs of the IODE network. China, Russia and USA have already established an ODP node, and Japan and Korea are ready to do so. He also mentioned that SG-ODP will hold its second meeting in February 2012 in Oostende, Belgium.

Dr. Suzuki reported the status of OBIS (Ocean Biogeographic Information System). IODE adopted the establishment of SG-OBIS (Steering Group for OBIS) and GE-OBIS (Group of Experts on OBIS) at IODE XXI. An IOC circular for long-term members of GE-OBIS sent to the PICES Secretariat was forwarded to TCODE for discussion. TCODE encourages the nomination of long-term members to GE-OBIS from PICES member countries and continues to invite OBIS, as *ex-officio* member, to TCODE meetings.

Dr. Igor Shevchenko reported that rent for the AdHost remote server for the PICES GeoNetwork portal has been renewed and he continuously maintains the server. He has prepared a proposal to renew rent for next year. He noted that the GeoNetwork portal user's manual is available and presented it on a new document sharing system using Google Docs to the Committee. TCODE agreed to evaluate it. ix) Dr. Shevchenko also gave a short presentation on the GeoNetwork portal. There are currently 4,210 records of datasets, 3 of maps and graphics, 38 records of PICES Digital Data Library. v) He reported the results of AdHost performance experiments on accessing metadata from different locations and multiple users. All experiments were finished successfully and he

thanked the members for their collaboration. vi) Dr. Suzuki stated that existing metadata records have not been moved to the AdHost server yet, and that the status of China and Korea were unclear. He recommended that this item should be carried over for discussion to next year. vii) Dr. Shevchenko was unclear how the server could be removed from the NSDI clearinghouse system. However, it was noted that the node server of the NSDI clearinghouse in Japan had already terminated. iv) TCODE discussed developing a strategy to encourage metadata submission from relevant expert groups. TCODE agreed on the need to promote this activity and to continue to pursue a way to do this. d) Dr. Shevchenko will maintain the TCODE web pages on TINRO for the next year.

AGENDA ITEM 7

Report of FUTURE AP joint meeting at PICES-2011

Mr. Brown, Chairman of AP-SOFE, presented a report from the FUTURE Advisory Panels (AICE, COVE and SOFE) which included AP membership, the inter-sessional FUTURE workshop on “*Indicators of status and change within North Pacific Marine Ecosystems*” held in April, 2011, in Honolulu, USA, new Working Group on *North Pacific Climate Variability and Change* (WG 27) and Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28) and proposed new expert groups, Section on *Climate Change and Marine Ecosystems* (S-CCME) and *Human Dimensions of Marine Systems* (S-HD) linked to FUTURE, FUTURE co-sponsored topic sessions for PICES-2012, and other upcoming events and activities. Mr. Brown also discussed TCODE’s contribution to FUTURE, adding that present and past Chairs of TCODE are/were represented on the FUTURE APs.

AGENDA ITEM 8

Proposal for special volume dedicated to B. Megrey

Dr. Suzuki introduced a proposal submitted by Dr. Shin-ichi Ito (member of POC) for special volume or issue in a scientific journal dedicated to Dr. Bernard A. Megrey who was Chairman of TCODE from 2008–2010. Dr. Enrique Curchitser, who will serve as one of the guest editors, has already contacted the chief editor of the *Journal of Marine Systems*. The proposal also invites one or more TCODE members to be guest editors (TCODE Endnote 4). TCODE members endorsed the proposal and picked Dr. Suzuki to be one of the guest editors.

AGENDA ITEM 9

PICES data repository

TCODE members discussed storage and dissemination of data and information products from PICES expert groups. Dr. Deborah Reusser, member of Working Group on *Non-indigenous Aquatic Species* (WG 21), and observer at this meeting, introduced the NIS database project, which is great achievement of WG21, and requested TCODE to provide long term archive assistance of the data because WG 21’s term will be finished in October 2012. After discussing technical issues, TCODE agreed to assist in data archiving and registration of metadata on GeoNetwork. This activity will be added to next year’s workplan.

AGENDA ITEM 10

Annual country reports

Annual reports were submitted by China, Russia and USA but could not be presented at the meeting because of lack of time. However they can be found in *TCODE Endnotes 5, 6 and 7*, respectively, and will be available in Google Docs.

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AGENDA ITEM 11

Relation with other international programme/organizations

TCODE agreed to continue exchanging information with IOC/IODE, OBIS and ICES WGDIM. In addition, potential collaborations with other international programmes were with OceanSITES (worldwide system of long-term deeper water reference stations) suggested by Dr. Koslow, GEOS (Group on Earth Observations) suggested by Dr. Gongke Tan, and WDS (ICSU World Data System; formerly WDC (World Data Center)) suggested by Dr. Suzuki.

AGENDA ITEM 12

Summary of items with financial implications

Next year's rent for the AdHost server will be at the same level as this year.

AGENDA ITEM 13

TCODE workplan for 2011/2012

Dr. Suzuki presented a draft workplan for 2011/2012 based on the one for 2010/2011. Several changes were made at the meeting and a revised workplan was adopted (*TCODE Endnote 8*). Dr. Suzuki cautioned that this workplan was not final and requested members to continue providing input and revisions to the workplan at any time.

AGENDA ITEM 14

Other business

Dr. Royer introduced a draft proposal for the production of the third North Pacific Ecosystem Status Report (NPESR III) submitted to AP-SOFE and MONITOR in detail (*TCODE Endnote 9*). Dr. Shevchenko mentioned that the report will be also available on GeoNetwork. Members agreed that TCODE will also be responsible for this draft proposal.

Dr. Suzuki closed the meeting at 18:00 h.

TCODE Endnote 1

TCODE participation list

Members

Robin Brown (Canada)
Tony Koslow (USA)
Georgiy Moiseenko (Russia)
Thomas Royer (USA)
Igor Shevchenko (Russia)
Toru Suzuki (Japan, Chairman)

Observers

Yang Ho Choi (Korea)
Deborah Reusser (USA)
Gongke Tan (China)
Qiulu Wang (on China's behalf)
Jinkun Yang (on China's behalf)

TCODE Endnote 2**TCODE meeting agenda**

1. Welcome and introduction of members
2. Adoption of agenda
3. Report of POC/MONITOR/TCODE Workshop on October 14 – Suzuki
4. Review of proposed topic session for PICES-2012 in Hiroshima, Japan – T. Koslow and Suzuki
5. Report of POMA 2011 – Suzuki
6. Review progress on TCODE workplan for 2010/2011
 - a) Continue to support, coordinate, and identify of PICES data and information products
 - i) MONITOR - T. Royer
 - ii) AP-AICE (S-HAB, WG 21, WG 24) – I. Shevchenko and R. Brown (S-HAB)
 - iii) AP-COVE (S-CC, WG 20, WG 22, WG 23) - Suzuki and Brown (WG 22)
 - iv) AP-SOFE (WG-FCCIFS, SG-HD) - Brown
 - v) AP-CREAMS – Suzuki
 - vi) AP-CRP
 - vii) AP-MBM
 - b) Cooperation with other data management groups and activities
 - i) ICES WG on Data and Information Management (WGDIM) - G. Moiseenko
 - ii) IODE-XXI Session in March 2011 - Suzuki
 - iii) IODE GE-BICH in January 2011 – Suzuki instead of H. Garcia
 - iv) IODE ODP - Suzuki
 - v) OBIS – Suzuki
 - vi) Invitation of *ex-officio* member - Suzuki
 - c) PICES Metadata Federation Project
 - i) Renew Remote server contract - Shevchenko
 - ii) Continue to administer AdHost server - Shevchenko
 - iii) Prepare proposal to renew rented server for another year - Shevchenko
 - iv) Develop strategy to award and encourage metadata submission - All
 - v) Run the AdHost server performance experiment on accessing metadata from different locations and multiple users - Shevchenko and all
 - vi) China, Japan and Korea move their metadata records to the AdHost server - R. Yin (China), Suzuki (Japan), K-K. Jung (Korea), Shevchenko
 - vii) Remove NPEM, KODC, MIRC servers from the NSDI clearinghouse site - (NPEM), (KODC), Suzuki (MIRC)
 - viii) Update AdHost server to monitor MDB use – (Olga Vasik)
 - ix) Promote the GeoNetwork Portal
 - Prepare short PowerPoint presentation on GeoNetwork portal – Shevchenko and Brown
 - Request GeoNetwork resource be reported at PICES 2011 opening session as part of PICES activities – Shevchenko
 - Prepare a presentation for Expert Groups – Shevchenko and Brown
 - Add the MDB server link on the sidebar of the PICES web page
7. Report of FUTURE AP meeting and discussion AP-SOFE – Brown, Shevchenko and Suzuki
8. Discussion of proposal for special volume dedicated to B. Megrey – Suzuki
9. Discussion of PICES data repository - All
10. Annual country reports
11. Relation with other international programme/organizations
12. Summary of items with financial implications
 - i) Proposed inter-sessional workshop/meeting(s) for 2012 and beyond
 - ii) Proposed publications for 2012 and beyond
 - iii) Travel support requests
 - iv) Proposal to continue rented server for another year
 - v) Other items

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13. Discussion and adoption on TCODE workplan for 2011/2012
14. Other business
15. Closing

TCODE Endnote 3

Proposed Topic Session of PICES 2012 in Hiroshima, Japan

Title: *Trends in hypoxia and ecosystem impacts in the North Pacific*

Duration: ½ day

Sponsoring Committees: POC/BIO/TCODE

Declining oxygen levels have been reported from mid-ocean depths in the tropical oceans and across the North Pacific. Global climate models predict that dissolved oxygen concentrations in the deep ocean will decline by 20-40% over the coming century or so as global warming enhances stratification of the upper mixed layer and reduces ventilation of the deep ocean. This session will examine current trends in oxygen concentration in the North Pacific, the factors contributing to observed trends, and their ecosystem impacts. Studies examining time series for oxygen concentration in the deep ocean; the physical, chemical and biological factors underlying observed trends; and the physiological, ecological and biogeochemical impacts of hypoxia on the water column and benthos are invited. Examples of impacts on the distribution and abundance of deepwater fish stocks or the midwater micronekton, their predators and prey, are particularly encouraged. The session is especially interested in papers that examine the impact of hypoxia on ecosystem structure, the biogeochemistry of the carbon cycle, and the vulnerability of ecosystems to climate change.

Potential invited speakers: Brad Seibel, URI (USA); Frank Whitney, IOS (Canada); Tsuneo Ono or Y.W. Watanabe (Japan)

Scientists willing to serve as PICES convenors: Tony Koslow (USA), Tsuneo Ono (Japan)

TCODE Endnote 4

Proposal for special volume dedicated to Dr. Bernard A. Megrey

Theme: Modeling of marine ecosystem dynamics and the use of observations for improving models

Objective:

To highlight different approaches to modeling the impacts of climate variability and change on marine ecosystems and their ability to support sustainable ecosystem services.; to summarize the state of knowledge in marine ecosystems and to model them and explore data needs for improving modeling approaches, and hence our understandings.

Throughout his life, Dr. Bernard Megrey contributed to the modeling of marine ecosystems that incorporate both environmental and biological queues. He was engaged in a national/international effort to construct an integrated end-to-end ecosystem model (climate-to-fishers). He also explored historical data and promoted the importance of data for improving model skill and knowledge. This special volume will be dedicated to the memory of Dr. Bernard Megrey.

Guest Editors: Enrique Curchitser, Shin-ichi Ito, Geir Huse, Kenneth Rose, Francisco Werner (potentially Toru Suzuki and another member from T-CODE)

Proposed journal: Journal of Marine System

Papers to be called:

Papers on different types of ecosystem models will be accepted including: Mass-balance (ECOPATH) models, size-based models, minimalist models, individual based models (IBMs) and end-to-end models. Special emphasis will be placed on models that examine trophic interactions as well as models that link biogeochemical processes with higher trophic level production. Papers on methods for estimating uncertainties in model predictions and discuss data requirement to improve modeling approaches are also encouraged.

Timeline:

Dec. 2011	Call for papers
Oct. 2012	Deadline for submission
Jan. 2013	First review result will be return to the authors
Feb. 2013	Revision submission
May 2013	Publish

Potential papers:

- from presentations at ESSAS OSM 2011 (S3: *Modeling marine ecosystem dynamics in high latitude regions*);
- from presentations at PICES-2012 (Proposed POC/FIS Topic Session: *Linking migratory fish behavior to End-to-End models II*).
- Other studies under ICES, PICES and IMBER.

TCODE Endnote 5

2011 Country Report of China
submitted by
Yang Jinkun, NMDIS/SOA, China

1. Outline of Participation in TCODE

China has been following TCODE/PICES related marine ecosystem observations and study projects, and paying great attention to PICES oceanographic data exchange activities. China has already provided information on Chinese marine experts to TCODE, and has actively participated in TCODE marine information technology exchange activities.

The National Marine Data and Information Service (NMDIS), which subordinates to the State Oceanic Administration (SOA) of China, joined the PICES Metadata Federation Project (held by the North Pacific Ecosystem Metadatabase, NPEM) under TCODE in 2006. It officially became a Chinese Node for the PICES Metadata Federation and has been responsible for the setup and operational maintenance of the node since then. In August 2008 NMDIS completed the registration in the NSDI Clearinghouse of Federal Geographic Data Committee, FGDC, of the United States, and first released 50 metadata about ocean tide prediction products of Chinese oceanographic stations and major coastal ports and waterways in Chinese and Southeast Asian coastal areas. Mr. Yin Ruguang, from NMDIS, SOA, has been a member of TCODE for a long time, and has been actively participating in TCODE activities and implementation of the action plans.

2. Operation and Maintenance of Chinese Node of PICES Metadata Federation

2.1 Operation and Maintenance of the Node

In 2011, the Chinese node of the PICES Metadata Federation was moved to the PICES metadata rented server, and the routine management of the node has been conducted, which ensures the regular operation of the Chinese node.

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2.2 Metadata Release and Update

In response to the requirements of the PICES Metadata Federation Project, China increased the metadata of the Chinese node in 2011 to include:

- Monthly mean sea level metadata from 6 Chinese coastal stations, Dalian, Kanmen, Lvsi, Zhapo, Nansha and Xisha, with a time range from 2009 to 2010;
- Hourly sea level metadata from 2 Chinese coastal stations, Lianyungang and Dalian, with a time period from 2009 to 2010;
- Metadata of meteorological, wave, temperature and salinity data in 2010 from 13 Chinese coastal stations, Dalian, Xiaochangshan, Yantai, Xiaomaidao, Lianyungang, Lvsi, Shengshan, Zhenhai, Dachen, Nanji, Beishuang, Dongshan and Zhelang.

3. Exchange and Cooperation with Other Related International Programs

The National Marine Data and Information Service (NMDIS) is a public institution directly under the State Oceanic Administration (SOA) of China. It fulfills the national obligations of international marine information exchange and cooperation, and undertakes the work of the International Ocean Institute (IOI) Western Pacific Regional Center. On behalf of China, NMDIS participated in the IOC, JCOMM, GOOS, GLOSS and many other international organizations and programs. It hosts the China Argo Data Center, China GTSPP Data Center, China NEAR-GOOS Delay Mode Database, China ODAS Metadata Center, Ocean Data and Information Network for the Western Pacific Region (ODINWESTPAC), Ocean Data Portal (ODP) and many other national centers or national nodes. Information exchange and cooperation with international and regional projects have had good and fruitful outcomes, including:

- China Argo Data Center (<http://www.argo.gov.cn/>),
- China GTSPP Data Center (<http://221.239.0.160/gtsppweb/index.htm>),
- China NEAR-GOOS Delayed Mode Database (<http://near-goos.coi.gov.cn/>),
- China ODAS Metadata Center (<http://www.odas.org.cn/>),
- Ocean Data and Information Network for the Western Pacific Region (ODINWESTPAC) (<http://www.odinwestpac.org.cn/>),
- Ocean Data Portal (ODP) (<http://www.OceanDataPortal.org/>).

4. Proposal and Future Plan

4.1 Proposal

- i. To promote the sharing of PICES metadata, increase the amount of information, and establish the appropriate encouragement and reciprocal mechanism;
- ii. To further improve the update of TCODE website, and build a user-friendly interface for users to browse and download the latest technical documentation and project information;
- iii. China supports the development of the GeoNetwork Portal project, and recommends that TCODE could provide technical training and other technical support to Member States.

4.2 Future plan

- i. China will actively participate in, and implement, the TCODE 2011–2012 action plan.
- ii. China will continue to maintain the Chinese node of the PICES Metadata Federation, and increase PICES metadata information.

TCODE Endnote 6

2011 Country Report of Russia
prepared by
Igor Shevchenko and Georgiy Moiseenko

1. Key Institutions/Key Persons:

PICES TCODE
<http://tcode.tinro.ru/>
Igor Shevchenko

Fisheries Institutes

Pacific Fisheries Research Center (TINRO-Center)
<http://www.tinro-center.ru>
Igor Shevchenko

Russian Federal Research Institute of Fisheries & Oceanography (VNIRO)
<http://www.vniro.ru>
Georgiy Moiseenko

Khabarovsk Branch of Pacific Fisheries Research Center (KhOTINRO)
<http://www.tinro.khv.ru/>
Vladimir Shemyakin

Magadan Institute of Fisheries and Oceanography (MagadanNIRO)
<http://www.magniro.ru>
Igor Izergin

Chukotka Institute of Fisheries and Oceanography (ChukotNIRO)
Sergey Palma

Sakhalin Institute of Fisheries and Oceanography (SakhNIRO)
<http://www.sakhniro.ru>
Peter Vasilets

Kamchatka Research Institute of Fisheries and Oceanography (KamchatNIRO)
<http://www.kamniro.ru/kniro32/index.php>
Oleg Lapshin

Russian Federal Fisheries Agency
<http://fish.gov.ru>

Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO)
<http://www.atlantniro.ru/index.php/home/atlantniro>

Caspian Institute of Fisheries (KaspNIRKH)
<http://www.kaspnirh.ru/en/>

Polar Marine Fisheries Institute (PINRO)
http://www.pinro.ru/index_e.htm

Centre for Fishery Monitoring and Communications (CFMC)
<http://www.cfmc.ru>

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Kamchatka Regional Center for Monitoring (KRCM)

<http://www.krcm.ru>

National Fishery Resources

<http://www.nfr.ru>

Hydrometeorological Institutes

All-Russian Research Institute of Hydrometeorological Information – World Data Center (RIHMI-WDC)

<http://www.meteo.ru/english/>

Nickolay Mikhailov

State Oceanographic Institute (SOI)

<http://www.oceanography.ru>

Igor Zemlyanov

Arctic and Antarctic Research Institute (AARI)

http://www.aari.ru/default_en.asp

Far Eastern Regional Hydrometeorological Research Institute (FERHRI)

<http://www.ferhri.ru>

Nikolay Rykov

Academy of Sciences

Pacific Oceanological Institute (POI)

<http://www.pacificinfo.ru/en/>

Igor Rostov

Institute of Marine Biology (IMB)

<http://www.imb.dvo.ru>

Space Research Institute (IKI)

<http://www.iki.rssi.ru/eng/>

Evgeny Loupian

P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences

<http://www.ocean.ru/eng/>

2. Existing Data and Metadata Sets

Agency	Division	Data/Metadata description	URL
Russian Federal Fishery Agency	TINRO	Cruise metadatabase	http://metadata.tinro.ru/index.cgi?lang=en
	TINRO	Russian annual fishery statistics for Far East seas	http://vsurf.tinro.ru/index.jsp
	FCMC	Near real time fishery statistics	http://www.cfm.ru
Federal Service for Hydrometeorology and Environmental Monitoring	Hydrometeorological Centre of Russia	- Climate temperature and precipitation data - Weather forecasts	http://wmc.meteoinfo.ru
	AARI	Ice charts and forecasts	http://www.aari.ru/default_en.asp
	AARI	Interdisciplinary Arctic seas databases	http://www.aari.nw.ru/projects/ECIMOt/index.htm
	SOI	Hydrographic, meteorology and pollution data for Russian seas	http://www.oceanography.ru/
	FERHRI	Hydrographic station data; temperature, salinity; inter-disciplinary data	http://www.ferhri.ru
Russian Academy of Sciences	IKI	Satellite data (NOAA, GOMS, RESURS)	http://www.iki.rssi.ru/eng/ http://smiswww.iki.rssi.ru/
	POI	Hydrographic observations (national and foreign) in the Northern Pacific	http://www.pacificinfo.ru/en

The Russian Federal Program ESIMO portal <http://www.esimo.ru> is an entry point to sites maintaining governmental information funds of data on the state of the World Ocean and coastal areas.

3. Technical Methodologies

–

4. Ongoing Data Management Programs

The Unified System of Information on the World Ocean State (ESIMO) <http://www.esimo.ru>

5. Real-time data sources:

FCMC - Russian fishery statistics <http://www.cfm.ru>

6. Data visualization and analysis

TCODE-2011

7. Regulations for data exchange

Federal laws:

Федеральный закон от 20 февраля 1995 г. N 24-ФЗ "Об информации, информатизации и защите информации"

Закон РФ от 23 сентября 1992 г. N 3523-I "О правовой охране программ для электронных вычислительных машин и баз данных (в ред. Федерального закона от 24.12.2002 N 177-ФЗ)"

8. PICES GeoNetwork tests

PICES GeoNetwork portal home page

<http://67.212.128.197/geonetwork/srv/en/main.home>

In September 2011, tests on the PICES GeoNetwork server were performed. Some members of TCODE and scientists from TINRO-Center took part in this work. The total number of test participants was 7. The test results show that such a number of concurrent users is not critical for the current server configuration. A summary of these tests will be presented on the TCODE home page and Google Docs.

9. Russian scientists have taken part in the following TCODE activities:

PICES Metadata Federation Project

- Items of TCODE workplan:
 - Renew Remote server contract,
 - Continue to administer AdHost server,
 - Prepare proposal to renew rented server for another year,
 - Promote the GeoNetwork Portal, Prepare short PowerPoint presentation on GeoNetwork portal,
 - Prepare a presentation for Expert Groups,
 - Add the MDB server link on the sidebar of the PICES web page,
 - Explore GeoNetwork Portal backup options,
 - Update the Technical report to reflect GeoNetwork.

TCODE web pages maintenance.

TCODE Endnote 7

2011 Country Report of USA – U.S. Academic research

prepared by
Thomas Royer

1. Several multiyear marine field programs in the North Pacific are in transition. These studies in the Gulf of Alaska, Aleutian Islands, Bering and Beaufort Seas are funded in part by National Science Foundation (NSF) and North Pacific Research Board (NPRB). The Bering Sea Integrated Research Program/Bering Sea Ecosystem Study (BSIERP/BEST) had its field program from 2008 to 2010. The program is now in the analysis and synthesis phases. The site for data management for the BSIERP has been shifted from the University of Alaska Fairbanks to the Alaska Ocean Observing System (see www.aoots.org and www.nprb.org). A more recent field program in the Gulf of Alaska in 2011 by NPRB is the Gulf of Alaska Integrated Ecosystem Research Program (GOAIERP). It will have another field program in 2013. These programs are mentioned here to highlight the submission of these new data to the PICES GeoNetwork Portal. The data management for GOAIERP is in the RFP stage at the present time.

2. The Exxon Valdez Oil Spill studies (<http://www.evostc.state.ak.us/>) are continuing to address 1) herring and 2) long-term monitoring of marine conditions and injured resources within the spill region. They, too, will be encouraged to submit their metadata to the PICES GeoNetwork Portal.
3. The Alaska Ocean Observing System (AOOS) has a transitional data portal established and designed by a private consulting company, Axiom Consulting and Design. The beta version was released at the Alaska Marine Science Symposium in January 2011. The website at www.aos.org offers some archived and real time marine data for coastal Alaska. It provides access to a variety of oceanographic datasets and feeds, and they would appreciate comments on its content and operation. PICES members are encouraged to review this data portal and provide comments.
4. The U.S. Integrated Ocean Observing System will be expanding its field program in 2012 (see <http://www.ioos.gov/> for details).
5. There are growing concerns about the fragility of the data archives due to outdated equipment and software and the pressures of declining budgets. PICES participants should be aware of these potentially serious losses of archived data.
6. Some efforts need to be made within the PICES member countries to enhance the participation of member states in data archive/exchange processes. This might be accomplished by obtaining feedback on the existing practices for data exchange and National Oceanographic Data Center contacts. This enhanced data exchange might occur both with 1) the new NPESR procedures discussed at PICES 2011 by TCODE and MONITOR and 2) the implementation of the PICES GeoNetwork Portal.
7. There should be a better coordination of coastal monitoring activities for the Northeast Pacific from Mexico to Alaska. This would be a follow up of the November 2003 PICES workshop in Victoria. This would link coastal monitoring activities including IOOS, OOSs, CalCOFI, Line P, MBARI, Newport Line, Seward Line and fishery surveys by U.S. and Canadian fishery services. Perhaps the PICES 2013 Annual Meeting in British Columbia would be a place to hold another workshop on the status of these monitoring efforts and to determine whether coordination would help them. This item should be placed on the TCODE agenda for PICES-2012.

TCODE Endnote 8

TCODE Workplan in 2011/2012

- 1) Continue to support, coordinate, and identify of PICES data and information products
 - a) MONITOR
Responsibility – T. Royer
 - b) AP-AICE (S-HAB, WG 21 (–2012), WG 24)
Responsibility – I. Shevchenko and R. Brown (S-HAB)
 - c) AP-COVE (S-CC, WG 23 (–2011), WG 26, WG 27, WG 28)
Responsibility – T. Suzuki
 - d) AP-SOFE (WG-FCCIFS, SG-HD (–2011))
Responsibility – R. Brown
 - e) AP-CREAMS/AP-CRP/AP-MBM (–2011)
Responsibility – T. Suzuki
- 2) Cooperation with other data management groups and activities
 - a) ICES WG on Data and Information Management (WGDIM)
Responsibility – G. Moiseenko
 - b) IODE GE-BICH workshop in March 2012
Responsibility – H. Garcia and T. Suzuki
 - c) IODE SG-ODP-II in February 2012

TCODE-2011

- Responsibility – T. Suzuki
- d) OBIS and invitation of *ex-officio* member
Responsibility – T. Suzuki
- 3) PICES Metadata Federation Project
 - a) Renew remote server contract
Responsibility – I. Shevchenko
 - b) Continue to administer AdHost server
Responsibility – I. Shevchenko
 - c) Prepare proposal to renew rented server for another year
Responsibility – I. Shevchenko
 - d) Develop strategy to award and encourage metadata submission
Responsibility – All
 - e) Run the AdHost server performance experiment on accessing metadata from different locations and multiple users
Responsibility – I. Shevchenko and all
 - f) Japan and Korea move their metadata records to the AdHost server
Responsibility – T. Suzuki (Japan), (Korea), I. Shevchenko
 - g) Promote the GeoNetwork Portal
 - i) Update the Technical report to reflect GeoNetwork
Responsibility – I. Shevchenko, H. Garcia, R. Brown
- 4) Maintain TCODE web pages
Responsibility – I. Shevchenko
- 5) PICES-2012 Topic Session and Best Oral/Poster presentations
Responsibility – T. Koslow (co-convener)
- 6) Topic Session and/or Workshop Proposals to PICES 2013 in Nanaimo, Canada
Responsibility – All (Title, blurb, convener, potential invited speaker, and request co-sponsored to other committee and FUTURE)
- 7) POMA 2012 nomination
Remaining three nominations below will be rolled over to the next year (and beyond) for consideration at the next inter-sessional SB meeting. Consider a recommendation of new nomination before February 2012. Rank nominations for POMA 2012 before April 2012
- 8) Prepare to registration metadata of database of WG 21
Responsibility – I. Shevchenko
- 9) Prepare for production of the North Pacific Ecosystem Status Report – third edition
Responsibility – T. Royer and R. Brown

TCODE Endnote 9

Draft proposal on production of the North Pacific Ecosystem Status Report, NPESR

Submitted to AP-SOFE, MONITOR, and TCODE at PICES-2011, Khabarovsk, Russia, October 18, 2011
Please send comments to phil.mundy@noaa.gov

Background

Terms of reference of FUTURE SOFE AP and MONITOR require management of the NPESR. The third edition of the NPESR (2009 – 2014) would be due in 2015, based on schedules followed for the first two editions. The draft report is part of a discussion on how best to provide the information of the report in the future. To facilitate discussion, the draft proposal defines the parameters of report production and offers an example of how the report may be implemented in the next cycle. Funding is an important consideration; however it is a separate (but not unrelated) issue from the nature and means of production.

Report Parameters

1. Components, organization
 - a. Regional reports of disciplinary subject matter specialists
 - b. Trans-regional synthesis report
 - c. Outreach and Engagement
 - i. Power Point, professional, general
 - ii. Web-based delivery of figures and data
 - iii. Brochure, multi-language, general audiences
 - iv. Press releases, public seminars (*i.e.*, Sendai media model)
2. Formats
 - a. Paper
 - b. Web-based versions (pdf graphics format PICES web site, data formats, third party websites)
 - c. Peer reviewed journal (paper and electronic)
3. Timing of production of components and frequency of release
 - a. Annual or biannual regional report updates
 - b. Five or six year synthesis reports
 - c. Annual or biannual ppt, brochure, press release
4. Administrative structure
 - a. Editors
 - b. Regional leads
 - c. Subject matter specialists
5. Process of production
 - a. Manual
 - b. Fully or semi-automated

An Example of NPESR Report Production

A network of nine or ten correspondents (ocean and atmospheric physics, nutrients, phytoplankton, zooplankton, birds, fish, mammals, socioeconomics) per reporting region would annually update reports on a suite of agreed variables via the web in a process similar to electronically submitting a manuscript for review for journal publication, although much abbreviated. Submittals would consist of title, abstract, body, and data (QA, QC, QF) and metadata. A regional lead author, supported by IT staff and assisted by regional peer reviewers, would review submittals and request revisions if necessary. Edited submittals would be passed to two senior editors, assisted by database managers (MS SQL or Oracle) who would format into an NPESR (without synthesis report) on an annual basis. Senior editors would provide a preface of highlights that would serve for ppt and press release. Senior editors would organize synthesis on five- or six-year intervals, drawing upon lead authors, correspondents and other specialists as required.

The suite of agreed variables for each region would be developed through PICES processes. For example by use of “indicator selection framework” (AP-COVE, WG 28) to select time series in climate physics (WG 27), N,P,Z (MEQ), birds, fish and mammals (BIO, FIS), economics (HD), social impacts (HD). Note that “indicators” in this context are observables of known measurement error; variables (SST, fluorescence, DIC, DO, population estimates, *etc.*).

Report of the Technical Committee on Monitoring

The Technical Committee on Monitoring (hereafter MONITOR) met from 18:00–19:30 h on October 16, and from 14:00–18:30 hours on October 19, 2011, under the chairmanship of Dr. Hiroya Sugisaki. A total of 15 scientists from 5 PICES member countries were in attendance (*MONITOR Endnote 1*). The meeting agenda (*MONITOR Endnote 2*) was very full and business was conducted at a brisk pace.

AGENDA ITEMS 2 AND 10

Information and discussion for PICES-2011

MONITOR was assigned to judge the MONITOR/POC/FUTURE-sponsored topic session on “*How well do our models really work and what data do we need to check and improve them?*” (S9) by the Science Board Chairman. Dr. Sugisaki thanked the volunteer judges in advance for their service.

Dr. Naoki Yoshie (Ehime University, Japan) was awarded the MONITOR Best Presentation for his talk (co-authored by Xinyu Guo, Naoki Fujii and Tomohiro Komorita) on “*Phytoplankton and nutrient dynamics in the western Seto Island Sea based on observation and a modified NEMURO*”, and Dr. Vladimir Kulik was given the MONITOR Best Poster award for his presentation (co-authored by Igor Volvenko) on “*North Pacific database of pelagic and bottom trawl surveys from Russian EEZ applicable to Ecosystem based management*”.

AGENDA ITEM 3

Advisory Panel reports

Dr. Phillip Mundy, Chairman of the Advisory Panel on *Continuous Plankton Recorder Survey* (AP-CPR), reported on the Panel meeting held on October 15. Dr. Sonia D. Batten presented a report of the scientific accomplishments and present status of the North Pacific Continuous Plankton Recorder project. She reported on the inaugural meeting of the Global Alliance of CPR Surveys (GACS) and the Plankton 2011 Symposium that followed (September 22–23, 2011) in Plymouth, UK. MONITOR members agreed to keep a good relationship with GACS.

Dr. Vyacheslav Lobanov, Co-Chairman of the Advisory Panel for a CREAMS/PICES Program in East Asian Marginal Seas (AP-CREAMS), presented a report on AP-CREAMS-AP activities which the EAST-II project, a NOWPAP/PICES/IOC-WESTPAC joint training course on *Remote Sensing Data Analysis* held from October 8–12, 2011 in Vladivostok, Russia, and the completion of the supplemental chapter for the second North Pacific Ecosystem Status Report.

AGENDA ITEM 4

MONITOR Action Plan

The Committee Chair reported on the process of updating the MONITOR’s Action Plan, and presented its first draft. Committee members agreed to discuss it by e-mail, and to complete it by the end of March 2012.

MONITOR-2011

AGENDA ITEM 5

Status reports relevant to MONITOR

Framework on Ocean Observing

Comments from MONITOR were requested by Science Board on a presentation entitled “A framework for ocean observing” (FOO) by Dr. David Checkley in the Science Board Symposium (S1). MONITOR’s comments emphasize the importance of developing biological and chemical ocean observations (EOVs) in benthic to surface locations that are relevant to understanding productivity of higher trophic level organisms (*MONITOR Endnote 3*). Dr. Checkley discussed with MONITOR opportunities for collaboration between PICES and FOO. MONITOR agreed that this framework is important for ocean monitoring activities and recommended that PICES consider supporting and participating in the Framework and its process.

SCOR WG 137

Science Board Chairman, Dr. Sinjae Yoo, attended the Committee meeting and introduced the activities of SCOR Working Group 137 on *Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of Time-Series Observations* activities. The purpose of the presentation was to invite possible collaboration between PICES and SCOR through the Working Group and to seek MONITOR’s cooperation. MONITOR agreed to offer its support.

AGENDA ITEM 6

Relations with international/national organizations and programs

The representatives of the following organizations attended the committee meeting and reported their activities.

- Argo: Dr. Howard Freeland
- NEAR-GOOS: Dr. Dmitry Kaplunenko
- AOOS: Dr. Phillip Mundy
- NaNOOS: Dr. Jack Barth
- PaCOOS: Dr. Rosa Runcie
- SCOOS: Dr. Tony Koslow

AGENDA ITEM 7

PICES Ocean Monitoring Service Award (POMA)

The Chairman reviewed the role of the Committee in nominating and recommending candidates for POMA to the Science Board.

AGENDA ITEM 8

Country reports

The following Committee (and *ex-officio*) members from four PICES member countries made short presentations on national monitoring activities relevant to PICES. The report of Korea was sent to the Committee Chairman later:

- Canada: Dr. Jennifer Boldt
- Japan: Drs. Sei-Ichi Saitoh, Sanae Chiba
- Russia: Dr. Vladimir Kulik
- United States: Drs. Phillip Mundy and John Barth
- SAON (Sustaining Arctic Observing Networks): Dr. John Calder (Dr. Sugisaki reported on his behalf)

AGENDA ITEM 10

Planning for PICES-2011

MONITOR strongly supported a proposal for a 1-day Topic Session, jointly co-sponsored by POC, entitled “*Effects of natural and artificial calamities on marine ecosystems and the scheme for their mitigation*” (MONITOR Endnote 3).

AGENDA ITEM 11

Other business

Dr. Jack Barth informed MONITOR about an Ocean Observation meeting planned for 2013 in Oregon, USA.

MONITOR Endnote 1**MONITOR participation list**Members

John A. Barth (USA)
 Jennifer Boldt (Canada)
 Sanae Chiba (Japan)
 Vladimir Kulik (Russia)
 Vyacheslav Lobanov (Russia)
 Phillip R. Mundy (USA, Vice-Chairman)
 Young Jae Ro (Korea)
 Sei-Ichi Saitoh (Japan)
 Hiroya Sugisaki (Japan, Chairman)

Observers

Sonia D. Batten (Canada, CPR-AP)
 David Checkley (USA, IFSOO-TT)
 Howard J. Freeland (Argo)
 Tony Koslow (SCCOOS)
 Rosa Runcie (PaCOOS)
 Sinjae Yoo (Science Board Chairman)

MONITOR Endnote 2**MONITOR meeting agenda**

1. Welcome, Introductions and Sign-in (all)
2. Information and discussion for PICE-2011
 - Comments from MONITOR committee for the FOO talk by Dr. Checkley at SB symposium (Sugisaki)
 - Information for S9 (Barth, co-convenors)
3. Advisory Panel reports
 - Status of Pacific CPR program and advisory panel
 - Report on GACS workshop and Plankton symposium at Plymouth (Batten, Chiba and Sugisaki)
 - Report on CPR-AP meeting on 15th, Saturday (Mundy)
 - Status of CREAMS w. POC and W4 workshop report (Lobanov)
 - Report on the meeting of FUTURE on 16th, Sunday (AICE: Ro, COVE: Lobanov, SOFE: Mundy)
4. Committee’s contribution to FUTURE and Committee’s action plan (Sugisaki)
5. Status reports relevant to MONITOR
 - Report on IFSOO-TT (Integrated Framework for Sustained Ocean Observation Task Team: post Ocean Obs. ’09 activity) (Checkley)
 - Discussion on cooperation with SCOR 137 (Sugisaki)
6. Relations with international/national organizations and programs (invited)
 - Argo, NEAR-GOOS, AOOS, NaNOOS, PaCOOS, SCOOS
7. Report on POMA (Sugisaki)
8. Country reports of relevant monitor/observation activities

MONITOR-2011

Canada	(Boldt, Mackas)
China	(Zhang, Zhao)
Japan	(Chiba, Saitoh, Sugisaki)
Korea	(Park, Ro, Suh)
Russia	(Kulik, Lobanov)
United States	(Barth, Mundy, Napp)

9. Judges for PICES-2011 Best Presentation awards (All)
10. Proposals for PICES-2011 MONITOR workshops, special sessions, inter-sessional meetings (All)
11. Other business (if any)

MONITOR Endnote 3

Proposal for a 1-day MONITOR/POC Topic Session at PICES-2012 on “Effects of natural and artificial calamities on marine ecosystems and the scheme for their mitigation”

From ancient times, we have been discussing and taking countermeasures on the revival of fisheries and social infrastructures of waterside from natural disasters such as tsunamis and floods. The earthquake (Magnitude 9.0) disaster occurred in northeastern Japan on the 11th of March, 2011 was beyond our imagination. The earthquake and the gigantic tsunami destroyed the regional fisheries and surrounding society and impacted on marine ecosystems in eastern Japan. The tsunami also damaged the nuclear power plant at Fukushima, posing a serious threat of radioactive contamination to the North Pacific Ocean ecosystems.

Other recent examples are hurricane Katrina in 2005 and the oil spill accident of the Gulf of Mexico in 2010, which caused environmental pollution of the marine ecosystems and devastated parts of the economy. Recently, the magnitude of climatic disasters such as storms and floods may have been enhanced due to the global warming. Since oil and factories, power plants and other industrial infrastructures have been developed in the coastal areas of the world, coastal ecosystems are vulnerable to natural and artificial disasters. Therefore, it is urgent and most important to make wise use of ecosystem services to understand the effects of natural and artificial disasters on marine ecosystems, to document their restoration processes, and to promote effective measures for restoration and mitigation of disaster impacts.

The purpose of this session is to discuss:

1. Effects to the marine ecosystem by the disasters,
2. Effects to marine industries and societies by the disasters,
3. Schemes for the mitigations and recoveries from the disasters,
4. Field monitoring on the effect and the process of recoveries,
5. Domestic and international cooperation,
6. Policy and its effects on disaster preparations and recovery.

Co-sponsors: MONITOR, POC

Recommended Convenors: Tokio Wada (Japan), Hiroya Sugisaki (Japan)

MONITOR Endnote 3**MONITOR comments on Framework for Ocean Observing presented by David M. Checkley, Jr.**

The MONITOR Committee finds that the Framework for Ocean Observing is compatible with, and supportive of, the strategic plan of PICES and mission of MONITOR. The Framework is a process for fostering cooperation and collaboration among the community of ocean scientists for the purpose of enabling scientific discovery through improved communications and data sharing. The Framework is a logical and timely reinforcement and extension of principles embodied in the Global Ocean Observing System, as reflected in the Terms of Reference and Action Plan for MONITOR and its allied Committee, TCODE. Consistent with the missions of PICES and MONITOR, the Framework seeks to unite the presently largely independent ocean observing systems in order to provide interdisciplinary information based on observations from physics, biogeochemistry and biology, as required to solve complex management problems presented by global climate change. The Framework builds on principles of ecosystem observation that have evolved over the past three decades, emphasizing essential ocean variables (EOVs) from an observing system built around existing structures. As Dr. David Checkley presented in this talk, the requests to Ocean Observing from international societies will increase during the next decades. The Framework shows promise of implementing an organizational model that will enable faster provision of geographically coherent and temporally extensive observations and information for meeting scientific and societal needs. MONITOR recommends that PICES and scientists of PICES countries consider supporting and participating in the Framework and its process.

Report of the Section on *Ecology of Harmful Algal Blooms in the North Pacific*

The Section on *Ecology of Harmful Algal Blooms in the North Pacific* (S-HAB) met under the chairmanship of Drs. Vera Trainer and Changkyu Lee from 9:00 to 18:00 h on October 16, 2011, in Khabarovsk, Russia. The meeting was attended by members from China, Japan, Korea, Russia, and the United States of America. Other visiting scientists attended the meeting under their respective countries (*S-HAB Endnote 1*). The proposed agenda for the meeting (*S-HAB Endnote 2*) was reviewed by the Section and approved.

AGENDA ITEM 1

Discussion of the future of HAB work within PICES

Suggestions for future work by S-HAB were discussed and the proposed new Terms of Reference can be found in *S-HAB Endnote 3*.

AGENDA ITEM 2

Country reports and HAE-DAT database

Presentations on the use of the Harmful Algal Event Database (HAE-DAT) from each country and country reports were provided, except for Canada.

Canada

No report was available.

China

No report was given at the meeting, however, a written summary is presented here.

In 2010, a total 69 marine red tide events with a total affected area of 10,892 km² was recorded in China's sea areas. There were 39 red tide events with an affected area of 6,374 km² in the East China Sea, 14 events with an affected area of 233 km² in the South China Sea, 9 events and an affected area of 735 km² in the Yellow Sea, and 7 events and an affected area of 3,560 km² in the Bohai Sea. The occurrence of the red tides and the affected areas were obviously less than the mean value of that in the past five years.

May was the month that witnessed the most frequent occurrences of marine red tides. There were 23 red tide events with total affected areas of 5 730 km² in May, 15 events with total affected areas of 4 292 km² in June, 8 events with total affected areas of 311 km² in July, 7 events with total affected areas of 52 km² in September, 6 events with total affected areas of 317 km² in August. During the periods of January to April and October to November, there were not more than two events with relatively small affected areas for each event. The occurrences the red tides and the affected areas in each month mentioned above were generally less than the mean value of the corresponding month in the recent five years.

In 2010, there were altogether 19 species which caused red tides. Among them, *Prorocentrum donghaiense* caused the outbreak of as many as 18 red tide events; *Noctiluca scintillans* 12 red tide events; *Skeletonema costatum* and *Scrippsiella trochoidea* 6 red tide events for each; *Mesodinium rubrum* and *Karenia mikimotoi* 4 red tides events for each; *Heterosigna akashiwo*, *Gonyaulax polygramma* and *Chaetoceros* sp. 2 red tide events for each; *Chattonella marina*, *Akashiwo sanguinea*, *Pseudo-nitzschia pungens*, *Prorocentrum lima*, *Gymnodinium catenatum*, *Gyrodinium spirale*, *Gymnodinium* sp. *Phaeocystis globosa*, *Chaetoceros cyrvisetus*, and *Cryptomonas*, 1 red tide event for each. The red tides caused by toxic dinoflagellates evidently increased compared with the last five years.

S-HAB-2011

The largest area affected by red tides caused by *Prorocentrum donghaiense* was 4 539 km²; next were those affected by *Cryptomonas*, *Skeletonema costatum* and *Noctiluca scintillans*, being 3 350, 855 km² and 254 km² respectively. Red tides caused by *Prorocentrum donghaiense* and *Skeletonema costatum* were mainly recorded in the coastal waters of Zhejiang and Fujian; and red tides caused by *Noctiluca scintillans* were mainly recorded in the coastal waters of Tianjin and Xiamen. Red tides caused by *Cryptomonas* were recorded in the coastal waters between Qingwangdao to Shuizhong, having the largest affected area by a single event in this year.

Japan

Dr. Shigeru Itakura presented Japanese HAB events of the past year (2010) and the recent status of research and development activities on HABs.

Red tides

In Japan, harmful algal blooms (HABs) still remain a severe threat to aquaculture industries in coastal waters. For instance, in the summer of 2009 and 2010, large-scale red tides of *Chattonella marina/antiqua* occurred around Yatsushiro Bay and Ariake Bay (Kyushu Island), and those blooms caused mass mortality of cultured finfish (yellowtail, *etc.*), which resulted in the loss of over \$10 million of aquaculture products at Yatsushiro Bay and Ariake Bay. So, the management of HABs is still one of the important issues for the government and fisheries industry in Japan.

In 2010, red tide occurrences were reported from eastern Japan (82 cases), Seto Inland Sea (86 cases) and Kyushu area (74 cases). Within these red tides, fisheries damage cases were reported from eastern Japan (9 cases), Seto Inland Sea (8 cases) and Kyushu area (9 cases). The biggest fisheries damage (*ca.* \$70 million) was reported from Ariake and Yatsushiro bays (Kyushu area), which was caused by *Chattonella* spp., as noted above.

Toxic phytoplankton blooms

PSP (Paralytic Shellfish Poisoning) and DSP (Diarrhetic Shellfish Poisoning) are the major marine biotoxins caused by toxic phytoplankton in Japan. However, incidents of food intoxication by ciguatera or palytoxin-like poisoning have been increasing around the coastal area of western Japan in recent years. This may be partly due to environmental changes, for the average sea surface temperatures around Japan have risen as much as three times the world average over the past century. So, a research program funded by MAFF was started to develop toxin detection/quantification methods for ciguatera and palytoxin-like poisoning and to investigate the distribution of causative phytoplanktons around Japanese coastal areas.

In 2010, there were 26 cases of PSP events (exceeding the quarantine limit of 4.0 MU/g) and 19 cases of DSP (exceeding the quarantine limit of 0.05 MU/g) events in Japan.

Research and development for HABs

The HABs research and development framework can be divided into three tiers. The first tier is “Monitoring” - Development of a rapid, precise and easy method to identify/enumerate HAB species with ambient environmental factors. Many molecular biological techniques (such as LAMP methods, *etc.*) have been applied to this field recently.

The second tier is “Elucidation of HABs occurrence mechanism/Development of HABs prediction method” - Investigation of ecophysiological characteristics of each HAB species and exploration of the relationship between environmental factors and HAB occurrence. Species-specific and area-specific HAB occurrence mechanisms have been gradually revealed by these investigations.

The last tier is “Mitigation” - Development of countermeasures to reduce the impact of HABs. Due to the recent huge damage to fisheries caused by the red tide *Chattonella* spp., many chemical, physical or biological controls of HABs are under consideration.

Prepared by Shigeru Itakura (National Research Institute of Fisheries and Environment of Inland Sea, FRA).

Korea

Dr. Changkyu Lee reported that a total of 5 HAB events occurred on Korean coasts in 2011. *Akashiwo sanguinea*, *Prorocentrum micans*, *Scrippsiella trochoidea*, *Heterosigma* sp. and *Mesodinium rubrum* were responsible for 2011 HABs. The number of HAB events in 2011 was much lower than in 2009 and 2010 when they showed 37 and 16 events, respectively. There was no ichthyotoxic *C. polykrikoides* bloom in 2011; likewise in 2009 and 2010. The vegetative cells of *C. polykrikoides* appeared in the offshore of the southern coasts from late June to early July; likewise ordinary years. However, low salinity from late July through August by heavy rainfall from typhoon and/or strong approach of low saline water mass from the East China Sea was estimated to be related to the suppression of the growth of the species, particularly, considering that *C. polykrikoides* is a stenohaline species showing low growth rate at lower than 30–31 ppt salinity. Instead, there were blooms in the coastal areas by other dinoflagellates which are more competitive than *C. polykrikoides* in low salinity during this period. Overall, HABs by both fish killing species and non-fish killing species have been decreasing year by year since 2007. However, shellfish toxin producing species such as *Alexandrium* spp., *Dinophysis* spp. and *Pseudo-nitzschia* spp. still frequently appear and/or sometimes intoxicate shellfish although they seldom show high density to form blooms.

The benthic dinoflagellate *Gambierdiscus* spp. is the primary causative agent of ciguatera fish poisoning in tropical and subtropical areas. However, the geographic distribution of benthic dinoflagellates is poorly understood on Korean coasts. Benthic dinoflagellates population densities were investigated on the southern coast including Jeju Island from June to August in 2011. *Gambierdiscus* sp., *Ostreopsis* sp., *Coolia* sp., *Prorocentrum lima* and other unknown benthic dinoflagellates were found. *Gambierdiscus* sp. was detected from 32 out of 75 samples on the Jeju Island coast. *Ostreopsis* sp. was the most dominant benthic dinoflagellate. Vertical distributions were also surveyed from 0 to 15 m depth at 3 m intervals on the Jeju Island coast. Most benthic dinoflagellates were distributed within 6 m depth. This result suggests that *Gambierdiscus* sp. is widely distributed on the Jeju Island coast indicating potential ciguatera fish poisoning in Korean waters. Toxicity, morphological, molecular genetic characterization of these benthic dinoflagellates is currently in progress.

