NORTH PACIFIC MARINE SCIENCE ORGANIZATION (PICES)

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FOURTEENTH MEETING

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REPORT OF OPENING SESSION

The Opening Session was called to order at 8:30 a.m. on October 13, 2005, by the Chairman, Dr. Vera Alexander, who welcomed delegates, observers and researchers to the PICES Fourteenth Annual Meeting (PICES XIV).

Welcome addresses on behalf of the host state

Prof. Victor Gorchakov (Vice-Governor of the Primorye Region) welcomed participants on behalf of the host state (*OP Endnote 1*).

Remarks by representatives of Contracting Parties and the Chairman of PICES

Dr. Alexander invited Dr. Laura Richards (Regional Director of Science, Pacific Region, Fisheries & Oceans Canada) to make a statement on behalf of the Canadian Government. Dr. Richards addressed the session and her remarks are appended to the report in *OP Endnote 2*.

Dr. Alexander called upon Dr. Tokio Wada (Counselor, Resources Enhancement Promotion Department, Fisheries Agency, Japan) to speak on behalf of the Japanese Government. Dr. Wada addressed the session and his remarks are appended to the report in *OP Endnote 3*.

Dr. Alexander then asked Mr. Zhi-Xin Chen (Division Director, Department of International Cooperation, Ministry of Agriculture, People's Republic of China) to make a statement on behalf of the Chinese Government. Mr. Chen addressed the session and his remarks are appended to the report in *OP Endnote 4*.

Dr. Alexander invited Dr. Ig-