Prepared by: Changkyu Lee, Hyeong-Seop Kim, Taegy Park and Youngtae Park (Southeast Sea Fisheries Research Institute, NFRDI)

Russia

Dr. Tatiana V. Morozova, reported that a total of 21 bloom-forming species were recorded in 2010–2011 in Amurskii Bay. Those species belong to 5 taxonomic groups of phytoplankton: diatoms (72%), dinoflagellates (7%), raphidophytes (7%), cryptophytes (7%) and euglenophytes (7%). Monitoring studies carried out from 2010 to 2011 revealed the presence of biotoxin producers in plankton, benthic and epiphytic assemblages. Potentially toxic species belong to 3 groups of phytoplankton: dinoflagellates, raphidophytes and diatoms. *Dinophysis* species are capable of producing okadaic acid, which accumulates in the tissues of filter-feeding mollusks, causing the syndrome of diarrhetic shellfish poisoning (DSP). Five *Dinophysis* species were observed in 2010–2011 in the study area. The joint density of *Dinophysis* spp. reached a critical level throughout the observation period and was 5 times the critical level in July 2011. Data on toxin concentration of okadaic acid in the samples of mussels from Amurskii Bay were received by Enzyme Linked Immunosorbent Assay (ELISA) method. Maximum concentration of okadaic acid was detected in July and exceeded the reportedly harmful level for DSP.

Studies of epiphytic dinoflagellates on macrophytes growing in a bight of Peter the Great Bay revealed the presence of two potentially toxic species *Ostreopsis ovata* and *O. siamensis*. Those species are known to produce palytoxin-like compounds. The occurrence of *Ostreopsis* spp. was recorded in the middle of August 2010 at minimum concentration. Density of *Ostreopsis* spp. fast increased and reached maximum concentration in the middle of September 2010. The maximum abundance of *Ostreopsis* was observed on macrophytes *Neorodomella larix* – more than 70×10^3 cells per gram of dry weight in 2008 and *Briopsis* sp. – 334×10^3 cells per gram of dry weight. The abundances of *Ostreopsis* spp. increased when surface water

temperature was decreasing and a maximum peak occurred in the middle of September, when the temperature was 20°C. *Ostreopsis* density decreased at the end of October and no cells were recorded in November, when temperature was 7°C. The spatial distribution of *Ostreopsis* spp. in relation to hydrodynamics was studied in Peter the Great Bay in 2010. Three hydrodynamic regimens were defined: shaken, slightly shaken and calm. In sites with low hydrodynamics (calm regimen), *Ostreopsis* was present, as other benthic dinoflagellates were absent. In sites where macroalgae were directly hit by waves (shaken regimen), density of *Ostreopsis* spp. was low. On average, the abundance of *Ostreopsis* spp. was significantly higher in sites with a slightly shaken regimen (500–306 000 cells g⁻¹ DW) than in shaken regimen sites (0–2400 cells g⁻¹ DW). Cells of *Ostreopsis* spp. were not found in the water column. The maximum density of *Ostreopsis* spp. (more than 306*10³ cells g⁻¹ DW) was recorded on the macrophyte *Neorodomella larix*. Toxic events and reports of poisoning are not registered; however, concern centers on both the high diverse representation and abundance of potentially toxic algae in Russian waters.

Diatoms are the most common bloom-forming algae in the study area. The seasonal dynamic and toxicity of the diatom genus *Pseudo-nitzschia* (potential producers of the neurotoxin domoic acid and causative organisms of Amnesic Shellfish Poisoning) were studied in 2010–2011. The role of environmental factors in population dynamics of *Pseudo-nitzschia* species in Amurskii Bay was analyzed. A bloom of *Pseudo-nitzschia* was registered in October–November at a salinity of 31–33.5‰ and water temperature of 6–12°C. The most intensive peak of the *Pseudo-nitzschia* spp. density (the mean value of 1428.9 thousand cells/l) was recorded in the last two weeks of October after heavy rains. The outburst was determined presumably by mass development of *P. multistriata* (67% of the total density) and *P. calliantha* (9%). The methods of correlational and regressive analyses were used to find that water salinity, NH₄ concentrations in the environmental waters and water temperature had an influence on the “bloom” of *Pseudo-nitzschia* spp. A negative correlation was revealed between the density of *Pseudo-nitzschia* spp. and water salinity, NH₄ concentrations in the waters, and a positive correlation was found between the population density of diatom algae and water temperature.

Concentrations of domoic acid in clones of *Pseudo-nitzschia* isolated from Peter the Great Bay as well as in tissues of bivalves (*Mytilus trossulus*, *Crenomytilus grayanus*) from the same location were measured by Enzyme Linked Immunosorbent Assay using “ASP direct cELISA” kit (Biosence laboratories AS, Norway, AOAC official method 2006.02). For DA analysis, unialgal cultures were established for *P. pungens* (three isolates), *P. calliantha* (two isolates), and *P. delicatissima/arenysensis* (three isolates). Cultures of *Pseudo-nitzschia* species were isolated from Peter the Great Bay between December 2007 and December 2010. Samples of bivalve tissues were collected between May 2009 and April 2010 from two stations situated in Amurskii (43°12' N, 131°54' E) and Vostok (42°54' N, 132°46' E) bays. Domoic acid was found in stationary-phase cultures of *P. pungens* and *P. calliantha* isolated from Peter the Great Bay at concentrations varying between 42.9 and 115.4 pg ml⁻¹. No domoic acid has been detected in cultures of *P. delicatissima/arenysensis* from the same locality. Total concentrations of domoic acid in the bodies of the bivalves ranged from 0.01 to 0.5 mg·kg⁻¹ with a maximum in July samples; they were markedly lower than the maximum permissible content (20 mg·kg⁻¹) according to the European Community Regulation 2002/226/EC and to the Sanitary Regulations and Standards 2.3.2.2401-08 approved by the RF State Committee for Health and Epidemiological Inspection. The potential toxicity of *Pseudo-nitzschia* clones from Peter the Great Bay suggests that phytoplankton and shellfish toxicity monitoring is warranted in these waters, where bivalves are commercially harvested for human consumption.

Long-term observations indicated that the occurrence of HABs on the Russian East coast had an increasing trend and significant seasonality. To date we have identified 35 potentially toxic algal species. The appearance of new causative species, especially toxin-producing species, was observed in this period. Toxic algae represent several of the most dominant taxa in both abundance and biomass within the study area (e.g., *Dinophysis*, *Ostreopsis*, *Pseudo-nitzschia*). Other taxa, although low density was noted, still remain a potential threat as toxic producers. Continued studies of phytoplankton and microbenthic communities in Far Eastern Seas of Russia will no doubt reveal other potentially toxic species. For beneficial management practices, it becomes necessary to maintain programs that will identify and monitor potentially dangerous flora.

Prepared by: Tatiana Yu. Orlova, Inna V. Stonik, Marina S. Selina, Tatiana V. Morozova, Olga G. Shevchenko and Nellya G. Litvinova (A.V. Zhirmunsky Institute of Marine Biology of the Russian Academy of Sciences, Vladivostok)

USA

Dr. Vera Trainer related that in SE Alaska, Ketchikan and Metlakatla during May and June 2011, several people were sickened by paralytic shellfish poisoning after their consumption of butter clams, little neck clams, cockles and blue mussels. Four of the 21 people were hospitalized, none died. Toxin concentrations in the meal eaten by 1 person who was in the intensive care unit were ~5000 µg/100g (blue mussels) and concentrations of toxin in urine were 118 µg/100g. The time from consumption of shellfish to the onset of symptoms in this person was <1 minute. Symptoms included ataxia, dysphagia, floating sensation, paresthesia, shortness of breath, and weakness. Toxin analysis by LC/MS and ELISA in baby mussels from Ketchikan showed PSTs up to 28,000 µg/100g shellfish.

In late May 2011, a minor fish kill of yearling coho salmon occurred at the Squaxin Island Tribal net pens in Southern Puget Sound commencing on the 17th, possibly associated with a bloom of *Phaeocystis* sp., a harmful or noxious species not usually associated with fish kills and not previously reported from Puget Sound fish kills in the past. Fish are reared for a short term in these pens before release to enhance fisheries in the South Puget Sound and elsewhere in cooperation with the Washington State Department of Fish and Wildlife.

On June 25, 2011, 3 people became ill with diarrhetic shellfish poisoning (DSP) after eating mussels from Sequim Bay in northern Puget Sound near the Canadian border. Off Vancouver Island, Canada, there were an estimated 60 illnesses from DSP. This illness is caused through ingestion of shellfish that has accumulated toxins from the harmful algal bloom organism, *Dinophysis*, which produces a suite of neurotoxins including dinophysistoxins and okadaic acid. Approximately 2000 lbs of shellfish have been recalled due to this poisoning event. These toxins currently are not regulated in the U.S. *Dinophysis* abundance reached 53,000 cells/L and the primary species was *D. acuminata*. Toxin concentrations in blue mussels from Sequim Bay reached 1600 µg OA equivalents/g shellfish by LC/MS. The primary isomer was DTX-1.

In June–August 2011, *Heterosigma akashiwo* caused some fish kills in central Puget Sound and the Strait of Georgia, Canada. On June 21, 2011, a thick bloom of *H. akashiwo* was observed in Nanaimo, British Columbia (8,000–20,000 cells/mL). On June 25, 2011 the *H. akashiwo* bloom was observed to continue north – salmon mortalities occurred at Quadra Island. Samples from the east side of Quadra Island, Jervis Inlet and Sechart Inlet all showed very high (2000–20,000 cells/mL) concentrations. In Puget Sound, on June 26, 27 and 28, counts in the millions of cells per liter were being found at the surface (1.5 m), peaking at 1.8 million cells/L. on June 26 as red streaks swept through some of the fish pens in with the tide Deepwater Bay. America Gold fish farm personnel report seeing a dark brown streak of water (1.8 million/L) move through two of the 12 cages at the site on the evening of June 26. The next morning divers pulled 850 and 500 dead fish out of those two pens. The other 10 cages of fish at the same site had mortalities in the 50 to 90 fish per cage range. Fortunately the bloom stayed near the surface and cell counts at 10 m stayed an order of magnitude less. Subsequent dives over the next few days had <10 fish mortalities in each of the pens. Counts dropped to the 500,000 to 800,000 cells/L range at the surface and stayed at 180,000 cells/L at 10 m over the next couple of days. Large flood tides brought cleaner, green water into the area from the south up Rosario Strait. Increasing tides and tidal mixing during the week coupled with the cloudy weather may have helped to break up the dense *Heterosigma* bloom. Neap tides the week prior, and several weeks of large flow rates from the Fraser River, created a perfect “several hundred square mile large Petri dish.”

In Oregon, *Pseudo-nitzschia* were present in September 2011 on the north coast in numbers ~ 500,000 cells/L. However, long chains of up to 15 cells and cells in division remain common. Early indications of toxin production were reported by the Oregon Department of Agriculture in the week of July 12 indicating DA levels in mussels to be 7.6 ppm, which is the highest recorded level of DA in mussels since the coast-wide closure in 2005. Along the central coast cell counts of the smaller *P. cf. pseudodelicatissima* cell type increased to as high as 719,000 cells/L with no significant DA.

S-HAB-2011

In California, a HAB was documented in Sonoma County, north of San Francisco coincident with a large die-off of marine invertebrates starting the week of August 24, 2011. It is still uncertain whether the HAB caused the die-off, but this potential connection is being investigated by marine scientists. If a link is found, this would be the first scientifically confirmed report of a HAB associated with marine life mortalities in this region of northern California. Previously, only small-scale die-offs in coves have been observed, and these have been attributed to low dissolved oxygen conditions following the accumulation of macroalgae. Reports of the phytoplankton bloom were confirmed in the nearshore from Bodega Bay north to Anchor Bay and probably extended beyond 50 miles of these confirmed reports. In the week prior to the bloom, ocean conditions were calm and there was an extraordinary display of bioluminescence in the water at night that continued throughout the period of the bloom.

The invertebrates potentially affected by the bloom were reported from many taxa including mollusks, echinoderms and crustaceans. However, fish deaths were not observed. Invertebrates within the University of California Davis, Bodega Marine Laboratory also died during this event starting on August 29 including abalone, sea urchins, and sea stars but again, fish were not affected.

In water samples collected from Bodega Head, Fort Ross and Salt Point during the bloom, the dominant phytoplankters were dinoflagellates belonging to the *Gonyaulax spinifera* species complex. The algae were identified by Adele Paquin (Sonoma State University) and Gregg Langlois (California Department of Public Health), and the identifications were subsequently confirmed by Rita Horner (University of Washington) and Charles O'Kelly (Friday Harbor Laboratory). In the week prior to the bloom, ocean conditions were calm and there was an extraordinary display of bioluminescence in the water at night that continued throughout the period of the *Gonyaulax spinifera* bloom. The invertebrate taxa affected during the bloom included mollusks, echinoderms and crustaceans. Fish deaths, however, were not observed. Invertebrates within the Bodega Marine Laboratory also died during this event starting on August 29, including abalone, sea urchins, mussels and sea stars. As elsewhere, though, fish were not affected.

Mussels, which were among the animals that died during the bloom, feed on phytoplankton and bioconcentrate toxins produced by phytoplankton. Mussel samples collected during the bloom were tested for both Paralytic Shellfish Poisoning (PSP) and Amnesic Shellfish Poisoning (ASP) toxins. Both of these toxins were below minimum detection limits (Gregg Langlois, California Department of Public Health). Tests at the University of California, Santa Cruz (Raphael Kudela) and the Fish and Game Laboratory at OSPR (David Crane) detected trace levels of yessotoxins (YTX) in mussels. Members of the *Gonyaulax spinifera* species complex are known to produce YTX. To our knowledge, this is only the second time YTX has been detected in California waters. Further toxicity tests are now being conducted on tissues of abalone, sea stars, snails and kelp that were dying during the bloom.

Following anecdotal mortality reports, quantitative subtidal field surveys in the kelp beds in Sonoma County were conducted. At Fort Ross, 30% of red abalone *Haliotis rufescens* were dead. Other sites had 12–25% abalone mortality (Rogers-Bennett CDFG, BML). Red sea urchins, *Strongylocentrotus franciscanus*, that are fished commercially in the area, suffered 40–45% mortality. The patterns of mortality were not restricted to coves with the potential for low dissolved oxygen but were also encountered at exposed headland sites. Some species appeared to be unaffected by the toxin such as the Bat Star, *Asterina miniata*, which was observed actively feeding on dead abalone and sea urchins. Both abalone and sea urchins are herbivores, feeding primarily on drift kelp. The vector responsible for a potential trophic transfer from phytoplankton to herbivore is as yet unknown, and non-trophic vectors (e.g., water born toxins) may also be involved.

The Southern California Bight experienced significant marine mammal and bird strandings and deaths during Spring (primarily March–May) 2011, particularly in the Newport Beach to Huntington Beach region. Stranded animals testing positive for domoic acid were brought into a number of centers and organizations including: Pacific Marine Mammal Center (Laguna Beach), Marine Mammal Care Center at Fort MacArthur (San Pedro), California Wildlife Center (Malibu), International Bird Rescue (San Pedro), Los Angeles County Natural

History Museum (Los Angeles). Samples collected from animals, and testing positive for domoic acid, included approximately 60 sea lions, 10 dolphins, 20 birds (several species).

Monitoring for domoic acid during much of this period indicated low but consistently measurable concentrations. Sampling offshore was limited, but water samples collected at a few stations in the central San Pedro channel in early March detected extremely high values of domoic acid in the plankton (>50 µg/l).

Contributions by: Laura Rogers-Bennett (CDFG, UC Bodega Marine Lab); Gregg Langlois (Cal. Dept. Public Health); Raphael Kudela (UC Santa Cruz); Karina Nielsen (Sonoma State Univ.); Adele Paquin (Sonoma State Univ.); James Moore (CDFG UC BML), Dave Caron (USC), Nicky Haigh (HAMP), Jack Rensel (Rensel Assoc.), Kevin Bright (America Gold Seafood), Zachary Forster and Matt Hunter (Oregon Dept. Fish and Wildlife)

AGENDA ITEM 3

Planning for PICES-2012

It was recommended that the following be proposed to Science Board:

1. ½-day Topic Session on “*Range extension, toxicity and phylogeny of epiphytic dinoflagellates*” (S-HAB Endnote 4).
2. 1½-day Workshop on “*The contrasting cases of HABs in the eastern and western Pacific in 2007 and 2011*” (S-HAB Endnote 5).
3. 1-day S-HAB meeting, including country reports for HAB events in 2006–2007 and discussion of HAE-DAT use. Countries are requested to input HAB event data to HAE-DAT for 2000–2007 directly to the online database.

AGENDA ITEM 4

Items with financial implications and recommendations

1. Request full funding for 2 invited speakers to attend a ½-day Topic Session on “*Range extension, toxicity and phylogeny of epiphytic dinoflagellates*” at PICES-2012;
2. Request full support for 1 local (Japanese) student rapporteur to attend a 2-day Workshop on “*The contrasting cases of HABs in the eastern and western Pacific in 2007 and 2011*”;
3. Request funding for a 4 PICES members to attend a joint ICES/PICES/GEOHAB/NSF/NOAA sponsored workshop on Climate Change and HABs in Spring 2012 or 2013;
4. Request full travel support for 1 person for a joint ICES/PICES/GEOHAB/NSF/NOAA workshop planning meeting in late 2011 or early 2012;
5. New S-HAB member requests: Korea – Myeong Soo Han (Hanyang University), Tae Gyu Park (NFRDI); China – Chunjiang Guan (cjguan@nmemc.gov.cn), and HAE-DAT contributor Douding Lu (SOA). HAE-DAT focal point for China is changed to Hao Guo;
6. Request IOC representative to attend next PICES meeting to discuss HAE-DAT, country maps and decadal reports (Henrik Enevoldsen, Monica Lion);
7. Travel support for 1 Canadian S-HAB member and 1 Russian S-HAB member to attend PICES-2012;
8. PICES China delegate to contact the International Cooperation Department to request HAB data (from Liqi Chen) for HAE-DAT entry.

AGENDA ITEM 5

S-HAB Topic Session and Workshop at PICES-2011

A summary of the MEQ Topic Session (S5) on “*Harmful algal blooms in a changing world*” and the MEQ Workshop (W2) on “*Remote sensing techniques for HAB detection and monitoring*” can be found in the “Session Summaries” section of PICES Annual Report for 2011.

S-HAB-2011

AGENDA ITEM 3

Report on the Satellite Remote Sensing workshop in Vladivostok

Dr. Rafael Kudela, representing PICES at the NOWPAP/PICES/WESTPAC sponsored workshop on “*Remote sensing data analysis*” (October 8–12, 2011) in Vladivostok, Russia, provided a summary to S-HAB.

AGENDA ITEM 4

The joint Harmful Algal Bloom Programme and International Oceanographic Data and Information Exchange Harmful Algae Information System: An update and country maps

Drs. Henrik Enevoldsen and Monica Lion, representing the IOC-IEO Science and Communication Centre on Harmful Algae, were unable to attend the meeting but sent a slide presentation which S-HAB members reviewed. The focal points for each country were listed and changes were made from Dr. Yasunori Watanabe to Dr. Shigeru Itakura (Japan) and from Jinhui Wang to Dr. Hao Guo (China). Only one user name and password is assigned for each country, however, focal points can ask for help with data submission. How to submit data to the online HAEDAT submission form was reviewed. All countries except China submitted their data to the HAEDAT database. No maps were available to review, as an IOC representative was not at the meeting. However, example maps from European countries were shown.

AGENDA ITEM 5

Report on ICES Meeting and areas of ICES/PICES collaboration

Dr. Wells represented PICES at the meeting of ICES-IOC Working Group on Harmful Algal Bloom Dynamics (April 24–27, 2012, Oban, UK). See *S-HAB Endnote 6* for the report.

AGENDA ITEM 6

ICES/PICES joint workshop on “Range Extension of HAB Species”

A proposal for a joint PICES/ICES workshop was discussed during the ICES/IOC WGHABD meeting in Oban, UK (April 24–27, 2012)

AGENDA ITEM 7

PICES Seafood Safety Project

Travel to the Philippines in early 2011 allowed a visit to labs in the provinces (Tacloban and Sorsogon), sites where screening tests for toxins are being implemented. The effectiveness of these tests in unique species of shellfish were assessed. A planning trip to Indonesia occurred in September 2011. This trip allowed S-HAB members to critically assess the level of capacity at present and the immediate training needs. It also allowed us to assess the higher level government support for sustaining the capacity over the coming years. The training class in Indonesia, planned for February 2012 was discussed.

AGENDA ITEM 8

Position statement on Rensel *et al.* paper

This item was not discussed.

AGENDA ITEM 9

S-HAB-S new Terms of Reference

New terms of reference were discussed briefly, but it was decided that the final revision would be done by e-mail with Dr. Trainer providing the first draft.

AGENDA ITEM 10

New findings, significant publications from each country

This item was not discussed due to lack of time.

AGENDA ITEM 11

Discussion of Proposals for the future and review of assignments

A ½-day MEQ Topic Session on “*Range extension, toxicity and phylogeny of epiphytic dinoflagellates*” and a 1½-day MEQ/FUTURE workshop on “*The contrasting cases of HABs in the eastern and western Pacific in 2007 and 2011*” were proposed for PICES-2012 in Hiroshima, Japan. Section members agreed to provide written country reports and entries into HAEDAT for the coming meeting.

S-HAB Endnote 1**S-HAB participant list**Members

Hao Guo (China)
 Ichiro Imai (Japan)
 Akira Ishikawa (Japan)
 Shigeru Itakura (Japan)
 Changkyu Lee (Korea)
 Tatiana Morozova (Russia)
 Satoshi Nagai (Japan)
 Vera Trainer (USA)
 Mark Wells (USA)
 Takafumi Yoshida (*ex-officio* member
 representing NOWPAP)

Observers

Stewart Johnson (Canada)
 Chunjiang Guan (China)
 Kunio Kohata (Japan)
 Raphael Kudela (USA)
 Sangjin Lee (Korea)
 Chen Siging (China)
 Xiaomeng Wang (China)
 Yasunori Watanabe (Japan)

S-HAB Endnote 2**S-HAB meeting agenda**

1. Welcome, goals of HAB Section meeting (Vera Trainer and Changkyu Lee)
2. Country Reports (2010-11) and HAE-DAT (year 2006) reports
 - USA (Vera L. Trainer)
 - Korea (Changkyu Lee)
 - Japan (Shigeru Itakura)
 - China (Mingyuan Zhu)
 - Canada (Robin Brown)
 - Russia (Tatiana Morozova)
3. Report on Vladivostok Satellite Remote Sensing workshop (Raphael Kudela)
4. The joint Harmful Algal Bloom Programme and International Oceanographic Data and Information

S-HAB-2011

- Exchange Harmful Algae Information System: An update and country maps (Vera Trainer)
5. Report on ICES Meeting and areas of ICES/PICES collaboration (Mark Wells)
 6. Discussion of ICES/PICES joint workshop on “Range Extension of HAB Species”
 7. PICES Seafood Safety Project (Mark Wells)
 8. Position statement on Rensel *et al.* paper
 9. Discussion of S-HAB new Terms of Reference
 10. Quick exchange of new findings, significant publications from each country
 11. Discussion of Proposals for the Future and Review of assignments

S-HAB Endnote 3

Revised Terms of Reference for the Section on the *Ecology of Harmful Algal Blooms in the North Pacific*

1. Continue PICES member country data entry into the joint ICES-PICES harmful algal event database to allow global comparison of changes in harmful algal bloom occurrences.
2. Convene workshops and sessions including joint sessions with other international organizations (e.g. ICES) to evaluate and compare results and maintain an awareness of state-of-the-art advances outside the PICES community.
 - Convene a joint PICES/ ICES workshop to assess the purported links between climate change and HAB character, frequency and severity. Participants will publish a comprehensive review paper that identifies the near and long term research priorities, and the monitoring structures needed to effectively hindcast and forecast future HAB events, responsive to FUTURE goals.
3. Produce position papers that are posted on the PICES website that document the unanimous HAB Section opinion on timely subject related to HABs including topics related to FUTURE such as how human activities (increased cultural eutrophication and climate changes including temperature, changes in stratification and ocean acidification) might affect harmful algal bloom incidence and magnitude.

S-HAB Endnote 4

Proposal for a ½-day MEQ Topic Session on “Range extension, toxicity and phylogeny of epiphytic dinoflagellates” at PICES-2012

Co-conveners: Willam Cochlan (USA), Satoshi Nagai (Japan)

Ciguatera fish poisoning is a growing food-borne illness that is common in tropical waters, where poisoning numbers are poorly known but estimated to range from 50,000 to 500,000 cases per year. The incidence of ciguatera is on the rise, and appears to correspond to disturbances in the environment such as nutrients released into coastal waters, land-use changes, or warmer coastal waters. Indeed, the flagellates, *Gambierdiscus* and *Ostreopsis*, that can produce ciguatoxin or palytoxin-like compounds, appear to be spreading to more temperature latitudes, including the waters of PICES member countries. To gain better insight to this new issue, we invite papers addressing benthic dinoflagellate taxonomy, evidence for range extension, descriptions of standardized sampling programs; assays for assessing toxicity, and sentinel products to alert public health officials to ciguatera risk. The goal of the session is to formulate a better understanding of environmental conditions fostering the prevalence of ciguatoxin-producing organisms in new geographical regions.

Proposed invited speakers: Chinain (French Polynesia), Bob Bidigare, Takuro Omura (Japan)

S-HAB Endnote 5

**Proposal for a 1½-day MEQ/FUTURE Workshop on
“The contrasting cases of HABs in the eastern and western Pacific in 2007 and 2011”
at PICES-2012**

Co-conveners: Changkyu Lee (Korea) and Mark Wells (U.S.A.)

Harmful algal blooms reached historic levels along coastlines of the eastern Pacific in 2011 but similar blooms were minimal to non-existent in Japan, Korea, and Russia. The situation was largely reversed in 2007, and this disparity between these years offers a unique opportunity to compare and contrast the basic environmental parameters and HAB dynamics during these regimes. Combining these observations with a broader overview of the basin-scale physical dynamics during this time frame would provide new insights to the factors enhancing these blooms. The workshop foundation will be the pre-submission of available data from member countries, including but not limited to: HAB species presence and abundance, time of year, temperature range, salinity range, water clarity, wind, river flow (flooding), and upwelling indices. Workshop participants will review and discuss the trends and patterns in these data over the first day, and integrate them with information on the basin-scale physical dynamics. Participants will develop a detailed outline for manuscript preparation during the second day, with agreed writing assignments and draft submission deadlines. The manuscript will be targeted for the appropriate international journal decided upon by participants.

Proposed invited speakers: PICES experts in basin-scale physical dynamics such as William Peterson, Tsuyoshi Onizuka, Rho Youngjae to provide overview of basin-scale physical dynamics in the 2 contrasting years.

S-HAB Endnote 6

**PICES Report on
ICES - IOC Working Group on Harmful Algal Bloom Dynamics (WGHABD) 2012
Oban, United Kingdom, April 24-27, 2012**

PICES participation in the ICES WGHABD meeting focused primarily on two resolutions passed at the Intergovernmental Panel on Harmful Algal Blooms (IPHAB) meeting in April, 2011. These resolutions, and actions taken or discussed during the 2012 WGHABD meeting are:

Resolution IPHAB-X.6 - HARMFUL ALGAE AND GLOBAL CHANGE

- 1) Identify central unresolved issues that limit advances in understanding how projected climate change may influence HAB events by convening an ICES/IOC/PICES workshop of HAB experts. (The second of two resolutions.)

The original plan to address the HAB/Climate change issue was to organize and hold a 5 day workshop with ~30-35 invited participants whose expertise spans both the ecological and geographical issues surrounding the HAB problem. The workshop would be co-organized by Mark Wells (PICES) and Bengt Karlson (ICES). The central outcome would be a seminal publication in a high profile journal that identifies the keystone parameters and research infrastructure needed to test the purported HAB-Climate Change linkage. This publication would be accompanied shortly thereafter by a special publication of participant authored papers in the international journal Harmful Algae. A second aspect of the workshop would be to develop recommendations for LTER-type sites well suited for HAB evaluation (augmenting existing or planned infrastructures).

The funding required to support this workshop plan is ~ 130K USD. NSF, NOAA and GEOHAB are unable to provide this level of funding at this time. There is a small possibility that funding sources in Sweden may be able to support this scale of workshop, but it remains unclear at this time. An alternate, scaled down workshop

S-HAB-2011

was discussed, comprising a small group (≤ 10) of key individuals with different expertise that bears strongly on climate change/HAB linkages or investigating them. The goal of this more modest workshop, to be held in 2013, remains the same; to outline and write a condensed review (position) paper on the central issues. This 3-4 day mini-workshop also would provide the organizational structure and steering committee for a broader, open workshop on HABs and Climate Change (Stage II) to be held in 2014. The cost of the mini-workshop is estimated to be ~25K USD, and preliminary discussion with NSF indicates that there may be sufficient funding available to support this mini-workshop with assistance from PICES. Effort now is on-going to finalize the funding sources.

After consultation with Bengt Karlson (co-organizer) and the WGHABD participants, the following draft list of key topic areas for discussion were decided upon:

1. Increased temperature (physiological, chemical)
2. Ocean acidification (cell growth, toxin production, trace metal speciation)
3. Stratification (nutrient and light dynamics)
4. Winds (nutrient re-supply to surface waters via mixing, upwelling)
5. Increasing/decreasing precipitation (changes in runoff, CDOM, light fields, salinity, nutrients)
6. Eutrophication (in combination with 5 plus increasing land use at higher latitudes)
7. Trophic effects from changes in essential fatty acids (in combination with 1, 2, and 5)
8. Broader ecosystem changes (annual windows for bloom development, timing of blooms relative to key trophic/human interactions)

A list of potential mini-workshop participants was drafted and is under consideration. The WGHABD strongly endorsed the above plan.

Resolution IPHAB-X.7 - FISH KILLING MARINE ALGAE

IPHAB Decides, with reference to the HAB Programme Plan, objective 6.3.1, ii, to establish a Task Team on Harmful Algae and Fish Kills with the following terms of reference:

- i) develop a Term of Reference on fish killing algae for 2012 for the ICES-IOC Working Group on Harmful Algal Bloom Dynamics before 1 August 2011;
- ii) prepare an overview of scale of issue and priorities and report to IPHAB-XI with view to develop a community scale project
- iii) support the organization of a joint ICES/IOC/PICES meeting to better define global understanding of the broad issues listed in item i);

Decides also that the Task Team will be composed by A. Cembella (Germany) (Co-chair), R. Gowen (United Kingdom) (Co-chair), P. Hess (France), and M. Wells (PICES). The Task Team may be expanded as required to fulfil the Terms of Reference.

The Terms of Reference for the Fish Killing Algae were reviewed. The ICES WGHABD will prepare a draft report in time for the PICES Annual meeting in fall, 2012, so that PICES HAB section may add their findings and perspective. The joint ICES/PICES final report on Fish Killing Marine Algae will be available after the ICES WGHABD meeting in spring, 2013, where it will be presented at the next IPHAB meeting.

The general discussion points during the WGHABD meeting were:

1. Fish killing algae occurred in Danish waters during 2011. In an unusual case, *Pseudochatonella* blooms happened in winter, with the cell isolates having an optimal growth between 1–6°C, with growth cessation above 6-10°C. This observation is extraordinary, and indicates that the traditional view that fish killing blooms are restricted to seasonal warm periods is wrong.
2. The Danish government is working to increase aquaculture fish production by 100,000 tons per year over the next few years. This is a major increase, with potential negative impacts on coastal waters. This drive to substantially increase marine fish aquaculture parallels ongoing efforts in Indonesia.

3. The first occurrence of *Pseudofisteria Shumwayae* in European waters was observed in Dec., 2011, where it was involved in a penned aquaculture fish kill. This event attracted considerable discussion in terms of whether it resulted from a new species introduction, or a selective bloom of a rare endemic origin.
4. Wells presented a PICES perspective on blooms of the fish killing phytoplankton *Heterosigma akashiwo*. This species has been observed in coastal waters across the U.S. but Puget Sound is the only region where this organism is harmful and economically devastating to fish aquaculture operations. *H. akashiwo* is a major killer of fin-fish including cultivated Atlantic (*Salmo salar*) and Pacific (*Oncorhynchus* spp.) salmon (Taylor and Haigh, 1993) and there are reports of wild salmon and marine fish mortality in Washington coastal waters (Horner *et al.*, 1997; Hershberger *et al.* 1997). “Farmed” fish are particularly vulnerable because they cannot escape when winds or currents move the blooms into penned areas. Large blooms have covered the entire central and north basins of Puget Sound, North Hood Canal, portions of the Juan de Fuca Strait and much of Strait of Georgia (Taylor and Haigh 1993). *H. akashiwo* has caused the death of net pen salmonids in Puget Sound since at least 1976 (Rensel *et al.*, 1989; Rensel, 2007) with major losses occurring in 1989, 1990, 1997, 2006, 2007, and 2009. *H. akashiwo* blooms also have occurred during intervening time periods, some small in spatial extent, but these are poorly documented. These HABs are considered a serious risk to site development for new, net-pen facilities, particularly given that as few as 500 cells/L can cause fish deaths when cells are expressing toxicity (Horner, 1998). The salmon aquaculture industry in Washington State suffers economic losses of ~ \$2 to 6 million per episode due to *H. akashiwo* blooms. Losses to free-ranging (wild) fish are known to occur but are poorly quantified because these fish sink upon death in the cool, temperate waters of the Sound. Recent findings suggest that Fraser River sockeye salmon returns, historically the most valuable west coast Canadian and United States salmon fishery, can be detrimentally affected by blooms of *H. akashiwo* (Rensel *et al.*, 2010).

The 2013 ICES-IOC WGHABD meeting will be hosted by Beatriz Reguera in Vigo, Spain, planned for April 9-12, 2013. PICES travel support will be requested for a HAB Section member to participate in this meeting and IPHAB for follow up on the HAB workshop report, the Fish-Killing Algae report and for planning of the open science meeting on HABs and Climate Change.

ICES-IOC Working Group on Harmful Algal Bloom Dynamics

Scottish Marine Institute Oban, United Kingdom 2012



Left to right: Mark Wells, Jean-Pierre Lacaze, Joe Silke, Keith Davidson, Don Anderson, Jennifer Martin, Eileen Bresnan, Samia K. Mikhail, Ainhoa Blanco, Richard Gowen, Steve Milligan, Beatriz Reguera, Neils Daugbjerg, Hak-Gyoon Kim, Bengt Karlson, Ken Jones and Seong-An Choi. Missing from the photograph: Hanna Mazur-Marzec, Ailsa Hall, Peter Petrov and Layla al-Musawi.

Report of the Section on *Carbon and Climate*

The meeting of the Section on *Carbon and Climate* (S-CC) was held from 09:00-18:00 on October 15, 2011 in Khabarovsk, Russia. Drs. James Christian (Canada) and Toshiro Saino (Japan) acted as meeting chairs. Eight members were present, representing all PICES member countries (*S-CC Endnote 1*). Some minor amendments were made to the meeting agenda (*S-CC Endnote 2*) which was then adopted unanimously.

AGENDA ITEM 2

Membership

Since the PICES 2010 Annual Meeting, two additional members were appointed to S-CC, Dr. Dong-Jin Kang of KORDI, representing Korea, and Dr. Burke Hales (OSU), representing the United States. Drs. Kyung-Ryul Kim (Korea) and Steve Emerson (USA) have stepped down. An additional *ex-officio* member has been proposed, representing SOLAS (Dr. Yukihiro Nojiri), but has not yet been appointed. Drs. Kang and Hales attended the meeting and introduced themselves to the membership (Dr. Hales could not attend in person but was present via VOIP connection).

AGENDA ITEM 3

S-CC achievements in the past 12 months

Five year report to parent committees

Following the S-CC meeting at PICES-2010, a report was made to the parent committees (BIO and POC) on achievements during the first 5 years and plans for the next 5. This report was well received by the parent committees and was published in the 2010 Annual Report. A brief review of this report was given for the membership, and further discussion of future plans and goals was undertaken in the afternoon.

PACIFICA Carbon Data Synthesis

A brief review of the status of PACIFICA was given. The data analysis and adjustment phase is winding down with the key data products expected to be opened in a beta version by the end of 2011. Some key participants, such as Drs. Masao Ishii and Tsuneo Ono, were not present so some key decisions had to be deferred and will be proposed to the full membership via email. The adjustment table is online and all PACIFICA participants can propose alterations to the adjustment values in this table. All participants will be encouraged to propose any remaining changes by a date yet to be fixed but not later than February 2012.

Publication of Korean and Chinese versions of the Guide to Best Practices for Ocean CO₂ Measurements

The Best Practices Guide (see the 2007 Annual Report) has now been published in both Korean and Chinese languages. The Korean version is available online at CDIAC. The Chinese version is not but we will endeavour to have it there soon. Both are available in hardcopy. The Korean translation was carried out by Drs. Tongsup Lee, Dong-Jin Kang, Junghee Shim and Jae-Yeon Kim and is published by KORDI. Five hundred hardcopies were printed. The Chinese translation was carried out by Drs. Liqi Chen and Zhongyong Gao and is published by the Ocean Press of China (oceanpress.com.cn). The Korean version includes corrections specified in the Errata to the English original to YYYY-MM-DD. This date needs to be published on CDIAC.

AGENDA ITEM 4

Reports of collaborating organizations and agencies

Reports were given on several international programs relevant to the mandate of S-CC including GLODAP (Kozyr), SOCAT (Kozyr), SOLAS (Dai), IOCCP (Kozyr), and CLIVAR/GO-SHIP (Murata). Dr. Tischenko (Russia) gave a brief report on recent S-CC related activities at the V.I. Il'ichev Pacific Oceanological Institute (POI), the main Russian oceanographic institute on the Pacific Coast.

GLODAP is planning a GLODAP v.2 dataset which will include PACIFICA, CARINA and other new datasets published since the release of original GLODAP database.

The SOCAT database has just been opened to the public as Version 1.5. Versions 1.0–1.4 were open only to SOCAT investigators. There are cruise data and gridded data viewers, both LAS based. Dr. Reiner Schlitzer (AWI, Germany) has created an ODV version. Dr. Hales commented that it is important to make sure links to the original data are maintained, and to avoid artificial redundancy (*e.g.*, if someone posts $f\text{CO}_2$ data that are calculated from $p\text{CO}_2$ data already in the dataset). Dr. Alex Kozyr gave some examples of how Digital Object Identifiers (doi) are used to uniquely identify datasets and to give data originators a traceable reference they can list on their own CVs and activity reports, which provides an additional incentive to share data. Dr. Christian commented that in PACIFICA all data are identified by EXPCODE, which is a unique identifier to an individual cruise.

SOLAS has national programs in 26 countries and SSC members from 12. It has just published its Mid-Term Development Strategy and elected new chairs: Eric Saltzmann (USA) and Veronique Garcon (France). It will host an Open Science Conference May 7–10, 2012 in the U.S. and a Summer School in Xiamen, China (tentatively August 22–September 4, 2013). This will be the first SOLAS Summer School held in a PICES country. SOLAS and IMBER also have a new joint Working Group on Ocean Acidification (launched September 2009).

IOCCP met in Paris in September. Discussion was mostly on SOCAT, future data submission, and the next release of the SOCAT dataset. Dr. Kozyr made presentations on the new data that are available at CDIAC, PACIFICA and GLODAP v.2 at this meeting.

CLIVAR ends in 2012, and GO-SHIP becomes the main international program for ship-based hydrographic observations. A map on the CDIAC web site (<http://cdiac.ornl.gov/oceans/RepeatSections/>) shows all past CLIVAR cruises as well as forthcoming GO-SHIP cruises. The Japan Repeat Hydrography implementation group met at JMA on February 17, 2011. This group includes many PACIFICA investigators and S-CC members (*e.g.*, Drs. Akihiko Murata, Masao Ishii, Takeshi Kawano, Michio Aoyama). A planned cruise will begin in the Indian Ocean and sail to the Pacific occupying the P10 line. There are also plans to reoccupy P1, and occupy a new P10N line, in 2014. Dr. Christian commented that previous occupations of P1 have passed near Line P but not close enough to have crossovers with most Line P cruises with the PACIFICA crossover radius of 250 km, and it will help future data synthesis efforts if longline cruises passing near to time series locations make an effort to occupy the key time series stations. Japan GEOTRACES and SOLAS/IMBER cruises are also planned which will provide useful data, and occupy lines that may be included in future data products like GLODAP v.2.

Dr. Tischenko described some key POI projects during 2007–2011, including monitoring climate change in the Japan/East Sea, Peter the Great Bay and the Primorye shelf area (9 cruises total). These cruises measured oxygen, nutrients, pH, alkalinity, and humic substances. The methods used for pH and alkalinity differ from the current international standard methods, but analysis of certified reference materials for alkalinity show differences from the standard values usually $< 1 \mu\text{mol/kg}$ (the PACIFICA threshold for adjustment is $6 \mu\text{mol/kg}$). These cruises also measured underway temperature, salinity, and $p\text{CO}_2$. Joint cruises have been held with Korean scientists under East-U. In August 2007 severe hypoxia was observed in Amursky Bay (down to $4 \mu\text{mol/kg}$). Russian scientists also participated in a Japanese GEOTRACES cruise in the Japan/East Sea.

AGENDA ITEM 5

Report on Paris workshop: Surface/Interior Carbon Synthesis

A joint SOLAS/IMBER/IOCCP Surface/Interior Carbon Synthesis meeting was held from September 14–16, 2011 in Paris, France. S-CC members Ishii, Murata, Suzuki (Japan), Feely, Sabine, and Kozyr (USA) attended. Drs. Feely and Ishii chaired the Pacific Basin breakout group. Topics of discussion included verifying the reality of surface $p\text{CO}_2$ trends. The PACIFICA data product will play a key role in answering this question. Future observing needs were also discussed, and it was suggested that full seasonal coverage and improved South Pacific coverage are needed, along with additional parameters such as O_2/Ar and $^{16}/^{17}/^{18}\text{O}$ to constrain NCP and NPP. It was also suggested that sampling requirements for new sensors (*e.g.*, onboard Argo floats) can be identified using models.

AGENDA ITEM 6

Completion of PACIFICA

The finalization of the PACIFICA data product was discussed at length and it is planned to open a beta version within the next 3 months. Because several key participants were not present, an exact target date was not decided upon, but will be at the very latest February 2012. Dr. Christian gave a brief presentation on the revised Line P data set and methods for integrating time series data, which were not considered in the CARINA protocols from which the PACIFICA protocols were adapted. A scientific publication describing these methods is in preparation, and the highlights were presented. It was suggested that A-line data be excluded from PACIFICA due to lack of data below 1500 m which PACIFICA protocols specify as the minimum depth for crossover analysis; a final decision will be made in consultation with A-line PI Dr. Ono.

AGENDA ITEM 7

Intercomparison experiments

A new carbon parameters intercomparison experiment is currently being planned by S-CC member Dr. Andrew Dickson (USA), and all members were encouraged to participate.

Dr. Murata gave a brief presentation on a planned nutrient intercomparison experiment to be carried out in early 2012. The core parameters will be nitrate, nitrite, phosphate and silicate concentrations, with ammonium and dissolved organic carbon, nitrogen and phosphorus as optional parameters. The method of preservation is to be heat-sterilization followed by sealing in polypropylene bottles, which has been quite successful in the past. The participant list will be finalized in December 2011, samples will be sent out mid January 2012 and results will be reported by end of April 2012. A preliminary report will be released June 2012. This experiment will be followed up with onboard intercomparison experiments planned for 2013 and/or 2015 on the Australian and Japanese research vessels *Investigator* and *Mirai*, respectively.

AGENDA ITEM 8

Topic sessions for PICES-2012

A topic session was proposed by S-CC to the BIO and POC Committees for PICES-2012 in Hiroshima, Japan, on the topic of “*Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas*” (S-CC Endnote 3). An additional session has been proposed by TCODE for POC and BIO co-sponsorship, on the topic of “*Trends in hypoxia and ecosystem impacts in the North Pacific*”. S-CC members support the endorsement of this proposal by the parent committees, but it was suggested that the title could be revised to replace the term “hypoxia” with “declining oxygen concentrations”. It was suggested that the S-CC proposed topic session could be revised to include O₂ as well as CO₂ and so broadened to merge the proposed TCODE session into that session, if the one is approved and the other declined. Subsequent to the Annual Meeting it was agreed that the proposed topic sessions would be merged. The revised topic session description is included as S-CC Endnote 4.

AGENDA ITEM 9

Participation in international conferences

Several major international symposia are planned for 2012: Second International Symposium on “*Effects of climate change on the world's oceans*” in Yeosu, Korea (May 15–19, 2012) and the Third International Symposium on “*The ocean in a high CO₂ world*” in Monterey, California (September 24–27, 2012). The first is PICES co-sponsored and S-CC members are well represented. Previously S-CC had planned to organize a topic session, but the conference organizing structure precluded this. Nonetheless, S-CC members are organizing the carbon biogeochemistry session (“*Changes in the marine carbon cycle*”, S10). The second symposium has less S-CC representation. However, S-CC member, Dr. Richard Feely (USA), is on the SSC. Members were encouraged to submit abstracts to both symposia.

AGENDA ITEM 10

Four-year plan and integration with FUTURE

Plans for the next 4 years and integration of S-CC into FUTURE were discussed at length. Science Board Chair, Dr. Sinjae Yoo, gave a brief presentation on the structure, goals and objectives of FUTURE, and its new and planned experts groups. It was decided that the principal role of S-CC is to provide data and expertise to the various expert groups whose primary goals include understanding the impacts of biogeochemical phenomena like ocean acidification and deoxygenation, but lack specific expertise in biogeochemistry. Specific strategies for offering these groups Status reports, Outlooks and Forecasts were discussed. This is also discussed at length in the 5-year report included in the 2010 PICES Annual Report (see http://www.pices.int/publications/annual_reports/Ann_Rpt_10/2010%20CC-S.pdf). It was also recommended that PICES co-sponsor training initiatives like the 2013 SOLAS Summer School in Xiamen and the 2012 *p*CO₂ intercomparison experiment, and provide some funding for early career scientists from PICES member countries to attend.

It was also discussed that within the next 2–3 years plans should be initiated for some sort of “final product” to be created that would summarize the work of S-CC at the completion of 10 years of its existence.

S-CC Endnote 1

S-CC participation list

Members

James Christian (Canada, Co-Chairman)
Minhan Dai (China)
Burke Hales (USA)
Dong-Jin Kang (Korea)
Alex Kozyr (USA)
Akihiko Murata (Japan)
Toshiro Saino (Japan, Co-Chairman)
Toru Suzuki (Japan)
Pavel Tischenko (Russia)

Observers

Taekeun Rho (Korea)
Mitsuo Uematsu (Japan)
Sinjae Yoo (Science Board Chairman)

S-CC Endnote 2

S-CC meeting agenda

1. Opening (Christian, Saino)
Review and adopt agenda
2. Membership
3. S-CC achievements in the past 12 months
5-year report to parent committees (Christian, Saino)
PACIFICA Data Synthesis (Christian, Suzuki)
Publication of Korean version of Best Practices Guide (Kang)
4. Information exchange
SOCAT (Kozyr)
SOLAS-IMBER (Dai)
IOCCP/GCP/GLODAP2 (Kozyr)
CLIVAR/GO-SHIP (Murata, Kozyr)
POI activities (Tischenko)
5. Report on Paris workshop: Surface/Interior Carbon Synthesis (Murata)
Future goals and objectives
6. Completion of PACIFICA
7. Intercomparison experiments: nutrients, carbon
8. Topic sessions for PICES-2012
9. Participation in international conferences in Yeosu and Monterey
10. Four-year road map and integration with FUTURE

S-CC Endnote 3**Originally proposed topic session for PICES-2012**

Title: *Anthropogenic CO₂ trends and their impacts on marine ecosystems in the North Pacific and its marginal seas*

Duration: 1 day

Sponsoring Committees: POC, BIO

Anthropogenic CO₂ has been accumulating in the upper ocean for the past two centuries, and is beginning impact ecosystems in ways that will likely become more profound and ubiquitous in the coming decades. The North Pacific is a key area of concern because of naturally shallow carbonate saturation horizons and relatively low buffering capacity. Anthropogenic CO₂ alters the oceanic carbonate system, the main chemical equilibrium that gives seawater its buffering capacity. The added carbon drives down the pH and reduces the saturation state of carbonate minerals like calcite and aragonite in a process known as “ocean acidification”. Anthropogenic changes are not only seen in the open ocean, but can be even more significant in coastal regions and marginal seas. Anthropogenic CO₂ affects calcifying organisms, but its biological impacts are not limited to these organisms and are felt across ecosystems. We invite papers on the changing distribution of anthropogenic CO₂ in the upper ocean, its impacts on organisms and ecosystem function, and emergent impacts on biogeochemical cycles related to the interaction of ocean acidification with climate change and other anthropogenic impacts.

Scientists willing to serve as PICES convenors: Masao Ishii (Japan), Lisa Miller (Canada)

S-CC Endnote 4**Revised topic session proposal for PICES-2012**

Title: *Changing ocean biogeochemistry and its ecosystem impacts*

Duration: 1 day

Sponsoring Committees: POC, BIO

Ocean biogeochemistry is undergoing rapid and growing anthropogenic change. A significant fraction of anthropogenic CO₂ is taken up by the ocean, which drives down pH and reduces the saturation state of carbonate minerals like calcite and aragonite, a process known as “ocean acidification”. Dissolved oxygen concentrations in the subsurface ocean will also likely decline over the coming century with a warmer and more stratified upper ocean and reduced ventilation of the deep ocean. Declining oxygen levels have now been reported from mid-ocean depths in the tropical oceans and across the North Pacific. Both processes are of particular concern in the North Pacific, where the water is naturally ‘old’ and has shallow calcium carbonate saturation horizons, relatively low buffering capacity, and extensive oxygen minimum zones. It is anticipated that these anthropogenic influences on the global ocean will increase in coming decades as atmospheric CO₂ levels and global temperatures continue to rise. We invite papers on the changing biogeochemistry of the global ocean, its impacts on organisms and ecosystem function, and emergent impacts on biogeochemical cycles related to the interaction of ocean acidification and declining oxygen with climate change and other anthropogenic impacts.

PICES convenors: Tony Koslow (USA), Arthur Chen (IGBP), Lisa Miller (Canada), Steven Bograd (USA)

Potential invited speakers: Brad Seibel (USA); Frank Whitney (Canada); Tsuneo Ono (Japan), Y.W. Watanabe (Japan)

Report of Working Group on *Non-indigenous Aquatic Species*

The Working Group on Non-indigenous Aquatic Species (hereafter WG 21) held its sixth meeting October 14-15, 2011 under the chairmanship of Darlene Smith who presented opening remarks and welcomed participants. WG 21 members from three PICES member countries (Canada, Japan and USA) and observers from the Northwest Pacific Action Plan (NOWPAP) and the IOC Sub-Commission for the Western Pacific (WESTPAC) were present (*WG 21 Endnote 1*). On the first day, the agenda dealt with items 1 to 4, with the remainder being discussed on the second day. The agenda for the meeting can be found in *WG 21 Endnote 2*.

AGENDA ITEM 2

Country and organization reports

Canada

The first Canadian Aquatic Invasive Species Network (CAISN), which was established in 2006, came to a close in 2011. The focus of the network was to identify and quantify the vectors and pathways by which aquatic invasive species enter Canada, determine factors that affect their colonization success, and develop risk assessment models for potential and existing aquatic invasive species. A report on CAISN is available at: http://www.caisn.ca/uploads/CAISN_FinalReport20112.pdf.

The Canadian Government has renewed funding for CAISN to address remaining information gaps. Future research will focus on four new core themes:

- Early Detection,
- Rapid Response,
- AIS as Part of Multiple Stressors,
- Reducing Uncertainty in Prediction and Management

More information can be found online <http://www.caisn.ca/en/index.php>.

Currently there are two research projects underway in the Pacific including: Characterizing effects of trophic interactions between native and non-native filter feeders on establishment and spread of aquatic invasive species, and evaluation of the efficacy of trap out efforts to control invasive European green crab: Lessons from Pipestem Inlet, BC.

Fisheries and Oceans Canada is also currently developing a national regulatory proposal to address the threat of aquatic invasive species.

Japan

A new species of non-colonial tunicate *Asciadiella aspersa*, first identified in Japan in 2009, has become widespread. It is causing serious damage to various cultured species, especially scallops. Work to confirm the validity of identification and origin of this species is ongoing.

Future funding from the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF), which has funded two WG 21 projects, will now focus on how to use coastal ecosystems sustainably and will not be directed specifically to non-indigenous species.

Russia

Dr. Alexi Gorodkov provided a summary of non-indigenous species in the Far East of Russia. There are currently 66 species listed that are in various stages of introduction. The species list can be found in the following paper: Non-indigenous species in the Far-Eastern seas of Russia. Zvyagintsev A.Yu., Radashevsky V.I., Ivin V.V., Kashin I.A. and Gorodkov A.N. 2011. *Russian Journal of Biological Invasions*. 2(2–3): 44–73.

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Russia is considering ratification of the International Convention for the Control and Management of Ships' Ballast Water and Sediments. (N.B. Canada and Korea are the only two PICES member countries to have signed the convention.)

United States of America

The U.S. Fish and Wildlife Service (USFWS) is leading the North Pacific Landscape Conservation Cooperative (NPLCC), one of the many LCCs in a new national network aimed to address large-scale conservation issues like climate change and invasive NIS through a collaboration of natural resource agencies and universities. The NPLCC includes estuarine and coastal waters from Northern California to southeast Alaska. Although the NPLCC is still formulating its priorities and has not yet significantly addressed marine bioinvasions, it is anticipated that this will become a priority in the future.

As part of the National Fish Habitat Action Plan, USFWS and the National Oceanic and Atmospheric Administration (NOAA) are helping lead the formation of a new Pacific Marine and Estuarine Fish Habitat Partnership that will encompass California, Oregon, and Washington coastal waters. As with other fish habitat partnerships under this national program, this effort may be a source of additional resources for non-indigenous species monitoring and control.

The National Ocean Policy, established by Presidential Executive Order on July 19, 2010, includes nine National Priority Objectives that address pressing issues such as climate change and ocean acidification. A strategic action is being developed for each one of these objectives. (<http://www.whitehouse.gov/administration/eop/oceans>). Invasive species components are being incorporated into strategic action plans to:

- identify and prevent high-risk introductions of non-native species;
- increase research capacity to document economic and ecological impacts; and
- establish interagency partnerships to bring together expertise, strengths and resources to control existing populations.

NOAA has assisted in updating and revising the Hazard Analysis and Critical Control Point (HACCP) planning process to increase its benefit to preventing the spread of invasive species. The revised HACCP planning process includes a stronger emphasis on risk assessment in order to identify high-risk activities and focus attention on actions needed to reduce the movement of potential invasive species. NOAA will continue to offer HACCP training sessions to staff and grant recipients.

There is increased interest in non-indigenous tunicates in the Northeast Pacific since *Didemnum vexillum* was discovered last year on the Oregon coast and in Sitka, Alaska. In both cases, consideration of eradication opportunities were clouded by uncertainty about species range and the limited success of previous control efforts of this species and other non-indigenous tunicates in Puget Sound. There is also limited information available to help predict the ecological and economic implications of an invasive tunicate invasion in nearshore habitats. Citizen scientists were key to the discoveries in both Oregon and Alaska and continued to help with additional surveys in 2011 – illustrating the value in engaging nonprofessional groups in early detection of marine non-indigenous species.

The recent northward range expansion of *Undaria pinnatifida* into San Francisco Bay continues to raise concerns about its potential establishment in Oregon and Washington coastal waters. Currently there is no substantial effort to regularly survey for this macroalgae in the Northwest, nor is there much information available to estimate its potential impacts or plan for rapid response opportunities.

The West Coast Governor's Agreement on Ocean Health continues to support a Spartina Action Coordination Team and the associated goal of eradicating non-indigenous *Spartina* spp. from the West Coast by 2018.

Northwest Pacific Action Plan (NOWPAP)

Dr. Sangjin Lee provided an overview of NOWPAP activities related to aquatic invasive species. A regional report entitled “*Regional Overview and National Reports on the Marine Invasive Species of the NOPAP Region*” has been produced. It contains information on current activities, threats and management, and information on current and ongoing research projects, and can be found at <http://dinrac.nowpap.org>.

IOC Sub-Commission for the Western Pacific (WESTPAC)

Dr. Suchanna Apple Chavanich gave an update on WESTPAC activities related to non-indigenous species conducted under the Project on Coastal Marine Biodiversity. The objectives of this project are to understand and provide the scientific basis for biodiversity management, to establish an effective management plan and monitoring programs for marine biodiversity among WESTPAC member countries and to encourage research collaboration and exchange of knowledge among WESTPAC countries.

Of note for 2011 was the IOC-WESTPAC/PICES joint workshop on “*Rapid Assessment Survey Methodologies for Detecting Marine Non-Indigenous Species*” held July 19–21. The purpose of the workshop was to provide a contextual perspective on why monitoring for non-indigenous species is important; to educate participants in RAS methodologies and demonstrate their application; and to provide participants with an overview of the PICES WG 21 database and how all can benefit from such an application. Twenty-nine participants from 9 countries (Canada, China, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam) attended.

AGENDA ITEM 3

Reports on WG 21 inter-sessional activities in 2011*Demonstration Rapid Assessment Survey (RAS) in Thailand*

As mentioned above, the second demonstration workshop was conducted July 19–21, 2011 in Phuket, Thailand. Twenty-nine participants from 9 countries were provided with an overview of the rationale behind rapid assessments and the methods developed and used by WG 21. Two intertidal field sites were visited to collect scrapings and collector plates. A significant advantage of these methods is their low cost. It was noted that tropical waters have a high percentage of unknown species and taxonomy issues. Dr. Hiroshi Kawai (Kobe University, Japan) gave a presentation on molecular tools for species identification. Participants indicated that they were very satisfied with the workshop and that they intended to initiate rapid assessment projects in their home countries.

Seventh International Conference on Marine Bioinvasions

The Seventh International Conference on Marine Bioinvasions was held August 23–25 in Barcelona, Spain. Dr. Thomas Therriault served on the conference Scientific Steering Committee, representing WG 21. The theme of the conference was “*Advances and gaps in understanding marine bioinvasions*”. PICES provided travel support to 8 graduate students and 4 postdoctoral fellows from PICES member countries to attend the conference. Additional information on the conference can be found at http://www.pices.int/publications/pices_press/volume20/v20_n1/pp_32-33_MBIC.pdf. The Eighth Conference on Marine Bioinvasions is to be held in 2013 on Canada’s West Coast. This location was chosen to increase participation from Western Pacific countries.

RAS 2011 in Vostok Bay, Russia

The fourth WG 21 RAS was conducted from October 7–14, 2011, at the Vostok Marine Station. Most of the sampling was conducted in and around Vostok Bay in habitats that varied from small harbors to rocky shores and mud flats. Collector plates were deployed for 5 months. Two sets of these plates were recovered from Vostok Bay and one from the international harbor in Vladivostok. Participants from all PICES member countries attended. Additional information on the Russian rapid assessment survey can be found at http://www.pices.int/publications/pices_press/volume20/v20_n1/pp_26-29_RAS-2011.pdf.

WG 21-2011

Database and atlas project

The framework for the NIS atlas and database was published in a peer reviewed journal. The citation for this paper is: Evolution of natural history information in the 21st Century – Developing an integrated framework for biological and geographical data. Reusser, Deborah A. and Lee II, Henry, J. 2011. *Journal of Biogeography* 38: 1225–1239 and can be found online at <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2699.2011.02515.x/pdf>

The Atlas of Nonindigenous Marine and Estuarine Species was peer reviewed. The Atlas is generated from the database and contains 700 species and is now 1800 pages long. For each taxa there is a two-page profile containing extensive information on habitat requirements, life history and distribution (native and non-native ranges). The Atlas also contains an extensive bibliography.

AGENDA ITEM 4

MAFF projects plans for 2012

Taxonomy project

A third and final demonstration RAS workshop is scheduled for February 8–9, 2012 in Nagasaki, Japan. The workshop will be held in collaboration with NOWPAP and IOC-WESTPAC and will be hosted by Dr. Takeo Kurihara of the Japanese Fisheries Research Agency at the Seikai National Fisheries Research Institute in Nagasaki.

Database and atlas project

The Atlas of Nonindigenous Marine and Estuarine Species generated from the PICES Non-indigenous Species Database will be published in electronic format. Development of a web application for the database, hosted by the U.S. National Atlas Program will continue.

Final reports on the two projects will be provided to MAFF.

AGENDA ITEM 5

WG 21 Terms of Reference

WG 21 is scheduled to complete its mandate with its last meeting at PICES-2012 in Hiroshima, Japan. The final report to meet the Terms of Reference will be prepared for review and revision at the Hiroshima meeting.

WG 21 Endnote 1

WG 21 participation list

Members

Blake Feist (USA)
Takeo Kurihara (Japan)
Henry Lee II (USA)
Debbie Reusser (U.S.A.)
Darlene Smith (Canada, Co-Chair)
Thomas Therriault (Canada)
Hisashi Yokoyama (Japan)

Observers

Suchanna Apple Chavanich (WESTPAC)
Alexi Gorodkov (Russia)
Sangjin Lee (NOWPAP of UNEP)

WG 21 Endnote 2

WG 21 meeting agenda

October 14, 2011 (Saturday, 9:00am-5:30pm)

1. Opening remarks and introductions
2. Country and organization updates
3. Reports on WG 21 inter-sessional activities in 2011
4. MAFF projects plans for 2012

October 15, 2007 (Sunday, 9:00am-12:30pm)

5. WG 21 Terms of Reference

Report of Working Group 23 on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim*

The annual meeting of the Working Group on *Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim* (WG 23) was convened in Khabarovsk, Russia, at 0900 h on October 16, 2011. Only 6 of 17 members were able to attend, and 4 observers participated (*WG Endnote 1*). Most of those who could not attend sent their regards to the U.S. Co-Chairman, Dr. William Peterson. The meeting agenda can be found in *WG 23 Endnote 2*.

AGENDA ITEM 2

Status of posting references and papers

The meeting began with a discussion of the status of posting of references and pdf copies of published papers to our ZOTERO web-page. ZOTERO is a web-based bibliographic site where documents can be stored and shared openly with WG members. The idea is that representatives of the member countries will post publications, reports and theses to this website focusing on works available in their own country that are not available (or have limited availability) to those from other PICES member countries. Ms. Tracy Shaw established the personal WG 23 page on ZOTERO; she also did a live demonstration of how to access the site over the internet, and showed members how to view the content. Presently there are ~ 125 references listed on the site. David Checkley mentioned that they had tried to use ZOTERO in SPACC at the recommendation of Dr. Patricio Bernal but they never got going on the idea.

AGENDA ITEM 3

Country reports

Detailed reports were presented by Japan, Korea and Russia. Each report summarized work carried out during the past year along with a comment on status of posting references to ZOTERO and the potential for future collaboration on research cruises.

a. Canada

No report.

b. China

No report.

c. Japan

Attempts to improve krill biomass estimates from the MOHT were described and were reported on a poster presented at PICES-2011. A major feeding experiment was carried out in June 2010 during which grazing by krill and copepods was measured. Clearance rates for krill ranged from 54 to 736 ml per euphausiid-hour. Highest filtration rates were on “flagellates”. There are more than 100 papers published by Japanese scientists on krill that will soon be posted to ZOTERO. Sixty-four papers are in English with about an equal number in Japanese. What remains is to translate at least the abstract, figure captions and table legends of the more important papers written in Japanese.

d. Korea

Future cruises have been scheduled for April and August 2012–2015. They could include collaborators. Bi-monthly time series of zooplankton data from 1976 show a gradual increase in zooplankton biomass since 1990 but copepod biomass has declined since 2005. Recent increases in biomass are due to increased biomass of salps. A total of approximately 30 on-board live-animal experiments were conducted during cruises in 2010 and 2011. The brood size of *E. pacifica* was studied, and research on krill diets based on lipid, stable isotope,

WG23-2011

and gut content was summarized. On two cruises specimens were collected for genetic analysis and were sent to the Peterson lab in Newport, Oregon. During the April 2011 cruise, plankton net sampling was carried out along with an acoustic survey to derive better estimates of krill biomass. Tracy Shaw (U.S. member of WG 23) participated in the August 2011 cruise.

e. Russia

A summary of the work done by TINRO-Center from 1985–2010 was described. Thousands of plankton samples have been collected and processed for biomass of krill and other zooplankton. Information was presented on the catchability of different plankton nets, which is necessary to understand so that samples collected by different nets can be compared. Overviews of sampling in four regions were provided including the total quantity of zooplankton, the role of every taxonomic group in the structure of plankton community, the species composition and some information about their biology, features of their spatial distribution, vertical distribution, seasonal and inter-annual dynamics of the abundance of major groups, standing stocks of zooplankton and estimates of the volumes of zooplankton consumed by nekton. A list of papers by Russian scientists that could be added to the ZOTERO web-site was provided.

f. U.S.A.

The report from the U.S.A. was in the form of a talk by Tracy Shaw on the synthesis paper, “*Comparison of brood sizes of Euphausia pacifica, pan-Pacific*”. This talk generated a debate about the degree to which krill were more like fishes than copepods, as suggested by Dr. David Checkley and Peterson. Dr. Sonia Batten described krill as being like chickens. Dr. Peterson reported briefly on progress of a study of the population genetics of krill. A graduate student has begun to sequence the DNA of *Euphausia pacifica* specimens from Korea and Oregon. Results will likely be reported at PICES-2012 in Hiroshima, Japan.

AGENDA ITEM 4

Presentations

Dr. Michael Dagg reviewed feeding behavior of krill with a focus on *Euphausia pacifica* and asked the question, “What is it about feeding behavior that allows *E. pacifica* to populate wide-spread regions of the North Pacific?” He reviewed the literature on several topics including studies of filter feeding (and mesh size of feeding baskets) and gut contents, predatory feeding, the digestive system, gut passage times and assimilation efficiency. Overall, he concluded that *E. pacifica* is able to eat just about anything (phytoplankton, microzooplankton, mesozooplankton, detritus including marine snow and phytodetritus, and perhaps benthos), within a broad size range from small (a few mm) to large (copepods) and over a very wide range of concentrations – its feeding behavior is flexible, adaptive, and opportunistic. Because it has such dietary flexibility and also has the ability to feed over a very wide range of food concentrations, it is seldom starving, but because it has such high upper levels of ingestion it is seldom satiated or ‘full’ (*i.e.*, it is almost always at least a little hungry).

Xiuning Du is a Ph.D. student from Ocean University in Qingdao, China, who worked in Dr. Peterson’s lab in Newport for 1½ years. Among other things, she performed experiments on grazing by adult *Euphausia pacifica* using the “disappearance of particles” technique, both through microscopic counts and “disappearance of chlorophyll” using size-fractionation of natural seawater and fluorometry. A summary of her work is as follows: selective feeding does occur in *E. pacifica*. Long-chain diatoms were sometimes avoided when they had especially high density. As for diatom prey, adaptive and opportunistic feeding could be seen; ciliates were the preferential prey when they had substantial biomass before the upwelling season or during the decay of upwelling blooms. In the late upwelling season in August, ciliates were preferred though in low abundance, likely because of opportunistic feeding or seasonally physiological needs like essential nutrients. Smaller flagellates were positively selected when better foods were lacking. Large dinoflagellates or ciliates were predominantly preferred to their smaller types. Questions were centered on the significance of “selectivity”.

AGENDA ITEM 5

General Discussion

There was interest by everyone in continuing the Working Group activities, especially the collaborations that have been established. The members present also felt that it would be useful to try to establish a new working group. It was suggested that the Working Group Final Report could be used to introduce a new set of questions that would form the basis of the new working group. WG 23 resolved to continue discussions on the potential of forming a new working group that would focus on one of two topics: (a) euphausiid vital rates, a topic needed to improve models – will require new experimental work, (b) basin-scale comparison of the role small pelagics in ecosystems (krill, anchovies and sardines) and how their roles might be modified by a changing climate – will require some new thinking.

*WG 23 Endnote 1***WG 23 participation list**Members

Michael J. Dagg (U.S.A.)
 Natalia Dolganova (Russia)
 Se-Jong Ju (Korea)
 Yuji Okazaki (Japan)
 C. Tracy Shaw (U.S.A.)
 William T. Peterson, (U.S.A., Co-Chairman)

Observers

Sonia Batten (Canada, representing David Mackas)
 David Checkley (U.S.A.)
 Vladimir Kulik (Russia)
 Ryan Rykaczewski (U.S.A.)

*WG 23 Endnote 1***WG 23 meeting agenda**

1. Welcome and introduction
2. Agenda additions and/or changes
3. Status of posting references and papers
4. Country reports
5. Presentations (M. Dagg, X. Du)
6. General discussion

Report of Working Group 24 on *Environmental Interactions of Marine Aquaculture*

The Working Group on *Environmental Interactions of Marine Aquaculture* (WG 24) held its final meeting on October 15, 2011, in Khabarovsk, Russia. The meeting was co-chaired by Drs. Katsuyuki Abo and Stewart Johnson (for Ms. Ingrid Burgetz). A list of participants and the meeting's agenda can be found in *WG 24 Endnotes 1 and 2*.

AGENDA ITEM 2

Overview of Working Group 24 commitments from 2010

Dr. Abo provided a brief review of the Working Group commitments which were made at the 2010 Annual Meeting in Portland, Oregon, USA.

AGENDA ITEM 3

Presentation and discussion on Terms of Reference 1 activities and report

Dr. Abo is leading this part of the Working Group activities which is examining the “environmental interactions of aquaculture”. He has received country reports from most of the PICES member countries with the exception of U.S. and China. The goal is to have all country reports completed by December 1, 2012. The Co-chairs and Dr. Stewart Johnson will summarize and complete the final report for TOR1.

AGENDA ITEM 4

Presentation and discussion on Terms of Reference 2 report and opportunity for final additions

Ms. Burgetz is leading this part of the Working Group activities which is examining the current “risk assessment methods used to assess environmental interactions of aquaculture”. Unfortunately, Ms. Burgetz was unable to attend the meeting but it was reported that she will finalize the report for TOR2 (risk assessment) based on submissions that have been made by PICES member countries. Modification of country reports will be completed by December 1, 2011. The final report will be completed by September 1, 2012.

AGENDA ITEM 5

Presentation and discussion on Terms of Reference 3 activities and report

In order to collect information for TOR3, member countries were provided in 2010 with a template to complete. Dr. L. Gustafson (USA) is compiling this information, which will be used in the production of the final report. The Working Group is planning to also use this information to produce a review paper on Diseases and Disease Regulations in PICES member countries that will be submitted for publication in a peer reviewed journal. Information has been received from all member countries except China, who will submit this information on or before December 1, 2011.

AGENDA ITEM 6

Discussion on finalizing reports for each of the Terms of Reference

For a number of reasons WG 24 was not able to complete its final report in 2010/11. The Working Group requested an extension to enable completion of the final report. The schedule for production of the final report is as follows:

WG 24-2011

December 1, 2011: final input from all member countries on all Terms of Reference;
May 1, 2012: draft reports will be completed and circulated for members comments;
July 1, 2012: deadline for receipt of comments from Working Group Members;
September 1, 2012: completion of final Working Group report to all Working Group members and the PICES Secretariat.

The Co-Chairs and Dr. Johnson will compile and edit the final version of the WG 24 report.

AGENDA ITEM 7

Summary of Working Group activities and report to Committees

A summary of Working Group activities over the past year was reported by Dr. Abo to the FIS and MEQ parent committee meetings at PICES-2011.

AGENDA ITEM 8

Discussion on future activity of mariculture issues within PICES

Members of the Working Group were in agreement that aquaculture remains an important topic for PICES and the FUTURE Program. Dr. Galina Gavrilova (Russia) suggested the extension of WG 24 for 1 year to allow us to complete the final report and to develop a proposal for a study group. Upon further discussion, the Group consensus was that, following approval of the United States, an application for a study group related to aquaculture would be put forward at the 2012 PICES Annual Meeting. The focus of this study group and its Terms of Reference will be developed over the next year, taking into consideration the direction of Working Group on Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors (WG 28) and other FUTURE activities. Members of WG 24 and others will contribute to this activity.

Action Item: WG 24 members will be contacted to determine whether they are in favor of developing a study group proposal for consideration at the PICES-2012. Members will be requested to provide suggestions from which Terms of Reference and the objectives of such a study group can be developed.

AGENDA ITEM 9

Topic Session S6 at PICES-2011

A half-day MEQ/FIS Topic Session on "*Identification and characterization of environmental interactions of marine aquaculture in the North Pacific*" was held at PICES-2011. This session included invited oral presentations by Dr. Sakami (Japan) and Dr. Dong (China). Eight oral and 3 poster presentations given.

Following the presentations there was a brief discussion of WG 24's plan to propose a study group at the next PICES Annual Meeting in Hiroshima, Japan. Participants were requested to contact Working Group members over the next year with their suggestions and ideas.

WG 24 Endnote 1

WG 24 participation list

Members

Katsuyuki Abo (Japan, Co-Chair)
 Galina Gavrilova (Russia)
 Graham Gillespie (Canada)
 Toyomitsu Horii (Japan)
 Stewart Johnson (Canada, Acting Co-Chair for
 Ingrid Burgetz)
 Hyun-Jeong Lim (Korea)
 Myoung-Ae Park (Korea)
 Ping Zhuang (China)

Observers

Natsuki Hasegawa (Japan)
 Yukimasa Ishida (Japan)
 Tomoko Sakami (Japan)
 Mikhail Stepanenko (Russia)
 Mingyuan Zhu (China)

WG 24 Endnote 2

WG 24 meeting agenda

1. Welcome and Introductions (Chairs: Katsuyuki Abo and Stewart Johnson)
2. Overview of WG commitments from 2010 (Abo)
3. Presentation and discussion on TOR1 activities and report (Facilitated discussion: Katsuyuki Abo – facilitator)
4. Overview of TOR2 report and opportunity for final additions (Facilitated discussion: Stewart Johnson – facilitator)
5. Presentation and discussion on TOR3 activities and report (Facilitated discussion: Stewart Johnson – facilitator)
6. Discussion on finalizing reports for each of the TOR
7. Summary of WG activities and report to Committees
8. Discussion on future activity of mariculture issues within PICES
9. Topic Session S6 on “*Identification and characterization of environmental interactions of marine aquaculture in the North Pacific*” at PICES-2011

Report of Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences*

The Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* (WG 26) held its first meeting from 14:00 to 19:15 h on October 15, 2011 in Khabarovsk, Russia, under the local chairmanship of Prof. Shin-ichi Uye (Japan) and remote chairmanship of Dr. Richard Brodeur (USA). A total of 14 members and 5 observers participated in the meeting (*WG 26 Endnote 1*). The agenda for the meeting can be found in *WG 26 Endnote 2*.

AGENDA ITEM 2

Objectives and goals of WG 26

The Group confirmed the objectives and goals based on the Terms of Reference for WG-26.

Overview of jellyfish blooms and related research in members' countries

1. Canadian Pacific waters was reviewed by Lucas Brotz. He also provided an overview of the global picture of jellyfish blooms that he had studied for his recent Master's thesis.
2. Chinese waters was reviewed by Siqing Chen and Zijun Xu. Dr. Chen described the results of a national project on the Key Process, Mechanism and Ecological Consequences of Jellyfish Blooms in China Coastal Waters. Dr. Xu explained another national project, mainly focusing on the establishment of a monitoring system for early warning of possible jellyfish blooms.
3. Jellyfish in Japanese waters was reviewed by Hideki Akiyama and Shin-ichi Uye. Dr. Akiyama reported a China-Japan-Korea International Project on the Giant Jellyfish Bloom. Prof. Uye summarised the results of studies carried on under the Prediction and Control of Jellyfish Outbreak (STOPJELLY) Project.
4. Jellyfish in Korean waters was reviewed by Dr. Changhoon Han.
5. Jellyfish in Russian Pacific waters was reviewed by Dr. Alexander Zavolokin.
6. Jellyfish in U.S. Pacific waters was reviewed by Dr. Jennifer Purcell.

AGENDA ITEM 3

Draft outline for Working Group report

Following a brief explanation by Prof. Uye on the tentative outline of working group report, WG 26 discussed the viewpoint, target, structure, *etc.* of the report. The Co-Chairs will revise the tentative outline and email the members for further comments. Collaborative studies among PICES member countries were proposed to tackle some topics, such as sampling problems.

AGENDA ITEM 4

Proposal of a jellyfish blooms topic session at PICES-2012

Prof. Uye reported on a proposal for a topic session at PICES 2012 in Hiroshima that was submitted to the BIO Committee (*WG 26 Endnote 3*). The proposal is entitled "*Jellyfish in marine ecosystems and their interactions with fish and fisheries*". Because of high importance and popularity of the topic, the Co-Chairs believe that it is likely to be approved. This 1-day topic session will be a good opportunity to show WG 26 activity to the PICES community.

WG 26-2011

AGENDA ITEM 5

Change of co-chair

The current Co-Chair from Korea, Dr. Young-Shil Kang, will be replaced with Dr. Won-Duk Yoon.

AGENDA ITEM 6

Closing

Prof. Uye expressed his thanks to all participants for their enthusiastic discussion and cooperation for making the first Working Group meeting successful.

WG 26 Endnote 1

WG 26 participation list

Members

Hideki Akiyama (Japan)
Richard Brodeur* (USA, Co-Chairman)
Lucas Brotz (Canada)
Siqing Chen (China)
Kristin Cieciel (USA)
Elena Dulepova (Russia)
John Field (USA)
Changhoon Han (Korea)
Haruto Ishii (Japan)
Xinming Pu (China)
Jennifer Purcell (USA)
Shin-ichi Uye (Japan, Co-Chairman)
Zijun Xu (China)
Alexander Zavolokin (Russia)

Observers

Sonia Batten (Canada)
David Checkley (USA)
Cynthia Suchman (USA)
YongJiu Xu (China)
Mingyuan Zhu (China)

*via Skype

WG 26 Endnote 1

WG 26 meeting agenda

1. Opening remarks
2. Objectives and goals of WG 26
3. Draft outline for the Working Group report
4. Proposal of a jellyfish blooms topic session at PICES-2012
5. Change of co-chair
6. Closing

*WG 26 Endnote 3***Proposal for a 1-day BIO/FIS Topic Session at PICES-2012 on
"Jellyfish in marine ecosystems and their interactions with fish and fisheries"**

Convenors: Shin-Ichi Uye (Japan), Richard Brodeur (USA), Song Sun (China), Won-Duk Yoon (Korea)

Evidence is accumulating that gelatinous zooplankton populations have increased substantially in many regions of the world, most likely through anthropogenic stresses, but we have insufficient understanding of how these blooms affect fish and, more broadly, marine ecosystems. Some benefits of jellyfish to marine fish include provisioning of food for some species and shelter for juvenile stages of several others. There is also a relatively minor human benefit in that some jellyfish are both commercially fished and cultured for human consumption in several countries. However, the negative effects of jellyfish population outbursts are thought to greatly exceed any positive ones and their effects on ecosystems and the economies that depend on them can be profound. These effects have been examined through field studies, controlled laboratory experiments, and estimated using quantitative ecosystem models. Jellyfish are generally detrimental to fish because they feed on zooplankton and ichthyoplankton, and so are both predators and potential competitors of fish. Relatively little of the energy consumed by gelatinous zooplankton ends up at higher trophic levels of interest to humans compared to krill and forage fishes. Jellyfish blooms also directly impact commercial fisheries through filling or clogging trawls and fouling fixed gear and aquaculture net pens, resulting in enormous economic losses worldwide. This session will focus on empirical field, laboratory, or modeling studies that examine the effects jellyfish have on marine ecosystems, fish species and fisheries, and relevant ecosystem-based management issues important to the needs of society over wide-ranging space and time-scales up to and including climate variations.

Working Group on North Pacific Climate Variability and Change

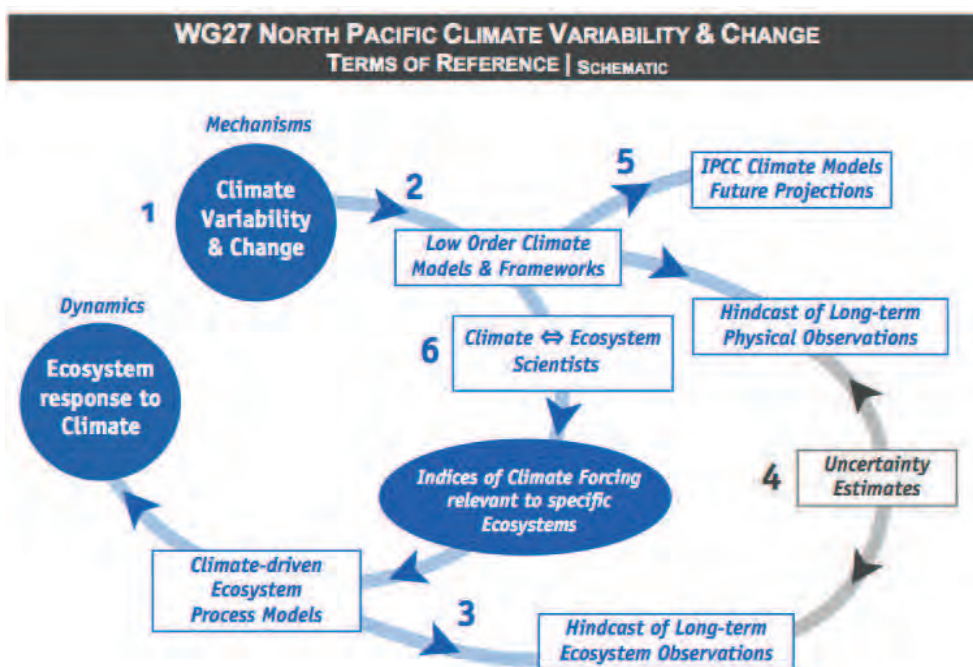
Despite relatively short time to prepare for the first meeting of Working Group on *North Pacific Climate Variability and Change* (WG 27), WG 27 showed great enthusiasm, with 16 of 19 members attending the meeting at PICES-2011 in Khabarovsk, Russia (*WG27 Endnote 1*). The business meeting agenda (*WG 27 Endnote 2*) began at 9:00 h with participants introducing themselves and briefly summarising their research.

AGENDA ITEM 2

Overall views for the Working Group

As many of the WG members were new to PICES, Co-Chairman, Dr. Michael Foreman, gave a short presentation outlining how such groups are organized within the structure of PICES and their obligations for reporting, meeting, and sponsoring workshops and topic sessions. The benefits of having links to other expert groups in PICES, specifically the proposed initiative on climate change effects on marine ecosystems and the proposed new working group on regional climate modelling, were presented and emphasised.

Co-Chairmen, Drs. Shoshiro Minobe and Emanuele Di Lorenzo, reviewed WG 27 terms of reference (TOR) and Dr. Di Lorenzo presented a schematic summarising the terms of reference and the necessary steps to attain those goals. Dr. Minobe also emphasized how the WG is a good opportunity to increase the value of POC disciplines in PICES, and the value of PICES in the wider physical oceanographic and climate communities.



WG27-2011

AGENDA ITEM 3

Presentations on topics relevant to terms of reference

In the main part of the meeting, each participant was given the option of providing a short presentation outlining facets of their research which were relevant to the TOR. All WG members exercised this option and key points of these presentations are summarized in *WG27 Endnote 3*.

AGENDA ITEM 3

Discussion for specific plans and schedule

The meeting then revisited the TOR, and for each of the first six, a list of members interested in directing some of their research in that direction was made. These lists are included along with the TOR (*WG27 Endnote 4*). Following this discussion, action items for each of the TOR were also developed and are listed in *WG27 Endnote 5*.

Dr. Di Lorenzo suggested that the working group have its own webpage and presented a prototype (*WG27 Endnote 6*) with several sub-links designed to facilitate communication among the group, to the PICES community, and to the general public. The plan is to have this webpage housed at the Georgia Institute of Technology, where there are fast servers, and to have a link on the PICES webpage.

No other business was discussed and the meeting was adjourned at about 17:45 h. Dr. Minobe thanked all participants for their presentations, discussion, and commitment to conducting research directed at specific terms of reference.

WG 27 Endnote 1

WG 27 participation list

Members

Soon-Il An (Korea)
Steven Bograd (USA)
Enrique Curchitser (USA)
Shoshiro Minobe (Co-Chairman, Japan)
Emanuele Di Lorenzo (Co-Chairman, USA)
Michael Foreman (Canada)
Shin-ichi Ito (Japan)
Chan Joo Jang (Korea)
Xiaopei Lin (China)
Guimei Liu (China)
Takashi Mochizuki (Japan)
Tatyana Pavlova (Russia)
Bunmei Taguchi (Japan)
Elena Ustinova (Russia)
Sang-Wook Yeh (Korea)
Yury Zuenko (Russia)

Observers

Robin Brown (Canada)
Kyung-Il Chang (Korea)
Anne Hollowed (USA)
Dosoo Jang (Korea)
Suam Kim (Korea)
Mi Hye Lee (Korea)
Vyacheslav Lobanov (Russia)
Olga Trusenlova (Russia)

WG 27 Endnote 2**WG 27 meeting agenda**

1. Welcome and self-introduction
2. Overall views for this working group (Foreman, Di Lorenzo, Minobe)
3. Short presentations for topics relevant to TORs from each member (10 min)
4. Discussion for specific plans and schedule

WG 27 Endnote 3**Summary of members' research areas and interest****1. Soon-II An:**

- The forcing of the PDO (diagram) is made up of Kelvin Waves, ENSO → AL connection and also SSH thermocline variations in the KOE.
- AR-1 model to reconstruct PDO using all components shows KOE, ENSO ocean and atmospheric teleconnections are important.
- Use AR-1 model to diagnose IPCC models. Controlled mostly by North Pacific modes and weak connection to ENSO.
- PMIP models to understand if PDO and ENSO coupling in a changing climate is modulated in time → when ENSO is weaker and teleconnection pattern may have changed PDO is still strong and driven by AL.
- Explore these dynamics in CMIP5 and paleoclimate simulations.
- Question: feedback from KOE → AL → PDO?

2. Chan Joo Jang:

- MLD depth in IPCC models → improved better metrics for IPCC models. MLD depth shows strong dipole change over the KOE region. Stronger wind stress between 30–40°N drives MLD change → SST and Qnet.
- IPCC model have strong biases in the mean, shallower North of KOE and deeper south of the KOE. Future changes in MLD pattern similar to bias.
- MLD projected changes are strong in the KOE but also show a pattern in the return eastern boundary current (shallowing).
- MLD variance also changes.
- Question: how important is MLD depth and variance for ecosystem processes?
- Question: is KOE position related to changes in MLD depth?

3. Sang-Wook Yeh:

- Warm pool SST impacts on North Pacific climate variability and change == teleconnection from tropics to extra-tropics and mean trend of warm pool → mean NPGO like changes in North Pacific. 2nd mode warm pool mode captures trend and connected to NPGO.
- Warm pool trend shift Aleutian Low → mean NPGO-like pattern in the extra-tropical SST (cartoon diagram). Evidence that the NPGO amplitude is increased.
- Question: Does NPGO force changes in North Pacific atmospheric circulation and teleconnection with ENSO?

4. Bunmei Taguchi:

- Decadal variability in the KOE (2007 study) showing shift and intensification (speed) of mode. 2nd mode important for sardines. Large-scale waves are important but it is the frontal scale dynamics that ultimately downscale the signal.
- Frontal scale dynamics impact the large-scale circulation with a possibility of dual way interactions.
- Frankignoul *et al.* 2011, Yeh *et al.* 2011.

- Atmospheric patterns are driven by SST frontal structures but there is still debate on what is the actual pattern of the response.

5. Enrique Curchister

- Regional coupled models, improving biases in eastern boundary current, nesting regional models in climate models. Feedback from regional scale to basin-scale climate variability
- Coupled model of ocean and fish to be used to explore how the regional expression of climate impacts ecosystem variables and develop process model to capture how climate signals impact ecosystem variables the essential connecting dynamics.
- SODA output for North Pacific 5 days output (.25 resolution).

6. Steven Bograd

- Long-term variability in the California Current, phenology, climate change effects on top predator. Developing hypotheses to link physical forcing to ecosystem variability and develop climate-driven ecosystem models.
- Understanding long-term trends in nutrients and oxygen that are coherent → hypothesis developed about ventilation rates. Testing this hypothesis could be an important activity.
- Biogeochemical emphasis.
- Trends and decadal changes in the spring transition connected to 2nd mode → large-scale climate.
- Niches of animals inferred from tagging shows a connection to ocean properties.
- large-scale climate affects these properties → empirical model to connect to habitat.

7. Michael Foreman:

- TOR number 4. Long-term timeseries of winds off BC coast 50 year.
- CUI dynamics along the entire North American coast (timing and strength and its relation to climate) use Foreman data with CCS data.
- Increase wind variability trend.
- Gillet 2003 trends in SLP.

8. Patrick Cummins (presented by M. Foreman)

- Timeseries of SST and salinity at lighthouses.
- SST connected to PDO.
- Salinity local signal still to be explained.

9. Shoshiro Minobe

- TOR number 4: estimating uncertainties in the decadal signals using an AR-1 model.
- 2000s phase reversal to weakened Aleutian low and positive phase of PDO occurred for sure.

10. Xiaopei Lin:

- Western Pacific Current impact on climate change.
- Warming trend related to ocean advection, on the other hand latent heat flux is cooling.
- Mechanism driving this trend remain unclear.
- Dipole mode related to the KOE mode.
- Regional air-sea coupled model (WRF + ROMS) covering most of Asia and western Pacific.
- Question about the validity of SST data in the Yellow Seas.

11. Shin-Ichi Ito

- Pacific saury projections using Nemuro fish forced by IPCC model outputs.

12. Elena Ustinova

- Climate variability and change in far eastern seas and adjacent areas.

13. Guimei Liu

- Regional ocean, biological, and carbon coupled model for the South China Sea.
- 30-yr integration of a 0.125-degree OGCM over the North Pacific.

14. Yury Zuenko

- Finding adequate indices to connect physical variability to ecosystem measure in the Japanese sea.
- Arctic Oscillation (AO) seems very relevant but not ENSO (although lag relationship has not been explored).

15. Tatiana Pavlova

- Analysis of AOGCMs in the Arctic region. Multi-mode ensembles analysis.

16. Takashi Mochizuki

- Decadal projection with MIROC show some skill in predicting the PDO, defined as 0–400 m averaged water temperature EOF1, for several years.
- They perform assimilation to initialize the decadal state and then ensemble runs are performed to assess the skill of prediction.

17. Emanuele Di Lorenzo

- PODX: Pacific Ocean Decadal/Climate Change Study: Di Lorenzo, Schneider, Vimont, Newman, Cobb.
- AR4/AR5 climate model simulations and paleo data.
- How do AR4 model capture these pacific decadal modes?
- Furtado *et al.* 2011.
- AR4 models (Ensemble mean): looks good for AL/PDO, but NPO is good SST2 is bad.
- Also, bad for ENSL→AL, CPW (shifted west) →NPO, NPGO→CPW.

WG 27 Endnote 4**Terms of reference: Members' involvement**

1. Summarize the current understanding of mechanisms of Pacific climate variability and change, and evaluate the strengths of the underlying hypotheses with supporting evidence.
(*Members involved: Di Lorenzo, Taguchi, Ustinova, Minobe*)
2. Develop conceptual frameworks and low-order models of North Pacific climate variability and change, which can be used by climate researchers to investigate the mechanisms of those variations and by ecosystem scientists to explore hypotheses linking ecosystem dynamics and physical climate.
(*Members involved: Xiaopei Lin, Soon Il, Sang-Wook, Di Lorenzo, Minobe*)
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.
(*Members involved: Foreman, Guimei, Bograd, Ito, (Hollowed), Di Lorenzo, Curchister*)
4. Develop a method to identify and provide uncertainty estimates of decadal variability in recent historical climate and ecosystem time series.
(*Member involved: Minobe*)
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.
(*Members involved: Di Lorenzo, Yeh, Jang, Guimei, Pavlova, Bograd, Mochizuki*)
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

WG27-2011

species and ecosystem responses to climate variability and change.

(Members involved: Foreman, Guimei, Bograd, Ito, (Hollowed), Di Lorenzo, Curchister)

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.
(Most members are heavily involved in these organizations)
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.

WG 27 Endnote 5

Action items for 2011–2012

TOR 1 and 2: **TOR 2** Dr. Minobe will produce a simple mathematical framework or simple model to capture and quantify the known mechanisms of Pacific climate variability with Dr. Di Lorenzo and Foreman by the end of 2011. This review will be submitted in January 2012 to the other members for discussion. Dr. Di Lorenzo will also implement a Linear Inverse Model (LIM) for quantifying and testing the dynamics of the links between the different modes of Pacific climate variability.

TOR 3: Drs. Minobe and Di Lorenzo will lead an effort to update and expand the Hare and Mantua (2000) ecosystem dataset and re-interpret the results in light of the recent advances in our understanding of Pacific climate variability. We will also attempt to include other ecosystem data from Drs. S. Chiba, S. Bograd and J. Keister.

TOR 4: Dr. Minobe will continue to develop methods for estimating uncertainties in the physical indices. Methodologies for ecosystem uncertainties will be address at a later stage when the first process models become available.

TOR 5: Drs. Di Lorenzo and An are currently publishing papers that use metrics from low-order climate models to evaluate the IPCC models. Other members are also conducting research that falls under this TOR. We plan to review all these findings at the next meeting together with results from research activities of other non-members.

TOR 6: We will begin by establishing a connection with new P/ICES initiative on climate change effects on marine ecosystems as well as reviewing PICES Scientific Report No. 34 (Forecasting Climate Impacts on Future Production of Commercially Exploited Fish and Shellfish, A.B. Hollowed, R.J. Bramish, T.A. Oakey and M.J. Schirripa (Eds.), 2008) which provides a comprehensive review of several hypotheses of how ecosystem variables are linked to physical parameters.

WG 27 Endnote 6

Website development

The WG 27 webpage includes motivation, terms of references, member list, and links to video presentation for proposal of the working group (April 2011) and to the FUTURE project, which is the current central project of PICES.

WG27 NORTH PACIFIC CLIMATE VARIABILITY & CHANGE
WEBSITE | [HTTP://WG27.PICES.INT](http://wg27.pices.int)

WEBSITE


PICES Working Group 27 North Pacific Climate Variability & Change

http://wg27.pices.int

PICES WG27

PICES Working Group 27

North Pacific Climate Variability & Change



[Home](#) | [Terms](#) | [Publications](#) | [Docs](#) | [Data & Models](#) | [Presentations](#) | [Links](#)

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

Members

Canada: Patrick Cummins, Mike Foreman (Co-Chair)

China: Xiaopei Lin, Guimei Liu, Lixin Wu

Japan: Shoshiro Minobe (Co-Chair), Shin-ichi Ito, Takashi Mochizuki, Bunmei Taguchi

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

Russia: Yury Zuenko, Elena Ustinova, Tatyana Pavlova

U.S.A.: Emanuele Di Lorenzo (Co-Chair), Enrique Curchitser, Taka Ito, Steven Bograd

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Report of Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*

The meeting of the Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28) was held from 14:00–18:00 h on October 15, 2011 at the PICES-2011 in Khabarovsk, Russia. Dr. Motomitsu Takahashi (Japan) acted as meeting Chair. Seventeen people were present, representing 5 PICES member countries (*WG 28 Endnote 1*). Dr. Takahashi recommended asking Drs. Ian Perry (Canada) and Chaolun Li (China) to serve as Co-Chairs of the Working Group. This report reflects discussions at the meeting on some of the Agenda Items (*WG 28 Endnote 2*).

AGENDA ITEM 2

Schedule of Working Group activities

Each of 7 terms of reference of WG 28 was divided into the year when it would be addressed.

Year 1

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. Identify trends in these stressors if possible.
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).

Year 2

1. Using criteria agreed to at the 2011 PICES FUTURE inter-sessional 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.
2. Review existing frameworks to link stressors to impacts/change, assessing their applicability to North Pacific ecosystems and identify the most appropriate for application to North Pacific ecosystems.
3. Determine if ecosystem indicators provide a mechanistic understanding of how ecosystems respond to multiple stressors and evaluate the potential to identify vulnerable ecosystem components.

Year 3

1. 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?
2. Do different parts of the ecosystem respond differently (*e.g.*, trophic level responses)? How do stressors interact? Publish a final report summarizing results with special attention to FUTURE needs. This Working Group will focus primarily on delivery of FUTURE Questions 1 and 3 (see http://www.pices.int/members/scientific_programs/FUTURE/FUTURE_IP_final_2009.pdf).

AGENDA ITEM 4

Proposals for Working Group activities at PICES-2012

The first year of WG 28's activities include a broad range of tasks, so the following activities were proposed for PICES-2012:

- 1-day WG meeting;
- 1-day Workshop on “*Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts*” (*WG 28 Endnote 3*);
- ½-day Topic Session on “*Ecosystem responses to multiple stressors in the North Pacific*” (*WG 28 Endnote 4*).

WG 28-2011

WG 28 Endnote 1

WG 28 participation list

Members

Jennifer Boldt (Canada)
Ik Kyo Chung (Korea)
Shigeru Itakura (Japan)
Sachihiko Itoh (Japan)
Vladimir Kulik (Russia)
Jaebong Lee (Korea)
Steve Rumrill (USA)
Jameal Samhoury (USA)
Motomitsu Takahashi (Japan, Co-Chairman)

Naoki Yoshie (Japan)
Chang-Ik Zhang (Korea)

Observers

Robin Brown (Canada)
George Hunt (USA)
Sangjin Lee (NOWPAP of UNEP)
Thomas Therriault (Canada)
Atsushi Tsuda (Japan)
Yutaka Watanuki (Japan)

WG 28 Endnote 2

WG 28 meeting agenda

1. Welcome, Introduction and sign-in (all)
2. General review of Terms of Reference and discussion about WG frameworks
 - WG deliverables
 - Contributions to FUTURE
 - Timelines
 - Leads
3. Review of recent PICES activities related to this WG
 - Review of FUTURE Inter-sessional Workshop in Honolulu in April 2011
 - Forthcoming related workshop/symposium
4. Discussion on possible topic session at PICES-2012 and -2013
 - Review of a topic session proposal
 - Terms, invited speakers, program
 - Other related issue
5. Discussion on how to activate our WG
 - How to share papers and ideas
 - Next meeting (PICES-2012)

WG 28 Endnote 3

**Proposal for a 1-day workshop at PICES-2012 on
 “Identifying critical multiple stressors of North Pacific marine ecosystems and indicators
 to assess their impacts”**

Co-Convenors: Jennifer Boldt (Canada), Vladimir Kulik (Russia), Chaolun Li (China), Jameal Samhour (USA), Motomitsu Takahashi (Japan), Chang-Ik Zhang (Korea)

Multiple natural and human stressors on marine ecosystems are common throughout the North Pacific, and may act synergistically to change ecosystem structure, function and dynamics in unexpected ways that can differ from responses to single stressors. Further, these stressors can be expected to vary by region, and over time. This workshop seeks to understand responses of various marine ecosystems to multiple stressors, and to identify and characterize critical stressors in PICES regional ecosystems including appropriate indicators of their impacts. The goal is to help determine how ecosystems might change in the future and to identify ecosystems that may be vulnerable to the combine impacts of natural and anthropogenic forcing. Contributions are invited which identify and characterize the spatial and temporal extent of critical stressors in marine ecosystems (both coastal and offshore regions) of PICES member countries, and in particular the locations at which multiple stressors interact. Contributions will include a review and identification of broad categories of indicators which document the status and trends of ecosystem change at the most appropriate spatial scale (e.g., coastal, regional, basin) in response to these multiple stressors. This workshop is linked with the topic session titled “Ecosystem responses to multiple stressors in the North Pacific” but is designed to provide more in-depth examination and discussion of the spatial and temporal extents of critical marine ecosystem stressors and their potential indicators. It will assist with progress towards the goals of PICES WG 28 on Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors (http://www.pices.int/members/working_groups/wg28.aspx).

WG 28 Endnote 4

**Proposal for a ½-day Topic Session at PICES-2012 on
 “Ecosystem responses to multiple stressors in the North Pacific”**

Co-Convenors: Vladimir Kulik (Russia), Ian Perry (Canada), Motomitsu Takahashi (Japan)

Marine ecosystems of the North Pacific, both coastal and offshore, are influenced by multiple stressors, such as increased temperature, change in iron supply, harmful algal blooms, invasive species, hypoxia/eutrophication, ocean acidification, and intensive fishing. These multiple stressors can (but do not always) act synergistically to change ecosystem structure, function, and dynamics in unexpected ways that can differ from responses to single stressors. Further, these stressors can be expected to vary by region and over time. This session seeks to understand the responses of various marine ecosystems to multiple stressors and to identify appropriate indicators of these effects. Contributions are invited which review and define categories of indicators to document the status and trends of ecosystem change at a variety of spatial scales (e.g., coastal, regional, basin) in response to multiple stressors. Emphasis will be placed on empirical and theoretical approaches that forge links between ecosystem change and the intensities of multiple stressors. This session will form a contribution to the work of PICES WG 28 on Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors (http://www.pices.int/members/working_groups/wg28.aspx).

Invited Speakers: Natalie Ban (James Cook University, Australia), Ben Halpern (University of California Santa Barbara, USA)

Report of the Advisory Panel on Continuous Plankton Recorder in the North Pacific

The Advisory Panel on *Continuous Plankton Recorder in the North Pacific* (MONITOR) met from 18:00 to 19:00 h on October 15, 2011, in Khabarovsk, Russia. The meeting was chaired by Dr. Phillip R. Mundy and attended by the Chair of MONITOR, Dr. Hiroya Sugisaki. The list of participants and agenda are found in *CPR-AP Endnotes 1 and 2*.

AGENDA ITEM 3

Report on CPR activities in 2010–2011

Advice

The CPR continues to build a unique set of observations on zooplankton species composition that is invaluable for understanding the extent and effects of global climate change in the North Pacific. Information from CPR is made available in a timely manner and it is used to support a growing legacy of scientific publications. CPR exemplifies the benefits derived from PICES' fostering of cooperation and communication among nations in North Pacific marine science.

Sampling 2011

Sampling was conducted as planned with 3 east–west (VJ) transects and 5 north–south (AT) transects being completed, with a sixth AT transect producing useful data for only two thirds of its length. A new ship, *Morning Cedar*, took over the VJ route when the *Skaubryn* was sold after the 2010 sampling season. An analysis of the depth of tow on the VJ route during 2011 found that it was about the same as 2010 on the *Skaubryn*, indicating that the collection of CPR data should not be affected by the transition even though the *Morning Cedar* is slightly faster. A successful transition to new support personnel for the AT transect in Alaska was completed following the retirement of long-time CPR servicing volunteers, Bob and Scott Benda, at the end of the 2010 season.

Publications

- Batten, S.D. and Walne, A.W. 2011. Variability in northwards extension of warm water copepods in the NE Pacific. *Journal of Plankton Research*. doi: 10.1093/plankt/fbr065
- Bond, A.L., Jones, I.L., Williams, J.C. and Byrd, V. 2011. Diet of auklet chicks in the Aleutian Islands, Alaska: similarity among islands, interspecies overlap, and relationships to ocean climate. *Journal of Ornithology*. doi: 10.1007/s10336-011-0704-3. **NB: This is a significant achievement as the first paper to use Pacific CPR data without Batten as co-author.**
- Rooper, C.N., Boldt, J.L., Batten, S.D., and Gburski, C. (in review) Growth and production of Pacific ocean perch (*Sebastes alutus*) in nursery habitats of the Gulf of Alaska. *Fisheries Oceanography*.

Presentations at PICES-2011

- Science Board Symposium (S1) Mechanisms of marine ecosystem reorganization in the North Pacific Ocean - Chiba *et al.* *Phytoplankton phenology and community changes in the western subarctic North Pacific 2000-09 based on satellite and CPR observation*.
- (S4) Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species - Yoshiki *et al.* *Interannual variability of zooplankton community structure based on Continuous Plankton Recorder in the western subarctic North Pacific during 2001–2009*.

AP-CPR-2011

Funding

Dr. Sonia Batten reported that funding from Canada, Japan, the United States is in place through the end of 2013 to 2016, and funding from the Sir Alister Hardy Foundation (SAHFOS) is in place through 2012. Details on funding outlooks are presented in national reports under Agenda Item 5.

AGENDA ITEM 4

Report from MONITOR Chair

Dr. Sugisaki attended the Global Alliance of Continuous Plankton Recorders Surveys (GACS) at SAHFOS in Plymouth, England, September 22–23, 2011 where he signed to support GACS on behalf of PICES. Following the GACS inauguration, Dr. Sugisaki attended the 80th anniversary celebratory scientific meeting of the CPR, Plankton 2011. AP-CPR participants, Drs. Chiba, Batten and Yoshiki also attended the meeting. Dr. Sugisaki reported that SAHFOS strongly supports Pacific CPR as one of its best examples of the global nature of the CPR network.

AGENDA ITEM 5

National CPR Reports

Canada

Dr. Batten reported on behalf of Dr. David Mackas who was unable to attend. Canadian funding was renewed through March 2014 at the same level as the previous year.

Japan

Dr. Sanae Chiba reported that funding from the Japan Society for the Promotion of Science (JSPS) is secure through 2013. She has an application in process that would extend funding through 2018. Dr. Chiba is presenting a paper in the 2011 Science Board Symposium (S1-7707) on changes in phenology and community structure on CPR results (see Agenda Item 3). Co-authors include three participants in the AP meeting (Sugisaki, Batten and Yoshiki) and two other authors. Dr. Tomoko Yoshiki will present a paper (S4-7803) later in the week on community structure in CPR samples 2001–2009. SAHFOS and JAMSTEC (Japan Agency for Marine-Earth Science and Technology) exchanged an official IA on CPR sample handling and data policy as for the Japanese contribution to the North Pacific CPR project, which will be effective up to FY2013.

Russia

Dr. Vladimir Radchenko reported on an atlas of historical biomass of common species of zooplankton from the western North Pacific and marginal seas that will be prepared at the end of this year and published in the first half of 2012. The structure of the atlas will be close to the four-volume “Atlas of quantitative nekton distribution” published in 2003–2006. The plankton database includes information from approximately 21,800 net stations conducted by TINRO-Center (Vladivostok) in the time period 1984–2010.

USA

The Exxon Valdez Oil Spill Trustee Council (Anchorage, USA) has committed support through 2016 with the possibility of renewal for an additional 5 years, dependent on performance. The North Pacific Research Board funding is secure through mid-2014.

Auke Bay Laboratories continues to pursue participation in processing of CPR samples and support of CPR transects on behalf of the Alaska Fisheries Science Center. NOAA’s National Marine Fisheries Service has invited a presentation to its Science Board in February 2012, which indicates continued interest at the national level in supporting CPR.

AGENDA ITEM 7
New Business

None presented.

CPR (North Pacific) web links

PICES: <http://www.pices.int/projects/tcprstnp/default.aspx/#data>

SAHFOS: <http://www.sahfos.ac.uk/sister-survey/pacific-cpr-survey/background.aspx>

AP-CPR Endnote 1

AP-CPR participation list

Members

Observers

Sonia D. Batten (Canada, SAHFOS)
Sanae Chiba (Japan)
Phillip R. Mundy (USA, Chairman)
Vladimir Radchenko (Russia)

Tsuneo Ono (Japan)
Hiroya Sugisaki (Japan, MONITOR Chair)
Tomoko Yoshiki (Japan)

AP-CPR Endnote 2

AP-CPR meeting agenda

1. Welcome (Mundy)
2. Additions and modifications to agenda
3. Overview of CPR activities in 2010 – 2011 (Batten)
4. Report of Plymouth, UK meetings and GACS MOU (Sugisaki)
5. Reports and comments of national representatives
6. Receive suggestions for 2010 – 2011 CPR draft annual report (Mundy)
7. New business
8. Adjourn

Report of the Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas*

The meeting of the Advisory for a *CREAMS/PICES Program in East Asian Marginal Seas* (AP-CREAMS) was held on October 14, 2011 in Khabarovsk, Russia, under the chairmanship of Drs. Joji Ishizaka, Kyung-Ryul Kim, and Vyacheslav Lobanov. Nine Panel members from China, Japan, Korea, Russia, and USA and 20–25 observers attended the meeting (*AP-CREAMS Endnote 1*). The meeting agenda can be found in *AP-CREAMS Endnote 2*.

AGENDA ITEM 1

AP-CREAMS tasks

Dr. Kim briefly reviewed the history and tasks charged to AP-CREAMS. The Advisory Panel was established at PICES-2005 in Vladivostok, Russia, with the terms of reference:

1. to initiate and oversee a program to study the hydrography, circulation, and biology and their variability in East Asian Marginal Seas in the PICES area, effect of climate and long-term changes in the abiotic and biotic environments of this region
2. to facilitate the establishment of permanent observation and data exchange networks in this region;
3. to convene workshops/sessions to evaluate and compare results from the program.

AGENDA ITEM 2

Meetings in 2011

Inter-sessional AP-CREAMS meeting

AP-CREAMS held an inter-sessional meeting from April 18–19, 2011, in Hangzhou, China, and was hosted by the Second Institute of Oceanography, SOA. Six members from China, Japan, Korea, and Russia attended.

PICES-2011

The second meeting took place on October 14, 2011, in Khabarovsk, Russia, during the PICES 2011 Annual Meeting. It was attended by 9 members (China, Japan, Korea, Russia, USA) and numerous observers. The agenda of the meeting included brief national reports on activities and plans related to the CREAMS/PICES program, discussion on capacity building activities, report and discussions on international co-operation, progress of the EAST-II program, preparation and report on the POC/MONITOR/TCODE Workshop on “*Recent advances in monitoring and understanding of Asian Marginal Seas: 5 years of CREAMS/PICES EAST-I Program*” (W4), and discussion and decisions on the “Supplement to the 2010 PICES North Pacific Ecosystem Status Report-2010: Status and trends of East Asian Marginal Seas in 2003–2010: CREAMS/PICES EAST-I Area”

AGENDA ITEM 3

Research activities in 2011

EAST-I region

A 5-year 2nd phase of the Korea EAST-I program was launched in June 2011, building on the 1st phase activities and now also including research tasks of “pelagic-benthic coupling” and “modeling and projections”. Under the Korea EAST-I program, 3 multidisciplinary surveys were conducted in the Ulleung Basin in March and twice in August. Time series stations, the coastal buoy station (ESROB), submarine cable voltage measurement, and subsurface mooring (EC1), have been in operation continuously in the Ulleung Basin. A

AP-CREAMS-2011

moored profiler (E-RAP) operating on a real-time basis will be deployed in November in the middle of the Ulleung Basin at the SuperStation.

A project on shelf/deep sea interaction in the northwestern part of the EAST-I area was implemented by the V.I. Il'ichev Pacific Oceanological Institute (POI) under a new Russian program, "Comprehensive Study of the Far Eastern Seas" for 2011–2013. The project consists of field observations, including CTD and hydrochemical surveys, mooring stations and drifting buoy deployments in the coastal areas of Primorye, Peter the Great Bay and Primorye Current area. Two cruises (winter and fall seasons) were conducted by the R/V *Professor Gagarinskiy* 2011.

POI FEB RAS and the Japan Meteorological Agency (JMA) agreed to start a joint long-term observation program under the NEAR-GOOS project "NEAR-GOOS Cross-basin Climate Monitoring Section" with objectives to improve the understanding of the response of regional seas in the EAST-I region to climate change. A cross-basin section will be composed of a PM line implemented by JMA from the Japanese coast up north to Yamato Rise and a 134°E line implemented by POI from the Russian coast down south to meet the PM line. The section will be repeated once a year. The first observations are planned for November 2011.

EAST-II region - Nagasaki-Maru cruise

The cruise was implemented as a research and training operation in the East China Sea from July 15–25, 2011 with Dr. Joji Ishizaka (Nagoya University, Japan) as chief scientist. Twenty-five participants from Japan, 4 from Korea and 3 from China included 23 Ph.D. and graduate students. The research goals of the cruise were to: map the physical, chemical and biological parameters of Changjiang Diluted Water (CDW), trace the CDW to understand changes with time of the parameters and estimate how primary production of CDW is maintained, and map the locations of giant jellyfish.

AGENDA ITEM 4

Capacity building

A NOWPAP/PICES/IOC-WESTPAC Joint Training Course on "*Remote sensing data analysis*" took place from October 8–12, 2011 in Vladivostok, Russia, hosted by POI and Far Eastern Federal University. An additional co-sponsor was the International Ocean Colour Coordinating Group (IOCCG).

The course consisted of lectures by experts and hands-on tutorial sessions on analysis of satellite data. This training course aimed at providing opportunities for students, early career researchers and coastal managers to obtain useful skills and knowledge to utilize remote sensing data to monitor and assess the coastal and marine environment. The topics covered remote sensing of eutrophication, red tides, oil spills and coastal habitats with a focus on the Northwest Pacific Ocean. The following international experts participated as lecturers: Leonid Mitnik, Vyacheslav Lobanov, Leonid Kucheiko (Russia), Roland Doerffer (Germany), Mati Kahru, Raphael Kudela (USA), Joji Ishizaka, Genki Terauchi, Teruhisa Komatsu (Japan), Yu-Hwan Ahn (Korea) and Sung Ling (China).

Twenty-five trainees from China (1), Japan (3), Korea (1), India (1), Indonesia (1), Philippines (1), and Russia (17) attended the course. The training course was provided free of charge but travel costs and accommodation were borne by the participants. PICES provided financial support for 3 participants, IOC WESTPAC for 2, and IOCCG and NOWPAP for 1 each. Selection of participants to be funded was done by the organizers, based on the contents of submitted applications.

NOWPAP plans to have another remote sensing training course in China in 2013/2014.

AGENDA ITEM 5

Workshop at PICES-2011

A ¾-day POC/MONITOR/TCODE Workshop (W4) on “Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program” took place on October 14 at PICES-2011. Co-Convenors were Kyung-Il Chang (Korea), Toshitaka Gamo (Japan), Young-Shil Kang (Korea), Kyung-Ryul Kim (Korea), Vyacheslav Lobanov (Russia), Toru Suzuki (Japan) and Yury Zuenko (Russia) and invited speakers were Sukgeun Jung (Jeju National University, Korea), and Tomoharu Senjyu (Kyushu University, Japan).

Under the auspices of the EAST-I program initiated and supervised by AP-CREAMS, scientists from Japan, Korea and Russia have carried out many successful cruises in the East Asian marginal seas over the last 5 years. With the active discussion and promotion by AP-CREAMS of a new EAST-II program focusing on the Yellow and East China Seas, the workshop provided a forum to summarize some important results obtained by the international cooperative efforts of EAST-I. Thirteen oral and 7 poster papers on hydrography, circulation, biogeochemistry, and ecology and their variability in East Asian marginal seas in the PICES area and on the effects of climate and long-term changes in the abiotic and biotic environments of this region were presented. Presentations and discussion on the Supplement to the 2010 North Pacific Ecosystem Status Report (NPESR) were included in the agenda. Around 30–35 persons attended the workshop. For more details, see the Sessions Summary section of the PICES 2011 Annual Report.

AGENDA ITEM 6

AP-CREAMS activity to complete the 2010 NPESR

In response to Science Board’s decision at PICES-2010, AP-CREAMS was charged with the task of completing the chapter not included in the 2010 North Pacific Ecosystem Status Report (letter of December 21, 2010 from Dr. John Stein, Science Board Chairman). An Advisory Panel *ad hoc* committee consisting of Drs. Toshitaka Gamo and Joji Ishizaka (Japan), Kuh Kim and Chang Keun Kang (Korea), and Vyacheslav Lobanov and Yury Zuenko (Russia) was formed at the AP-CREAMS meeting on April 18, 2011, in Hangzhou, China. The following series of activities and decisions was taken by the Committee:

- June 17, 2011 – the 1st *ad hoc* Committee meeting (Busan, Korea) to discuss contents, lead and contributing authors, expected volume, schedule for implementation;
- Sept. 1, 2011 – a 2nd *ad hoc* Committee meeting (Busan, Korea) to discuss the first draft and identify any missing items;
- Oct. 7, 2011 – the Supplement to the NPESR submitted to AP-CREAMS;
- Oct. 14, 2011 – Discussion and approval of the Supplement to the NPESR at W4 and AP-CREAMS meeting at PICES-2011 in Khabarovsk, Russia.

A table of contents of the Supplement to the 2010 North Pacific Ecosystem Status Report is appended in *AP-CREAMS Endnote 3*. The full draft of the report was submitted separately to AP-CREAMS. The revised draft is a result of the collective works of more than 80 contributing authors and is more than 300 pages long.

Taking into consideration a progress report presented by the *ad hoc* committee workshop, and comments and suggestions during the discussion at the W4 workshop at PICES-2011, AP-CREAMS came to the following decisions:

- to approve the revised draft of the Supplement to the 2010 NPESR prepared by the *ad hoc* committee;
- to take into account the comments and recommendations by the W4 participants and to charge the *ad hoc* committee to make corresponding corrections and editing of the presented revised draft to plan printing of the Supplement within 6 month since its approval by Science Board.

AP-CREAMS opened the meeting to general audience. After few comments on the scientific contents of the draft, prepared and submitted by *ad hoc* committee, the naming issue was mentioned by one of the audience

AP-CREAMS-2011

members in regard to the AP-CREAMS report to Science Board. The Advisory Panel members agreed not to discuss it because it was not a scientific issue.

AGENDA ITEM 7

Activities planned for 2012 and beyond

- EAST-I (Russia-Korea joint cruise in October 2012),
- EAST-II (Cruises in July/August 2012),
- Symposia during the 6th PEACE Symposium, Nagoya, Japan (+ 9th KJWOC?) December, 2012 (travel support from PICES),
- Next AP meeting in spring 2012 in Yeosu, Korea,
- Workshop and Summer School on “*Ecosystem modeling*” in 2014,
- Joint remote sensing training with NOWPAP in 2013 or 2014.

AGENDA ITEM 8

Funding requests

AP-CREAMS requests PICES support for:

- 2 invited speakers to attend CREAMS/PICES session at the 6th PEACE Symposium in December 2012 in Nagoya, Japan;
- a Workshop and Summer School on “*Ecosystem modeling*” in 2014;
- Joint remote sensing training course with NOWPAP in 2013 or 2014.



Participants at the AP-CREAMS workshop (W4) and meeting at PICES-2011 in Khabarovsk, Russia (back row: left to right), Vyacheslav Lobanov, Chan Hong Park, Kyung-Ryul Kim, Joji Ishizaka, Yury Zuenko, Tomoharu Senju, Toru Suzuki, (front row: left to right) Kyung-Il Chang, Toshitaka Gamo, Pavel Tishchenko, David Checkley, and Kuh Kim.

AP-CREAMS Endnote 1

AP-CREAMS participation list

Members

Kyung-Il Chang (Korea)
David Checkley (USA)
Toshitaka Gamo (Japan)
Joji Ishizaka (Japan, Co-Chairman)
Kyung-Ryul Kim (Korea, Co-Chairman)
Vyacheslav Lobanov (Russia, Co-Chairman)
Pavel Tishchenko (Russia)
Dongfeng Xu (China)
Yury Zuenko (Russia)

Observers

up to 25 observers

AP-CREAMS Endnote 2

AP-CREAMS meeting agenda

1. AP-CREAMS tasks
2. Meetings in 2011
3. Research activities in 2011
4. Capacity building
5. Workshop at PICES-2011
6. AP-CREAMS activity to complete the 2010 NPESR
7. Activities planned for 2012 and beyond
8. Funding requests

AP-CREAMS Endnote 3

**A table of contents of the revised draft of the Supplement to the 2010 North Pacific Ecosystem Status
Report prepared by AP-CREAMS, October 7, 2011**

Foreword

Highlights

I. Climate and Physical Ocean

Atmosphere and Surface Fluxes

Sea Level

Surface Mixed Layer

Temperature and salinity

Circulation and Currents

Hydrography and Fluxes in the Straits

Mesoscale Eddies

Coastal Upwelling and Cross Shelf Exchanges

Sea Ice

II. Chemistry

Chemical tracers in seawater

Biogeochemical Aspects/Features/Issues

Pollution

III. Phytoplankton and Macrophyte

Seasonal variability of satellite chlorophyll-a and primary production

ENSO scale variability phytoplankton

Decadal scale variability of phytoplankton

Recent variations of satellite chlorophyll-a

Other Factors influencing phytoplankton

Seaweed in Japanese Coast

Seaweed in Russian Coast

Seaweed in Korean Coast

Harmful Algae Bloom of *Cochrodinium polykrikoides*

Bloom of giant jellyfish *Nemopilema nomurai*

IV. Zooplankton

Southwestern Japan/East Sea (SJES)

Northwestern Japan/East Sea (NJES)

Regional comparison of zooplankton community in relation to climate change

Jellyfish

V. Fish and Invertebrate

Nekton and macrobenthic communities

Key species

Response of fish and invertebrates to climate changes

VI. Birds and Mammals

Marine Birds

Pinnipeds

Cetaceans

(in total: 314 pages, 83 contributing authors)

Report of the Advisory Panel on *Marine Birds and Mammals*

Opening

The meeting of the Advisory Panel on *Marine Birds and Mammals* (AP-MBM; under the auspices of BIO Committee) was held from 09:00–12:30 h on October 16, 2011 in Khabarovsk, Russia. The business meeting focused on completion of a new Activity Plan and the associated foci for AP-MBM under FUTURE, including discussion of future workshops and topic sessions in 2012 and 2013.

AGENDA ITEMS 1 AND 2

Call to order and review agenda

Drs. Yutaka Watanuki and Rolf Ream, new Co-Chairs of AP-MBM, called the meeting to order and welcomed members and observers (*AP-MBM Endnote 1*). AP-MBM members representing Canada, Japan, and USA were present. AP-MBM forwarded its request to BIO that all PICES member countries send delegates to PICES Annual Meetings and AP-MBM business meetings, and that China and Korea nominate members to the AP-MBM. Specifically, AP-MBM asked BIO to recommend that an additional member be added to the AP-MBM from Korea. Dr. Seok-Gwan Choi, representing Korea, has been a regular and active observer and participant at past AP-MBM meetings (*e.g.*, at PICES Annual Meetings and ESSAS OSM). The agenda was reviewed and approved (*AP-MBM Endnote 2*).

AGENDA ITEM 3

Reports from members

Dr. Hidehiro Kato (Japan) reported on his activities as the PICES liaison to the International Whaling Commission (IWC; *AP-MBM Endnote 3*). The AP thanked Dr. Kato for his efforts to integrate PICES science in the IWC science-policy arena, and recommends to BIO that Dr. Kato remain as the PICES liaison. The AP also recommended to BIO that PICES support a request to IWC to include a seabird observer in the IWC POWER cruise (see *AP-MBM Endnote 3*). This sighting survey in the North Pacific covers a large geographic area, and will help meet the objectives of the new AP-MBM Activity Plan by providing valuable at-sea distribution data for seabirds. Drs. William Sydeman (USA) and Rob Suryan (USA) will lead efforts to organize activities and obtain support for seabird observer(s) on this cruise should a request be approved by IWC.

AGENDA ITEM 4

Discussions

a. *AP-MBM Terms of Reference*

In response to the PICES integrative science program, FUTURE, revised Terms of Reference (TOR) for AP-MBM were presented, discussed, amended, adopted, and were submitted to BIO for approval. The revised Terms of Reference are provided (*AP-MBM Endnote 4*).

b. *AP-MBM Activity Plan*

The AP-MBM Co-Chairs presented a newly developed 3-year Activity Plan for discussion with AP members and observers. This plan of action was developed explicitly to support and promote the goals of FUTURE's Science Plan. During a ½-day Workshop on “*Comparative analyses of marine bird and mammal responses to climate change*” hosted by AP-MBM during the PICES/ICES ESSAS Open Science Meeting (Seattle, USA, May 2011), a number of topics were developed for possible inclusion in the Activity Plan. Potential topics

AP-MBM-2011

were circulated to AP-MBM members for ranking, and Spatial Ecology and Conservation was selected as the basis of the new Activity Plan. The primary objectives of AP-MBM under this topic are to:

- i. Synthesize distribution data of MBMs and its temporal change in the North Pacific based on boat-based surveys, remote tracking, and terrestrial surveys).
- ii. Examine the physical and biological factors that correspond to the distribution and abundance of MBM and their ecological/economic (fisheries) hot spots.
- iii. Provide information on important ecological areas in the PICES regions to facilitate understanding and sustainable use of marine resources.

Briefly, during 2012–2014, AP-MBM plans to summarize information on the distribution and movement of multiple species of MBMs that would be useful for identifying important (for productivity, biodiversity, fisheries) and vulnerable (because of climate and anthropogenic impact, including fisheries and pollution) ecological areas in the PICES region. This will help us understand the spatial and temporal dynamics responsible for variable habitat use (*i.e.*, biological hotspots). Knowledge of MBM use of ecological important areas, now and in the future, will contribute to the FUTURE mission of understanding climate change and anthropogenic impacts on marine ecosystems in the PICES region.

The AP reiterated its primary mission to provide advice to the PICES community about the role of marine birds and mammals in North Pacific marine ecosystems. Secondly, the AP exists to ensure that seabirds and marine mammals are included in all PICES-related ecosystem research, including forecasting, and outreach and communications. The new Activity Plan was approved by the AP-MBM (*AP-MBM Endnote 5*).

c. Introduction of Topic Session S2 at PICES-2011

Dr. Rob Suryan (USA) introduced the upcoming BIO/POC Topic Session (S2) entitled “*Mechanisms of physical-biological coupling forcing biological “hotspots”*”, to be held October 18, 2011. This is a joint theme session of PICES/ICES that was proposed by AP-MBM. The session will examine the physical and biological oceanographic factors that correspond to ecological or economic “hotspots” in the North Pacific and North Atlantic and their marginal seas. Dr. Kaoru Hattori presented a preview of her presentation to the AP on her research on Steller sea lions. Takashi Yamamoto (Japan) also presented a preview of his presentation on seabird “hotspots in Japan.

A report summarizing the presentations and conclusions was prepared by the co-convenors following the session, and is included in the Sessions Summary section of the 2011 PICES Annual Report at http://www.pices.int/publications/annual_reports/Ann_Rpt_11/2011-Session-sum.pdf.

d. Review of topic session proposal for PICES-2012

AP-MBM discussed a proposed topic session (*AP-MBM Endnote 6*) which was submitted to BIO earlier this year for inclusion in the PICES 2012 Annual Meeting in Hiroshima, Japan. The proposal is titled, “*Spatial patterns of anthropogenic stressors: predators as sentinels of marine ecosystem health*”, and was developed explicitly to address the theme description (*Effects of natural and anthropogenic stressors in the North Pacific ecosystems: Scientific challenges and possible solutions*) for the PICES Annual Meeting. AP-MBM members, Dr. Peter Ross (Canada) and Dr. Yutaka Watanuki (Japan), would serve as co-convenors of this topic session if approved by BIO and Science Board.

e. Potential inter-session workshop

To enhance the science needed to address our selected focal area of Spatial Ecology and Conservation, AP-MBM members and observers discussed the value of a 2-day inter-session technical workshop on methodology (including modeling, analysis) to derive “hotspots” of seabird and marine mammal aggregations or diversity. This workshop would emphasize methods to synthesize disparate bird and mammal distribution and abundance data (*e.g.*, how to combine tracking and shipboard observations) and key product development, such as the making of an Atlas (potentially entitled “*Hotspots of Marine Birds and Mammals in the North*

Pacific”) of important and vulnerable areas based on these distributional data. This could be a key product of new AP-MBM activities.

f. Possible topic sessions for PICES-2013

Potential workshop/topic sessions for 2013 PICES Annual Meeting in Canada were discussed. A topic session on modeling change in the distribution and range of marine birds and mammals relative to climate change and isothermal displacements and other anthropogenic stressors was selected for development; Dr. Sydeman (USA) will take the lead in preparing a blurb on this potential topic.

g. Proposal for a Study Group

Due to advances in knowledge on the distribution, abundance, and food habits of marine birds and mammals, there was interest in updating PICES Scientific Report No. 14 (2000), *Predation by marine birds and mammals in the subarctic North Pacific Ocean*. Additionally, there has been an increased interest in the roles of large predatory fish in the World’s oceans. The utility and feasibility of an updated report that also incorporates information on prey consumption by large predatory fish, was discussed by AP-MBM. A potential Study Group was proposed (*AP-MBM Endnote 7*) to further address these topics, along with possible participants, and required resources. The proposed 1-year Study Group, co-chaired by Drs. George Hunt and Hidehiro Kato, would:

- 1) Assess the feasibility of conducting a full update of PICES Scientific Publication 14 with the addition of information on prey consumption by large predatory fish;
- 2) Identify potential candidates from PICES member countries with the required expertise;
- 3) Assess the financial and temporal resources necessary to complete such an update;
- 4) Provide, by the 2014 PICES Annual Meeting, a report to the BIO Committee and AP-MBM detailing the above findings of the Study Group.

(The proposal for new Study Group was later changed to a workshop proposal for PICES-2012 on the same theme according to Science Board suggestion.)

AP-MBM-2011

AP-MBM Endnote 1

AP-MBM participation list

Members

Seok-Gwan Choi (on behalf of Korea)
Kaoru Hattori (Japan)
Hidehiro Kato (Japan)
Rolf Ream (USA, Co-Chairman)
Peter Ross (Canada)
William Sydeman (USA)
Yutaka Watanuki (Japan, Co-Chairman)

Observers

George Hunt (USA)
Taro Ichii (Japan)
Robert Suryan (USA)
Atsushi Tsuda (Japan)
Takashi Yamamoto (Japan)

AP-MBM Endnote 2

AP-MBM meeting agenda

1. Call to Order – Review Agenda (modify as needed)
2. Introductions - meeting participants, new members of PICES community
3. Reports from members
4. Discussions
 - a. Review AP-MBM Terms of Reference
 - b. Review AP Activity Plan, Spatial Ecology and Conservation
 - c. Introduction of Topic Session S2 at PICES-2011
 - d. Review 2012 workshop/topic session proposal and identify possible participants and speakers
 - e. Long term strategic plan; link with FUTURE, other committees, potential workshop, topic session
 - f. Discuss and identify possible PICES-2013 proposal topics and the leaders
 - g. Proposal for a Study Group
5. Wrap-up

AP-MBM Endnote 3

Report of PICES Liaison to International Whaling Commission

PICES Observer Report on the 63rd IWC Scientific Committee Meeting

Hidehiro Kato

Tokyo University of Marine Science and Technology, Tokyo 104-8477, Japan

The 63rd scientific committee meeting (SC) of the International Whaling Commission (IWC) was held at Tromsø, Norway from May 30 to June 11, 2011. A total of 187 scientists, including 118 from 25 contracting governments, 42 invited experts, 8 observers from 4 international organizations (ACCOBAMS, IUCN, NAMMCO and PICES), 15 local scientists and 4 others participated this year annual meeting. PICES was especially welcomed by the IWC/SC. For the management of cetacean stocks, which is most important task for the committee, the SC explored improvement of management methods for cetacean stocks after the enforcement of the commercial whaling moratorium in 1985, and had already agreed with the scientific basis of RMP (Revised Management Procedure) in 1996 through long time endeavors by many scientists. The IWC/SC is continuing work on checking its performance and implementation trial of the RMP for the stocks after the completion of comprehensive assessments on respective large cetacean stocks.

This year following topics were noted:

1. RMP implementation

For the RMP implementation, the IWC/SC has focused on western North Pacific Bryde's whale, North Pacific common minke whale, North Atlantic fin whale and North Atlantic common minke whale stocks, and the SC continued to precede their protocol based on the agreed process. In the North Pacific region, it was agreed by the SC that the implementation review, which is the most advanced stage, would be started in 2012 for western North Pacific Bryde's whales and it is also expected to go for implementation review for North Pacific minke whales in the near future.

2. Comprehensive assessment

Under the comprehensive assessment (CA), this year the IWC/SC continued reviewing the stock status of southern blue and humpback whales in the southern hemisphere and right whales, including northern and southern hemisphere populations. Among them, the humpback whale CA is in the most advanced stage and it is expected to be completed by 2013. The CA for the Antarctic minke whales has well developed assessments this year, with a focus on comparison of population abundance and its trend between different stock assessment models (The OK and The SPLINTER); the differences between two estimators has decreased and their population status differed by local regions.

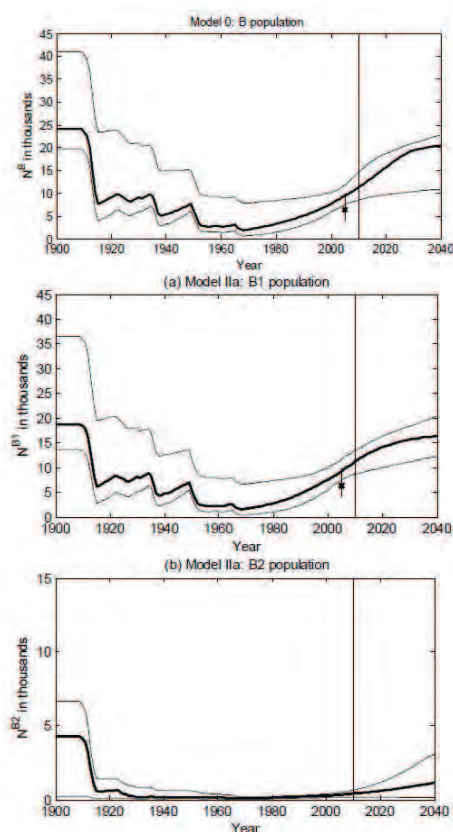


Fig. 4. Median trajectory (solid line) and 90% probability interval (long dashed lines) for the Model 0 reference case (top) and IIa reference case (B1 stock: middle, B2 stock: bottom). The trajectories to the right of the vertical dashed line are projections into the future under the assumption of zero catch. A MARK generated sighting-resighting abundance estimate (x) and 95% confidence interval (vertical line) for Gabon is presented for comparison. See SC 63-Rep6 for details.

Management of aboriginal and subsistence whaling

The IWC/SC has managed ongoing aboriginal and subsistence whaling using the AWMP (Aboriginal and subsistence whaling management scheme) which includes bowhead whale stocks in the Arctic region, fin whale, minke whale and humpback whale stocks of western Greenland, humpback whale off St. Vincent and the Grenadines, and Eastern stock of gray whales of Chukoto. Through examinations of updated scientific information, the SC concluded that the present catch levels for these respective stocks would not harm the stocks.

3. Western gray whales

The western gray whale is noted as a highly depleted stock, with a population size around 120 individuals. The IWC/SC received a very interesting report that a Russian-US research team, in cooperation with the IWC/SC, tried satellite tracking on a large male in the Summer of 2010. Of particular note was that the animal crossed the Okhotsk Sea and southern parts of Bering Sea, and consequently reached the West Coast of North America.

4. Environment issues

For environment issues around cetacean stock managements, the IWC/SC has two working groups (E, Environmental concern; EM, ecosystem modeling), and a number of matters related to environmental factors that affect cetaceans were discussed. This year progress on the following issues were reviewed in the E Working Group:

- 1) Status of the cetacean Environment Report (SOCER),
- 2) Update on POLLUTION 2000+ Phase II,
- 3) Cetacean emerging and resurging disease (CERD),
- 4) Review new information on anthropogenic sound,
- 5) Review progress on work from the 2nd Climate Change Workshop (January 2010, Arctic and other seas) and Workshop on Small Cetaceans and Climate Change (November 2010).

For ecosystem modeling, the EM Working Group dedicated its time to three general tasks:

- 1) Review recent work in ecosystem modeling,
- 2) Discuss how ecosystem models can be used in the work of the Committee,
- 3) Review issues relating to ecosystem modeling.

Under item (1), ecosystem modeling in the North Pacific was reviewed by an invited US modeling scientist. He noted particularly (a) advances in statistical fitting procedures using Ecosim models; and (b) recent developments in end-to-end ecosystem models, focusing on biological models built within the Regional Oceanographic Models (ROMS) framework. The SC welcomed his review.

5. North Pacific Sighting survey cruise (IWC/POWER cruise)

It was agreed the comprehensive cetacean sighting survey project would commence in summer 2010 under cooperation between Japan, Republic of Korea and United States under the auspices of the IWC. The project includes line transect sighting for estimating population abundance, biopsy skin-sampling, and photo ID for stock structure on major large cetaceans. It was also agreed for the years 2011 onwards, that the project will be conducted by the IWC/SC directly as its own middle- to long-term research project. The project was renamed as "Pacific Ocean Whale and Ecosystem Research (POWER)" project this year. It was reported that the 2010 POWER cruise was successfully conducted; it was particularly noted that there were a considerable number of biopsy and photo ID samples from humpback, fin and blue whales in addition to many sighting of sei whales. Survey area has been agreed upon for 2010 to 2012, as shown in the figure below, and the survey in future years will be conducted in lower latitudes between 40°N to 30°N east of 160°E.

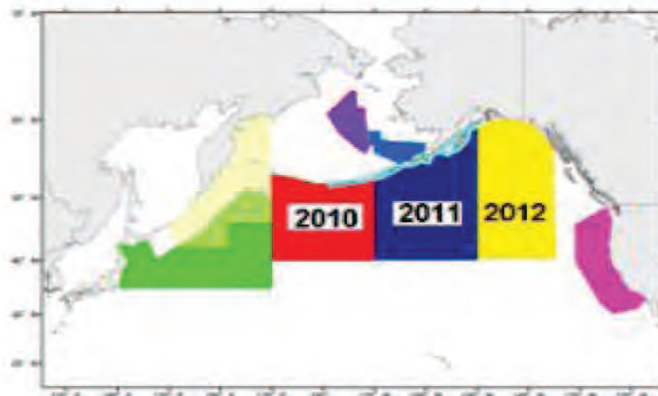


Fig. 5. Recent surveys in the North Pacific. The 2010 and 2011 IWC/Japan Joint Cetacean Sighting Survey research areas are shown in red and dark blue, respectively and the proposed area for 2012 is in yellow. These areas have not been surveyed previously. Other coloured areas represent surveys conducted in the North Pacific in relatively recent years: in 1999 (purple) and 2000 (blue) by Moore *et al.* (2002), in 2001-2003 (sky blue) by Zerbini *et al.* (2006), in 2001 and 2005 (pink) by Barlow and Forney (2007), in 2005 (light yellow) by Miyashita (2006). Sighting surveys have been conducted in the green area since 1994 as a part of JARPEN II (Pastene *et al.*, 2009).

6. Other issues

The IWC/SC also covers relevant issues on small cetaceans, whale watching, by-catch, humane-deduced mortality, *etc.* as in other previous years.

7. Next year's meeting

The next annual meeting of the IWC/SC will be held at Panama City, Panama during two weeks in mid June 2012. The IWC meeting will be also held at Panama City in mid July 2012.

AP-MBM Endnote 4

Terms of Reference (revised 2011.10.10)

1. Provide information and scientific expertise to BIO and the FUTURE Program, and, when necessary, to other scientific and technical committees with regard to the biology and ecological roles of marine mammals and seabirds in the PICES region.
2. Identify important problems, scientific questions, and knowledge gaps for understanding the impacts of climate change and anthropogenic factors on MBMs in ecosystems of the PICES region through Workshops, Theme Sessions and Science Reports.
3. Assemble information on the status and key demographic parameters of marine mammals and seabirds and contribute to the Status Reports.
4. Improve collaborative, interdisciplinary research with marine mammal and seabird researchers and the PICES scientific community.

Co-Chairs: Rolf Ream (USA), Yutaka Watanuki (Japan)

Marine birds and mammals (MBMs) are: 1) highly mobile and their movement and distribution are easily observed from above the sea; 2) important marine top predators that consume substantial amounts of forage prey; and 3) susceptible to the changes in marine food web structure and productivity, and to a variety of anthropogenic impacts, so they are believed to be sentinels of ecosystem health. Incorporating these characteristics of MBMs, and the objectives of FUTURE, we propose Spatial Ecology and Conservation as the topic of priority for AP-MBM 2012–2014 activities. Terms of reference are revised accordingly (see *AP-MBM Endnote 4*).

Here we 1) describe the rationale of this topic, 2) summarize related past activities, and 3) describe potential activities or products to be accomplished by AP-MBM.

Topic summary (2012–2014): Spatial Ecology and Conservation

Leaders: Rolf Ream (USA), Yutaka Watanuki (Japan), Robert Suryan (USA, non-member),

Rationale

Marine birds and mammals (MBMs) are not distributed evenly and aggregate at various temporal and spatial scales due to physical forces, biochemical factors, patchiness of their prey, behavioral and social factors, and the spatial dynamics of marine ecosystems. Thus coupling their distribution at sea with physical and biological factors is a subject of great interest and importance (Coyle *et al.* 1992, Hunt *et al.* 1993, and many others).

Research on the distribution and movement of MBMs in marine ecosystems can be relatively easy to accomplish and provides useful information for marine spatial planning and management (LME, IBA, IEA, and MPA; Hyrenback *et al.* 2000, Louzao *et al.* 2009, Worm *et al.* 2003, Hooker 2008). Additionally, identification of biological hot spots, where abundance and/or biodiversity is high, and elucidating the mechanisms, through the combination of biological (movement of MBMs and primary production) and physical information, that are responsible for establishing and maintaining (spatial and temporal stability/frequency) the hotspots, is critical for fisheries and conservation of MBMs.

Related past activities of MBM-AP

BIO (AP-MBM) co-sponsored the topic session titled, “*Hot spots and their use by migratory species and top predators in the North Pacific*” at the PICES Annual Meeting in 2004. The related papers were subsequently published in Deep Sea Research II (2006). BIO (AP-MBM) and POC co-sponsored the topic session titled, “*Mechanisms of physical-biological coupling forcing biological hotspots*” at PICES-2011. Due to advancements in tracking techniques, studies on the movements of MBMs and the factors affecting their distributions have progressed substantially (Pinaud *et al.* 2005, and many others). At-sea bird and mammal census data are also accumulated and analyzed with the aid of new spatial statistics (Louzao *et al.* 2009 for an example).

Activity plan

In three years (2012–2014) AP-MBM will: 1) synthesize distribution data of MBMs (boat-based, tracking, and terrestrial surveys) and its temporal change, 2) examine physical and biological factors that correspond to ecological/economic (fisheries) hot spots, and 3) provide information on important ecological areas in the PICES regions to facilitate sustainable use of marine resources. These efforts will be useful for identifying important (for productivity, biodiversity, fisheries) and vulnerable (because of climate and anthropogenic impact including fisheries and pollution) ecological areas in the PICES region and to help understand the spatial and temporal dynamics responsible for variable habitat use (*i.e.*, biological hotspots). Knowledge of

MBM use of ecologically important areas, now and in the future, will contribute to the FUTURE mission of understanding climate change and anthropogenic impacts on marine ecosystems in the PICES region.

Time schedule

2012: PICES Annual Meeting, Hiroshima, Japan

Business Meeting: ½ day

Proposed topic session: *Spatial patterns of anthropogenic stressors: predators as sentinels of marine ecosystem health* (Convenors: Peter Ross, Yutaka Watanuki)

2013: Potential inter-sessional workshop (location to be determined)

A 2-day workshop on methodology of data analysis and modeling of at-sea spatial data, and for standardization of mapping efforts. This workshop would emphasize methods to synthesize disparate bird and mammal distribution and abundance data, and to standardize development of key products, such as an atlas of important and vulnerable areas based on their distributional data.

2013: PICES Annual Meeting, Nanaimo, Canada

Business Meeting: ½ day

Potential workshop and topic session: *Modeling changes of distribution and ranges of MBMs in relation to climate change and anthropogenic impact*

2014: PICES meeting.

Business Meeting: ½ day

Potential workshop and topic session: Synthesize the data and make an atlas of important and vulnerable areas using distribution of MBMs. Proceedings and PICES Science Report (Ream, Suryan, Watanuki)

AP-MBM Endnote 6

Proposal for a ½ day BIO Topic Session at PICES-2012 “*Spatial patterns of anthropogenic stressors: Predators as sentinels of marine ecosystem health*”

[later renamed as “*Environmental contaminants in marine ecosystems: Seabirds and marine mammals as sentinels of ecosystem health*”

Coastal developments (urban, industry) and pollutants (heavy metals, POPs, plastics, oil spill, radiation) can have detrimental effects on a variety of marine resources in coastal and offshore areas. It is increasingly important to identify sources, subsequent transport through marine physical systems and resulting spatial patterns of these anthropogenic stressors. Compared to river-lake systems, knowledge of anthropogenic stressors in marine systems is relatively lacking due to difficulties with detection over broad areas and in offshore regions. Because marine organisms, especially top predators (marine mammals and seabirds), bio-magnify these stresses, these organisms can be used as bio-indicators. Their usefulness will be discussed at MEQ Workshop PICES 2011. This session will 1) identify spatial patterns and geographic areas of concern (high concentrations) of anthropogenic stressors (pollutants etc) in the PICES region using bio-indicators, 2) examine mechanisms of transport, and ultimate disposition, of stressors in marine ecosystems, and 3) discuss possible health effects on predators and human consumers. Review papers, case studies, and innovative methods papers on anthropogenic stressors in marine predators are invited, as are papers that distinguish between the effects of natural and anthropogenic stressors. In particular, studies linking predator habitat use with spatial aspects of stressors in the environment and in predators are encouraged. Funding is requested for 1-2 invited speakers.

Sponsoring Committee: BIO (AP-MBM)

Potential Co-sponsors: MEQ, FUTURE, ICES, GESAMP, WG28, Japan Science Promotion Society (grant to Y. Watanuki; funding available for 1–2 scientists to attend)

Convenors: Peter Ross (Canada), Yutaka Watanuki (Japan)

Potential invited speakers: H. Takada (POPs; Japan), A. Watanabe (marine plastics; Japan), J. Elliot (POPs; Canada), G.M. Ylitalo (marine contaminants; USA)

Output: Proceedings or a review paper

AP-MBM Endnote 7

Proposal for a 1-day Workshop at PICES-2012 on “*The feasibility of updating PICES Publication 14 on Prey Consumption by marine birds, marine mammals, with the addition of prey consumption by large predatory fish in the PICES regions*”

[later renamed as “*The feasibility of updating prey consumption by marine birds, marine mammals, and large predatory fish in PICES regions*”]

Sponsoring Committee: BIO (AP-MBM)

Proposed Convenor: George Hunt (USA; not presently a member of AP-MBM), Hirohito Kato (Japan)

Proposed participants: Selected members of AP-MBM-AP, appropriate fish experts

Rationale:

It is now 12 years since the publication of PICES Scientific Report No. 14, Predation by marine birds and mammals in the subarctic North Pacific Ocean (2000, edited by Hunt, G.L. Jr., Kato, H. and McKinnell, S.M.). This publication remains the sole overview of the trophic requirements and roles of marine birds and mammals for the North Pacific, and has been a much used by a wide variety of scientists and managers interested in modeling or understanding the roles of marine birds and mammals. As of October 16, 2011, Google Scholar lists 49 citations of this PICES publication.

PICES Scientific Report No. 14 is now considerably out of date. In the time since its publication, our knowledge of the distribution and abundance of marine birds and mammals has advanced greatly, as has our knowledge of the food habits of a number of species. For a number of species there exist updates on numbers and distributions, and on changes in numbers in the past decades. Additionally, there has been an increased interest in the roles of large predatory fish in the World’s oceans. Thus it would seem timely to update PICES Scientific Publication No. 14, and, if interest exists, include information on prey consumption by large predatory fish.

The update of PICES Scientific Report 14 will be of value to both scientists and managers in PICES member countries, as well as to the work of expert groups in PICES that are responding to the needs of FUTURE. Knowing the distribution, abundance and prey needs of top predators is the fundamental first step in assessing their role in marine ecosystems, in assessing how their roles may change as climate change and other stressors (natural and anthropogenic) impact marine ecosystems, and in planning for their conservation. AP-MBM will need this information to provide advice to other segments of the PICES community. The data presently assembled in PICES Scientific Report No. 14 is now sufficiently out of date as to be misleading. Thus, an update is timely.

The proposed 1-day Workshop would:

- 1) Assess the feasibility of conducting a full update of PICES Scientific Publication No. 14 with the addition of information on prey consumption of large predatory fish;
- 2) Identify potential candidates from PICES countries with the required expertise;
- 3) Assess the financial and temporal resources necessary to complete such an update;
- 4) Provide a report to the BIO Committee and AP-MBM detailing the above findings.

Requirements of the Workshop: A full day meeting is required during the 2012 PICES Annual Meeting in Japan. To ensure the attendance of at least one expert on large predatory fish, the Workshop would require travel support for one person with appropriate fish expertise.

Joint PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Science*

Executive Summary

ICES and PICES are the major intergovernmental marine science organisations in the northern hemisphere, coordinating and steering activities of 23 countries, three of which are members of both organisations (Canada, USA and Russia). ICES and PICES have established a number of cooperative arrangements that include co-sponsored symposia, working groups, sessions in each others Annual Science Conferences and capacity building exercises. These are largely developed in response to the drive and synergy of scientists in the networks, and in the absence of a formal plan for cooperation. This document provides a framework for these cooperative activities to be developed, implemented, steered and managed, based on ICES and PICES needs and aspirations, The framework was developed by a study group on strategic planning, and will guide scientists and officers from both organisations in the development of this ongoing and expanding cooperation.

1 Background

ICES (International Council for the Exploration of the Sea) and PICES (North Pacific Marine Science Organization) are the major international intergovernmental marine science organizations in the northern hemisphere, with primary interests in the temperate and sub-Arctic regions of the Pacific and Atlantic Oceans, poleward of approximately 30°N. Both organizations have a responsibility to promote and to coordinate marine scientific research in their respective jurisdictions, and to promote the collection and exchange of information and data related to marine scientific research.

In recognition of shared interests and a desire by both organizations to facilitate and enhance cooperation between them, a Memorandum of Understanding (MOU) was signed in 1998 (Appendix 1) to provide a general framework for cooperation. The MOU specifies that the organizations should consult regularly on ways in which co-operation between them can be further improved and extended. The establishment of the P/ICES Study Group on *Strategic Planning* is consistent with principles of cooperation described in the MOU. The Study Group was established to develop a formal framework for cooperation between ICES and PICES to serve as the basis for linkages of our science plans and longer-term strategic planning. Its terms of reference are:

- 1) To review their organization's existing and planned scientific activities to identify scientific themes that could potentially benefit from the other's involvement in these activities.
- 2) To list potential areas of cooperation.
- 3) To convene a meeting/workshop to:
 - a) Improve understanding of the science activities of each organization;
 - b) Review scientific topics from TOR (1) to identify areas of common interest;
 - c) As an example of recent cooperation, review progress of the joint Working Group on *Forecasting of Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS) established in 2008;
 - d) Develop a framework for cooperation between ICES and PICES that lists categories of joint activities and the rationale for each, including the benefits to each Organization from the joint activity; identify priorities for joint activities within categories;
 - e) Recommend processes for implementing TOR (3d);
 - f) Recommend approaches to develop a strategic plan for cooperation and mechanisms to periodically update that plan.
- 4) The Co-Chairmen will prepare a final Study Group report for distribution by the P/ICES Secretariats by August 2011.

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Membership from ICES includes: Manuel Barange (Chair SCICOM, co-Chair P/ICES SGSP), Adi Kellermann (ICES Secretariat), Begoña Santos and Mark Dickey-Collas (SCICOM representatives)

Membership from PICES includes: Sinjae Yoo (Chairman, Science Board), Skip McKinnell (PICES Secretariat), Thomas Therriault and Hiroaki Saito (Science Board members).

The Study Group met first during the ICES ASC in Nantes, France, September 21, 2010 to plan their work. Most SG members were present as were some invited guests (from ICES: Jürgen Alheit, Germany; Bill Karp, USA and from PICES: Anne Hollowed, USA; Suam Kim, Korea). The SG met again immediately prior to the PICES Intersessional Science Board meeting in Honolulu, USA, April 29, 2011. This draft Study Group report was developed by correspondence for consideration by the ICES Scientific Committee and PICES Science Board and, when approved, to the ICES and PICES science communities for guidance.

2 Organisational structure and procedures

2.1 ICES

The International Council for the Exploration of the Sea (ICES) coordinates and promotes marine research on oceanography, the marine environment, the marine ecosystem, and on living marine resources in the North Atlantic. Members of the ICES community now include all coastal states bordering the North Atlantic and the Baltic Sea, with affiliate members in the Mediterranean Sea and southern hemisphere.

ICES is a network of more than 1600 scientists from 200 institutes linked by the ICES Convention to add value to national research efforts. Scientists working through ICES gather information about the marine ecosystem. Besides filling gaps in existing knowledge, this information is developed into unbiased, non-political advice. It is ICES vision to be an international scientific community that is relevant, responsive, sound, and credible concerning marine ecosystems and their relation to humanity. ICES mission is to advance scientific capacity to give advice on human activities affecting, and affected by, marine ecosystems.

ICES was established on 22 July 1902 in Copenhagen, Denmark, by eight founding nations, as the result of a concern growing during the late 19th century over the well-being of fish stocks in the North Sea coupled with efforts by different groups of scientists in neighbouring countries to promote and encourage international scientific marine cooperation.

ICES operates through a system of more than 120 Expert Groups. Groups under the Science Programme produce the science needed to underpin the advice and advance marine research into new fields to support new and future advisory needs. Science groups report to several overarching and cross-cutting Steering Groups which were set up by the ICES Science Committee (SCICOM) to coordinate and align the work of the Expert Groups with the ICES Science Plan. SCICOM is empowered to speak and decide on science issues on behalf of the organization. Groups under Advice produce scientific, independent advice on fisheries management, ecosystems and environmental issues which is peer reviewed and quality assured through a system of review groups. The final advice is released through the ICES Advisory Committee which is also empowered to speak and decide on behalf of the organization. The superior decision making body is the congregation of the national ICES delegates, the Council, which meets once per year in relation with the Annual Science Conference where the work programme for a given year is drafted and decided.

2.2 PICES

The North Pacific Marine Science Organization (PICES) is the international, intergovernmental organization that is responsible for coordinating and promoting marine scientific research and scientific information exchange among its members (Canada, Japan, People's Republic of China, Republic of Korea, Russian Federation, and the United States of America). The primary area of interest to the organization is the northern

North Pacific Ocean, bounded at the south by 30°N latitude and in the north by Bering Strait. PICES was established by international convention in 1992, with a Secretariat hosted by Fisheries and Oceans Canada at the Institute of Ocean Sciences, Patricia Bay, Canada.

Two Delegates from each member country plus a Chairman elected by the Delegates form a Governing Council that is responsible for policy, general direction, and priority setting. The scientific activities of PICES are established by a network of 300 scientists, appointed by the members to serve on Standing Committees and various thematic expert groups. Governing Council is advised by its Science Board on scientific priorities for the Organization. The Science Board is formed by the chairs of the six permanent Scientific and Technical Committees and the leaders of major scientific initiatives of the Organization. Should any member country not be represented on Science Board by virtue of having a chairmanship, it can appoint a representative to serve its scientific interests.

The scientific work of PICES is conducted primarily by ephemeral Working Groups and Study Groups with 1-3 year lifespans to achieve the results described in their terms of reference. Advisory Panels and Sections provide longer-lived expert groups to maintain specific expertise within PICES. Chairmanship for expert groups is often shared by Asian and North American scientists. The Scientific and Technical Committees are responsible for the planning and direction of major disciplinary themes within the Organization. They provide general supervision to the expert groups and report their activities to Science Board.

From time to time, Science Board has provided formal scientific advice to a member country but it is not a major activity. Scientists in PICES have focused on reporting status and trends in the North Pacific and understanding the nature and consequences of global climate change. New initiatives will seek to communicate this understanding to society.

The work of the Organization is determined primarily by the scientists of the member countries. They are supported by a Secretariat that is responsible for organizing their international meetings and workshops, publishing their work, fundraising, maintaining and developing the PICES website, maintaining and enhancing relations with other international organizations, and for the day to day running of the Organization. When called upon, Secretariat leads the development of major scientific products.

3 Major scientific topics of joint interest to ICES and PICES

ICES and PICES provide governments with international fora for joint scientific research and the provision of scientific advice on marine ecosystems. The strategy should allow ICES and PICES scientists to add value to their science, provide synergies on regional and global issues, and enhance the visibility of both organisations. This Strategy should be adaptive to allow the organisations to respond to changing priorities of the science world.

The group identified 4 long-term research priority areas for the P/ICES Cooperation Strategy given the new ICES Science Program and the PICES FUTURE Program:

- a) **Climate change.** There are considerable uncertainties regarding the impact of climate change on marine ecosystems. Consideration is needed of the degree to which predicted changes in the physical and chemical environment will impact ecosystem properties. Priority ecosystem properties include productivity, habitat quality and quantity and therefore marine biodiversity, species phenology, distribution, species interactions and the sustainability of fisheries and aquaculture. Changes in the interactive nature of ocean and atmosphere dynamics also need significant consideration. The above require greater effort in improving current forecast and hindcast models, and the development of scenarios of change. Both PICES and ICES have worked independently in the past on these issues and synergy would improve the likelihood of success, and a unified northern hemisphere voice.
- b) **Ecosystem assessment (including ecosystem modelling).** The European Marine Strategy Framework Directive requires the development of indicators of ecosystem state and function for the European seas, to ensure these achieve good environmental status (GES). ICES and its member countries are developing the

scientific base for the MSFD, which relies on ecosystem assessments. PICES is developing a framework of indicators for the North Pacific, leading to a similar vision of assessing the state of ecosystems. One of the scientific challenges of these developments is the quantification of ecosystem resilience, or its ability to recover from disturbance, and the development of end-to-end modelling capability. As anthropogenic impacts such as climate change, pollution, overfishing, *etc.* impact the world's seas, resilience becomes an important attribute which will determine the resistance to irreversible changes. In the past ICES has focused primarily on the linear process of resilience erosion, while PICES has devoted significant attention to non-linear processes or regime shifts. By comparing and contrasting impacts and mitigation measures from across P/ICES areas, both organisations can progress our understanding of linear and non-linear vulnerability changes to management actions, with a view of developing ecosystem assessment principles and methodologies. Key to these methodologies is the development of ecosystem end-to-end models of diverse complexity, geographical focus and structure, to be used both as scientific tools as well as assessment tools.

- c) **Ocean acidification and hypoxia/anoxia.** Although significantly different, these phenomena require the engagement of the physical, chemical and biological oceanographic community of both organisations to tackle these issues that have been considered the “other side” of climate change. The decrease in pH in the world's oceans as a result of increased anthropogenic CO₂ dissolved in seawater has received less attention than other anthropogenic impacts but also has the potential to cause irreversible damage to many marine organisms with calcium carbonate structures. Integration of this knowledge into broader resource management frameworks appears essential. An even less appreciated but equally significant phenomenon is the observed decrease in subsurface oxygen concentrations over the shelf and coastal regions in many areas of the world, and the extension of low-oxygen “dead zones”. Combined with the observed increases in the number of hypoxia episodes (low concentrations of oxygen that result in the injury and/or death of marine organisms) in coastal environments, deoxygenation appears to be a significant process requiring basin- and hemisphere-wide attention.
- d) **Marine spatial planning.** Human pressure on coastal and oceanic ecosystems is increasing continuously through the combined impacts of pollution, overfishing, coastal developments, shipping, *etc.* Achieving sustainable use of marine resources will require the management of all these pressures. Recent policy drivers in the ICES area (European Commission review of the Common Fisheries Policy, Marine Strategy Framework Directive) require a quantum leap in the way we understand and implement spatial planning. Sharing knowledge on tools, best practices, implementation, *etc.* between both organizations is considered important.

While this list is not exhaustive, and should not limit cooperation in other areas where developments in both organisations meet (*e.g.*, bioinvasions), it provides a good focus to steer and prioritise cooperation. In addition there are operational areas in which P/ICES cooperation would be beneficial. These include training, international exposure, and data management.

- a) **Training.** ICES and PICES should promote cooperation in the training of personnel and exchange of experts. Comprehensive training is the base for future research. ICES already has a Training Programme in place which is particularly targeted at supporting science advisory needs, but includes other fields as well. This programme could provide a platform for joint training activities. Provision of training opportunities for early career scientists continues to be a priority for both ICES and PICES. Currently, the two organizations co-sponsor an annual summer school to provide technical training to scientists from less developed countries or who require special expertise. However, there are other areas in which technical or scientific training could be provided, including the potential for on-line training opportunities, and exchange of expertise should be encouraged.
- b) **Knowledge exchange/Communication.** Both organisations have avenues of communication and knowledge exchange. In the case of ICES this includes: the ICES Journal of Marine Science which is a peer review journal, the ICES Cooperative Research Reports, ICES Insight and several other miscellaneous publications, steered by a Publications and Communications Committee (PUBCOM). PICES also produces a number of scientific reports, special issues in peer review journals, PICES Press, *etc.* The Advisory Panel on *Status, Outlooks, Forecasts, and Engagement* (SOFE-AP) of the PICES

FUTURE programme is responsible for communicating FUTURE Science to a variety of audiences. There are many reasons to maintain a publication programme, including institutional exposure and the development of a public image. However, it may be advantageous for both organisations to explore in the future whether there are opportunities for shared publications when the opportunity arises (*e.g.*, joint symposia), and where exposure of ICES and PICES work would have more impact on the world stage if carried out together.

4 Implementation procedures

There are many potential mechanisms for cooperation between ICES and PICES. Such mechanisms include:

- Theme Sessions at annual meetings
- Working Groups
- Symposia
- Workshops
- Strategic Initiatives

Theme Sessions

Joint Theme Sessions have been the most common mechanism for cooperation between ICES and PICES. There are a large number of past examples of co-hosted sessions at both the Annual ICES Annual Science Conference and the PICES Annual Meeting, where the benefits of sharing research findings and expertise have been demonstrated.

To improve planning and coordination within each organization, ICES and PICES have established deadlines prior to their respective science executive meetings in the fall to allow time for a thorough review and discussion of the proposed sessions within each organization. A common deadline for each organization (September 6, 2011), set in advance of the ICES ASC, also provided an opportunity to share information on the total collection of proposed sessions, whether jointly sponsored or not. Sharing session information may lead to joint sponsorship where it was not anticipated by the proponents.

- PICES – Topic session proposals generated by scientists working under the PICES umbrella should be sent to the PICES Secretariat by the deadline. Proposals should include: a title, duration (generally full or half day), session description, list of convenors, sponsoring PICES committee(s), co-sponsoring organizations (if any), and whether (and where) a publication is intended.
- ICES – Theme session proposals may come from any scientist in the ICES science community and should be submitted to the ICES Secretariat by the deadline. It is helpful to inform the Chair of an ICES Expert Group or SCICOM Steering Group relevant to the proposal to seek its support. The proposal needs to include a concise but sharp description of the session, names of the convenors with affiliation, and its relevance to the ICES Science Plan.

The ICES SCICOM and PICES SB will evaluate and agree on cosponsoring of sessions. The agreement will consider not just the scientific excellence and appropriateness of the proposals, but also the financial constraints of funding such sessions.

Working Groups

- PICES – Working Groups in PICES are overseen by its Scientific Committees. In general, few are formed each year so effective planning is a crucial element of successfully establishing a WG. The need to establish a WG usually follows after one or a series of topic sessions and workshops that are organized on a common theme over a period of 1 year or more. Thereafter, a request for a Study Group (SG are generally 1 year in duration) can be a first step in establishing the Terms of Reference and potential membership of a Working Group, with a typical duration of 3 years. FUTURE Advisory

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Panels will review these proposals to determine their relevance and importance to the FUTURE Science Program. As a consequence of the relatively lengthy process, there is no set schedule for submitting proposals, except to note that SG/WG proposals can be brought to the attention of SB by a Committee chairman either at the inter-sessional meeting in the spring or at the annual meeting in the fall. As decisions are taken by consensus, scientists from all Member States should be consulted.

- ICES – ICES work is accomplished by various committees, expert groups, and workshops. Currently, there is an Advisory Committee (ACOM) that provides advice to clients on fisheries and marine ecosystem issues, and a Science Committee (SCICOM) (formally the Consultative Committee as established in the ICES Convention) that oversees all aspects of the scientific work. These two committees establish groups that deal with specific science and advisory topics as required. Working under ACOM are Expert Groups, Review Groups, Advice Drafting Groups, and Data/Benchmark workshops. Proposals for Working Groups are presented through one of the five Steering Groups of the ICES Science Committee. The Science Committee makes final decisions on the creation, dissolution and extension of working groups. ICES does not provide funding to activate its working groups, and therefore decisions are based exclusively on the scientific excellence, advisory need, and bottom-up drive of the proposal. From 2011 ICES working groups are given terms of reference for a 3-year period, at which point they can request extension, modification or closure, based on a self-assessment procedure.

There has been one previous example of a joint P/ICES WG. They represent one of the most effective mechanisms for cooperation when there is the need to focus on a specific topic with specific deliverables defined by terms of reference. Given the different mechanisms of implementation of working groups in ICES and PICES proposers are asked to engage at an early stage with the Secretariats of both bodies to explore ways of implementing proposals.

Symposia

ICES and PICES have co-sponsored many symposia. This is a fairly well tested cooperative approach which operates successfully (see Appendix 2). Symposia chosen must offer research and science fields of interest to both ICES and PICES. Both organisations must have scientists from their areas on the organising or science committees. Co-sponsoring sessions at international conferences can raise the profile of research being conducted by ICES and PICES.

- PICES – Proposals generated internally within PICES for jointly sponsored symposia are generally brought to the attention of Science Board by Committee chairmen at one of its two meetings during the year. The nature of the discussion often depends on whether PICES is asked to be the organizer. Normally, PICES organizes one major symposium per year in the spring. Typically, this symposium is jointly sponsored because of the financial commitments required to organize a major symposium. Organizations seeking co-sponsorship of a symposium by PICES should direct a letter of invitation to the Executive Secretary of PICES. In addition to the scientific imperative, the letter should include the names of other co-sponsoring organizations and a summary of role and financial/in-kind contributions expected of PICES. The Executive Secretary will circulate the invitation to the relevant Committees. Significant commitments of resources typically require 2–3 years advance planning.
- ICES – symposia to be co-sponsored by ICES require a special resolution category to be filled in by the conveners or organizers of the symposium and discussed at one of the two annual meetings of the Science Committee. Symposium sponsorship by ICES could consist of endorsement by ICES of the objectives and scientific excellence of the planned symposium, financial assistance, and an opportunity to use to *ICES Journal of Marine Science* as an outlet for the proceedings.

SCICOM decides on the pathways, criteria and nature of sponsorship to maintain the quality of the ICES label for sponsoring science symposia. Criteria for consideration include scientific quality, solid basis for

co-sponsorship, strategic links to ICES science and advisory priorities, sufficient time and space left before the event to accommodate planning, sound financial basis.

Requests are submitted to SCICOM for approval via the Head of Science Programme, at least 1 year in advance of the symposium in question. The SCICOM Steering Group Chair relevant to the topic should be informed as he will assist the Head of Science Programme in shadowing the symposium. The level of financial support is limited and predetermined.

Workshops

New emerging issues often demand innovative and multidisciplinary approaches. The ability to deal with and resolve new concepts is likely to be enhanced by the bringing together of ICES and PICES expertise. The recent PICES FUTURE workshop on ecosystem indicators (April 2011) is such an example, where the search for representative, easy to measure and cost-effective indicators of ecosystem status in the Pacific could be helped by the European experience on ecosystem indicators developed as part of the Marine Strategy Framework Directive.

- PICES – Proposals for jointly sponsored workshops are generally brought to the attention of Science Board by Committee chairmen. For the most part, a proposal for a workshop should resemble a proposal for a scientific session, with some additional information depending on whether it is associated with a P/ICES annual meeting local host/organizer, institute/location, dates, financial expectations of PICES (commonly for invited speakers from PICES and/or PICES convenors).
- ICES – The procedure for consideration and approval of workshops in ICES is identical to that for working groups. As for working groups ICES does not provide financial support to workshops, unless a special category 4 resolution is tabled at the annual meeting of the ICES council.

Strategic Initiatives (ICES nomenclature)/Scientific Programmes (PICES)

Strategic initiatives (SI) are new cross-cutting activities that require the engagement and participation of several organisations. They are aimed at multi-disciplinary topics that could benefit from additional coordination. In ICES such initiatives have been implemented for four areas of cooperation: Biodiversity, Climate change, Marine spatial planning and Stock Assessment methods. The SI on climate change (see below) is expected to be co-sponsored by PICES.

SI are equivalent to Scientific programmes in the PICES system, although their use has been limited.

Cooperation in the area of SI/SP on climate change is being developed and tested by the Joint ICES-PICES Strategic Initiative on Climate Change effects on Marine Ecosystems (SICCME) which aims to ensure that *“ICES and PICES will become the leading international organizations providing science and advice related to the effects of climate change and variability on marine resources and ecosystems”*. This joint activity builds on the work of the Joint Working Group on Forecasting Climate Change Impacts on Fish and Shellfish (WG-FCCIFS) and on previous activities that were developed within each organization.

Other

ICES and PICES could explore joint participation as partners in international/EU projects, providing expertise, gaining knowledge and helping to deliver sustainable management of marine systems. Collectively, ICES and PICES could also provide advice in a united manner to international bodies or committees (e.g., IPPC or RFMO).

5 Monitoring/steering cooperation

The group concludes that this framework should provide sufficient guidance to the ICES and PICES communities to develop bottom-up joint activities (section 3), with clear procedures for approval and implementation (section 4). The implementation of these activities needs to be agreed by the organisations' respective science bodies: the Science Board (SB) in the case of PICES and the Science Committee (SCICOM) in the case of ICES. In the consideration of cooperative proposals these bodies also need to consider their own scientific priorities as determined by their science, implementation, and/ or strategic plans,

- the financial and structural constraints under which the organizations operate and,
- the balance of cooperative activities in their own portfolios.

Section 4 also provides guidance as to when and how proposals need to be developed and tabled at the above committees.

However, a mechanism is needed to monitor and steer P/ICES collaborative arrangements, and to act as an interface between the PICES SB/ICES SCICOM and the proponents of joint collaborative activities. It is proposed that this role be carried out, in the case of ICES by the Chair of SCICOM and the ICES Secretariat Head of Science Programme, and in the case of PICES by the Chair of the Science Board and a representative from the PICES Secretariat. This group ensures a responsive structure with a light footprint and minimal additional costs, and with the mandate to implement common activities in line with this report. Nevertheless, it is suggested that a wider strategic analysis be conducted every 3–5 years, and that this includes an additional 2–5 members of each organization. There is no need to formalize this group at this stage as it should reflect the cooperation that develops in the coming years.

6 Conclusion and next steps

The P/ICES Study Group on Science Cooperation agreed on the need for a formal framework to guide, develop, implement and monitor arrangements between PICES and ICES in the area of science cooperation.

It was recognized that collaborations had developed very successfully in recent years, mostly through interactions between individual scientists or between the Secretariats. While this process is welcome and supported it can also bypass the scientific structures of the organizations. As cooperation evolves it is important to establish priorities for cooperation, mechanisms for approval and implementation, and processes for monitoring and steering.

The Study Group report provides a vision and a set of priorities to guide the communities in the development of scientific cooperation arrangements. In particular, cooperation is encouraged in the following areas:

- Climate change
- Ecosystem assessment/ modelling
- Ocean acidification / hypoxia
- Marine spatial planning

It is also recognized that cooperation should continue or be developed in a number of operational areas such as data management, training and science communication.

The report describes the collaborative procedures to be followed, for joint working groups, joint workshops and symposia, theme sessions at ICES and PICES annual meetings and joint strategic initiatives/sections. Procedures for other collaborations (*e.g.*, Publications, Training) may require further development.

The proposals in this report ensure that the relevant science structures of PICES and ICES take ownership of the process of approval and implementation of cooperative arrangements. Finally, the group suggests that the

monitoring and steering be conducted by the chairs of ICES SCICOM and PICES SB, and the Head of Science (or equivalent) in the ICES and PICES Secretariat. A broader meeting every 3–5 years would provide room for a review of the collaboration, and the development of a strategic pathway that maximizes the value to both organizations.

This report and its recommendations are to be tabled at the autumn 2011 meetings of the ICES SCICOM and PICES SB. It is recommended that these recommendations, if approved, be implemented immediately, and that the group of four in charge of monitoring and steering cooperation provide a brief update of the implementation of this framework annually.

Annex 1: Memorandum of Understanding between the North Pacific Marine Science Organization and the International Council for the Exploration of the Sea

Recognizing that the North Pacific Marine Science Organization, (PICES), hereinafter called “the Organization”, exists to (a) promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned and of its living resources, including but not necessarily limited to research with respect to the ocean environment and its interactions with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna, and ecosystems, its uses and resources, and impacts upon it from human activities; and (b) promote the collection and exchange of information and data related to marine scientific research in the area concerned. In order to further enhance its institutional capabilities, the Organization seeks, *inter alia*, to establish and maintain mutually agreed working arrangements with other international organizations which have related objectives.

Recognizing that the International Council for the Exploration of the Sea, hereinafter called “the Council”, exists to: (a) promote and encourage research and investigations for the study of the sea particularly related to the living resources thereof; (b) draw up programmes required for this purpose and to organize, in agreement with its Contracting Parties, such research and investigations as may appear necessary; (c) publish or otherwise disseminate the results of this work; and (d) provide scientific information and advice to Member Country governments, and the regulatory commissions with which co-operative relationships have been established. In order to carry out these tasks appropriately and efficiently, the Council seeks, *inter alia*, to establish and maintain mutually agreed working arrangements with other international organisations which have related objectives.

The Organization and the Council, hereinafter called “the Parties”, have, therefore, agreed to the following Understanding:

- 1) There shall be reciprocal consultations and regular contacts between the Parties on matters of common interest in the field of marine scientific research, data exchange, and training and related activities, including environmental studies;
- 2) There shall be regular exchange between the Parties of information, documents, and publications relating to programme and project plans and to the results of activities agreed to be of mutual interest, joint or otherwise;
- 3) The Parties shall invite each other to be represented, in an observer capacity, at meetings of common interest, to the extent that this is possible within their respective working procedures;
- 4) The Parties shall, as appropriate, undertake joint activities, including when required, the establishment of joint subsidiary bodies or other suitable arrangements, to study and report on matters of common interest, including the support of those activities that concern them both;
- 5) The Parties shall consult regularly on ways in which co-operation between them can be further improved and extended. Specific joint programmes and activities may be defined through addenda to this framework agreement on a biennial basis;
- 6) The terms of this Understanding may be revised by the Parties if they both agree. The Understanding shall continue on the basis of the existing terms until new terms have been agreed;
- 7) Either Party may withdraw from the Understanding at any time subject to giving one year's written notice to the other Party;
Any agreement, arrangement or joint activity entered into in consequence of this Memorandum of Understanding which involves a financial commitment will be covered by an annex to this Memorandum governing the provision of funds;
- 8) Recognizing and fully respecting their various mandates, policies and priorities, the Parties agree that this Understanding shall enter into force upon signature and shall remain in force unless either Party withdraws pursuant to Paragraph 7 above.

Appendix 2: Table of past and future (agreed) cooperation

Table 1 List of PICES / ICES co-sponsored symposia for 2010–2012.

Year	Date	Title	Venue	Conveners	Co-Sponsors
2010	November 8–11	Symposium on “Ecosystems 2010: Global progress on ecosystem-based fisheries management”	Anchorage, USA	G. Kruse (USA), P. Livingston (USA), D. Woodby (USA), D. Evans (USA), C. Zhang (Korea), G. Jamieson (Canada)	Alaska Sea Grant, FAO, US NMFS, NPFMC, Alaska Depart. of Fish and Game
2011	March 14–18	5th International Zooplankton Production Symposium	Pucón, Chile	R. Escrübano (Chile), D. Bonnet (France), J. Keister (USA)	DFO
2011	April 26–28	Workshop on “Indicators of status and change within North Pacific marine ecosystems”	Honolulu, USA	Thomas Theriault (Canada), Sachihiko Itoh (Japan), Jacquelyne King (Canada), ICES participation	FUTURE
2011	May 2–6	Workshop on “Reaction of northern hemisphere ecosystems to climate events (regime shifts): A comparison”, May 2–6, 2011, Hamburg, Germany;	Hamburg, Germany	Jürgen Alheit (ICES/Germany), Christian Möllmann (ICES/Germany), Sukgeun Jung (PICES/Korea), Yoshiro Watanabe (PICES/Japan)	ICES, PICES
2011	May 22–26	Symposium on “Comparative studies of climate effects on polar and sub-polar ocean ecosystems: Progress in observations and prediction”	Seattle, USA	G. Hunt (USA), Ó. Asthórrsson (Iceland), M. Kishi (Japan)	ESSAS
2011	May 22	Workshop on “Biological consequences of a decrease in sea ice in Arctic and Sub-Arctic Seas”	Seattle, USA	Anne Hollowed (PICES), Harald Loeng (ICES)	ICES, PICES
2011	September 21–24	Theme sessions at ASC on: “Atmospheric forcing of Northern hemisphere ocean gyres and their subsequent impact on the adjacent marine climate and ecosystems”; “Atlantic redfish and Pacific rockfish: comparing biology, ecology, assessment and management strategies for <i>Sebastes spp.</i> ”; “Recruitment processes: Early life history dynamics – from eggs to juveniles”; “Surplus production models: Quantitative tools to manage exploited fisheries and compare the productivity of marine ecosystems”	Gdansk, Poland	Jürgen Alheit (ICES/Germany), Hjalmar Háttún (ICES/Faroe Islands), Emanuele Di Lorenzo (PICES/USA), Ichiro Yasuda (PICES/Japan) Benjamin Planque (ICES/Norway), Paul Spencer (PICES/USA), Christoph Stransky (ICES/Germany), Steve Cadrin (ICES/USA) Richard Nash (ICES/Norway), Ed Houde (ICES/USA), Rick Brodeur (PICES/USA) Ken Drinkwater (ICES/Norway), Jason Link (ICES/USA), Jennifer Boldt (PICES/Canada), Ian Perry (PICES/Canada)	ICES, PICES

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Year	Date	Title	Venue	Conveners	Co-Sponsors
2011		Topic session at PICES-2011 on “ <i>Linking migratory fish behavior to end-to-end models</i> ” Session on “ <i>Mechanisms of physical-biological coupling forcing biological “hotspots”</i> ” Workshop on “ <i>Trends in marine contaminants and their effects in a changing ocean: Refining indicator approaches in support of coastal management</i> ”		Michio Kishi, Shin-ichi Ito, Enrique Curchitser, and Skip McKinnell (PICES), Geir Huse (ICES) Elliott Hazen (PICES/ U.S.A.), Oleg Katugin (PICES/Russia), Robert Suryan (PICES/U.S.A.), Yutaka Watanuki (PICES/Japan), Ichiro Yasuda (PICES/Japan), Jürgen Alheit (ICES/Germany) Olga Lukyanova (Russia, PICES), Peter Ross (PICES/Canada), Kris Cooremans (ICES/B)	PICES, ICES
	October		Khabarovsk, Russia		
2012	April	Early Career Scientist Conference “ <i>Oceans of change</i> ”	Mallorca, Spain	A. Kellermann (ICES/Denmark), S. McKinnell (PICES/Canada)	NOAA, Regional Government of Majorca
2012	May 14–18	Second Symposium on “ <i>Effects of climate changes on the world’s oceans</i> ”	Yeosu, Korea	L. Valdes (Spain), K. Suam (Korea), S. Hughes (UK), Hiroaki Saito (Japan)	IOC, MIFFAF (Korea)
2012	November 8–12 (tentative)	Forage Fish Interactions and Ecosystem Approach to Fisheries Management (FACTS)	Nantes, France	S. Neuenfeldt (Denmark), M. Peck (Germany), plus two externals	FACTS (ECFP7)
		NMFS: National Marine Fisheries Service NPFMC: North Pacific Fishery Management Council DFO: Fisheries and Oceans Canada ESSAS: Ecosystem Studies of Sub-Arctic Seas Program IOC: Intergovernmental Oceanographic Commission			

Report of the FUTURE Advisory Panel on *Anthropogenic Influences on Coastal Ecosystems*

AP-AICE Chairman, Dr. Thomas Therriault, welcomed the two members (*AP-AICE Endnote 1*) and guests to the third meeting of the FUTURE Advisory Panel on *Anthropogenic Influences on Coastal Ecosystems* on October 16, 2011, in Khabarovsk, Russia. The draft agenda (*AP-AICE Endnote 2*) was reviewed and agreed upon, except that the SCOR discussion was postponed to the joint Advisory Panel meeting.

AGENDA ITEM 2

Review of AP-AICE Terms of Reference and draft workplan (revised August 2011)

A lack of members at the meeting was seen as a potential problem but given that this agenda item was postponed from 2010, discussion proceeded. E-mails were sent by Dr. Therriault to all AICE members to confirm desire/ability to participate as members, and all confirmed their wish to continue except Dr. Young Shil Kang who was travelling.

A pending item was for AP-AICE to consider the definition of coastal ecosystem. Participants agreed that there was no hard and fast rule for this and that the definition would depend largely on the question being addressed. It was noted that Exclusive Economic Zones (EEZs) could be considered as a starting point if needed.

The second pending item for the AP was the recommendation to POC to establish a working group on ocean acidification/hypoxia. Although WG 27 (Working Group on *North Pacific Climate Variability and Change*) was established inter-sessionally, the group will only deal with some elements of this item from a FUTURE perspective, so the Section on *Carbon and Climate* (S-CC) will have a critical role to play. Similarly, WG 28 (Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*) may determine these are major stressors but it is unlikely this group will have time to explore mechanisms related to specific stressors.

Action: AP-AICE to determine if S-CC Terms of Reference (TOR) need to be revisited to ensure good alignment with FUTURE. (This is likely an area of modeling interest within the PICES community.)

Participants discussed recommending the desirability of establishing a working group on habitat loss in coastal systems to MEQ/BIO. Participants agreed that this topic was very specific and that key elements of this topic should emerge from WG 28. Thus, it was determined that it would be premature to develop a working group at this time.

The fourth pending item was the development of an AP-AICE website. The TCODE representative on AP-AICE suggested this was, in fact, a larger issue within FUTURE and suggested that Google Sites would be a good way forward. The existing PICES GeoPortal Network is a good way to exchange metadata but likely is not a good option for general communication and file sharing. The item was discussed further on how to improve communication within the FUTURE program.

Action: Dr. Shevchenko to work with the other FUTURE APs and PICES to develop web tools for communication within FUTURE.

The Working Group on *Non-indigenous Marine Species* (WG 21) and Working Group on *Environmental Interactions on Marine Aquaculture* (WG 24) are both nearing completion and a request was made for spatial-specific data that can feed into WG 28. Similarly, upcoming revisions to the Section on *Harmful Algal Blooms*

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(S-HAB) TOR should clearly articulate how information they are collecting is relevant to FUTURE, and especially to WG 28.

Inter-sessionally, the AP-AICE Chair worked with the new Co-Chairs of WG 27 and WG 28 to help ensure workplans being developed were aligned with FUTURE.

It was noted that the inter-sessional FUTURE Workshop (April 26–28, 2011, Honolulu, USA) was a great success and that the report is available on the PICES website at <http://www.pices.int/publications/presentations/2011-FUTURE-wsh/2011-FUTURE-workshop.aspx> and should be reviewed by the AP members. The criteria to develop indicators may be more broadly applicable and should help WG 28 advance quickly on some of their early tasks.

Action: AP members to review inter-sessional FUTURE workshop report as some gaps relevant to AICE and FUTURE were identified, most notably how FUTURE will deal with ecosystem resilience and vulnerability. AP members to consider ways to advance this topic within FUTURE, such as a new study group or working group.

It was noted that TOR for both S-CC and S-HAB might benefit from some input from the FUTURE APs. S-CC revised its TOR in 2010 and S-HAB's new TOR were not available before the AP meeting.

Action: MEQ to provide S-HAB TOR to AP-AICE (and perhaps AP-COVE and AP-SOFE) for review as soon as possible.

The AP-AICE Chair worked inter-sessionally with PICES Co-Chair of P/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS), Dr. Anne Hollowed, to refine a proposal for PICES involvement with ICES on a strategic initiative on climate change and marine ecosystems. A presentation was made by PICES Co-Chair of WG-FCCIFS, Dr. Suam Kim (see Agenda Item 8).

The AP-AICE Chair worked inter-sessionally with Chairman of the Study Group on *Human Dimensions*, Dr. Mitsutaku Makino, to refine the Study Group's recommendations. The final Study Group report was circulated to AP members for comment/discussion (see Agenda Item 9).

The AP had considerable discussion about its role. In general, AP members are struggling to provide constructive feedback without a clearer understanding of required/desired FUTURE products. Although the AP feels the newly established Working Groups, especially WG 27 and WG 28, will significantly advance FUTURE, the AP feels a framework or "roadmap" is highly desirable. This will be critical when FUTURE needs to compile information/data arising from several working groups over several years. Pending discussions at the joint AP meeting (October 16, 2011) and a potential inter-sessional FUTURE workshop, AP-AICE feels it will be in a better position to advise once a better road map for FUTURE is developed. AICE thinks development of an AP-specific workplan should not be undertaken in isolation and that this should be addressed more broadly by FUTURE.

AGENDA ITEM 3

Report from the inter-sessional FUTURE workshop (Honolulu, April 2011)

The Chair provided a brief overview of the FUTURE workshop on "*Indicators of status and change within the North Pacific marine ecosystems*" held April 26–28, 2011, in Honolulu, USA (see also Agenda Item 2).

AGENDA ITEM 4

Report from the P/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* (SG-SP)

The Chair provided a brief overview on the report of the joint PICES/ICES Study Group on *Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science* which was circulated to AP members in advance of the meeting.

Action: AP members to provide comments on recommendations for approaches to develop a PICES/ICES strategic plan for cooperation within 2 weeks of PICES-2011.

AGENDA ITEM 5

Topic sessions at PICES-2012

This year, topic session proposals were due by September 6, 2011. This was to allow Standing Committees and FUTURE APs more time to review and provide input. This process also better aligns PICES and ICES for potential co-sponsorship of sessions. AP-AICE reviewed all proposals and looked for ones that were of general interest to the AP. AP-AICE identified the following suggested ranking with the possibility that a) and b) might be combined to a single session.

- a) risk management session,
- b) calamities session,
- c) environmental contaminants session,
- d) multiple stressor session.

AGENDA ITEM 6

Potential inter-sessional FUTURE meeting (Spring 2012)

Several potential options for an inter-sessional meeting were discussed:

- No inter-sessional meeting,
- A directed meeting focused on a high priority topic for FUTURE,
- A joint meeting of new Working Group/Section leads with the FUTURE SSC,
- A potentially FUTURE SSC-expanded meeting to develop a FUTURE road map.

AP-AICE supported the option of developing a FUTURE roadmap, as it felt it is timely and much needed. This would also ensure that FUTURE is well aligned with what is expected/required to be delivered, with timelines and mechanisms to make this happen.

Recommendation: AP-AICE supports the option of developing a FUTURE roadmap.

AGENDA ITEM 7

Review TOR of new FUTURE-related Working Groups established inter-sessionally

Since TOR were developed with input, no changes were suggested at this time.

AGENDA ITEM 8

Review TOR of a proposed Section on *Climate Change on Effects on Marine Ecosystems*

Dr. Suam Kim made a presentation on behalf of the proposed Section on *Climate Change Effects on Marine Ecosystems* (S-CCME). The AP agreed that S-CCME will build on the success of the joint P/ICES Working

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Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS) and furthers an already strong working relationship between PICES and ICES. Although the reporting of this Section was slightly unclear given the number of Standing Committees the proposed activities fit, this specific element of the proposal will need to be resolved by Science Board, the SSC for FUTURE.

Recommendation: AP-AICE strongly supports the establishment of a new on Section on *Climate Change Effects on Marine Ecosystems*.

AGENDA ITEM 9

Review final report from SG-HD and discuss potential for proposed Section on *Human Dimensions*

The Study Group on *Human Dimensions* final report was circulated by e-mail to AP members in advance of the meeting in Khabarovsk. No comments were provided by e-mail but this item was discussed by the AP-AICE participants. AP-AICE supports SG-HD's proposal to establish a new expert group on human dimensions, potentially a section, as it is a key element of FUTURE science that has not been acted on. Given that human dimensions-related work within PICES is new, careful attention will be required to draft TOR for this group. Also, this expert group will bring new knowledge/expertise into the PICES realm that is currently lacking. A section makes sense given the large tasks ahead but if a section is developed then TOR will need to be reviewed/updated more frequently, *i.e.*, every 3 years for sections. A longer lived working group (more than the typical 3-year term) is also possible and could provide more flexibility in aligning TOR and work plans with FUTURE priorities.

Recommendation: AP-AICE supports the proposal to for a new expert group on human dimensions.

AGENDA ITEM 10

Identification of high priority topics for FUTURE including potential Open Science Meeting in 2013

AP members felt that until a road map for FUTURE was developed, it would be hard to recommend specific topic sessions for an Open Science Meeting. Discussion also focused on whether this was a meeting simply to showcase recent advances or was to accomplish more. Avoiding overlap with the Annual Meeting could become an issue. There was no specific recommendation at this time.

AGENDA ITEM 11

Remaining items

As the meeting time expired, the AP members concluded there was no need to discuss any of the remaining agenda items in detail as no recommendations for new expert groups was tabled. Communications and a detailed road map for FUTURE were highlighted as the largest hurdles facing this science program.

*AP-AICE Endnote 1***AP-AICE participation list**Members

Steven J. Bograd (USA)
 Igor Shevchenko (Russia)
 Thomas Therriault (Canada, Chairman)

Absent

Young Shil Kang (Korea)¹
 Young-Jae Ro (Korea)
 Song Sun (China)
 Masahide Kaeriyama (Japan)²

¹ Notified in advance

² Flight cancelled

*AP-AICE Endnote 2***AP-AICE meeting agenda**

1. Welcome, introductions, opening remarks
2. Review AP-AICE TOR and draft workplan (revised August 2011)
3. Report from the inter-sessional FUTURE workshop (Honolulu, April 2011)
4. Report from the P/ICES SG-SP
5. Report from SCOR WG meeting (Sinjae Yoo)/potential collaborations (*deferred to Joint AP meeting*)
6. Potential topic sessions at 21st Annual PICES Meeting, Japan (October 2012)
NOTE: Sessions will still be proposed via Committees to Science Board
7. Potential inter-sessional FUTURE meeting (Spring 2012)
8. Review TOR of new FUTURE-related Working Groups established inter-sessionally
 - a. WG 27: *North Pacific Climate Variability and Change*
 - b. WG 28: *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors*
9. Review TOR of a proposed Section on *Climate Change on Marine Ecosystems*
10. Review final report from SG-HD and discuss potential for proposed Section on *Human Dimensions*
11. Identification of high priority topics for FUTURE including potential Open Science Meeting in 2013
12. Mechanisms to address high priority topics identified above (*How do we advance FUTURE? What are the major challenges?*)
13. Potential for new expert groups and timelines for establishment
14. Linkages to other FUTURE APs
15. Action items for AP-AICE members
 - a. Develop more specific workplan for AP-AICE
 - b. Working outside annual/inter-sessional meetings
 - c. Potential Mechanisms for Communication (*e.g.*, Skype, GeoPortal, FUTURE website [restricted access?])
16. Other issues (roundtable)

Report of the FUTURE Advisory Panel on *Climate, Oceanographic Variability and Ecosystems*

The FUTURE Advisory Panel on *Climate, Oceanographic Variability and Ecosystems* (AP-COVE) held its third meeting from 08:30-12:00 on October 16, 2011 in Khabarovsk, Russia. Dr. Jacquelynne R. King chaired the meeting on behalf of Dr. Hiroaki Saito, the Chairman of AP-COVE, who was unable to attend the Annual Meeting. Participating members and the agenda can be found in *AP-COVE Endnotes 1 and 2*.

AGENDA ITEM 2

Review AP-COVE Terms of Reference and draft workplan

The workplan discussed during the summer of 2011 was approved.

AGENDA ITEM 3

PICES-2012 topic sessions/workshop

Of the topic sessions proposed for PICES-2012, AP-COVE identified 4 priority sessions:

- BIO/MEQ: *Identifying critical multiple stressors of North Pacific marine ecosystems and indicators to assess their impacts*;
- MEQ/FIS: *Social-ecological systems on walleye pollock under changing environment: an inter-disciplinary approach* [later renamed to “*Social-ecological systems on walleye pollock and other commercial gadids under changing environment: An inter-disciplinary approach*”];
- POC/FUTURE/CLIVAR [later changed to POC/CLIVAR/ICES co-sponsorship]: *Challenges in understanding North Pacific climate variability and change* [later changed to *Challenges in understanding Northern Hemisphere ocean climate variability and change*];
- FIS/POC/ICES: *Comparison of impact of multi-decadal climate variability in North Pacific and North Atlantic ecosystems and corresponding teleconnection pattern* [merged with preceding proposal].

AGENDA ITEM 4

Potential inter-sessional FUTURE meeting

Members discussed options for a potential workshop and discussion issues during the inter-sessional meeting and suggested a 5-day meeting in Western Russia which would devote:

- 2 days to PICES/ICES modellers on regional end-to-end models;
- 1 day for core participants of a modelling working group, proposed Section on *Climate Change Effects on Marine Ecosystems* (S-CCME) and proposed Section on *Human Dimensions* to detail their Terms of Reference (TOR) and workplans and to look for means to integrate across these groups;
- 2 days for FUTURE APs to review activities to date, review the FUTURE Implementation Plan, and map out upcoming activities and milestones.

AGENDA ITEM 5

Review of TOR of new COVE-related Working Groups

Working Group on *Jellyfish Blooms around the North Pacific Rim: Causes and Consequences* (WG 26)

AP-COVE reviewed WG 26 TOR and advised the WG to add “Linkages to FUTURE Science Plan”. Other advice was that the WG clarify the proposed approach to “Provide jellyfish metrics as indicator of ecosystem

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change and resiliency”.

Working Group on *North Pacific Climate Variability and Change* (WG 27)

WG 27 Chairman, Dr. Emanuele Di Lorenzo, explained the mechanism, indices and dynamics of climate-driven ecosystem models which contribute to IPCC future projections. He also explained resiliency of climate and the ocean system to link the FUTURE Scientific Program.

Working Group on *Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors* (WG 28)

The results of an inter-sessional FUTURE workshop (April 26–28, 2011, Honolulu, USA) were described in which the workshop participants determined the weighting to be used for indicators: 1) status and trends, 2) extent of critical stressors, 3) assessing ecosystem impacts/changes. Indicators could be categorized as ecosystem status, ecosystem services and management.

AP-COVE advised the Chairs of WG 27 and WG 28 to identify areas of overlap and potential collaboration between them.

Section on *Carbon and Climate*

S-CC member, Dr. Toru Suzuki, explained the Section’s linkage to FUTURE and to upcoming topic sessions. The first steps are for the open ocean and second step is for the coastal area.

AGENDA ITEM 6

Review of Science Plan and Implementation Strategy of proposed S-SCCME

AP-COVE supports the proposal for a new Section on *Climate Change Effects on Marine Ecosystems*, and suggested that its parent committees should be POC, BIO and FIS. If approved, AP-COVE recommends a more explicit integration with WG 27.

AP-COVE supports the proposal for a Section on *Human Dimensions*. If approved, AP-COVE requests that the Section’s TOR be augmented to include a training component in order to educate the PICES scientific community on social sciences and human dimensions and how these disciplines interact with the traditional science disciplines.

AGENDA ITEM 7

Mechanisms to address high priority topics

AP-COVE suggested that the topic of resilience (and vulnerability) should be an upcoming high priority of FUTURE science. Members recommended that a workshop be convened to focus on examples of change of ecosystem status and ecosystem recovery. The workshop could lead to the establishment of a working group on resiliency in 2014.

AGENDA ITEM 8

Potential for new expert groups and timelines for establishment

AP-COVE discussed two working group proposals that are being considered by PICES scientists. The first is a working group on downscaling climate models to regional models, and the second is a working group on end-to-end models (possibly jointly with ICES). Specific proposals were not yet developed, but may be presented at PICES-2012. AP-COVE recommended that the proponents of these two groups discuss their objectives to consider if their efforts can be linked, and to identify the linkages to proposed S-CCME and to WG 27.

AGENDA ITEM 9

Action items for AP-COVE members (including “WORK TOOL”)

AP-COVE will review and revise its TOR by summer 2012 and will also review the FUTURE Implementation Plan in 2012 for possible revisions. For meetings outside of inter-sessional or Annual Meetings, AP-COVE would like to use either Skype or WebEx. For either option, it would be most suitable to arrange times that encompassed afternoon and early evening for North America and morning for the western North Pacific. Strict end times would have to be adhered to. Preference for WebEx was suggested, since this allows for voice communication, and for bulletin board services to type communication, as well as slide sharing. These features would aid non-English speaking participants.

AGENDA ITEM 10

Confirm membership of AP-COVE

AP-COVE members were requested to e-mail Drs. Saito or King to either confirm their willingness to remain as members or to step aside.

AGENDA ITEM 11

Other issues

None.

AP-COVE Endnote 1**AP-COVE participation list**Members

Emanuele Di Lorenzo (USA)
 Jung-Hoon Kang (Korea)
 Jacquelynne King (Canada, meeting Chair)
 Vyacheslav Lobanov (Russia)
 Toru Suzuki (Japan)

AP-COVE Endnote 2**AP-COVE meeting agenda**

1. Welcome and Introduction
2. Review AP-COVE TOR and draft workplan
3. PICES-2012 topic sessions/workshop
4. Potential inter-sessional FUTURE meeting
5. Review of TOR of new COVE-related Working Groups
6. Review of Science Plan and Implementation Strategy of proposed SSICME.
7. Mechanisms to address high priority topics
8. Potential for new expert groups and timelines for establishment
9. Action items for AP-COVE members (including “WORK TOOL”)
10. Confirm membership of AP-COVE
11. Other issues

Report of the FUTURE Advisory Panel on Status, Outlooks, Forecasts and Engagement

A meeting of AP-SOFE was held from 09:00–12:30 h on October 16, 2011 at PICES 2011, followed by a joint meeting of the three FUTURE Advisory Panels from 14:00–18:00 h on October 16, 2011 in Khabarovsk, Russia. The Chairman, Mr. Robin Brown, welcomed members and observers (*AP-SOFE Endnote 1*). Dr. Skip McKinnell served as rapporteur. After several changes were made to the draft agenda, a revised agenda was adopted (*AP-SOFE Endnote 2*). The Chairman drew attention to the AP-SOFE website and the supporting documents which were posted there.

AGENDA ITEM 2

Review AP-SOFE Terms of Reference

The Chairman reviewed the TORS and activities of the Advisory Panel that occurred in relation to them.

- TOR 4 – new groups established at PICES-2011 will lead to a stronger implementation of FUTURE.
- TOR 5 – AP-SOFE will be seeking further input at PICES-2011 and will develop ideas by the time of the inter-sessional Science Board meeting in 2012.
- TOR 6 – there is a need for SOFE to liaise with the Section on *Human Dimensions*, if it is established.

Action: Track down state of Study Group on *Communications* final report.

TOR 7 – WG 27, WG27, S-CCME, S-HD

TOR 8 – Peer review: Dr. McKinnell reviewed the experience of producing and developing the Cohen Commission report. AP-SOFE agreed to place the report on the PICES website. Publication options were discussed. The Advisory Panel felt that the report should not be published in the Scientific Report series (because it is peer-reviewed). It was questioned whether or not PICES needed a new series for peer-reviewed reports. In his review, Dr. McKinnell's recommendation for the development of similar advisory reports was to identify someone as a scientific editor of the report.

No changes to the AP-SOFE were proposed.

AGENDA ITEM 3

Workplan

AP-SOFE discussed its workplan and a modified version was adopted (*AP-SOFE Endnote 3*) Specific items for discussion were:

- NPESR II outreach/engagement: The desirability of producing brochures and/or ppt files was discussed after a draft PICES PowerPoint presentation was given by the SOFE Chairman. Responses were: Korea (ppt and brochure), Russia (summary for website), Japan (ppt), China (ppt, and brochure for the public). It was agreed that the brochure should be aimed at a different (*i.e.*, public) market, for 'selling' the organization, for example. It was suggested that the Secretariat create an archive of figures on the PICES website for general use (perhaps with PICES logo).
- Public lecture: Dr. Shin-ichi Ito inquired if a public lecture on North Pacific ecosystem status could be presented at PICES- 2012. The request was favourable received.

Action: Chairman to complete a PowerPoint presentation and circulate to members for comments by December 15; Secretariat to establish a website with figures for use/re-use.

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- PICES Scientific Report No. 37 on Ecosystem-based Management Science and its Application to the North Pacific: The production of a brochure on this report has stalled. Ms. Patricia Livingston suggested that a draft could be put together fairly quickly from existing materials and offered to lead this activity. It was noted that the North Pacific Research Board has had good success using a two-page format for such brochures.

Action: Ms. Livingston to head activity to produce a brochure from PICES Scientific Report No. 37.

AGENDA ITEM 4

Report of the 2011 inter-sessional FUTURE workshop

The chairman referred members to the report/presentation posted on the PICES website at <http://www.pices.int/publications/presentations/2011-FUTURE-wsh/2011-FUTURE-workshop.aspx>.

AGENDA ITEM 5

Topic sessions at PICES-2012

AP-SOFE reviewed the lists proposed by the Standing Committees and identified an MEQ/FIS topic session on social-ecological systems that SOFE would like to see go forward at PICES-2012. The AP suggested that the session could be expanded from walleye pollock.

AGENDA ITEM 6

Report from WG-FCCIFS

The Co-Chair of PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* (WG-FCCIFS), Dr. Anne Hollowed, presented a report on the WG activities and accomplishments. AP-SOFE was appreciative of the tremendous progress of this Working Group.

AGENDA ITEM 7

ICES/PICES Strategic Initiative on Climate Change effects on Marine Ecosystems (SICCME)

The Chairman referred members to the Science Plan and Implementation Plans posted on the FUTURE website (http://www.pices.int/members/scientific_programs/FUTURE/FUTURE-main.aspx). At the joint FUTURE Advisory Panel meeting (October 16, 2011), Dr. Hollowed presented a plan for a Strategic Initiative on Climate Change effects on Marine Ecosystems (SICCME), as a follow-on activity of WG-FCCIFS. The Panel determined that this was a key activity for the FUTURE program and strongly supported this initiative. A discussion of the best reporting structure of SICCME within PICES was deferred to Science Board.

AGENDA ITEM 8

Report and recommendations from the Study Group on *Human Dimensions* (SG-HD)

The Chair referred the Panel to the final report from SG-HD. Dr. Mitsutaku Makino presented TOR for a proposed Section on *Human Dimensions*. AP-SOFE reviewed these and strongly supported the proposal, noting that the social science research was very challenging for PICES, but is critical for the success of FUTURE.

AGENDA ITEM 9

Identification of high priority topics for FUTURE including potential Open Science Meeting in 2013

At the joint FUTURE AP meeting, there was much discussion about priority topics for FUTURE, including a proposed Open Science Meeting. Support for a proposed FUTURE OSM was not universal. Some participants thought it was premature while others felt that it might compete inappropriately for attendance with the PICES Annual Meeting or with other critical meetings.

AGENDA ITEM 10

Mechanisms to address high priority topics identified above

This item was discussed at the AP-SOFE meeting and at the Joint AP meeting. Conclusions reached included:

- A strong requirement to continue the progress made by WG-FCCIFS through SICCME;
- A requirement to build social science capacity within PICES through the establishment of a longer term expert group;
- A requirement to establish one or more working groups which are tightly focussed on FUTURE objectives;
- Developing a more detailed Implementation Plan/roadmap to guide the integration of PICES activities and the production of reports, forecast and outlooks.

It was noted that the outreach/engagement component of FUTURE remains as a substantial challenge, as noted by the Study Group on *Communications*.

AGENDA ITEM 11

Potential for new expert groups and timelines for establishment

AP-SOFE placed a high priority on the establishment of SICCME and a new expert group on human dimensions. The proposed Working Group on *Regional Climate Modeling* was also seen as an important step in moving forward with the FUTURE plan.

AGENDA ITEM 12

Action items for AP-SOFE

Action Items were identified in the AP-SOFE workplan (Agenda Item 3). Approaches for improved communication/collaboration between annual/inter-sessional meetings were discussed, including the use of a website (such as the AP-SOFE website) on Google Docs for collaborative writing and other technologies.

AGENDA ITEM 13

Report on the PICES Advisory Report to the Cohen Commission

Deputy Executive Secretary, Dr. Skip McKinnell, reported on the PICES Advisory Report to the Cohen Commission on “*The decline of Fraser River sockeye salmon in relation to marine ecology*” and his testimony at that Commission. AP members were directed to the Commission’s website where the document (<http://www.cohencommission.ca/en/pdf/TR/Project4-Report.pdf>) is located as formal testimony at the inquiry.

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AGENDA ITEM 14

United Nations Global Marine Assessment

Dr. Tony Koslow highlighted the value of having a global assessment of the state of the world ocean, and that an organization like PICES could contribute greatly to such a report. Dr. McKinnell, who attended the UN Working Group of the Whole meeting in New York (June 2011), returned with a pessimistic view of the likelihood of a successful result under the current circumstances. Unlike the Intergovernmental Panel on Climate Change, Member States of the UN (also Member States of PICES) envisage a very limited role for regional organizations, strong oversight of the process by the UNGA, directed by the part of the UN that is associated with UNCLOS (United Nations Convention on the Law of the Sea), a report that includes many topics which exceed the current capacity of PICES, and a virtually non-existent budget. The Global Assessment includes socio-economics that are associated with the ocean environment. Member States of the UN were particularly sensitive to the idea that the report might deal with effects of national policies on the marine environment.

AP-SOFE Endnote 1

AP-SOFE participation list

Members

Harold (Hal) Batchelder (USA)
Robin Brown (Canada, Chairman)
Oleg Katugin (Russia)
Shin-ichi Ito (Japan)
Phillip Mundy (USA)
Chang-Ik Zhang (Korea)

Observers

Anne Hollowed (USA)
Tony Koslow (USA)
Guimei Liu (China)
Patricia Livingston (USA)
Mitsutaku Makino (Japan)
Skip McKinnell (PICES)

AP-SOFE Endnote 2

AP-SOFE meeting agenda

1. Welcome, introduction and opening remarks
2. Review SOFE TOR
3. Review SOFE workplan
4. Report from the FUTURE inter-sessional workshop (Honolulu, April 2011; J. King)
5. Potential topic sessions at 21st Annual PICES Meeting, Japan (October 2012). *Sessions will still be proposed via Committees to Science Board*
6. Report from WG-FCCIFS (Hollowed)
7. ICES/PICES Strategic Initiative on Climate Change and Marine Ecosystem (SICCME) (*To be deferred to Joint AP Meeting?*)
8. Report and Recommendations from SG-HD (*Joint AP Meeting*)
9. Identification of high priority topics for FUTURE including potential Open Science Meeting in 2013 (*defer to Joint AP Meeting*)
10. Mechanisms to address high priority topics identified above
 - How do we advance FUTURE?
 - What are the major challenges?
11. Potential for new expert groups and timelines for establishment
12. Action items for AP-SOFE members
 - Develop more specific workplan for SOFE-AP
 - Working outside Annual/inter-sessional Meetings

- Potential Mechanisms for Communication (e.g., SOFE –AP website, Skype, GeoPortal, FUTURE Website [restricted access?])
- 13. Report on the Cohen Commission (McKinnell)
- 14. UNEP Assessment (McKinnell; Koslow)
- 15. Other issues (Roundtable)

AP-SOFE Endnote 3**AP-SOFE Terms of Reference and workplan**

Task	Activities underway/Completion date
TOR 1: Establish a list of specific FUTURE priority topics, activities and products for review by the Science Board;	- information gathering from Committees at PICES 2011 - ISB 2012 - FUTURE Roadmap
TOR 2: Work with the existing expert groups associated with FUTURE to review and revise, if needed, their Terms of Reference;	- October 2011 (PICES 2011) - ongoing - specifically - work needed with MEQ on S-HAB (complete by ISB 2012?) - Other ExG?
TOR 3: Work with the Scientific and Technical Committees and the PICES community to identify gaps in the priorities and activities of the expert groups and to provide recommendations to the Science Board;	- SICCME - Human Dimensions - October 2011 (PICES 2011) - ongoing
TOR 4: Coordinate with the Scientific and Technical Committees in developing Terms of Reference for new expert groups to be part of FUTURE;	- SICCME (done) - Human Dimensions (done) - ongoing
TOR 5: Coordinate with the Editors of the next version of the North Pacific Ecosystem Status Report and advise on how the Report should be updated in the future;	- information gathering from Committees at PICES 2011 - complete for ISB 2012
TOR 6: Work with the Communication Study Group and the Study Group on Human Dimensions of Environmental Change to commence the review of user characteristics for FUTURE products;	- not done in 2011 - part of TOR for new ExG - completion date subject to new HD ExG
TOR 7: Recommend expert groups to identify major sources of uncertainty and impediments to improving the skill of assessments and forecasts, suggest research areas for priority development, and provide coordination of potential PICES products;	- October 2011 (PICES 2011) - ongoing - HD ExG - SICCME ExG - ISB 2012 – FUTURE roadmap
TOR 8: Provide for a PICES final peer review on information and interpretations.	- done for Cohen Commission report - ongoing requirement

Summary of Scientific Sessions and Workshops

Science Board Symposium (S1)

Mechanisms of Marine Ecosystem Reorganization in the North Pacific Ocean

Co-Convenors: *Sinjae Yoo (SB), Atsushi Tsuda (BIO), Mikhail Stepanenko (FIS), Steven Rumrill (MEQ), Hiroya Sugisaki (MONITOR), Kyung-Il Chang (POC), Toru Suzuki (TCODE), Thomas Therriault (AICE), Hiroaki Saito (COVE), Robin Brown (SOFI) and Fangli Qiao (China)*

Background

Marine ecosystem variation often is attributed to natural or anthropogenic stressors, especially climatic or hydrological forcing. These studies typically show correlations among ecosystem characteristics and indices of global warming or climatic oscillations. Also, changes in biological communities often are described in terms of their correlative relationships to these large-scale indices. While these studies have produced interesting results, the underlying mechanisms responsible for ecosystem change have not been totally identified, especially when it comes to understanding how populations, communities, and ecosystems are reorganized, sometimes dramatically, over short time periods. Complexity, arising from varying influences of biotic and abiotic factors on multiple spatial and temporal scales, challenges our understanding of these processes. Because of our insufficient understanding of ecological mechanisms for oceanic regions, it is not unusual to find that what has happened in the past cannot adequately predict what will happen in the future. Thus, the focus of this Science Board Symposium will be on describing mechanisms of ecosystem change and reorganization. The influence of factors operating at various temporal and spatial scales will be considered. This symposium will lead to a better understanding of factors that control species composition and ecosystem structure in the North Pacific Ocean, and improve our ability to predict system responses to future stressors, including climate change.

Summary of Presentations

The Science Board Symposium was held on Monday, October 17, 2011 (full day) and was launched with a keynote address by Olga Temnykh and included five invited presentations: Sukgeun Jung (Jeju National University, Korea), Maurice Lavoisier (Université Laval, Canada), William Sydeman (Farallon Institute for Advanced Ecosystem Research, U.S.A.), Mitsuo Uematsu (University of Tokyo, Japan), and Igor Volvenko (TINRO-Center, Russia). In addition, there were seven contributed oral presentations and six poster presentations.

The keynote address was given by Olga Temnykh (Pacific Research Fisheries Center, TINRO-Center) who provided a view of recent climate variability relative to variability observed over much longer time scales. Dr. Temnykh highlighted the role of cosmologic and geophysical factors responsible for shaping the atmosphere and hydrosphere. Using recently compiled datasets on variations in productivity of pelagic and bottom fish, squid, zooplankton and jellyfish acquired by TINRO-Centre in the northwestern Pacific Ocean over the past 30 years, she showed that biotic responses might be synchronous or asynchronous with global and/or regional climate processes. Thus, caution must be exercised when linking observed changes in ecosystem properties to climate variability. Lastly, Dr. Temnykh highlighted the need for extreme caution when attempting to forecast ecosystem changes as this can only be accomplished once the underlying mechanisms have been resolved.

There is little doubt that volcanic eruptions can significantly impact atmospheric and oceanographic processes. Mitsuo Uematsu highlighted the fact that impacts on atmospheric processes have been relatively well studied while those on oceanographic ones have not. Using three case studies, Mitsuo showed how biogeochemical processes in the North Pacific Ocean are affected by volcanic eruptions and the importance of these events in

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maintaining North Pacific marine ecosystems. For example, the Miyake-jima volcano (Tokyo, Japan) is an important source of nitrogen compounds, Mt. Okmok (Aleutian Islands, USA) is an important source of iron, and emissions from Kilauea volcano (Hawaii, USA) can alter cloud cover and thus the amount of light/radiation able to reach the ocean's surface and contribute to primary productivity. Advances in monitoring and ocean observing programs are making it possible for (almost) real time data to be shared broadly.

Keeping with the volcanic theme, Maurice Levasseur introduced us to his research into the role of volcanic dust in promoting phytoplankton productivity. Maurice noted that although Fe limitation has been noted for some time in the Alaskan Gyre, most efforts to understand how increasing Fe might increase productivity have largely been indirect. For example, *in situ* observations of large scale fertilization experiments or addition of chemical forms of iron. To better understand the actual bioavailability of iron in the ocean and its potential contribution to primary productivity, Maurice presented the results of his incubation studies that tested different sources and concentrations of Asian dust and volcanic ash on plankton communities in the North Pacific. Further, results suggest potential changes in pH could dramatically alter the biogeochemistry of iron in North Pacific marine ecosystems.

Igor Volvenko presented a conceptual and mathematical approach to integrate total biomass, animal size, and species richness, diversity, and evenness. Applying these approaches to multispecies assemblages of the Northwest Pacific he was able to demonstrate that a set of general principles could be used to characterize the organization of pelagic ecosystems in 4-dimensional space and provided some thoughts on how these might change in the future in response to ecosystem variability/change.

Using the California Current ecosystem as a case study, William Sydeman investigated how global climate change might affect this upwelling ecosystem. He showed that many species in this system are able to quickly take advantage of favorable conditions and are able to buffer themselves when conditions are poor. In addition to looking at species-specific responses (*e.g.*, range shifts), Dr. Sydeman explored potential mechanisms responsible for determining ecological interactions (*e.g.*, trophic relationships). The extensive study of the region allows detection of changes in currents, upwelling, and stratification. Not surprising, krill, forage species and predators have each altered their distribution in response to these ecosystem changes. However, non-linear responses also have been observed. For example, increased mis-match between predators and prey that ultimately decrease the predictability of the system which in turn has significant ecosystem and management implications. Thus, it is critical to start incorporating biological parameters in ocean observing programs.

Using long-term datasets from Korea, Sukgeun Jung explored the relationships between: 1) meteorological and hydrographical conditions; 2) volume transport of the Tsushima Warm Current; 3) zooplankton abundance/biomass; and 4) fishery catch. Applying categorical multivariate analyses Prof. Jung was able to demonstrate four regimes characterized by commercial species exploited during them: 1) saury; 2) pollock; 3) sardine; and 4) squid. Other shifts in commercial catches seemed to be related to strong El Niño events despite a lack of confirmation from oceanographic measurements in Korea.

The remainder of the symposium included a variety of presentations related to the symposium theme. For example, Ryan Rykaczewski used a modeling approach to show how nitrogen concentrations are expected to increase while oxygen levels are expected to decrease in coastal waters as the age of water masses change with climate change. Similarly, Chan Joo Jang showed how mixed layer depth variability contributes to changes in chlorophyll concentrations as a function of changes in nutrient cycling and William Peterson showed a linkage between the PDO and a copepod index that showed in warm periods small, lipid-poor copepods dominated and in cold periods large, lipid-rich species dominated. These changes are important for understanding how upper trophic levels might be affected by changes in the PDO. Min Bo Luo used a variety of community metrics to show the impact of large scale development in the Yangtze Estuary, Sanae Chiba showed data on the start, peak and end of phytoplankton blooms in association with the PDO, and Yury Zuenko showed how changes in winter monsoon patterns can create a match/mismatch with the spring bloom and this in turn affects cod survival. The last oral presentation by Jameal Samhouri showed how an Ecopath with Ecosim model can be

used to infer trophic changes in response to the observed decrease in top predator biomass in the California Current system. Simulations suggest that the initial predator release might be short-lived as compensation by the rest of the community develops. His talk highlighted the complexity of marine ecosystems and the potential difficulty with forecasting specific ecosystem responses to observed or expected forcing.

List of Papers

Oral Presentations

Vjacheslav P. Shuntov and Olga S. Temnykh (Keynote)

Recent changes in the North Pacific marine ecosystems related to climate change: Global or regional forcing?

Mitsuo Uematsu, Shigenobu Takeda, Hiroshi Furutani and Itsushi Uno (Invited)

Potential importance of volcanic emissions on marine biogeochemical cycles and clouds over the North Pacific

Maurice Levasseur (Invited)

Response of the plankton ecosystem of the Alaska Gyre to dust and ash depositions under current and future pH conditions

Ryan R. Rykaczewski, John Dunne and William T. Peterson

Projected changes in the relationship between water-column stratification and nutrient supply in the northeast Pacific

Igor V. Volvenko (Invited)

Biological structure of the ocean and general patterns in the spatial-temporary distribution of the integrative characteristics of pelagic macrofauna of the north-west Pacific

William J. Sydeman, Isaac D. Schroeder, Jarrod A. Santora, Sarah Ann Thompson, Jeffrey G. Dorman, John C. Field, Steven J. Bograd, Baldo Marinovic, Julie A. Thayer and Bryan A. Black (Invited)

Mechanisms of change in the California Current: An ecosystem case history

Chan Joo Jang, Sinjae Yoo, Taewook Park, Jisoo Park and Minho Kwon

Mixed layer depth variability and its associated changes in chlorophyll concentration in the North Pacific Ocean

William T. Peterson

Variations in source waters which feed the California Current may be the mechanism which links the PDO and climate change with ecosystem response

Min Bo Luo, Xin Qian Shen and Yun Long Wang

Comparison between the biodiversity index, Exergy, and the AMBI index for the benthos during large-scale engineering within the Yangshan Deep-water Harbor (Yangtze Estuary, China)

Sukgeun Jung and Iisu Choi (Invited)

Climate-driven ecosystem shifts in Korean waters during the past 40 years

Sanae Chiba, Kosei Sasaoka, Hiroya Sugisaki, Tsuneo Ono, Tomoko M. Yoshiki and Sonia Batten

Phytoplankton phenology and community changes in the western subarctic North Pacific 2000-2009 based on satellite and CPR observation

Yury Zuenko

Winter monsoon influence on reproduction of winter-spawning fish (Japanese sardine and Saffron cod) in the Japan/East Sea

Nick Tolimieri, Jameal Samhourj and Phillip Levin

Ecological consequences of a precipitous decline in mean trophic level in the Northern California Current

David M. Checkley, Jr.

A framework for ocean observing

Poster Presentations

Chan Joo Jang, Jisoo Park, Taewook Park and Sinjae Yoo

Projected changes in the North Pacific Ocean mixed layer depth and their impacts on primary production

Jongyeon Park, Jongseong Kug, Jisoo Park, Sangwook Yeh and Chan Joo Jang

Variability of chlorophyll associated with ENSO and its possible biological feedback in the Equatorial Pacific

Jiyeon Kim, Kwangbae Kim, Chaewoo Ma and Heungsik Park

Changes in the population and distribution of the amphipoda *Haustorioides koreanus* (Family Dogielinotidae) caused by the Hebei Spirit oil spill in the Hakampo and Ggotji beach on the west coast of Korea

Kwangbae Kim, Jiyeon Kim and Chaewoo Ma

Spatio-temporal changes in distribution and density of polychaete communities in Hebei Spirit oil spill impacted intertidal zones of the west coast of Korea

Xinming Pu and Ruixiang Li

Changes in phytoplankton within the Yellow Sea during the past 50 years

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BIO/POC Topic Session (S2)

Mechanisms of physical-biological coupling forcing biological "hotspots"

Co-Convenors: Jürgen Alheit (ICES/Germany), Elliott Hazen (PICES/U.S.A.), Oleg Katugin (PICES/Russia), Robert Suryan (PICES/U.S.A.), Yutaka Watanuki (PICES/Japan) and Ichiro Yasuda (PICES/Japan)

Background

This session will examine the physical and oceanographic factors that correspond to ecological or economic "hotspots" in the North Pacific and North Atlantic and their marginal seas. For the Pacific, this session will focus on the Kuroshio/Oyashio extensions and ecotone, the intersection of the Sea of Okhotsk and the western North Pacific (Kuril Islands region), and the Western Bering Sea. For the Atlantic, this session will focus on the North Sea, the intersection of the Gulf Stream and Labrador Current, in addition to tidally driven systems such as the Gulf of Maine and Gulf of St. Lawrence. "Hotspots" can broadly be defined as areas encompassing high species diversity, high abundance of individuals, especially of important indicator species, or areas of high economic value. Interdisciplinary contributions on physical-biological coupling and resulting seasonal or year-round "hotspots" in primary to tertiary productivity are invited. This includes data on physics, phyto- and zooplankton, forage fish, and upper trophic level predators (e.g., fish, seabirds, mammals, humans). We are particularly interested in simultaneous multi-species multi-use hotspots (*i.e.*, sites of ecological importance that overlap highly with sites of economic value) and potential changes in hotspots under future climate change scenarios. Modeling and empirical studies are encouraged. We will solicit a special publication in the primary literature pending subscription to the session.

Summary of presentations

Session 2 at PICES 2011 had a total of 14 talks and with no fewer than 40 attendees in the audience. Some talks focused on the physical oceanography at known marine hotspots (4 papers), while others considered seabirds (4), fish (3), and marine mammal (3) hotspots, multispecies hotspots, and also overlaps between hotspots and human impacts. A common theme was the issue of scale underlying identification or formation of hotspots, from those formed by ocean currents spanning 5000 km² to tidally driven hotspots in the wakes of headlands at the scale of 100 km². Scale differences highlight a range in biophysical factors affecting hotspot formation and persistence.

We discussed interest in assembling a special journal issue stemming from the theme session and at least half of the presenters were prepared to contribute a paper to a special issue. Our impression was that by reaching out to the broader community there will be sufficient interest for a full volume. Further interest and potential journals will be considered during the coming months. The audience felt that by focusing on mechanisms of hotspot formation in addition to other questions noted below, this volume would be sufficiently distinguished from the 2006 Deep-Sea Research II volume stemming from a 2004 PICES hotspot session. From the discussion session, we identified which questions about hotspots were most important to answer as a focus of the theme issue and came up with the following:

- 1) How do the two broad classes of hotspots differ, specifically what are the mechanisms of hotspot formation for both 1) aggregative and 2) bottom-up forced hotspots. How do the mechanisms allow the hotspot to persist or re-occur predictably?
- 2) How do we prioritize hotspots, e.g. does a certain percentage of the population have to visit a hotspot for it to be a hotspot, or are hotspots that support high biodiversity and strong ecological interactions the most important hotspots?
- 3) How might species interactions affect the use of hotspots by certain species?
- 4) What hotspots are at greatest risk? Which hotspots have greatest threat from human uses (e.g. fisheries, shipping lanes). For persistent or predictable hotspots, how persistent are they over decadal or multi-decadal time scales, e.g. which hotspots are likely to change under broad scale forcing such as regime shifts or climate change?

List of papers

Oral presentations

Sei-Ichi Saitoh, Robinson M. Mugo, Mukti Zainuddin and Fumihiko Takahashi (Invited)

Potential fishing zones as “hotspots” of skipjack tuna (*Katsuwonus pelamis*) and albacore (*Thunnus alalunga*) in the western North Pacific

Shin-ichi Ito, Yugo Shimizu, Shigeho Kakehi, Taku Wagawa, Masatoshi Satoh, Daisuke Ambe, Takeshi Okunishi and Kazuyuki Uehara

A quasi-steady warm water jet and an ecological hotspots in the western North Pacific

David G. Foley

Constructing oceanographic data sets and delivery systems to meet the needs of biologists

Robert Survan, Kathy Kuletz, Martin Renner, Patrick Ressler, Shannon Fitzgerald, Kiyooki Ozaki, Fumio Sato, Tomohiro Deguchi and Elizabeth Labunski (Invited)

Mechanisms affecting seabird-prey associations over submarine canyons in the northwestern Bering Sea

Igor M. Belkin (Invited)

Satellite oceanography of fronts as biological hotspots

Robinson M. Mugo, Sei-Ichi Saitoh, Fumihiko Takahashi, Akira Nihira and Tadaaki Kuroyama

When, where and why skipjack tuna, red flying squid and pacific saury potential fishing zones are likely to overlap in the western North Pacific: A proof of concept

Takashi Yamamoto, Akinori Takahashi, Nariko Oka, Takahiro Iida, Nobuhiro Katsumata, Katsufumi Sato and Philip N. Trathan

Foraging areas of streaked shearwaters in relation to seasonal changes in the marine environment of the Northwestern Pacific

Jürgen Alheit (Invited)

Climate variability impact on North Sea ecosystem

Elliott L. Hazen, Scott A. Shaffer, Michelle A. Kappes, Ryan R. Rykaczewski, David G. Foley, Steven J. Bograd and Daniel P. Costa

Oceanographic habitat segregation among postbreeding Hawaiian albatrosses and potential changes from 2001-2100

Mary-Anne Lea, Jeremy T. Sterling, Nicholas A. Bond, Sharon Melin, Rolf Ream and Tom Gelatt

Habitat use of Alaskan northern fur seal pups in the western North Pacific Ocean

Kaoru Hattori, Takeomi Isono and Orio Yamamura

Wintering aggregations of Steller sea lions in Ishikari-Bay, Sea of Japan

Haruka Nishikawa, Ichiro Yasuda, Sachihiko Itoh, Yoshikazu Sasai and Hideharu Sasaki

Impacts of climatic regime shift on Japanese sardine stock collapse

Konstantin Rogachev

Satellite and direct observations of circulations features associated with bowhead feeding hotspots in the Sea of Okhotsk

Poster Presentations

Tomoko Harada, Kentaro Kazama, Tomohiro Deguchi, Hajime Suzuki and Yutaka Watanuki

Foraging behavior of subtropical black-footed albatross *Phoebastria nigripes* and the marine environment around Bonin Islands

Igor M. Belkin and S. Kalei Shotwell

Propagation of SST anomalies along the North Pacific

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FIS Topic Session (S3)

Population dynamics, trophic interactions and management of cephalopods in the North Pacific ecosystems.

Co-Convenors: *John Field (USA), Yasunori Sakurai (Japan), Mikhail Zuev (Russia)*

Background

Cephalopods are typically an important component of marine food webs due to their rapid growth, high population turnover rates and often great abundance. They also represent a major, and apparently growing, fraction of total catches, both in the northern Pacific and throughout the world's oceans. Populations tend to exhibit boom-bust cycles, challenging traditional management strategies, and at times representing highly visible indicators of ecosystem change. In this session, we considered papers that examined the ecology and management of cephalopods in North Pacific ecosystems, specifically on the known or suspected drivers of population dynamics and the consequences to fisheries and ecosystems.

Summary of presentations

This half-day session included eight oral presentations and eight poster presentations. The first speaker, Chingis Nigmatullin (Russia, invited) began the session with a discussion of the community ecology of ommastrephid cephalopods in pelagic food webs, and specifically, the relationship between the parasites of nektonic squids and their hosts throughout the world oceans. The talk focused on the role of large ommastrephid populations "ecosystem enzymes" that help to accelerate basic ecosystem processes and trophic interactions through considerable horizontal and vertical migratory behavior. Next, Dr. Mitsuo Sakai (Japan, invited) provided a logical continuation of the first talk by evaluating the fluctuations of Pacific ommastrephids relative to fisheries and markets for squid products. Interestingly, their results suggested some relationship between squid abundance and environmental forcing factors for some species and ecosystems, but they did not suggest basin-wide synchrony in the abundance and dynamics of large ommastrephid populations in the Pacific. Mary Hunsicker (USA, invited), rounded out the discussion with an evaluation of the direct (commodity) and supportive role of cephalopods to global fisheries, with some focus on fisheries and ecosystems of the North Pacific. Her results suggest that the total contribution of cephalopods in marine ecosystems varied considerably, but ranged as high as 55% of landings and 70% of landed values, with the commodity values tending to be greatest in coastal ecosystems and the supportive role tending to be more important in pelagic ecosystems.

The next sequence of papers investigated the population dynamics, movement and bioenergetics of the common squid, *Todarodes pacificus*, throughout the western Pacific. Hideaki Kidokoro (Japan) investigated how catches, stock size, distribution and movement patterns varied between the 1950s and the recent era, emphasizing the cooperation in both research and management between Japanese and Korean fisheries for this important species. Similarly, Alexander Dulenin (Russia) reported on the migration of *T. pacificus* north to the Russian waters of the Tartar Strait, a migration that resumed in the 1990s following an extended period when migrations were not observed. His conclusion that a return to previously observed migration patterns was a result of warming trends, and this was consistent with that of the previous talk by Kidokoro, who demonstrated that catches and abundance of this species were low during the cool conditions of the 1970s and 1980s, but began to increase in the early 1990s. Hyejin Song (Japan) explored the bioenergetics and the trade off between growth and maturation of *T. pacificus* in waters around Japan and Korea, which were consistent with the hypothesis that water temperature (rather than prey density) was a key driver of growth and maturation for this species. Mikhail Zuev (Russia) provided a comprehensive overview of both seasonal progression and long-term variability in gonatid squid abundance and distribution in the northern Sea of Okhotsk. Finally, Horomichi Igarashi (Japan) presented a habitat suitability model for neon flying squid (*Ommastrephes bartramii*), which suggested that transport and eddy formation in the Kuroshio-Oyashio transition zone leads to high productivity and suitable habitat for this species.

List of papers

Oral presentations

Chingiz M. Nigmatullin (Invited)

Structural and functional aspects of nektonic squid food and parasite relations in the World Ocean ecosystems

Mitsuo Sakai, Yoshiobu Hiraoka, Taro Ichii, Hitoshi Imaizumi, Shintaro Imamura, Denzo Inagake, Toshie Wakabayashi, Yoshiki Kato, Katsuhiko Miki, Hideki Nikaïdo, Yosuke Ochi, Yuji Omura, Hiroaki Saito, Go Takayama, Takakashi Yanagimoto, Takanori Kobayashi, Nobuhide Hamaji and Ken-Ichi Ishida (Invited)

Utilization structure of jumbo flying squid stock in fluctuating environments: Possible impact on other squid harvests in the North Pacific

Mary E. Hunsicker, Timothy E. Essington, Reg Watson and Ussif R. Sumaila (Invited)

The value of cephalopods to global marine fisheries

Hideaki Kidokoro, Norio Yamashita, Sangwoo Kim, Youngmin Choi and Yasunori Sakurai

Ecological traits and population dynamics of Japanese common squid *Todarodes pacificus* that concerned with the fishing grounds and fishing seasons of Japanese and Korean fisheries

Polina Dulenina and Alexander Dulenin

Some data on biology and fishing of Pacific squid (*Todarodes pacificus*) in northwestern part of the Tartar Strait and their relations with hydrological processes

Hyejin Song, Michio J. Kishi and Yasunori Sakurai

Prediction of trade-off between growth and maturation depending on the environmental conditions in common squid *Todarodes pacificus*

Mikhail A. Zuev, Nikolai S. Vanin, Oleg N. Katugin and Gennady A. Shevtsov

Long-term fluctuations in gonatid squid (Gonatidae) abundance in the Okhotsk Sea

Hiroichi Igarashi, Toshiyuki Awaji, Masafumi Kamachi, Yoichi Ishikawa, Norihisa Usui, Yosuke Fujii, Takahiro Toyoda, Shuhei Masuda, Toshimasa Doi, Shiro Nishikawa, Yoshihisa Hiyoshi, Mitsuo Sakai, Yoshiki Kato, Sei-Ichi Saitoh and Shin-ichi Sato.

A statistical approach to identify optimal habitat suitability of neon flying squid in northwestern North Pacific by using satellite datasets and 3-D ocean data assimilation product

Poster Presentations

Osamu Tamaru, Kazushi Miyashita, Yasuzumi Fujimori, Toshihiro Watanabe and Teisuke Miura

Fishery Income fluctuation by selecting fishing ground in the Japanese coastal squid jigging fishery

Mikhail A. Zuev, Gennady A. Shevtsov and Oleg N. Katugin.

Seasonal shifts in species composition and distribution of cephalopods in the epipelagic northwest Pacific Ocean

Gennady A. Shevtsov and Konstantin A. Karyakin

Pelagic cephalopods of the Subarctic transition zone in spring 2010

Toshie Wakabayashi, Takashi Yanagimoto, Shiro Wada, Yoshiki Kato and Mitsuo Sakai

A review of population structure of the neon flying squid, *Ommastrephes bartramii* and new findings based on mtDNA sequence data

Konstantin A. Karyakin, Gennady A. Shevtsov and Oleg N. Katugin

Cephalopods from the Emperor Seamounts

Julia S. Stewart, William F. Gilly and John C. Field

Movement patterns and foraging ecology of the Humboldt squid in the California Current

Vasily D. Didenko, Nikolai S. Vanin and Oleg N. Katugin

Is there a relation between the abundance of *Berryteuthis magister* (Teuthida: Gonatidae) off the Kuril Islands and variability in atmospheric circulation patterns?

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FIS/POC Topic Session (S4)

Recent changes of North Pacific climate and marine ecosystems: Implications for dynamics of the dominant species

Co-sponsored by: ICES

Co-Convenors: *Sukyung Kang (Korea), James Overland (U.S.A.), Akihiko Yatsu (Japan) and Skip McKinnell (PICES)*

Background

The coincidence of multidecadal-scale alternations of dominant marine fish species coupled with multidecadal-scale “Climatic Jumps” created a concept of the Regime Shift. The recently published PICES North Pacific Ecosystem Status Report noted that the frequency of these events appears to have increased, and various indicators suggest that their amplitude has increased as well. The Arctic Oscillation Index, for example, reached an extreme negative anomaly during January-March of 2010, which brought a severe winter to much of the Northern Hemisphere, while other areas were warmed equivalently by the effects of the 2009/10 El Niño. The summer of 2010 saw record-setting high temperatures in some PICES member countries, accompanied by an abrupt shift in the tropics from El Niño to La Niña in July 2010. In the northwestern Pacific, after decades at low levels, sardine abundance has begun to increase, while the anchovy abundance is declining; perhaps signaling a new Regime. This session will review recent ocean/climate variability, with emphasis on what has occurred from 2009 to 2010. It will focus on the major ecological components of North Pacific marine ecosystems, particularly commercially important fish species. Papers on mechanistic linkages between population dynamics of marine species and environmental conditions are especially encouraged.

Summary of presentations

Drs. Kang, McKinnell and Yatsu chaired the session as Dr. Overland was unable to attend. Dr. Yatsu welcomed the many participants to the session and introduced the main theme. Emanuele DiLorenzo began his invited talk by asking how the regime-like states of marine ecosystems might arise from alternative physical models of forcing and dissipation (memory) in ocean. Biological processes tend to act as a low pass filter that removes high frequency noise. A first integral of a noisy time series, for example, enhances lower frequencies, and a second integration does it again. Prof. Di Lorenzo used a krill (*Nyctiphanes simplex*) time series as an example of how double integrating physics, in this case the PDO index, has a correlation ($r = 0.55$) with *N. simplex*. Double integration of the PDO gives a correlation of $r = 0.84$ with the Aleutian Low. The presentation was followed by a lively discussion. Tracy Shaw followed with a presentation on the relatively intimate linkages between physical forcing, plankton community composition, and salmon survival in the Columbia River (USA). Tomoko Yoshiki introduced some new results from the Japanese CPR program in the western Pacific. She divided the transect into east and west regions at 155° E longitude and found that, except for *Eucalanus bungi*, development times were similar in west and east despite differences in SST in these regions. *E. bungi* development was perhaps tied to the chlorophyll bloom. The beginning of this bloom is earlier in the west. Earlier blooms after 2005 were associated with earlier development in the west. On behalf of David Mackas and Moira Galbraith, who were unable to attend, Skip McKinnell described new findings from a 20 year reconstructed time series of zooplankton biomass in the Strait of Georgia. Most of the larger crustacean taxa in the Strait of Georgia show strong multi-year fluctuations and/or downward trends of annual average biomass. Strong subsurface warming of the Strait is likely an important environmental driver. Changes of the zooplankton community are likely to have contributed to reduced growth and survival of planktivorous fish (e.g. juvenile salmon). Lu Guan has been sampling the ichthyoplankton of the Strait of Georgia since 2007. She found that the ichthyoplankton community composition was very different in 2007, 2009, and 2010...with a shift from pelagic to demersal species over the period. The ichthyoplankton in 2007 was dominated by Pacific hake (*Merluccius productus*). Abundances were low in 2009 for many species, but all increased dramatically in 2010. Larval mean size was examined and was found to vary significantly across years. She demonstrated that some of this difference could be attributed to different hatching dates among years. Jinyeong Kim examined

factors that may affect the recruitment and biology of anchovy in Korean waters. She postulated that a strong (weak) Siberian High is associated with increasing (decreasing) anchovy abundance. Condition factor and GSI were positively correlated with copepod density and physical properties. Invited speaker Jürgen Alheit described coincident regime shifts in the late 1980s in the Baltic Sea, North Sea, and North Atlantic Ocean. Southern species generally replaced more northern species, a pattern that was also found in lakes. Water temperatures were increasing in many ecosystems in the late 1980s. In the central Baltic Sea, the change occurred between 1987 and 1988 while in the North Sea, the change occurred in 1989/90. Anatoliy Ya. Velikanov reported on the intermittent appearance of warm-water fish species in the Okhotsk Sea. Walleye pollock (*Theragra chalcogramma*) spawning biomass along the west coast of Sakhalin dropped dramatically in 1999. On the eastern side, it has an increasing trend. There was an increase in the abundance of warm-water species in the 1980-90s and there was higher abundance of species that have winter-spring spawning. Yongjun Tian reported that a regime shift from cold to warm occurred in the late 1980s. The fish community structure changed as well. The response to the shift was species-specific. A small number of indicator species were selected: yellowtail (*Seriola quinqueradiata*), bluefin tuna (*Thunnus thynnus*), jack mackerel (*Trachurus symmetricus*), anchovy (*Engraulis japonicus*), sardine (*Sardinops melanostictus*), Pacific cod (*Gadus macrocephalus*), and snow crab (*Chionoecetes japonicus*). Their selection was based on factors like trophic level, and demersal/pelagic, etc. The indicator species suggested that changes in the fish community occurred in 2004/05. Anne Hollowed described time series of recruitment variability in many demersal stocks of the eastern Bering Sea where cooling was detected from 2006. Stock-recruitment curves are a strong assumption with an uncertain validity. Grouping of time series was made on the basis of similarity in the time domain. Life history strategies are important when examining recruitment time series. A recruitment index showed a change in 2007 in a shorter life-span group. Andrei S. Krovnin examined low-frequency variability in Western Kamchatka pink salmon. For even years, there are high correlations with catches and climate are pan-hemispheric (resembles EOF1 of SSTA). For odd year, the high pan-regional correlations are with EOF2. The strongest shift in EOF1 occurred in 1998/99. A sharp increase in odd year catches occurred in 1992/93. He predicted that high catches will remain until the end of the warm phase of the Atlantic Meridional Oscillation. Akihiko Yatsu reported on a very high probability of at least a minor regime shift between 2005 and 2010, suggesting that it was in 2006/07. He reported similarities between recent years and early 1970s in the PDO, SOI, high abundances of copepods in the Kuroshio and Oyashio/Kuroshio transition, and high reproductive success rates in two stocks of sardine. He also noted that swift shifts in ENSO state are generally associated with regime shifts. Sangdeok Chung found a shift in fish species composition in a bay of western Japan that was associated with the 1988/89 regime shift and decreased oxygen. Jacquelynne King reported an abrupt change in migratory behaviour of Pacific hake in British Columbia around 2006. She also discussed the implications of having a mixture of migratory and resident populations on fisheries management. J. Anthony Koslow presented results of time series analyses of midwater and pelagic fishes in CalCOFI region, which suggested more important ecological roles of midwater species than considered so far, and changes in their biomass associated with dissolved oxygen conditions. Session convenors thanked ICES for co-sponsoring the session by providing travel support to Dr. Alheit, the invited speakers and the participants for their efforts to produce a scientifically interesting session. If there was any shortfall in the session, it was a generally lack of presentations that focused on the most recent period of ecosystem variability, but perhaps many felt that more time is needed before strong conclusions about a recent regime shift can be generated.

List of papers

Oral presentations

Emanuele Di Lorenzo and Mark Ohman (Invited)

A null hypothesis linking zooplankton “regime shifts” to North Pacific climate

Soonil An, Jiwon Kim, Seulhee Im, Beakmin Kim and Jaehung Park

Recent and future sea surface temperature trends in Tropical Pacific

C. Tracy Shaw, Leah R. Feinberg, Cheryl A. Morgan and William T. Peterson

Recent high variability in hydrography and lower trophic levels in the upwelling region off Newport, OR, USA

Tomoko M. Yoshiki, Sanae Chiba, Hiroya Sugisaki, Kosei Sasaoka, Tsuneo Ono and Sonia Batten

Interannual variability of zooplankton community structure based on Continuous Plankton Recorder in the western subarctic North Pacific during 2001-2009

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David Mackas and Moira Galbraith (presented by Skip McKinnell)

Zooplankton time series from the Strait of Georgia (British Columbia, Canada): Changes in biomass and community structure 1990-2010

Lu Guan, John Dower, Skip McKinnell and Pierre Pepin

Inter-annual variation in the spring ichthyoplankton assemblage in the Strait of Georgia from 2007-2010

Jinyeong Kim, Heeyong Kim and Sukgeun Jung

Predicting recruitment of anchovy based on oceanographic and reproductive conditions in the southern waters of Korea

Jürgen Alheit. Simultaneous (Invited)

Atlantic and Pacific regime shifts through northern hemisphere teleconnection pattern

Anatoliy Ya. Velikanov

Some features of changes in species composition and stock abundance for pelagic fishes off Sakhalin Island during the first decade of the 21 century: Recurrent influence of climatic regime shift

Yongjun Tian and Hideaki Kidokoro

Response patterns of the fish community in the Japan Sea to the climate regime shifts and identification of ecosystem indicators

Anne Hollowed, Matt Baker, Megan Stachura, Nathan J. Mantua and Ray Hilborn

Regime shift effects on Bering Sea fish and fisheries

Andrei S. Krovnin, Nataliya V. Klovach, Boris N. Kotenev and George P. Moury

Multi-decadal changes in the Far East salmon stocks in relation to climate regime shifts in the Northern Hemisphere

Akihiko Yatsu, Kaoru Nakata, Kimio Hanawa, Tomowo Watanabe and Hiroya Sugisaki

Recent changes in stock abundance of small pelagics in the Kuroshio/Oyashio ecosystem and associated physical conditions

Sangdeok Chung and Hideaki Nakata

The change in the environment and fish community structure in an enclosed bay of western Japan over the last five decades

Jacquelynn R. King, Gordon A. McFarlane, Simon R.M. Jones, Scott R. Gilmore and Cathryn L. Abbott

Abrupt changes in migratory behaviour of Pacific hake in Canadian waters: Stock delineation and implications for fishery management

J. Anthony Koslow, A. Lara-Lopez, P. Davison and N. Bowlin

Climate, biomass, and the trophic role of midwater fishes in the southern California Current

Poster Presentations

Kyungsu Kim, Jeonghee Shim and Suam Kim

Effect of ocean acidification on the early life history of coastal fishes

Dmitriy Antonenko and Nadezhda L. Aseeva

The long-term dynamics of biomass and species composition of flatfish in waters of Primorye Region (Sea of Japan)

Chih-Hao Hsieh, Wann-Nian Tzeng, Yu-Heng Tseng, Yu-San Han, Chih-Chieh Hsu, Chih-Wei Chang, Sen Jan and Emanuele Di Lorenzo

Multi-scale climate effects on the recruitment of Japanese eel, *Anguilla japonica*, to Taiwan

Kazuaki Tadokoro, Yuji Okazaki, Tsuneo Ono and Hiroya Sugisaki

Recent changes of Neocalanus copepods biomass in the Oyashio waters, western North Pacific

Sukyung Kang, Kwangho Choi, Jisuk Ahn, Jaedong Hwang and Dongwoo Lee

Distribution and species composition of major fish species under varying climate scenarios in Korean waters

MEQ Topic Session (S5)***Harmful Algal Blooms in a changing world***

Co-Convenors: *Tatiana Morozova (Russia) and Mark Wells (U.S.A.)*

Background

The impacts of regional and global climate change and other anthropogenic forcing on the initiation, frequency and severity of harmful algal blooms (HABs) are widely anticipated but are difficult to identify. Often these “blooms” reflect subtle adjustments in the relative proportion of HAB species within a larger, more abundant phytoplankton community. In others, new blooms may reflect the possible climate-driven range extension of HAB species, but direct evidence that previous environmental conditions were unfavorable for bloom development normally is lacking. Ascribing HAB events to specific, but slowly evolving driving forces, will demand comparative observations among similar but geographically separated ecosystems. This session invites papers that focus on emerging toxic and ecosystem disruptive HAB events as well as changing plankton assemblages that are evolving towards more frequent or intense HAB incidents. Papers addressing long-term time series data, land use changes, effects of macro- or micro-nutrient stress on cell physiology, trophic interactions, and the impacts of changing riverine runoff, ocean development (*e.g.*, aquaculture, wind turbines), and ocean acidification are particularly encouraged. The goal of the session is to help formulate a better understanding of conditions enhancing the success of HAB species.

Summary of Presentations

The central goal of this session was to ascertain the leading current indicators of climate-related changes in the distribution, frequency or intensity of Harmful Algal Bloom (HAB) outbreaks in the PICES nations. The session began with an invited speaker, Dr. Feixue Fu, who presented her recent findings that increasing pCO₂ in seawater can dramatically increase growth rates and toxin production of HAB groups that already are a serious health and economic threat in the North Pacific. These novel studies highlight the synergistic interactions by which climate change may increase HAB problems beyond that due to range extension and evolving oceanographic conditions. The Session also learned about an extraordinary 35 year dataset detailing the dynamics of nutrients and harmful algal species in the eastern Seto Inland Sea; a rich database that tracks significant changes in HAB species occurrence through time. The importance of these changes in time was emphasized in a presentation of new information about the recent dramatic increases in Harmful Macroalgal Blooms (H-MABs) in Chinese coastal waters. Participants also learned about studies on the surprising distribution of ciguatoxin-producing *Ostreopsis* in Peter the Great Bay, and a summary of the spatial patterns of toxic phytoplankton in the Sea of Okhotsk. Perhaps one of the strongest findings of climate-associated range extension of HAB species is that of *Gambierdiscus* spp., responsible for Ciguatera Fish Poisoning, in temperate eastern coastal waters of Japan, where it appears to have migrated recently from the tropical and subtropical Ryukyu Island chain. Increasing toxic concerns also are suggested in Puget Sound, Washington State, USA, where model-projected continuation of increasing springtime freshwater runoff and higher surface water temperatures during summer are predicted to interact synergistically, resulting in more frequent, longer duration and higher intensity outbreaks of paralytic shellfish poisoning. Participants learned that this trend of increasing HAB outbreaks already is occurring along the California coast, where time series studies show that true red tides have increased dramatically since 2005 coincident with mesoscale changes in depth and intensity of stratification and upwelling favorable winds, as well as from land-sea coupling processes. These changes appear to be associated with decadal-scale oceanographic forcing and increasing anthropogenic impacts, though the mechanisms remain unclear. The well-attended session provided a dynamic platform for discussion and debate about the emerging indicators that climate and basin scale changes are leading to increased HAB problems in coastal waters of the North Pacific. There were 35 scientists in attendance: Japan (8), Korea (3), USA (9), China (7), Russia (8), Canada (0).

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List of papers

Oral Presentations

Feixue Fu (Invited)

Global change and the future of toxic algal blooms in the North Pacific Ocean

Tetsuya Nishikawa, Yutaka Hori, Satoshi Nagai, Kazutaka Miyahara, Yukinobu Nakamura, Kazuhiro Harada, Minoru Tada, Takehiko Manabe, Kuninao Tada and Ichiro Imai

Long term (35 years) observations in dynamics of nutrients and phytoplankton including the harmful diatom *Eucampia zodiacus* in Harima-Nada, eastern Seto Inland Sea, Japan

Charles G. Trick and Brian Sutton-Quaid

Are fish-killing flagellates a sign of things to come?

Marina S. Selina, Tatiana V. Morozova, Nellya G. Litvinova, Dmitry I. Vyshkvartsev and Tatiana Yu. Orlova

Seasonal dynamics and spatial distribution of *Ostreopsis* spp. in the Peter the Great Bay, the Sea of Japan

Akira Ishikawa, Yumi Takeichi, Setsuko Sakamoto and Mineo Yamaguchi

Year-round occurrence of the benthic dinoflagellate *Gambierdiscus* sp. in temperate coastal waters of Japan

Mingyuan Zhu and Ruixiang Li

HAB in coastal waters of China in 2010

Ekaterina V. Lepskaya

Toxic micro alga in Okhotsk Sea in Kamchatka shore

Stephanie K. Moore, Vera L. Trainer, Nathan J. Mantua and Eric P. Salathé, Jr

Future scenarios for environmental conditions favoring the accumulation of paralytic shellfish toxins in Puget Sound shellfish

Raphael M. Kudela, John P. Ryan and Jenny Q. Lane

Multiple, simultaneous harmful algal bloom organisms and toxins in the California Current: An emerging threat?

Poster Presentations

Qiulu Wang and Yanxia Zhou

The elementary study of the bacteria biomass and environmental factor in East China Sea

Inna V. Stonik, Tatiana Yu. Orlova, Luisa N. Propp, Natalia L. Demchenko and Anna V. Skriptsova

Bloom of *Pseudo-nitzschia* species in Amurskii Bay, the northwestern East/Japan Sea: The role of environmental factors in population dynamics

Hao Guo

Study on the growth characteristics of cultured red-tide-algae *Alexandrium tamarense*

MEQ/FIS Topic Session (S6)

Identification and characterization of environmental interactions of marine aquaculture in the North Pacific

Co-Convenors: *Katsuyuki Abo (Japan), Brett Dumbauld (U.S.A.) and Galina Gavrilova (Russia)*

Invited Speakers:

Tomoko Sakami (Tohoku National Fisheries Research Institute, Japan)

Shuanglin Dong (Ocean University of China, PR China)

Background

Marine aquaculture is an important economic and social activity within PICES member countries. To ensure that development of aquaculture is environmentally and economically sustainable we need to: 1) improve our understanding of interactions between marine aquaculture and the environment (including wild stocks of plants and animals, 2) develop methods to study and/or predict such interactions, and 3) devise ways to reduce negative impacts on the environment. To this end the PICES Working Group on Environmental Interactions of Marine Aquaculture has begun to characterize the nature of these interactions with a focus on the benthic environment and aquatic animal health. To align with the activities, papers for this session are solicited in the

following areas: 1) identification and characterization of marine aquaculture-environmental interactions; 2) development of tools to identify and study such interactions; and 3) social science research related to aquaculture interactions with the marine environment.

Summary of presentations

The presentations covered a variety of applications of marine aquaculture in PICES countries. There were 2 invited oral presentations, 6 oral presentations and 3 posters prepared for this session from Canada, China, Japan, Russia and USA. Two oral presentations were cancelled but one alternative oral presentation was presented by Dr. Hasegawa. About 50 people participated in the topic session.

The invited speaker, Dr. Tomoko Sakami (Fisheries Research Agency, Japan) started the session by describing an attempt to assess aquaculture environments using microbial communities in bottom sediments. She suggested sedimentary microbe genomic information is a prospective parameter to assess the environments influenced by fish aquaculture (Abstract S6-7567). Another invited speaker, Dr. Shuanglin Dong introduced integrated aquaculture in China. He described the history, ecological rationales, classification and development of integrated aquaculture in China (Abstract S6-7755).

Dr. Katsuyuki Abo summarized research on environmental interactions of marine aquaculture in Japan. He reviewed studies on impacts of marine aquaculture on benthic environments to identify and characterize the environmental interaction of marine aquaculture in Japan (Abstract S6-7736). Due to visa application trouble, Dr. Brett Dumbauld was unable to attend the topic session so an alternative presentation was given by Dr. Natsuki Hasegawa. He discussed the use of aquaculture species for monitoring change in coastal ecosystems and fisheries productions. He suggested bivalves and seaweed species for aquaculture as potential indicators of coastal ecosystem production (Abstract S6-7665-2; provided as *Endnote 1*). Dr. Stewart Johnson presented an overview of interactions between wild and farmed salmonids in Southern British Columbia. He summarized surveys of pathogens in wild salmonids, laboratory studies on pathogens and hosts, improved diagnostic methods and the use of physical oceanographic models to predict pathogen movements within the environment (Abstract S6-7861). The influence of environmental factors on hanging plantations for *Laminaria* kelp was presented by Dr. Tatiana Krupnova (Abstract S6-7858). Dr. Sei-Ichi Saitoh discussed the use of GIS-based spatial models to select Japanese kelp aquaculture sites in the Southwestern Hokkaido (Abstract S6-7580).

Dr. Chunjiang Guan presented a poster on absorption of carbon and nitrogen by culturing *Sargassum thunbergii* in coastal waters. He suggested *Sargassum thunbergii* culture played an important role in restoring eutrophied sea waters and in absorbing CO₂.

At the end of the topic session, a proposed plan for a new SG at 2012 AGM was introduced to participants and ideas and suggestions of participants were requested during this year.

List of papers

Oral presentations

Tomoko Sakami, Ryuji Kondo and Takanori Bobayashi (Invited)

An attempt to assess the environment by using microbial communities of the bottom sediments from marine areas of fish aquaculture

Shuanglin Dong (Invited)

Integrated aquaculture in China

Katsuyuki Abo

Environmental interactions of marine aquaculture in Japan

Natsuki Hasegawa and Toshihiro Onitsuka

Monitoring the change of coastal ecosystem and fisheries productions using an aquaculture system

Stewart Johnson, Michael Foreman, Kyle Garver, Brent Hargreaves, Simon R.M. Jones and Chrys Neville

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Interactions between wild and farmed salmonids in Southern British Columbia: Pathogen transfer

Tatiana Krupnova, Vladimir Pavlutykov and Nina Shepel

Environmental influences on harvesting from hanging plantations for *Laminaria* kelp

Nyoman Radiarta, Sei-Ichi Saitoh, Toru Hirawake and Hajime Yasui

GIS-based spatial models for Japanese kelp (*Laminaria japonica*) aquaculture site selection in the Southwestern Hokkaido, Japan

Wei Zheng, Honghua Shi, Xuelei Zhang, Mingyuan Zhu and Zongling Wang

Ecological-economic assessment of monoculture and integrated multi-trophic aquaculture in Sanggou Bay, China

Endnote 1

Abstract of the alternative presentation, S6-7665-2

Monitoring the change of coastal ecosystem and fisheries productions using an aquaculture system

Natsuki **Hasegawa** and Toshihiro Onitsuka

Hokkaido National Fisheries Research Institute, FRA, 116 Katsurakoi, Kushiro, Hokkaido, 085-0802, Japan

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Linking changes in ecosystem and fisheries production with environmental factors which contribute to numerical models that predict that change is particularly difficult in coastal areas. Since there are more diverse organisms, landscapes, and interactions in coastal areas than those in offshore areas, change was not directly predicted by numerical models. Bivalves and seaweed species for aquaculture are potential indicators of coastal ecosystem production, because these primary consumers and producers are sensitive to environmental changes especially at early stages. However, changes in catch or landings do not reflect change in productivity and there might not be enough objective and scientific data on parameters like number and survival rate to estimate production in Japanese aquaculture using catch or landings alone. Therefore constructing a broad monitoring system of these productivity indices and other characteristics, which could be routinely collected with aquaculture, would be useful for analyzing catch data and for identifying change. Accumulation of these short-term data would effectively contribute to predicting mid and long term change in coastal ecosystem and fisheries production based on predictive environmental models.

Poster Presentations

Chunjian Guan and Feng'ao Lin

Absorption of carbon and nitrogen by culturing *Sarassum thunbergii* in coastal waters

Vera Valova

The influence of salmon hatchery conditions on the physiological status of Amur sturgeon

Olga G. Shevchenko

Monitoring of potentially toxic microalgae in Severnaya Bight (Slavyanskii Bay, the Sea of Japan) in 2008, 2009

MEQ/FUTURE Topic Session (S7)***Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems***Co-Sponsored by: *NOWPAP*Co-Convenors: *Masahide Kaeriyama (Japan), Olga Lukyanova (Russia), Steven Rumrill (U.S.A.) and Thomas Therriault (Canada)*Background

Land-sea interactions are widely recognized as an important component of coastal ecosystem processes throughout the North Pacific Region. Anthropogenic activities in upland and coastal areas can significantly alter the productivity of coastal ecosystems and disturb the communities that depend on them. Human activities such as pollution or overfishing can result in immediate and direct impacts on biological productivity. However, there are an increasing number of indirect impacts such as altering the flow of ecosystem-transboundary materials (ETMs) that are responsible for the enriched productivity of many northern coastal systems. In Asia, the dissolved iron that is transported from the Amur River basin into the Sea of Okhotsk and Oyashio Region is now recognized as a major regulator of the primary productivity in these coastal waters. Similarly, disruptions in the timing and amplitude of riverine discharges from the Columbia River Basin (Pacific Northwest) result in significant alterations of salinity regimes, sediment transport, biological productivity, and fisheries returns throughout the region influenced by the Columbia River plume. Anthropogenic impacts such as changes in land use, artificial river channelization, hydropower structures, and urbanization disrupt and alter the flow of ETMs thereby reducing the productivity in these coastal ecosystems. Furthermore, these alterations can lead to the manifestation of other stressors in coastal ecosystems such as jellyfish blooms, hypoxia events, and harmful algal bloom (HAB) outbreaks. This session will focus on: 1) how ETMs (*e.g.*, dissolved iron, carbon and other elements) are transported from upland ecosystems into coastal ones; 2) what mechanisms regulate the supply of ETMs and how the downstream transport of these impact the productivity (primary production) of coastal systems; 3) how anthropogenic impacts disrupt the ETM system and resulting changes downstream including increased ecosystem vulnerability; 4) how anthropogenic impacts directly reduce coastal productivity; and 5) exploration of potential adaptive management strategies based on the ecosystem-approach to protect the ETM system to ensure sustainability of coastal ecosystems and stability for the coastal societies depending on them.

List of papers*Oral presentations***Takayuki Shiraiwa** (Invited)

“Giant fish-breeding forest”: A new environmental system linking a continental watershed with open water

Svetlana Belava and Petr Tishchenko

Primary production of Amurskiy Bay (Japan Sea) in the winter season

Yousuke Koshino, Masao Minagawa, Hideaki Kudou, Yuxue Qin and Masahide Kaeriyama

Effect of salmon-derived nutrients and organic matter on riparian ecosystems in the Shiretoko World Natural Heritage area

Neil S. Banas, Barbara M. Hickey, Eric P. Salathé and Parker MacCready

Freshwater influences on productivity in the northern California Current System, present and future

Thomas W. Therriault and Claudio DiBacco

Does diet determine the impact of invasive tunicates in shellfish aquaculture?: Application of stable isotopes

Steven Rumrill, Alicia Helms and Adam DeMarzo

Detection of pH shifts in the South Slough estuary (Oregon, USA): Exploration of relationships between changing carbonate chemistry, eutrophication, and net estuary ecosystem metabolism

Jennifer E. Purcell

Jellyfish and ctenophore blooms coincide with human proliferations and environmental perturbations

Peter S. Ross and Steven Jeffries

Marine mammals provide an integrated measure of spatial and temporal trends in coastal food web contamination by persistent environmental contaminants

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Vladimir Shulkin (Invited)

The spatial dimension of the environmental problems existing in coastal zone due to land-sea interactions

Pavel Tishchenko, Vladimir Zvalinsky, Tatiana Mikhajlik and Petr Tishchenko

Assessment of eutrophication status of Amursky Bay (Japan/East Sea)

Ichiro Imai, Mineo Yamaguchi and Yutaka Hori

Long-term changes in eutrophication and harmful algal blooms in the Seto Inland Sea of Japan

Tatiana L. Chizhova, Hisatoshi Nakase, Pavel Tishchenko and Kazuichi Hayakawa

Distribution of polycyclic aromatic hydrocarbons in the North-western part of the Japan Sea

Jing Zhang and NSFC Task Team (Invited)

Remobilization of nutrients from watersheds and eutrophication in marine recipients

Jianguo Du, Bin Chen, Qiulin Zhou, Quan Wen, Honghua Shi, Weiwei Yu and Hao Huang

Strategies of marine biodiversity conservation based on integrated coastal zone management

Vladimir Ostrovskii

Factors controlling the pink salmon (*Oncorhynchus gorbusha*) juvenile abundance in the Isky River

Sergey D. Ponomarev

Influence of ecological factors on Pacific herring spawning efficiency

Vera Valova

Reactions by Amur sturgeon fingerling to pollution within the Amur River

Satoshi Nakada, Yoichi Ishikawa, Toshiyuki Awaji and Sei-Ichi Saitoh

Coupled land-ocean model for the coastal fisheries in a Region of Freshwater Influence (ROFI): A case study in Funka Bay

Poster Presentations

Lidiya T. Kovekovdova and Denis P. Kiku

Assessment of levels of toxic elements (As, Hg, Pb, Cd) in the environment and commercial hydrobionts in coastal waters of the Russian zone of Japan/East and Okhotsk Seas

Svetlana A. Ireykina

Molecular biomarkers in monitoring of the coastal and estuarine zones of Peter the Great Bay (Japan/East Sea)

Andrey P. Chernyaev and Anna S. Vazhova

Petroleum hydrocarbon distribution in the Far Eastern Seas of Russia in 2010

Anna S. Vazhova

Wastewater pollutants discharge into Peter the Great Bay (Japan/East Sea) through estuaries of the rivers

Aleksandra S. Kondakova and Andrey P. Chernyaev

Levels of 4-NP in coastal waters in the Russian zone of Japan/East and Bering Seas

Alexander Moshchenko, Tatyana Belan and Yuri Korostelev

Long-term changes in the marine environment and benthic communities in the north part of Amursky Bay (Sea of Japan)

Olga N. Lukyanova and Svetlana A. Ireykina

Pollution of river-sea interaction areas in Peter the Great Bay (Japan/East Sea)

T.P. Belova and Olga N. Selivanova

Application of *Saccharina*-based sorbents for purification of sewage waters of metal mining industry

Wang Yongzhi, Feng Aiping, Qiao Lulu, Yang Zuosheng and Bao Xianwen

Research on the transport mechanism for suspended sediment along northeast Shandong Peninsula coast in summer and winter

Irina R. Levenets and Anna V. Skriptsova

Macrophyte seasonality in the Sobol Bay, Peter the Great Bay, Sea of Japan

POC/FIS Topic Session (S8)***Linking migratory fish behavior to end-to-end models***

Co-sponsored by: *ICES*

Co-Convenors: *Enrique Curchitser (PICES/U.S.A.), Geir Huse (ICES/Norway), Shin-ichi Ito (PICES/Japan), Michio Kishi (PICES/Japan) and Skip McKinnell (PICES)*

Background

In order to understand ecosystem response to climate impacts, End-to-End modeling (E2E) approaches are essential. One of the most difficult parts for E2E is the modeling of fish behavior migration. Fish behavior can be very complex; it is a consequence of genetics, physical, chemical and biological environments and their interaction. Learned behavior may also be a factor. Recently, new technology has been introduced to tagging equipment, and as a consequence data availability is vastly improved. Additionally, new technologies are used to investigate fish movements in laboratory settings. This new information is expected to improve our understanding of fish migration mechanism and contribute to the development of fish migration models. Furthermore, the development of high-resolution ecosystem models coupled to circulation models makes it possible to simulate fish migration in the context of realistic environmental fields. The purpose of this session is to understand the current state of development in modeling fish behavior and discuss future potential collaborations to improve fish migration models. This session anticipates presentations that discuss successes (and failures) in modeling migratory fish behavior. Presentations related to data availability for model evaluation of fish behavior are also welcome. Based on the results and opinions expressed at the session, the conveners would like to discuss the desirability of establishing a group that will focus its attention on developing and advancing the state of fish behavioral modeling.

Summary of Presentations

Dr. Shin-ichi Ito and Dr. McKinnell chaired the session and introduced the history of this difficult topic. Invited speaker, Prof. Kenneth Rose of Louisiana State University, described why there is a growing increase in migration modelling. He noted that traditional modelling methods are perceived as unsuccessful, how many management issues involve space, how climate change is expected to affect distributions and behaviours, that data collection is becoming very spatially-detailed, how computing power continues to increase, and that significant advances in hydrodynamics and upper trophic level modeling have been made recently. He described an approach that is being used with doctoral candidate Kate Shepard to validate fish behaviour. Movement algorithms (kinesis, neighbourhood search, event-based) were evaluated. They concluded that the results were encouraging, that the three methods successfully trained with the Genetic Algorithm produced realistic movement, and that total egg production was fairly constant across methods and grids. Jerome Fieschter, the second invited speaker, described the performance of their end-to-end model efforts directed at sardine and anchovy. He is using a 3-D ROMS for ocean circulation, NEMUROMS for NPZ, a multi-species IBM for fish, and a fishing fleet dynamics model. To date, they have solved many numerical and bookkeeping issues, implemented different behavioral cues for movement, and next is to add more realistic biology. They found that balancing food/dietary factors when compared with balancing SST gave different results. In future, they intend to increase biological realism, and investigate the causes of low-frequency cycles. Yu-Heng Tseng described a modelling study of Japanese anchovy in the East China Sea. Little is known about the oceanic migration of the adults but spawning is known to occur in Taiwan Strait. The ability of the adults to reach southern spawning grounds may depend on Changjiang River discharge. He described that when coastal discharge from the Chiangjiang is included in the model, its variability is expected to affect migration routes (and availability) of anchovy to local fishermen. Skip McKinnell speculated on how the factors responsible for contemporary fish behaviour may have been determined by selective forces affecting the species centuries ago. Migration timing in sockeye salmon is relatively invariant compared to other behavioural traits. At the southern extreme of their range in North America, they have much earlier run timing than is expected from their spawning dates. Arriving at the “normal” time for their relatively late spawning date appears to have been selected against in earlier times. Kjell Utne and Geir Huse discussed how they are using individual-based

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models (IBM), genetic optimization algorithms, and observational data in their migration models of herring, blue whiting and mackerel in the northern North Atlantic Ocean. It is embedded within the NORWECOM coupled model system to provide access to daily physical and prey fields. The additional complexity is increasing the demand for computational resources. Shin-ichi Ito and his colleagues ended the session with an interesting presentation showing how they had evaluated both Euler-type and an IBM of saury migration. Euler-type models are computationally efficient because they simply move biomass from place to place on a fixed grid, but there is no information about the migration pathways of individuals that is possible with IBMs. Scaling IBMs to represent biomass has huge computational costs. The Euler-type model was able to capture the general features of saury feeding migration, egg production, and body size, but was unable to capture the westward spawning migration and required a somewhat artificial mixture of body sizes. The convenors were encouraged by the better-than-expected turnout of attendees to the topic session, so a repeat session is planned for PICES-2012 in Hiroshima.

List of Papers

Oral Presentations

Kenneth A. Rose, Katherine Shepard, Haosheng Huang, Sean Creekmore, Paul Venturelli, Jerome Fiechter, Enrique N. Curchitser, Kate Hedstrom, Matthew Campbell and Dubravko Justic (Invited)

Modeling movement of fish over spatial and temporal scales: If fish were dumber and people were smarter

Jerome Fiechter, Kenneth A. Rose, Enrique N. Curchitser, Kate Hedstrom, Miguel Bernal and Alan Haynie (Invited)

Behavioral cues for small coastal pelagic species in the California Current: Results from a fully-coupled end-to-end ecosystem model

Shin-ichi Ito and Takeshi Okunishi

Comparison of migration algorithms for Japanese sardine (*Sardinops melanostictus*) in the western North Pacific

Chen-Yi Tu, Yu-Heng Tseng, Tai-Sheng Chiu, Mao-Lin Shen and Chih-Hao Hsieh

Using coupled fish behavior-hydrodynamic model to investigate spawning migration of Japanese anchovy, *Engraulis japonicus*, from Taiwan to the East China Sea

Skip McKinnell

Evolution's challenge to modeling sockeye salmon spawning migration

Kjell Rong Utne and Geir Huse

Towards end-to-end modeling with a special focus on planktivorous fish

Shin-ichi Ito, Masatoshi Sato, Takeshi Terui, Michio J. Kishi, Daisuke Ambe, Takahiko Kameda, Satoshi Suyama, Masayasu Nakagami and Yasuhiro Ueno

Euler-type and Individual Based modeling approaches for fish migration: An example of Pacific saury

MONITOR/POC/FUTURE Topic Session (S9)

How well do our models really work and what data do we need to check and improve them?

Co-Sponsored by: *IMBER*

Co-Convenors: Jack Barth (U.S.A.), Dake Chen (China), Michael Foreman (Canada), Philip Mundy (U.S.A.), Young-Jae Ro (Korea), and Sei-Ichi Saitoh (Japan)

Background

Given the importance of models to FUTURE, it is crucial to examine their skill and utility through comparison with data. Models are being used to study and forecast physical (atmospheric and oceanic circulation and mixing), chemical (air-sea fluxes, dissolved oxygen), biological (primary production, trophic dynamics) and fisheries (individual based modeling, migration pathways) processes. Climate forcing and coupling between processes is of prime importance. Presentations are invited over the range of modeling scales, from local to global, and from hours to decades. Contributions are also welcome identifying data sets that we currently have that are helpful for assessing model skill and what new data sets are needed and might be obtained through

ocean observing efforts. Discussions of uncertainty in model predictions and ways to reduce that uncertainty are also invited.

Summary of presentations

This session was held to stimulate a review of a variety of models, especially how they compare with available data sets and what data are needed to improve the models. This is a timely topic as models are an important part of the PICES FUTURE Science Plan. An audience of about 50-60 people heard 18 oral presentations, five of which were invited. The posters were presented in the PICES poster session Thursday evening.

The invited speakers presented a series of stimulating talks on global scale physical modeling including downscaling to the Pacific marginal seas (Nikolay Diansky, Russia), on the dynamics of the Oregon continental shelf circulation using a data-assimilating model (Alexander Kurapov, U.S.A.), on end-to-end physics to fish and fishers models (Kenneth Rose, U.S.A.), on secular trends in a new global gridded phosphate and dissolved oxygen data base useful for comparing with global-scale numerical models (Shoshiro Minobe, Japan), and on an operational system to forecast fishery-resource variability using a circulation model and satellite data (Yoichi Ishikawa, Japan).

Throughout the talks and poster presentation, there was a consistent theme about the importance of long-term data sets for not only generating hypotheses about physical and biological variability, but for providing critical tests for the output generated by a range of numerical models. On the global and ocean basin scale, the value of the surface drifter velocity fields, the north-south heat flux as a function of latitude, and the subsurface hydrographic and velocity fields from Project Argo were noted. On the regional and coastal scale, the importance of satellite data (sea-surface temperature, surface height from altimetry, chlorophyll), surface velocities from high-frequency, land-based radar, subsurface data from moorings, and subsurface hydrographic and velocity data from the growing number of underwater gliders was noted. Several speakers noted that while the satellite data are invaluable, it is difficult to detect decadal variability since satellite data with global coverage are only about 30 years long. It was also commented on that we need at least 20 years of data before a trend can be detected in the presence of decadal variability.

For the more sophisticated bio-physical models, including end-to-end “climate-physics-fish-fisher” models, the need for quantitative data about the vertical distributions of both plankton and fish, and about fish populations over multiple generations are critical. In coastal waters, it is important to have data about yearly cycles of the vertical structure of the hydrographic, nutrient, phytoplankton and zooplankton fields. Several talks described models of water quality (pH, dissolved oxygen, turbidity) and water-borne diseases, especially those affecting aquaculture activities around the North Pacific, emphasizing the need to expand further our data collection efforts.

Two notable comments from the talks included Shoshiro Minobe’s nice analogy between preparing food for dinner from raw ingredients to preparing biogeochemical data sets (phosphate, dissolved oxygen) from world ocean data bases for use in model evaluation. He emphasized the care needed in data (food) preparation, in particular checks on data quality and careful attention to time and space gridding. In the context of the need for large, interdisciplinary teams to develop, analyze and apply ever-more sophisticated models and model-data comparisons, Kenneth Rose presented a very stimulating discussion about how humans interact and how we behave in groups. He suggested that we need changes in how we learn in groups and how best to make use of the range of ways we interact with each other. He emphasized the importance of face-to-face collaboration to balance our increasing reliance on electronic communication.

The Co-Convenors judged that the best oral presentation by a young scientist was by Naoki Yoshie (Japan) who spoke about “*Phytoplankton and nutrient dynamics in the western Seto Inland Sea, Japan, based on observation and a modified NEMURO model.*” Dr. Yoshie’s talk was praised for his clear description of the time- and space-varying biophysical water properties and plankton distributions, and his use and testing of a numerical model to explain the observed variability. The best poster presentation was by Vladimir Kulik

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(Russia) on a “North Pacific database of pelagic and bottom trawl surveys from Russian EEZ applicable to Ecosystem Based Management.” Dr. Kulik reviewed recent progress on assembling important biological data sets and making them available for potential application in fisheries management.

List of Papers

Oral Presentations

Nikolay A. Diansky and Vladimir Zalesny (Invited)

Numerical simulation of the large-scale ocean circulation with a multi-component splitting method

Alexander Kurapov (Invited)

Oregon coastal ocean data assimilation system: Model performance and assimilated data assessment

John A. Barth, Sangil Kim, Christopher A. Edwards and Patrick T. Drake

To where the currents flow - Larval dispersal and connectivity along the U.S. West Coast

Kenneth A. Rose (Invited)

Combining hydrodynamic, NPZ, and fish models into climate-physics-fish-fisher models: Can the biology and people keep up with the computers?

Angelica Peña and Diane Masson

Modelling lower trophic level ecosystem dynamics in the Strait of Georgia

Youngjae Ro, Kwangyoung Jung and Baekjin Kim

Ecosystem monitoring/modeling project in the Chunsu Bay, Yellow Sea, Korea

Xiangnan Wang, Changlei Ma, Songtang Liu, Jianjun Shi, Rui Zhu and Chuan Tian

Development and application of marine ecological and environmental monitoring system in the Yellow Sea and Polar region

Jerome Fiechter, Jeremiah Brown, Williams Leeds, Radu Herbei, Ralph Milliff, Christopher Wikle, Andrew Moore, Thomas Powell and Mevin Hooten

Parameter uncertainty in marine ecosystem models: What can we learn from ensemble calculations and Bayesian models?

Shoshiro Minobe and Uta Hosoya (Invited)

Regional secular trends in a new global gridded phosphate and oxygen dataset

James R. Christian

Effects of natural variability on biogeochemical processes in climate models

Takashi Mochizuki, Masahide Kimoto, Masayoshi Ishii, Yoshimitsu Chikamoto, Hiroaki Tatebe, Yoshiki Komuro, Takashi T. Sakamoto, Masahiro Watanabe and Masato Mori

Decadal prediction using recent series of MIROC global climate model

Yoichi Ishikawa, Toshiyuki Awaji, Masafumi Kamachi, Shuhei Masuda, Hiromichi Igarashi, Yoshihisa Hiyoshi, Yuji Sasaki, Shiro Nishikawa, Toshimasa Doi, Nozomi Sugiura, Norihisa Usui, Yosuke Fujii, Takahiro Toyoda, Sei-Ichi Saitoh, Mitso Sakai, Yoshiki Kato and Shin-ichi Sato (Invited)

Forecasting ocean circulation and fishery-resource variabilities for operational use

Mohamed Rawidean MohdKassim

Fish Forecasting System using Sea Surface Temperature and Chlorophyll satellite images: A statistical model approach

Michael Foreman, Kyle Garver, Dario Stucchi, Ming Guo and Darren Tuele

Uncertainties in modeling water-borne disease transmission among salmon farms in the Discovery Islands, British Columbia

Xiutang Yuan, Zhifeng Zhang, Chuanlin Huo and Gengchen Han

Environmental monitoring and assessment of mariculture zones in China: Status and prospects

V.F. Mishukov, V.V. Kalinchuk, V.V. Plotnikov and A.V. Voytsytskiy

Using satellite images for testing simulation models of contaminant transport in the Peter the Great Bay of the Sea of Japan

Poster Presentations

Shin-ichi Ito, Naoki Yoshie, Takeshi Okunishi, Tsuneo Ono, Yuji Okazaki, Akira Kuwata, Taketo Hashioka, Kenneth A. Rose, Bernard A. Megrey, Michio J. Kishi, Miwa Nakamachi, Yugo Shimizu, Shigeo Kakehi, Hiroaki Saito, Kazutaka Takahashi, Kazuaki Tadokoro, Akira Kusaka and Hiromi Kasai

Application of an automatic approach to calibrate the NEMURO nutrient-phytoplankton-zooplankton food web model in the Oyashio region

Vladimir V. Kulik and Igor V. Volvenko

North Pacific database of pelagic and bottom trawl surveys from Russian EEZ applicable to Ecosystem Based Management

Naoki Yoshie, Xinyu Guo, Naoki Fujii and Tomohiro Komorita

Phytoplankton and nutrient dynamics in the western Seto Inland Sea, Japan based on observation and a modified NEMURO model

Bunmei Taguchi, Hisashi Nakamura, Masami Nonaka, Nobumasa Komori, Akira Kuwano-Yoshida, Koutarou Takaya and Atsushi Goto

Seasonal evolutions of atmospheric response to decadal SST anomalies in the North Pacific subarctic frontal zone: Observations and a coupled model simulation

BIO paper session

Co-Conveners: *Atsushi Tsuda (Japan) and Michael Dagg (U.S.A.)*

Background

This session invites oral and poster presentations on all aspects of biological oceanography in the North Pacific and its marginal seas that are not covered in Topic Sessions sponsored by the Biological Oceanography Committee (BIO).

Summary of Presentations

The BIO Paper Session at PICES 2011 had a total of 14 talks and 19 posters and was well attended with a minimum of 20 attendees in the audience. There were a variety of talks focusing on the zooplankton (11 papers), phytoplankton (6), jellyfish (6), benthos (4) and other aspect of BIO from molecular microbiology to marine mammals. The convenors recognized that this regular session provides very important opportunities for working groups to present their results and for young scientists to participate.

List of Papers

Oral Presentations

Xiuning Du and William T. Peterson

Seasonal cycle of phytoplankton community composition in the coastal upwelling system off central Oregon in 2009

Elena A. Shtraikhert, Sergey P. Zakharkov, Tatyana N. Gordeychuk and Julianna V. Shambarova

About the mechanism of the winter-spring phytoplankton bloom in Peter the Great Bay (Sea of Japan)

Tatyana Belonenko and Alexey Koldunov

Non-stationary cycles of primary productivity in the Northeastern Atlantic

Jingfeng Fan, Lili Li, Jiangyu Li, Hao Guo and Xinzhen Lin

Diversity and structure of bacterial communities in Fildes Peninsula, King George Island

Kyung-II Chang and Heemang Park

Time-series measurements of biogeochemical and physical parameters in the southwestern East/Japan Sea during the spring transition in

Sang-Rae Lee, Jee Eun Lee, Jung Hyun Oak, Jin Ae Lee and Ik Kyo Chung

Metagenomic analysis reveals cryptic plankton biodiversity in the Nakdong River Estuary in Korea

Sayaka Matsumura, Hiroya Sugisaki, Hiroaki Saito, Yuji Okazaki and Tomohiko Kikuchi

Vertical distribution of euphausiids in the Oyashio to Oyashio-Kuroshio Transition Region of the western North Pacific

Rui Saito, Atsushi Yamaguchi, Ichiro Imai, Atsushi Tsuda and Ichiro Yasuda

Spatial and temporal changes in the zooplankton community around the Aleutian Islands during the summer of 2009

Kohei Matsuno, Atsushi Yamaguchi and Ichiro Imai

Body chemical contents and gut pigments of copepods in the western Arctic Ocean during summers of 2008 and 2010

Marina Yurieva, Artyom Lazhentsev, Aleksey Pavlovsky and Konstantin Gorbatenko

The biochemical composition and energy content of zooplankton of the Okhotsk Sea

Natalia T. Dolganova

Euphausiids from Far-Eastern Russian waters: Composition, distribution, and seasonal dynamics

Se-Jong Ju, Jinho Chae, Dongju Lee, Ah-Ra Ko, Hyungbeen Lee and Donhyug Kang

Importance of the bottom cold-water mass as an over-summering refuge for *Euphausia pacifica* in the Yellow Sea

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Atsushi Yamaguchi, Jumpei Fukuda, Kohei Matsuno and Ichiro Imai

Inter-annual and latitudinal changes in zooplankton abundance, biomass and size composition along the 180° transect in the North Pacific during summers: Analyses with an Optical Plankton Counter

Akira Okuno, Tatsuro Watanabe, Naoto Honda and Katsumi Takayama

Forecast of the giant jellyfish *Nemopilema nomurai* appearance in the Japan Sea

Changhoon Han and Wonduk Yoon

Distribution and density of *Aurelia aurita* polyps on Saemangeum dike, Korea

Elena A. Shtraikhert, Sergey P. Zakharkov, Tatyana N. Gordeychuk and Julianna V. Shambarova

Influence of environment factors on phytoplankton blooms in Peter the Great Bay (Sea of Japan) in winter- spring

Harold P. Batchelder, Jennifer Fisher and Alexander Kurapov

Potential larval connectivity among nearshore marine reserves in Oregon: The importance of temperature dependent pelagic durations and vertical distribution

Vjacheslav S. Labay

Elements of seasonal dynamics of the macrobenthos on a shelf of northeast Sakhalin (Sea of Okhotsk)

Anastasia S. Dolganova and R.G. Bezrukov

Composition and distribution of macrobenthos in some coastal-estuary systems in Ussury Bay (Japan/East Sea)

Poster Presentations

Kyoungsoo Shin, Minchul Jang, Pungguk Jang and Woojin Lee, Bonggil Hyun and Seungho Baek

Annual change in the mesozooplankton community of the western channel of the Korea Strait from 2006 to 2010

Yongjiu Xu and Joji Ishizaka

Abundance of giant jellyfish (*Nemopilema nomurai*) and spring sea surface temperature variability in the northern East China and Yellow Seas

Tatyana Belan, Boris Borisov, Ludmila Belan, Alexander Moshchenko and Tatyana Konovalova

Long-term dynamics of some plankton and benthic characteristics at the Piltun-Astokhsokoye field (NE Sakhalin Island Shelf)

Alexander V. Zavolokin

Jellyfish blooms in the Far Eastern Seas of Russia: Significance for ecosystems and social economic consequences

Kristin Cieciel, Jim Murphy, Lisa Eisner and Bruce Wing

A comparison of trawl caught jellyfish in the eastern Bering Sea

Jung-Hoon Kang, MinHo Seo, OhYoun Kwon and Woong-seo Kim

Vertical distribution of the copepod *Calanus sinicus* before and after formation of Yellow Sea Bottom Cold Water (YSBCW) in the Yellow Sea

Seungmok Roh, Joongki Choi and Youngju Lee

Distribution and community structure of phytoplankton in the offshore waters around Korean Peninsula during autumn season

Sungeun Ju, Jiho Seo and Joongki Choi

The distribution of Kuroshio indicator zooplankton around the IEODO Ocean Research Station in the East China Sea

Yuji Okazaki and Kazuaki Tadokoro

Biomass estimates of *Euphausia pacifica* using MOHT in the Oyashio region

OhYoun Kwon, Woong-seo Kim, Jung-Hoon Kang, Kyunwoo Lee and Jin Hwan Lee

Temporal and spatial variation of size-fractionated phytoplankton communities in the Yellow Sea, Korea

Kaoru Aoki, Takuya Sirokiya, Kazuya Takeda Satoshi Yamada, Masaya Toyokawa and Tomohiko Kikuchi

Spatiotemporal distribution and biomass of two abundant jellyfish in Ise and Mikawa Bay, Japan

Seokgwon Choi, Kyumjoon Park, Hyunwoo Kim, Youngran Lee, Jieun Park, Daeyeon Moon and Yongrock An

Finless porpoise, *Neophocaena phocaenoides*, Distribution in the South Sea of Korea

Elena Dulepova and Natalya Kuznetsova

Zooplankton production in the western zone of the Subarctic front in winter-spring 2011

FIS Contributed Paper Session

Co-convenors: *Mikhail Stepanenko (Russia) and Gordon H. Kruse (U.S.A.)*

Background

This session invited papers addressing general topics in fishery science and fisheries oceanography in the North Pacific and its marginal seas, except those covered by Topic Sessions sponsored by the Fishery Science Committee (FIS).

Summary of presentations

The session consisted of 18 oral presentations (one of which was cancelled) and 22 posters that covered a wide variety of species and topics from all six PICES member countries. Oral presentations were given during two morning sessions on October 18 and 19. On the first day, there were two talks on reproduction, the first on reproductive biology of kuro shrimp off Korea and the second on spawning migrations of chum salmon in the northwestern Sea of Okhotsk. Studies of recruitment considered walleye pollock in the Japan Sea and jack mackerel in the East China Sea. One presentation addressed different methods for estimating age and growth of largemouth bass. A second salmon talk addressed the contribution of Amur River salmon to the total biomass of salmon in the North Pacific Ocean. The remaining talks on the first day addressed population parameters of elkhorn sculpin in Korea, stock and fishery dynamics of the pollock and their relations to climate variability in the North Pacific, and nearshore fish community dynamics inferred from herring surveys off British Columbia. Talks during the second day included three talks on species interactions, including nekton species composition and abundance in the northwest Pacific, predator-prey interactions of pollock and arrowtooth flounder in the eastern Bering Sea, and dynamics of the demersal fish community on the west Kamchatka shelf. Three fishery management presentations addressed analyses leading to a reduced minimum size limit for Tanner crab in the eastern Bering Sea, concerns with the design of the management system for pollock fisheries in the eastern Bering Sea, and management strategies for a marine ranching system including risk analysis off Korea. The session was concluded with the presentation of a conceptual model for determining oil fate on habitat and wildlife in the Arctic Ocean and an analysis of temperature on hatching and advection of larval neon flying squid off Japan. Poster presentations spanned an even more diverse set of topics, including population genetics, distribution and migration, abundance and stock assessment, reproductive biology, age and growth, environmental and climate effects on species, trawling effects, fishery economics, and fishery management. The FIS Contributed Paper Session continues to be one of the most popular sessions at PICES Annual Meetings. Based on the number and high quality of oral presentations and posters, diversity of species, mix of topics, and level of attendance, the FIS Contributed Paper Session at PICES 2011 was deemed to be very successful.

List of Papers

Oral Presentations

Hyemin Park, Youngseok Seo and Chulwoong Oh

Reproductive biology of *Argis lar* from the East Sea of Korea

Sergey E. Kulbachny and Sergey F. Zolotukhin

Chum spawning migration in the north-western part of the continental coastline of the Okhotsk Sea

Masayuki Chimura, Yuuho Yamashita and Satoshi Honda

Why did the northern Japan Sea walleye pollock stock experience high survival in 2006?

Motomitsu Takahashi, Chiyuki Sassa and Youichi Tsukamoto

Growth-selective recruitment from pelagic to demersal habitats for juvenile jack mackerel in the East China Sea: Implications for year-class strength

Ming-Ming Zhang, Chulwoong Oh, Wanok Lee, Jaemin Back and Jonghun Na

Comparison of scales, whole otoliths and sectioned otoliths for estimating age and growth of largemouth bass, *Micropterus salmoides*

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Sergey F. Zolotukhin

Contribution of Pacific salmon from the Amur River to the total salmon biomass of the North Pacific Ocean

Soojeong Lee, Jaebong Lee, Hyeokchan Kwon and Changik Zhang

Population ecological parameters of elkhorn sculpin (*Alcichthys alcicornis*) along the Uljin area of Korea

Oleg A. Bulatov

Walleye pollock: Fishery and stock dynamics

Jennifer L. Boldt, Thomas W. Therriault, Douglas E. Hay, Jacob Schweigert and Matthew Thompson

Nearshore fish community dynamics in the Strait of Georgia: Information from juvenile herring surveys

Alexey A. Khoruzhiy

Species composition and abundance of the nekton community in the upper epipelagic layer of the Northwest Pacific Ocean during summer 2004-2010

Mary E. Hunsicker, Lorenzo Ciannelli, Kevin M. Bailey and Stephani Zador

The influence of climate and demography on predator-prey interactions between walleye pollock and arrowtooth flounder in the eastern Bering Sea

Nadezhda L. Aseeva, Andrey B. Savin and Marina B. Shedko

Dynamics of demersal fish community structure on the shelf of West Kamchatka

William R. Bechtol, Gordon H. Kruse, Joshua Greenberg and Hans Geier

Reduced minimum size limits improve Tanner crab fishery management in the eastern Bering Sea

Keith R. Criddle and James Strong

Dysfunction by design: Consequences of limitations on transferability of catch shares in the Alaska pollock fishery

Heewon Park, Jaebong Lee, Youngil Seo and Changik Zhang

Management strategies in a marine ranching ecosystem based on an integrated fisheries risk analysis method for ecosystems (IFRAME) framework

Elizabeth A. Logerwell and Mary Campbell Baker

A conceptual model for determining oil fate and effects on habitat and wildlife in the Arctic

Yoshiki Kato, Mitsuo Sakai, Takaya Namba, Toshie Wakabayashi, Shuhei Masuda, Hiromichi Igarashi, Yoichi Ishikawa, Masafumi Kamachi and Toshiyuki Awaji

Effect of water-temperature transition on hatching in the neon flying squid and numerical simulation of larval migration

Poster Presentations

Victor F. Bugaev

Correlation between the distribution of plerocercoid *Diphyllbothrium* sp. in sockeye salmon *Oncorhynchus nerka* smolts and adults with the abundance of parental stocks in the Kamchatka River

Ekaterina V. Golovashchenko and Oleg Z. Badaev

Efficiency increase of marine bioresources usage based on the example of some trades

Ekaterina V. Golovashchenko

Efficiency increase of marine bioresources usage based on the example of some trades economic value of ecosystem services of Eastern and Western Sakhalin fishery zones' shelf

Peng Sun and Zhenlin Liang

The effect of the trawl selective parameters on the phenotypic traits of fish stocks

Anna V. Dakus, Helen V. Kashchenko, Sergey D. Ponomarev and Evgeny Denisenko

The use of molecular techniques for population genetic analysis of the Pacific herring (*Clupea pallasii*) in the Okhotsk Sea

Chiyuki Sassa, Seiji Ohshimo, Hiroshige Tanaka and Youichi Tsukamoto

Reproductive biology of *Bentosema pterotum* (Pisces: Myctophidae) in the shelf region of the East China Sea

Jaebong Lee, Jonghee Lee, Kwangho Choi, Inja Yeon and Dongwoo Lee

Recent distribution and migration patterns of Pacific cod (*Gadus macrocephalus*) in Korean waters

Changik Zhang, Heewon Park, Youjung Kwon, Jaebong Lee, Youngil Seo, Heeyong Kim, Inja Yeon and Dongwoo Lee

Fisheries risk assessment in a marine ranching ecosystem based on integrated fisheries risk analysis method for ecosystems (IFRAME) framework

Changik Zhang, Jaebong Lee and Soojeong Lee

Stock assessment of elkhorn sculpin (*Alcichthys alcicornis*) along the Uljin area of Korea

Wongyu Park, Yujin Jeon, Junghwa Choi and Dongwoo Lee

Spatial and temporal variations of sea surface temperature, zooplankton abundance and anchovy harvest in western waters of the Korean Peninsula during the last three decades

Jungnyun Kim, Junghwa Choi, Kangseok Hwang, Taegyun Oh, Kwangho Choi and Dongwoo Lee

Seasonal variations of species composition and abundance in the decapod crustacean assemblage in the coastal waters of Geoje Island and Namhae Island, Korea

Alexander V. Lysenko

Snow crab (*Chionoecetes opilio*) in the western Kamchatka: A new target fishery?

T.A. Shatilina and A.A. Goryainov

Climatic changes above the Far East and returning of chum salmon into the South Primorye rivers

Ming-Ming Zhang, Chulwoong Oh, Wanok Lee, Jonghun Na and Jaemin Back

Aging method comparison and growth of Amur barbell, *Hemibarbus labeo* from Goe-san Lake in Korea

Andrew N. Deminoy

Occurrence of deep snow crab *Chionoecetes japonicus* on the shelf of the northwestern Sea of Japan

Alexei M. Orlov

Northwestern Pacific and southeastern Asia chondrichthyan fishes: Major threats and conservation status

Minkyong Shin, Wongyu Park, Changuk Park and Thomas Shirley

Distribution and timing of larval Tanner crab *Chionoecetes bairdi* in Glacier Bay and neighboring strait in southeastern Alaska, USA

Sachihiko Itoh, Toshiro Saruwatari, Haruka Nishikawa, Ichiro Yasuda, Kosei Komatsu, Atsushi Tsuda, Takeshi Setou and Manabu Shimizu

Exploring impacts of environmental history on larval growth: Combination of otolith microstructure analyses and particle-tracking experiments

Jinho Bae, Hyemin Park, Hyeonggi Kim and Chulwoong Oh

Age and growth of Conger eel *Conger myriaster* (Brevoort) using UV light from Korean waters

Graham E. Gillespie, Tammy Norgard, Sean MacConnachie, Lily Stanton and Jessica Finney

Program to assess the conservation status of the Olympia oyster, *Ostrea lurida*, in Canada

Suzanne Kohin, Heidi Dewar, John Childers, Karen Nieto, Eric Prince, Barbara A. Block and Rosa Runcie

Movements of albacore, swordfish and shortfin mako sharks in pelagic environments: Electronic tagging reveals the influence of oceanography on vertical and horizontal behavior

POC Paper Session

Co-Convenors: *Kyung-Il Chang (Korea) and Michael G. Foreman (Canada)*

Background

Papers are invited on all aspects of physical oceanography and climate in the North Pacific and its marginal seas, except those covered by Topic Sessions sponsored by the Physical Oceanography and Climate Committee (POC).

List of Papers

Oral Presentations

Elena I. Ustinova, Yury D. Sorokin and Svetlana Yu. Glebova

Regional and seasonal inhomogeneity of climatic variability in the Far-Eastern Seas

Alexander Lazarvuk, Boris Burov and Vladimir Ponomarev

Evolution of the thermohaline structure of water under ice of Amurskii Bay

Anastasiya Abrosimova, Igor A. Zhabin and Igor M. Belkin

Distribution of the Amur River discharge in the Okhotsk and Japan seas

Pavel A. Fayman, Vladimir Ponomarev and Vyacheslav Dubina

Simulation of the mesoscale circulation in the Peter the Great Bay and adjacent Japan Basin area

Igor A. Zhabin

Tidally driven system around the Shantar Islands (the Sea of Okhotsk)

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Oleg Zaitsev, Cuauhtemoc Turrent-Thompson and Jean Linero Cueto

Intense sea-breeze currents in the coastal zone of the southern Baja California peninsula, Mexico

Hanna Na and Kwang-Yul Kim

Decadal variability of the upper-ocean heat content in the Northwestern Pacific

Takao Kawasaki, Hiroyasu Hasumi and Masao Kurogi

A modeling study of the North Pacific shallow overturning circulation

Talgat R. Kilmатов and Olga I. Trinko

Modeling the subarctic–subtropical boundary and possible climatic changes

Tatyana Belonenko, Victor Foux, Victor Koldunov, Alexey Koldunov and Dmitriy Staritsyn

Sea-surface levels in the Northwestern Pacific as indicators of local and global tendencies in climate change

Howard J. Freeland

An analysis of the time-varying heat, salt and volume budget in an oceanic control volume

Michael Foreman, Wendy Callendar, Diane Masson, John Morrison, Badal Pal and William Merryfield

A regional climate model for the British Columbia continental shelf

Enrique N. Curchitser, Justin Small, Kate Hedstrom, Mike Alexander and Brian Kaufman

Regional and global ramifications of eastern boundary upwelling

Rong-shuo Cai, Hong-jian Tan and Rong-hui Huang

The impacts of thermal anomalies in the East China Sea and its adjacent seas on East Asian atmospheric circulation and climate change in East China

Fangli Qiao, Guansuo Wang, Xingang Lv and DeJun Dai

Drift characteristics of green macroalgae in the Yellow Sea in 2008 and 2010

Taewook Park, Chan Joo Jang, Minho Kwon, Hanna Na and Kwang-Yul Kim

Sea surface salinity variability in the Yellow and East China Seas and its relation to ENSO

Yanzhou Wei, Daji Huang and Xiaohua Zhu

Temporal and spatial variability of the Kuroshio at PN/TK sections during 1955–2010

Wang Rong, Xiao Yuzhang, Yang Fan, Song Pingping and Wang Hefeng

Analysis and forecasting of wind field characteristics on the northern and open-ocean borders of the South China Sea

Xiaomeng Wang and Jianbo Han

An overview of the development of technical and legal issues of carbon dioxide ocean storage and the progress in China

Poster Presentations

Hong-jian Tan and Rong-shuo Cai

Possible impact of tropical El Niño Modoki on SST of China's offshore and its adjacent waters

Larisa S. Muktepavel

Special features of spatial-temporal distribution of ice in the basic commercial zone and spawning areas of the Okhotsk Sea in 2006-2010

T.A. Shatilina, G.Sh. Tsitsiashvili and T.V. Radchenkova

Intrinsic features of regional circulation and climate above the Far East in the summer period of 1980–2009

Elena I. Yaroshchuk

The study of patterns of energy transformation of surface wind sea waves into energy of microstrains of the Earth's crust

Nadezda M. Dulova and Fedor F. Khrapchenkov

Short-term variability of currents and sea level fluctuations in the coastal zone of the Posyet Bay (the Sea of Japan/East Sea)

Galina Pavlova and Pavel Tishchenko

Alkalinity of the Japan Sea: A new look

Vadim V. Novotryasov and Anatoliy E. Filonov

Observations of highly nonlinear internal tidal waves in the Northern Gulf of California

Polina Lobanova and Dmitriy Staritsyn

On a possibility to forecast interannual variability of sea level in the Japan and Okhotsk Seas

Evgeniya Tikhomirova and Vladimir Luchin

Typical distributions of oceanographic parameters in Peter the Great Bay (Japan Sea)

Valentina V. Moroz

The intermediate water hydrology-acoustical characteristics forming peculiarities in the Kuril-Kamchatka area

Alexandr Figurkin

Variability of thermohaline characteristics in the 0-1000 m water layer of the deep part of the Okhotsk Sea

Svetlana Shkorba and Elena Dmitrieva

Linkages between anomalies of ice extent in the Japan/East Sea, Pacific SST and atmospheric indices

Irina Mashkina

Multi-scale variability of water structure in the northwestern part of the Sea of Japan using Argo drifters

Pungguk Jang, Kyoungsoo Shin, Okmyung Hwang, Minchel Jang, Woojin Lee, Bongkil Hyen and Dongchll Jeon

Seasonal effect of Tsushima Current Warm Water in the South Sea of Korea

Svetlana N. Taranova and Igor A. Zhabin

Seasonal and interannual sea surface temperature variability in the Japan/East Sea

Kwangyoung Jung, Youngjae Ro and Baekjin Kim

Impact of the freshwater release on the tidal circulation in the Chunsu Bay, Yellow Sea, Korea based on numerical modeling

Eduard A. Spivak and Anatoly N. Salyuk

Winter hydrography and periodic shallow water dynamics in the southeastern part of Laptev Sea—Results of the POI FEB RAS expedition in April 2011

Yongchao Pang and Zhuoying Zhao

On research status and application of China Standard Seawater

Kirill Kivva, Anna S. Vazhova and Sergey Dudkov

Influence of eddy structures on nutrients distribution in the western Bering Sea from September-October 2010

Vladimir Ponomarev, Pavel A. Fayman and Vyacheslav Dubina

Simulation of mesoscale circulation over the continental slope of the Northwest Japan/East Sea

Taewook Park, Chan Joo Jang, Johann H. Jungclaus, Helmuth Haak, Wonsun Park and Im Sang Oh

Changjiang freshwater effects on summer sea surface warming in the Yellow and East China Seas

Rosa Runcie, Jonathan Phinney and Harold P. Batchelder

Pacific Coast Ocean Observing System (PaCOOS) scientific objectives and recent activities

Dongfeng Xu and Mingquan Xu

The improvement of the Kuroshio path in Luzon Strait by assimilation of Argo data into numerical modelling

BIO Workshop (W1)

MEMIP-IV: Quantitative comparison of ecosystem models applied to North Pacific shelf ecosystems—humble pie or glee?

Co-Convenors: *Hal Batchelder (USA), Shin-ichi Ito (JPN), Angelica Pena (CAN) and Yvette Spitz (USA)*

Background

The objective of the Marine Ecosystem Model Inter-comparison Project (MEMIP) is to compare the performance of various lower trophic level marine ecosystem simulation models at predicting the abundance and distribution of coastal zooplankton functional groups. During the series of workshops, three test beds (Newport, Seward, and A-Line) were selected, and eight potential ecosystem models (NPZD+, NAPZD+, NEMURO, COSINE, NPZD-Fe, Nemuro-Fe, Nemuro-K5 and Biology) were identified to be embedded in ROMS-2D models. The focus of this 4th MEMIP workshop will be quantitative model-model and model-data analysis and comparison of the results of the simulations. Prior to this workshop, different ecosystem models embedded in ROMS-2D will have simulated several 3-4 specific years at each test bed. At the workshop, the results of different ecosystem models within each test bed will be compared. The combination of different years, multiple ecosystem models and three regions should provide sufficient runs to enable ensemble-based estimates of the uncertainty of ecosystem hindcasts, which will provide information needed for assessing FUTURE coupled ecosystem-physical forecast products.

Summary of Workshop

The 1.5 day workshop was convened on 14-15 October in Khabarovsk, Russia immediately prior to the PICES-2011 Annual Meeting. The workshop was co-convened by Harold Batchelder (USA), Shin-ichi Ito (Japan), Angelica Peña (Canada) and Yvette Spitz (USA). All of the convenors were in attendance for most of

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the workshop. Unfortunately, Dr. Ito had conflicts with meetings of two other PICES expert groups (one on Friday afternoon, and one on Saturday morning), so he was not able to participate in the entire workshop. We had arranged for two invited presentations (by Yvette Spitz and Jerome Fiechter, both of the USA), and one contributed presentation by Dr. Guimei Liu of China. Dr. Liu's presentation, originally scheduled for Friday was rescheduled to Saturday as she was unable to arrive in Khabarovsk until late Friday. An introduction to the workshop provided by Batchelder reminded the group of the workplan established at the MEMIP-2010 workshop in Portland, OR, USA, and updated the participants on the status in achieving those objectives. We expected to implement the physical test beds for the Gulf of Alaska and the A-Line prior to the PICES-2011 workshop, but were unable to do so. Batchelder briefed the group on the progress that was made when Dr. Ito spent a week in March 2011 at Oregon State University, working with Spitz and Batchelder. Model domains and bathymetric profiles were developed for both physical test beds, but forcing and boundary files (especially freshwater) were not completed during this visit. Consequently, the set of ecosystem simulations that were to be run on the set of Newport, Gulf of Alaska and A-Line circulation set-up were not accomplished prior to the PICES-2011 meeting. Thus, the primary objective of the 2011 workshop, which was to be quantitative skill assessment of the ecosystem models, could not be achieved. Instead, we focused on determining the best approach for re-tooling to accomplish the MEMIP objectives (which we detail below).

Jerome Fiechter provided an invited talk on how ecosystem model complexity, model parameterization and data assimilation affected the robustness and reliability of ecosystem predictions in coupled biophysical models. Using 3D-ROMS examples from the coastal Gulf of Alaska (CGOA) or California Current, several different lower trophic level ecosystem models were compared and assessed by comparing the modeled chlorophyll concentrations to observed SeaWiFS satellite patterns. The ecosystem models had different levels of complexity spanning simple to complex: 4 component NPZD; 11 component NEMURO; each of these with addition of Fe limitation; and a 90 component Darwin model. The CGOA models without assimilation of ocean physics exhibited poor agreement and bias of chlorophyll-*a* compared to SeaWiFS in the slope and basin regions. Data assimilation of SST, SSH and vertical section physics greatly improved the agreement of the modeled chlorophyll with the observations in regions where mesoscale activity affects the biology. Ensemble calculations also illustrated the spatial and temporal control exerted by the biological parameters (*e.g.*, phytoplankton light response, zooplankton grazing) on the NPZD model solution.

Yvette Spitz provided two presentations during the workshop. The first compared 2D and 3D simulations of the Oregon Shelf region and the second discussed approaches and issues to consider in skill assessment. Comparison of cross-shelf patterns from a 2D model with an extracted section from a 3D model of the Oregon shelf indicate that phytoplankton and zooplankton concentrations in the 2D simulation are higher than in the 3D simulation because of greater upwelling of nitrate near shore in the 2D simulation. Other conclusions from the comparison are that tuned parameters from a 2D simulation may not be appropriate for a 3D simulation, and that temporal and spatial patterns in a cross-shelf section are controlled by both the strength of upwelling and mesoscale features, which depend on topography, and that the time scale of the ecosystem response to upwelling dynamics may not be fully understood from 2D simulations.

Spitz explained why skill assessment of marine ecology is difficult. There are numerous metrics, univariate and multivariate, some of which are redundant, some complementary. Also results of coupled models are sensitive to the formulation and unknowns of ecosystem models, details of the circulation model, specific atmospheric forcing used, lack of data, and incomplete and uncertain data. She concluded that it is important to do quantitative skill assessment, but noted that large misfits of model and data, or differences among several models, may be due to factors other than differences in, say, the ecosystem models, and that it is important to control for as much of the variability as possible. Using a consistent physical test bed for comparison of multiple ecosystem models is one way to accomplish this for model-model comparisons. Model-observation comparisons are more difficult as it is impossible to exactly reproduce all of the observed forcing and natural variations that are responsible for the real-ocean observations, especially when the models are 2D and the real ocean 3D.

Based on the Pacific basin-wide physical-biogeochemical model (ROMS-CoSINE), Guimei Liu estimated the primary productivity and sea-to-air CO₂ flux in the South China Sea, the East China Sea, and the Yellow Sea.

It shows that the sea surface temperature (SST) controlled the spatial and temporal variations of the oceanic $p\text{CO}_2$ in the three marginal seas. Moreover, the role of the Pacific Decadal Oscillation, SST, and biological activity on the control of $p\text{CO}_2$ changes are examined in the China seas.

Future Work Plan for MEMIP (2011-2012)

To achieve comparisons of different ecosystem models within a single physical framework, we have re-examined what is feasible to accomplish prior to and at the PICES-2012 MEMIP workshop. We have eight relatively established ecosystem models ready to run within a 2D physical model framework. These include several variations of NPZD, NEMURO and the CoSINE model. Versions of NEMURO and NPZD with and without Fe control are part of this comparison. This is important because the role of Fe in coastal ecosystems is thought to vary. A ninth model, a modification of NEMURO with a stage-structured model of krill, is being developed and will be included in the comparison if available by February. The three model domains, Newport, GAK and A-Line are still planned, and data sets from the time-series collections along those lines have allowed us to identify 3 years in the early 2000s, when data are most complete, to perform model-data comparison in each system. This will allow the evaluation of the sensitivity of a model, often tuned to one year, to be examined for two other years within the same location. The years of interest for each region are: Newport (2000-2002), GAK (2001-2003) and A-Line (2001-2003). In all three regions, the period from late-winter to late summer is the seasonal period of interest. We developed the following strategy and timeline for making progress on these tasks. First, most of the MEMIP team will meet for 1 week in Corvallis, OR in March 2012. This will provide an opportunity to cross-compare model fields from multiple ecosystem models run within the Newport physical test bed, and to finalize the configuration and run simulations of the ecosystem models in the GAK and A-Line test beds. We assigned tasks to MEMIP team members to prepare for the March meeting. Batchelder, Spitz and Peña will be responsible for configuring and running the Newport model with as many of the ecosystem models that are ready in mid-January. Concurrently, Fiechter and Ito will develop 2D physical testbeds for the GAK and A-Line sections, respectively. Assuming all of this is accomplished prior to the March workshop, we expect to conduct model-model comparisons at the March workshop. Ideally, following the workshop each individual ecosystem model formulation (defined by state variables and parameter values) will be run for all three years in all three domains. Assessment will be done by comparing model results to both field observations of state variables, and by comparing model results from multiple years at one site, across sites, and across models. The MEMIP workshop proposed for PICES-2012 (Hiroshima) will be used to finish the skill assessment, and outline one or several papers for preparation.

List of papers

Oral presentations

Jerome Fiechter, Christopher A. Edwards, Andrew Moore, Nicole Goebel and Kaustubha Raghukumar (Invited)

How accurately can we predict chlorophyll concentrations in the Northeast Pacific: The role of ecosystem model complexity and data assimilation?

Yvette H. Spitz (Invited)

Intercomparison of pelagic ecosystem models for the Oregon Shelf: "The devil is in the details"

Guimei Liu, Fei Chai and Hui Wang

Comparison of air-sea CO₂ flux and biological productivity in the South China Sea, East China Sea, and Yellow Sea: A three-dimensional physical-biogeochemical modeling study

Harold Batchelder and Shin-ichi Ito

Updates on data progress since PICES-2010

Yvette Spitz and Shin-ichi Ito

Physical test bed updates

Guimei Liu

Ecosystem models

Angelica Peña

Ecosystem models

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Yvette Spitz

Ecosystem models

Jerome Fiechter

Ecosystem models

Shin-ichi Ito

Ecosystem models

Harold Batchelder

Ecosystem models

Individual/small group work

Ecosystem model results and analysis

Yvette Spitz

A skill assessment primer

FIS Workshop (W2)

Remote sensing techniques for HAB detection and monitoring

Co-sponsored by: *NOWPAP*

Co-conveners: *Tatiana Orlova (Russia), Yoshida Takafumi (CEARAC), Vera Trainer (U.S.A.)*

Background

Monitoring harmful algal blooms (HABs) and the environmental factors associated with their occurrence can often be improved by remote sensing. Satellite imagery can be used to help: (1) detect and identify HAB species or the oceanic features in which they reside, and (2) in mitigation of damage to fisheries and human health by HABs. However, the effective use of the data from these sensors is often hindered by a lack of skills to acquire, process, and interpret them. The goal of the workshop is to teach the basic skills needed to work independently with data from a variety of satellite sensors (*e.g.*, SeaWiFS, MODIS, MERIS, AVHRR, and CZCS). This workshop may also include such themes as the fundamentals of bio-optics, pigment algorithms, primary production algorithms and, to a lesser extent, the underlying physical principals leading to the measurement of sea surface temperature, ocean wind speed and ocean topography. A series of lectures will describe research and monitoring efforts that currently use remote sensing for the study of HABs. The workshop will take place following the NOWPAP/PICES/WESTPAC young investigator training course on "Remote sensing data analysis" held on October 8-12, 2011 in Vladivostok, Russia.

Summary of Workshop

This workshop featured 5 presentations including 2 keynote speakers, Dr. Joji Ishizaka and Dr. Raphael Kudela. The speakers highlighted the utility of satellite remote sensing as a useful tool for the study of harmful algal blooms, but pointed out the technical limitations, including inability to discriminate among individual phytoplankton species and the inability to detect low concentrations of phytoplankton which are needed to study the initiation of harmful algal blooms. In the afternoon a series of technical web-based demonstrations were given to show available remote sensing data such as NOAA's satellite sites, Indian, Korean and the newly-launched European satellite remote sensing websites. Analysis software was described including valuable freeware. Dr. Kudela demonstrated NASA's SeaDas software and demonstrated its utility with SeaWiFS imagery. There were 19 scientists in attendance: Japan (7), Korea (2), USA (4), Russia (4), China (2), Canada (0).

List of papers

Oral presentations

Raphael M. Kudela, Mati Kahru, John P. Ryan and David G. Foley (Invited)

Linking changes in dinoflagellate blooms along the US west coast to short and long term restructuring of the California Current System

Sergey P. Zakharkov, Tatyana N. Gordeychuk, Elena A. Shtraikhert and Julianna V. Shambarova

Study of diatom succession in the Sea of Japan based on satellite and ship data

Lijian Shi, Bin Zou, Yingni Shi and Maohua Guo

The application of HJ-1A/1B CCD data to *Enteromorpha Prolifera* monitoring over the Yellow Sea and East Sea

Joji Ishizaka, Kazuyoshi Miyamura, Ken Furuya and Shigeru Itakura (Invited)

Status and perspective remote sensing data use to reduce the damage caused by red tides (Harmful Algal Bloom) in Japan

Chao Liang

A preliminary study on the application of the wave degree of polarization in marine oil spill monitoring

MEQ Workshop (W3)

Pollutants in a changing ocean: Refining indicator approaches in support of coastal management

Co-sponsored by: *GESAMP, ICES and IOC*

Co-Convenors: *Kris Cooreman (ICES/Belgium), Peter Kershaw (GESAMP/UK), Olga Lukyanova (PICES/Russia) and Peter Ross (PICES/Canada)*

Background

Many anthropogenic pollutants impact marine environmental quality, with coastal zones being particularly vulnerable. Persistent organic pollutants (POPs) are a concern because they magnify in food webs and present health risks to humans and wildlife. Other chemicals are less persistent, but may nonetheless impact the health of biota. While some pollution indicators are ensconced into monitoring and management regimes in different nations over space and time, new pollutant concerns may not yet be captured by existing protocols. These include “micro-plastics”, the breakdown products of debris and other forms of structural pollutants, which can clog the gills of invertebrates and fish, and asphyxiate seabirds and marine mammals. In addition, these micro-plastics may adsorb some of the other chemical contaminants and transfer them to marine organisms. This workshop reviewed ways in which chemical and structural pollutants enter the marine environment, are transported through ocean currents and/or biological transport, and impact marine biota. The workshop reviewed several examples of pollution indicators used by different nations, as a basis for improving and/or expanding indicator approaches in the North Pacific Ocean. These examples also critically evaluate the extent to which changing baselines (*e.g.*, climate variability) may impact on source/transport/fate processes and effects on biota, and recommend means of improving the utility and reliability of current indicator/ monitoring approaches in a changing world.

The objectives of this workshop were to:

- (1) Critically review 3–5 examples of currently used indicators of marine contamination in different PICES member countries (*e.g.*, shellfish monitoring of PAHs, metals, persistent organic pollutants, fecal bacteria; POPs in seabird eggs and marine mammals); list advantages and disadvantages for each, and describe management/policy linkages; Consider the influence of changing climate on indicator performance and ways to address this.
- (2) Review emergent pollutant concerns and in particular, examine the topic of plastics and micro-plastics as structural pollutants and as mechanisms for the transfer of contaminants to marine biota; examine existing and/or new opportunities to establish indicator approaches to plastic pollution, and review sampling and analytical methods.

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(3) From these applied examples/case studies, identify opportunities for future PICES activities on the topic of marine pollution:

- evaluate feasibility of establishing Study Group on Marine Contaminants, including terms of reference, membership, and deliverables;
- describe the scope of PICES/FUTURE activities that focus on contaminants in the North Pacific marine environment;
- update and revise MEQ Action Plan elements on marine contaminants;
- identify potential interactions with IOC/ICES/GESAMP/NOWPAP/NOAA programs that focus on contaminants in the marine environment.

Summary of Workshop

Dr. Peter Kershaw (United Kingdom) described the mandate and activities of the United Nations-sponsored Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), which provides expert advice on priority topics, as well as assessments of regional and global environmental concerns. One activity that is relevant to PICES is the GESAMP effort to identify pollution indicators for the United Nations Transboundary Waters Assessment Programme (TWAP) in groundwater, rivers, lakes, Large Marine Ecosystems (LMEs) and open oceans. In addition, GESAMP has a number of Working Groups that are active in relevant areas, including 'mercury, cadmium and lead' (WG37), 'the historical inputs of contaminants into coastal ecosystems' (WG39), 'source, fate and effects of micro-plastics in the marine environment' (WG40). In addition, a new Correspondence Group is being established to evaluate the 'biomagnification of pollutants in top predators'.

Dr. Kris Cooreman (Belgium) described the aim within the ICES realm for integrated science in support of management. Dr Cooreman stressed that fisheries regulations were ineffectual when the root causes of reduced fish stocks are unrelated to fishing. In addition to a recent example of a population-level impact related to a single chemical (the antifoulant tributyltin and reduced shrimp stocks), other European examples include the effects of PCBs and DDT on reproduction and health of seabirds and marine mammals. A long history of interest in the area of marine pollution positions ICES well to partner with PICES on subjects of mutual interest into the future.

Dr. Joel Baker (USA) led discussions and activities on the topic of micro-plastics, which provided a basis for the field trip on the Amur River the following day. This pollutant category encompasses a wide variety of types, sizes, shapes, colours and origins for 'structural pollutants', highlighting the need for improved standardization of assessment methods. Major challenges, and hence opportunities for collaboration in the North Pacific, include: methods to detect and quantify, distribution over space, and effects on biota (including invertebrates, fish, turtles, seabirds and marine mammals).

Dr. Annamalai Subramanian (Japan) delivered an overview of POPs and metals in the Asia-Pacific region. The concentrations of different contaminants of concern have been quantified in some of the hundreds of invertebrate, fish, seabird and marine mammal species for which samples have been stored at the Environmental Specimen Bank for Global Monitoring at Ehime University, Japan. Results reveal widespread environmental responses to the use, disposal and regulation of many of the POPs. Of note was the influence of the biology of the species selected on the contaminant message: sessile mussels provided evidence of 'local' contamination, while migratory albatross and northern fur seals provided a more regional or 'global' contaminant signal.

Local participants, including Olga Lukyanova, Mikhail Simokon and Vasiliy Tsygankov, described some of the priority concerns along the coastline of the Russian Far East and adjacent waters. While human population density is relatively low in this region, there exist concerns about offshore oil and gas exploration and development in the Sea of Okhotsk, metals related to local industrial activity, radioactive releases, and POPs and biological pollutants from global sources.

Workshop Recommendations

To recommend establishing a one-year Study Group on *Marine Pollutants* to:

- Identify novel approaches to operational marine pollution assessment by developing a list of priority pollutant concerns in each PICES nation; identifying indicators of status, trends and effects; harmonizing methods to evaluate their effects on biota; and describing case studies which illustrate the effectiveness of indicators in informing the success of remedial actions.
- Identify interactions within PICES scientific committees and expert groups that will complement the SG-MP, and be consistent with FUTURE.
- Explore potential partnerships with other organizations which could lead to joint activities, improve efficiencies and strengthen scientific outcomes.
- Develop recommendations for a PICES expert group on marine pollutants.

List of papers

Oral presentations

Peter J. Kershaw (Invited)

Pollution indicators in the marine environment – A GESAMP perspective

Kris Cooreman, Roel Smolders, Yves Verhaegen, Koen Parmentier, Patrick Roose and Guy Smagghe (Invited)

Building expert knowledge to reach integrated scientific advice for marine management

Annamalai Subramanian and Shinsuke Tanabe (Invited)

Contamination by persistent organic pollutants in the Asia-Pacific region

Joel E. Baker, Julie Masura, Gregory Foster and Courtney Arthur (Invited)

Abundance, distribution, sources and potential implication of microplastic particles in coastal waters of the North Pacific region

Poster Presentations

Natalia Pichugina and Vladimir Goryachev

The radioactive pollution of hydrobionts at the place of nuclear accident in the Chazhma Bay, the Japan Sea

Vasiliy Yu. Tsvgankov, Margarita D. Boyarova, Peter A. Tyupelev and Olga N. Lukyanova

Persistent organic pollutants (POPs) and mercury (Hg) in organs of the grey whale (*Eschrichtius robustus*) from the Bering Sea

Mikhail V. Simokon and Lidiya T. Kovekovdova

Mercury in the bottom sediments of Peter the Great Bay (Japan/East Sea)

Mikhail V. Simokon

Environmental pollution monitoring of Far Eastern Seas

Zou Ya-Rong, Zou Bin and Liang Chao

Multiple index marine oil spill information extraction research

Zou Ya-Rong, Zou Bin and Liang Chao

Using the SAR to analyze marine oil spill polarization characteristics

POC/MONITOR/TCODE Workshop (W4)

Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program

Co-Convenors: *Kyung-Il Chang (Korea), Toshitaka Gamo (Japan), Young-Shil Kang (Korea), Kyung-Ryul Kim (Korea), Vyacheslav Lobanov (Russia), Toru Suzuki (Japan) and Yury Zuenko (Russia)*

Background

Under the auspices of the EAST-I program initiated and supervised by the CREAMS/PICES Advisory Panel, scientists from Japan, Korea and Russia have carried out many successful cruises in the East Asian marginal seas over the last 5 years. With the active discussion and promotion by CREAMS/PICES of a new EAST-II

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program focusing on the Yellow and East China Seas, it is timely to have a forum summarizing some important results obtained by the international cooperative efforts of EAST-I. This workshop welcomed studies on hydrography, circulation, biogeochemistry, and ecology and their variability in East Asian marginal seas in the PICES area and on effects of climate and long-term changes in the abiotic and biotic environments of this region.

Summary of Workshop

Workshop co-sponsored by Physical Oceanographic and Climate Scientific Committee (POC), Technical Committees on Monitoring (MONITOR) and Data Exchange (TCODE) was held on Friday, October 14, 2011 and consisted of 13 oral presentations (including 2 invited talks) plus 7 posters. It focused on 5 year advances in monitoring and understanding of Asian marginal seas related with CREAMS/PICES EAST-I Program initiated and supervised by the Advisory Panels for a CREAMS/PICES Program in East Asian Marginal Seas (CREAMS-AP), November 2005–October 2011.

The workshop started with a presentation by Kuh Kim on the progress of CREAMS-AP ad hoc committee to complete PICES Report on Marine Ecosystems of the North Pacific Ocean: 2003-2008. He explained that the Science Board of PICES 2010 charged the CREAMS-AP with the task to complete the chapter not included in the Report. The CREAMS-AP then formed an *ad hoc* committee to carry out this task and 6 members of the committee had 2 meetings to develop the content of the chapter, identify the leading and contributing authors and discuss the first draft of the report. He presented an overview of the report prepared by the *ad hoc* committee under a tentative working title of “Marine Ecosystems of the North Pacific Ocean 2003-2008: Japan/East Sea” and asked for comments and discussion on it from the workshop participants.

Kyung-Ryul Kim reviewed the results of Korea EAST-I (East Asian Seas Time-series I) program which was supported by Ministry of Land, Transportation and Marine Affairs of Korea in 2006 to identify, quantify and model the dynamic processes governing the climate variability and their linkage to change in marine ecosystem. Through this program integrated monitoring of various spatio-temporal scales was successfully performed in the sea and extensive international collaboration on joint cruises and scientific workshops was promoted. He briefly presented some important results of the Korean EAST-I program and expressed the hope that it would continue to serve as an important forum for international collaboration in the area for next five years.

Dong-Jin Kang presented preliminary results of EAST-I Real-time Automatic Profiler in the Ulleung Basin which was newly developed by the CREAMS/PICES program and had been deployed since May through September 2010. The system provided a large amount of data including daily profiles (and twice a day since June) of temperature, salinity, dissolved oxygen and fluorescence sent in real time mode through inductive modem and wireless telecommunication system.

Tomoharu Senjyu presented an invited talk on the linkage system among the East Asian seas and the atmosphere. He pointed out two examples of linkages. One of them is bidecadal variability of the Japan Sea Proper Water properties synchronized with cold air outbreaks in winter synchronized with atmospheric disturbances developed over the East China Sea. The second is interannual variation of salinity of the water transported through the Tsushima Strait which is connected with atmospheric and oceanographic conditions in the Yellow Sea and East China Sea.

Vyacheslav Lobanov reviewed the scientific activities of POI (V.I. Il'ichev Pacific Oceanological Institute, Russia) under the CREAM/PICES program over the past 5 years. Two collaborative cruises with Korea using R/V Akademik M.A. Lavrentyev were successfully conducted in 2007 and 2009 for monitoring over-turning circulation and biogeochemical processes in the Japan Sea. They observed a trend of bottom water warming since 2001 and further weakening of convective mixing. Strong hypoxia due to increased eutrophication was found in the bottom layers of the inner part of Peter the Great Bay in the northwestern Japan Sea.

Taekeun Rho presented an original result on vertical and spatial distribution patterns of transparent exopolymer particles (TEP) for better understanding the biological pump in the East Sea/Japan Sea. Strong positive relationship observed between TEP and chlorophyll-*a* in the chlorophyll maximum layer was regarded as evidence that TEP plays an important role in dynamic processes by phytoplankton.

Dmitry D. Kaplunenko showed vertical profiles of nitrate, temperature, salinity, fluorescence (chlorophyll-*a*) and dissolved oxygen in the northern Japan Sea, which were measured using a CTD SBE 9 profiler attached with an in situ ultraviolet spectrophotometer (ISUS). The linkage among variations of chlorophyll-*a*, nitrate and dissolved oxygen was well interpreted based on dynamic and biogeochemical processes in the Japan Sea.

Olga Trusenкова *et al.* developed a profound discussion on intense mesoscale dynamics with seasonal variability, by using eddy kinetic energy (EKE) values calculated from satellite altimetry data for almost two decades in the Japan/East Sea. EKE variations off Primorye coast were analyzed in detail by taking into account mesoscale structures in thermal contrasts on the satellite images, and patterns of wind stress and curl from satellite scatterometry were discussed as additional EKE forcing.

Junheon Jang, Kyung-II Chang (presenter) reported interesting results of spatially dense and high-resolution time series records of subsurface temperature and current velocity in the Ulleung Basin of the southwestern East/Japan Sea. Offshore intermediate waters as well as those at the continental slope were shown to have had a tendency of temperature decrease, accompanied with a decreasing trend of southward flow along the continental slope. Effects of these physical changes were discussed from ecological points of view.

Junghyun Kwak *et al.* presented seasonal variations of summer primary productivity (PP) and phytoplankton community structure in the East/Japan Sea in 2008-2010. In the Ulleung Basin, PP decreased gradually from spring to winter and then increased again to spring. Such seasonal variation corresponded to nutrients dynamics with the lowest concentration in November. Picophytoplankton was the main size fraction of phytoplankton that produced the largest portion of PP in the East/Japan Sea, but micro- and nanophytoplankton contributed over 60% of integrated PP in the Ulleung Basin in summer. Spatial variation of PP was closely associated with water column structure and vertical distribution of physicochemical parameters.

Andrey G. Andreev presented changes of physical and chemical parameters and chlorophyll *a* concentration in the central and southern Japan Sea, which were considered in relation to the ocean climate variability. Enhanced water volume transport of the East China Sea through the Tsushima/Korean Strait leads to dissolved oxygen depletion and increases stratification in the surface layer in pre-winter season that is one of the main reasons of dissolved oxygen reducing and temperature rising in the intermediated and deepwater.

Sukgeun Jung and Iisu Choi presented updated analytical results on relationships of fluctuation of dominant commercial fisheries species in the southwestern Japan/East Sea (SJES) with respect to oceanographic conditions in the SJES vs. the Korea Strait, which is under the influence of the Tsushima Warm Current and the counteractive episodic intrusions of cold water from the SJES. They suggested that oceanic conditions in the Korea Strait, rather than the Japan/East Sea, seemed to be more important in recruitments of the dominant fish species.

Yury Zuenko *et al.* presented recent climatic changes in the Japan/East Sea ecosystem on the tri-national data set. The abiotic and biotic parts of the data set are processed by Principal Component Analysis: 57-58% of both subsets variability are explained by the sum of PC-1 and PC-2. An increasing tendency of the PC-1 in the late 1980s, with a well-known regime shift depends on winter monsoon intensity that could be described by the Siberian High Index. The PC-2 decreased until the mid 1990s then had a shift to higher scores. These changes are possibly related to processes in the Pacific, more important for summer season in the Japan/East Sea.

After the all oral presentation, several questions and answers, and discussion were performed, and an alternate delegate of Japan commented that the name "Japan Sea" is the internationally recognized and established name so that Japan cannot accept "Japan/East Sea" in the current draft report by CREAMS-AP *ad hoc* committee.

Session Summaries-2011

Seven poster presentations were accepted in this workshop.

Dmitry V. Stepanov showed low-frequency variability of the circulation in the central part of the Japan Sea by numerical simulations using Numerical Mathematics Ocean Model (INMON). Initial conditions were based on the World Ocean Database 2009 and CORE atmosphere data from 1958 to 1990. The results indicated the main feature of large-scale circulation and its seasonal variability, and for spectral analysis of relative vorticity at the depth of 200m, 500m and 800m, 4 and 8 years period were dominated.

Pavel Semkin showed the results of observation of chemical parameters at surface and near bottom in Ussuriyskiy Bay, Japan Sea, from 2008 to 2011. The low oxygen, low pH and high pCO₂ water formed in the bottom in summer, and this water were upwelled by summer monsoon at the beginning of autumn. The high oxygen, low pCO₂ and low nutrients water formed in whole of the Bay in late winter, and temperature, nutrients and pCO₂ increased and oxygen decreased at near bottom in spring.

Kyung-II Chang showed wind-induced coastal upwelling and offshore movement of the upwelled cold and nutrient-rich water in the flow at the east of Korean Peninsula. He identified three events of significant temperature decrease in 19 events by ocean buoy observations in 2003-2009 and considered that the three events were caused by not only wind stresses but also a northern thick cold water was dominant.

Gennady Kantakov showed three experiments on surface current observations by newly-designed Argos drifters developed in the Okhotsk Sea the West Kamchatka and East Sakhalin in 2009–2011, and these Argos drifters survived in the pack ice and among drifting ice fields. He also demonstrated the Argos drifters and tracking system at the presentation.

The other 3 poster presentations were cancelled.

TCODE was responsible to select a Best Oral and Poster Presentation for TCODE within W4 presentations. A Best Oral Presentation Award did not apply because there was no oral presentation by early career scientist who is no more than 5 years into his/her Ph.D., and Kyung-II Chang was awarded a Best Poster Presentation for TCODE.

List of papers

Oral Presentations

Toshitaka Gamo, Joji Ishizaka, Changkeun Kang, Kuh Kim, Vyacheslav Lobanov and Yury Zuenko
Progress report of CREAMS-AP ad hoc committee to complete 2010 North Pacific Ecosystem Status Report

Kyung-Ryul Kim, Kyung-II Chang, Tongsup Lee, Changkeun Kang and Dong-Jin Kang
A report on Korea EAST-I (East Asian Seas Time-series I) program

Dong-Jin Kang, Hee-Mang Park, Cho-Rong Moon, Kyung-II Chang and Kyung-Ryul Kim
Preliminary results of E-RAP (EAST-I Real-time Automatic Profiler) in the Ulleung Basin, the East/Japan Sea

Tomoharu Senjyu (Invited)

The East Asian Marginal Seas System; Connectivity between the Japan Sea and the East China Sea

Vyacheslav Lobanov, Pavel Tishchenko, Alexander Sergeev, Dmitry D. Kaplunenko, Vladimir Ponomarev and Svetlana Ladychenko

Overview of POI activities under the CREAMS/PICES program

Taekeun Rho, Tongsup Lee, Hyunduck Jeon, Dong-Jin Kang and Kyung-Ryul Kim

Vertical and spatial distribution patterns of transparent exopolymer particles (TEP) in the East Sea during summer 2009

Dmitry D. Kaplunenko, Vyacheslav Lobanov, Pavel Tishchenko and Mariya Shvetsova

Vertical in situ profiles of nitrate and oxygen in the northern Japan Sea

Olga Trusenkov, Dmitry D. Kaplunenko, Svetlana Ladychenko and Vyacheslav Lobanov

Non-linear patterns of eddy kinetic energy in the Japan/East Sea

Junheon Jang, Kyung-II Chang, Seungtae Yoon and Hanna Na

Long-term variation of subsurface temperature in the Ulleung Basin of the East/Japan Sea

Junghyun Kwak, Yunsook Kim, Daesung Lee, Jeomshik Hwang, Kyung-Ryul Kim and Changkeun Kang

Summer primary productivity and phytoplankton community structure in the East/Japan Sea

Andrey G. Andreev

Year-to-year changes of pre-winter environmental conditions and chlorophyll a concentration in the central and southern Japan Sea

Sukgeun Jung and Ilsu Choi (Invited)

Alternations of dominant fisheries species in the southwestern Japan/East Sea since 1968 in relation to climate change

Yury Zuenko, Yongjun Tian, Sukgeun Jung and Rabea Diekmann

Recent climatic changes in the Japan/East Sea ecosystem on the tri-national data set

Poster Presentations

Dmitry V. Stepanov and Nikolay A. Diansky

Study of the low-frequency variability of the Japan/East Sea circulation by numerical Simulations

Pavel Semkin, Pavel Tishchenko, Vyacheslav Lobanov, Alexander Sergeev, Ruslan Chichkin, Galina Pavlova, Sergey Sagalaev, Elena Shkirknikova, Mariya Shvetsova, Petr Tishchenko, Tatyana Volkova and Vladimir Zvalinsky

Seasonal and spatial variability of hydrochemical parameters in the Ussuriyskiy Bay (Japan Sea)

Jaehyung Park and Kyung-II Chang

Characteristics of anomalous summertime coastal upwelling events off the east coast of Korea during 2003-2009

Gennady Kantakov, Victor Tambovsky, Alexey Bobkov and Evgeny Lunev

Recent surface currents observations in the Okhotsk Sea by Argos drifters

Best Presentations for Committee/Program-sponsored Topic Sessions or Workshops at PICES-2011

Science Board Best Oral Presentation

Mitsuo Uematsu (The University of Tokyo, Japan) on “Potential importance of volcanic emissions on marine biogeochemical cycles and clouds over the North Pacific” co-authored with Shigenobu Takeda, Hiroshi Furutani and Itsushi Uno

Science Board Best Poster

Chan Joo Jang (Korea Ocean Research and Development Institute,) on “Projected changes in the North Pacific Ocean mixed layer depth and their impacts on primary production” co-authored with Jisoo Park, Taewook Park and Sinjae Yoo

Best Oral Presentation by an early career scientist for the BIO-sponsored BIO/POC Topic Session on “Mechanisms of physical-biological coupling forcing biological “hotspots”(S2)

Robinson M. Mugo (Hokkaido University, Japan and Kenya Marine and Fisheries Research Institute) on “When, where and why skipjack tuna, red flying squid and pacific saury potential fishing zones are likely to overlap in the western North Pacific: A proof of concept” co-authored with Sei-Ichi Saitoh, Fumihiko Takahashi, Akira Nihira and Tadaaki Kuroyama

Best Poster for the BIO-sponsored Contributed Paper Session

Alexander V. Zavolokin (Pacific Research Institute of Fisheries and Oceanography (TINRO-Center), Russia) on “Jellyfish blooms in the Far Eastern Seas of Russia: Significance for ecosystems and socioeconomic consequences”

Best Oral Presentation by an early career scientist for the FIS-sponsored Contributed Paper Session

Soojeong Lee (Pukyong National University, Korea) on “Population ecological parameters of elkhorn sculpin (*Alcichthys alcicornis*) along the Uljin area of Korea” co-authored with Jaebong Lee, Hyeokchan Kwon and Changik Zhang

Best Poster for the FIS-sponsored Contributed Paper Session

Chiyuki Sassa (Seikai National Fisheries Research Institute, Fisheries Research Agency, Japan) on “Reproductive biology of *Benthosema pterotum* (Pisces: Myctophidae) in the shelf region of the East China Sea” co-authored with Seiji Ohshimo, Hiroshige Tanaka and Youichi Tsukamoto

Session Summaries-2011

Best Oral Presentation by an early career scientist for the MEQ-sponsored MEQ/FUTURE Topic Session on “Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems” (S7)

Yousuke Koshino (Hokkaido University, Japan) on “Effect of salmon-derived nutrients and organic matter on riparian ecosystems in the Shiretoko World Natural Heritage area” co-authored with Masao Minagawa, Hideaki Kudou3, Yuxue Qin and Masahide Kaeriyama

Best Poster for the MEQ-sponsored MEQ/FUTURE Topic Session on “Land-sea interactions and anthropogenic impacts on biological productivity of North Pacific Ocean coastal ecosystems” (S7)

Aleksandra S. Kondakova (Far Eastern Federal University, Vladivostok, Russia) on “Levels of 4-NP in coastal waters in the Russian zone of Japan/East and Bering Seas” co-authored with Andrey P. Chernyaev

Best Oral Presentation by an early career scientist for the POC-sponsored Contributed Paper Session

Hanna Na (Seoul National University, Korea) on “Decadal variability of the upper-ocean heat content in the Northwestern Pacific” co-authored with Kwang-Yul Kim

Best Poster for the POC-sponsored POC-sponsored Contributed Paper Session

Rong-shuo Cail (Third Institute of Oceanography, China) on “Possible impact of tropical El Niño Modoki on SST of China’s offshore and its adjacent waters” co-authored with Hong-jian Tan

Best Oral by an early career scientist for the MONITOR-sponsored MONITOR/POC/FUTURE Topic Session on “How well do our models really work and what data do we need to check and improve them?” (S9)

Naoki Yoshie (Ehime University, Matsuyama, Japan) on “Phytoplankton and nutrient dynamics in the western Seto Inland Sea, Japan based on observation and a modified NEMURO model” co-authored with Xinyu Guo, Naoki Fujii and Tomohiro Komorita

Best Poster for the MONITOR-sponsored MONITOR/POC/FUTURE Topic Session on “How well do our models really work and what data do we need to check and improve them?” (S9)

Vladimir V. Kulik Pacific Research Institute of Fisheries and Oceanography (TINRO-Center), Vladivostok, Russia) on “North Pacific database of pelagic and bottom trawl surveys from Russian EEZ applicable to Ecosystem Based Management” co-authored with Igor V. Volvenko

Best Poster or the TCODE-sponsored Workshop on “Recent advances in monitoring and understanding of Asian marginal seas: 5 years of CREAMS/PICES EAST-I Program”(W4)

Kyung-II Chang (Seoul National University, Korea) on “Characteristics of anomalous summertime coastal upwelling events off the east coast of Korea during 2003-2009” co-authored with Jaehyung Park

LIST OF PICES ACRONYMS

AP-AICE	FUTURE Advisory Panel on <i>Anthropogenic Influences on Coastal Ecosystems</i> (Oct. 2009 –)
AP-COVE	FUTURE Advisory Panel on <i>Climate, Oceanographic Variability and Ecosystems</i> (Oct. 2009 –)
AP-CPR	Advisory Panel on <i>Continuous Plankton Recorder Program</i> (Oct. 1998 –)
AP-CREAMS	Advisory Panel for a <i>CREAMS/PICES Program in East Asian Marginal Seas</i> (Nov. 2005 –)
AP-IFEP	Advisory Panel on <i>Iron Fertilization Experiment</i> (Oct. 1998 – Oct. 2007)
AP-MBM	Advisory Panel on <i>Marine Birds and Mammals</i> (Oct. 1999 –)
AP-MIE	Advisory Panel on <i>Micronekton Sampling Inter-Calibration Experiment</i> (Oct. 2002 – Oct. 2009)
AP-NPDB	Advisory Panel on <i>North Pacific Data Buoy</i> (Oct. 2001 – Oct. 2006)
AP-SOFE	FUTURE Advisory Panel on Status, Outlooks, Forecasts and Engagement (Oct. 2009 –)
BIO	Biological Oceanography Committee
CCCC	Climate Change and Carrying Capacity Scientific Program (Oct. 1995 – Oct. 2009)
F&A	Finance and Administration Committee
FIS	Fishery Science Committee
FUTURE	Forecasting and Understanding Trends, Uncertainty and Responses of the North Pacific Ecosystem (Oct. 2009 –)
GC	Governing Council
IP-WT	FUTURE Implementation Plan Writing Team (Jun 2008 – Apr 2009)
MEQ	Marine Environmental Quality Committee
MONITOR	Formerly Task Team on Monitoring (Oct. 1997 – Oct. 2004), renamed to Technical Committee on Monitoring
NEMURO	North Pacific Ecosystem Model for Understanding Regional Oceanography
NEMURO.FISH	NEMURO for Including Saury and Herring
NEMURO.SAN	NEMURO for Sardine and Anchovy populations
NPESR	North Pacific Ecosystem Status Report (Oct. 2002 – Oct. 2004)
PICES	North Pacific Marine Science Organization
POC	Physical Oceanography and Climate Committee
RHLF	Relocation and Home Leave Fund
SB	Science Board
S-CC	Section on <i>Carbon and Climate</i> (Oct. 2005 – Oct. 2013)
S-CCME	Section on Climate Change Effects on Marine Ecosystems (Jan. 2012 – Dec. 2020)
S-HAB	Section on <i>Ecology of Harmful Algal Blooms in the North Pacific</i> (Oct. 2003 – Oct. 2014)
S-HD	Section on <i>Human Dimensions of Marine Systems</i> (Jan. 2012 – Dec. 2020)
SG-CB	Study Group on <i>PICES Capacity Building</i> (Oct. 2002 – Oct. 2003)
SG-COM	Study Group on <i>Communication</i> (Oct. 2007 – Oct. 2009)
SG-EBM	Study Group on <i>Ecosystem-based Management Science and its Application to the North Pacific</i> (Oct. 2003 – Oct. 2004)
SG-ESR	Study Group on <i>Ecosystem Status Reporting</i> (Oct. 2006 – Oct. 2007)
SG-FERRRS	Study Group on <i>Fisheries and Ecosystem Responses to Recent Regime Shifts</i> (Oct. 2003 – Oct. 2004)
SG-FISP	Study Group on <i>Future Integrative Scientific Program(s)</i> (May 2005 – Oct. 2009)
SG-GOOS	Study Group to develop a strategy for GOOS (Oct. 2006 – Oct. 2007)
SG-HD	Study Group on <i>Human Dimensions</i> (Oct. 2009 – Oct. 2011)
SG-MAR	Study Group on <i>Marine Aquaculture and Ranching in the PICES Region</i> (Oct. 2006 – Oct. 2007)
SG-RAM	Study Group on <i>Restructuring of the PICES Annual Meeting</i> (Oct. 2008 – Mar. 2009)
SG-RPFR	Study Group on <i>PICES Rules of Procedure and Financial Regulations</i> (Oct. 2004 – Oct. 2006)

PICES Acronyms-2011

SG-SC	Study Group on <i>Scientific Cooperation between PICES and Non-member Countries</i> (Oct. 2006 – Oct. 2007)
SG-SI	Study Group on <i>PICES Strategic Plan</i> (Oct. 2003 – Oct. 2004)
SG-SP	Joint P/ICES Study Group on <i>Developing a Framework for Scientific Cooperation in Northern Hemisphere Marine Science</i> (Oct. 2009 – Oct. 2011)
SG-USP	Study Group on <i>Updating the PICES Strategic Plan</i> (Oct. 2009 – Oct. 2011)
SI-SG	Study Group on <i>PICES Strategic Plan</i> (Oct. 2003 – Oct. 2004)
SP-WT	FUTURE Science Plan Writing Team (Jan. 2007 – Apr. 2008)
TCODE	Technical Committee on Data Exchange
TT-MODEL	Conceptual / Theoretical and Modeling Studies Task Team (Oct. 1995 – Oct. 2009)
TT-CFAME	Climate Forcing and Marine Ecosystem Response Task Team (Oct. 2004 – Oct. 2009)
TT-BASS	Basin Studies Task Team (Oct. 1995 – Oct. 2004)
TT-MONITOR	MONITOR Task Team (Oct. 1997 – Oct. 2004)
TT-REX	Regional Experiments Task Team (Oct. 1996 – Oct. 2004)
TT-NEXT	NEMURO (North Pacific Ecosystem Model for Understanding Regional Oceanography) Experimental Plan Team Oct. 2002 – Oct. 2003)
WG 1	Working Group on <i>The Okhotsk Sea and Oyashio Region</i> (Oct. 1992 – Oct. 1993)
WG 2	Working Group on <i>Development of Common Assessment Methodology for Marine Pollution</i> (Oct. 1992 – Oct. 1994)
WG 3	Working Group on <i>Dynamics of Small Pelagics in Coastal Ecosystems</i> (Oct. 1992 – Oct. 1995)
WG 4	Working Group on <i>Data Collection and Quality Control</i> (Oct. 1992 – Oct. 1994)
WG 5	Working Group on <i>The Bering Sea</i> (Oct. 1992 – Oct. 1996)
WG 6	Working Group on <i>Subarctic Gyre</i> (Oct. 1992 – Oct. 1994)
WG 7	Working Group on <i>Modeling of the Subarctic North Pacific Circulation</i> (Oct. 1993 – Oct. 1995)
WG 8	Working Group on <i>Practical Assessment Methodology</i> (Oct. 1994 – Oct. 2000)
WG 9	Working Group on <i>Subarctic Pacific Monitoring</i> (Oct. 1994 – Oct. 1997)
WG 10	Working Group on <i>Circulation and Ventilation in the Japan/East Sea and its Adjacent Areas</i> (Oct. 1995 – Oct. 1999)
WG 11	Working Group on <i>Consumption of Marine Resources by Marine Birds and Mammals in the PICES Region</i> (Oct. 1995 – Oct. 1999)
WG 12	Working Group on <i>Crabs and Shrimps</i> (Oct. 1995 – Oct. 2001)
WG 13	Working Group on <i>Carbon Dioxide in the North Pacific</i> (Oct. 1997 – Oct. 2002)
WG 14	Working Group on <i>Effective Sampling of Micronekton to Estimate Ecosystem Carrying Capacity</i> (Oct. 1997 – Oct. 2004)
WG 15	Working Group on <i>Ecology of Harmful Algal Blooms (HABs) in the North Pacific</i> (Oct. 1999 – Oct. 2003)
WG 16	Working Group on <i>Climate Change, Shifts in Fish Production, and Fisheries Management</i> (Oct. 1999 – Oct. 2005)
WG 17	Working Group on <i>Biogeochemical Data Integration and Synthesis</i> (Oct. 2001 – Oct. 2005)
WG 18	Working Group on <i>Mariculture in the 21st Century – The Intersection between Ecology, Socio-Economics and Production</i> (Oct. 2003 – Oct. 2006)
WG 19	Working Group on <i>Ecosystem-based Management Science and its Application to the North Pacific</i> (Oct. 2004 – Oct. 2008)
WG 20	Working Group on <i>Evaluations of Climate Change Projections</i> (Oct. 2005 – Oct. 2010)
WG 21	Working Group on <i>Non-indigenous Aquatic Species</i> (Oct. 2005 –)
WG 22	Working Group on <i>Iron Supply and its Impact on Biogeochemistry and Ecosystems in the North Pacific Ocean</i> (Oct. 2007 – Oct. 2010)
WG 23	Working Group on <i>Comparative Ecology of Krill in Coastal and Oceanic Waters around the Pacific Rim</i> (Oct. 2007 – Oct. 2011)
WG 24	Working Group on <i>Environmental Interactions of Marine Aquaculture</i> (Oct. 2008 –)

PICES Acronyms-2011

WG-FCCIFS	Working Group on <i>Joint PICES/ICES WG on Forecasting Climate Change Impacts on Fish and Shellfish</i> (Jan. 2009 - Oct. 2011)
WG 26	Working Group on <i>Jellyfish blooms around the North Pacific Rim: Causes and Consequences</i> (Oct. 2010 –)
WG 27	Working Group on <i>North Pacific Climate Variability and Change</i> (Jun. 2011 –)
WG 28	Working Group on <i>Development of Ecosystem Indicators to Characterize Ecosystem Responses to Multiple Stressors</i> (Jun. 2011 –)
WG 29	Working Group on <i>Regional Climate Modeling</i> (Jan. 2011 –)

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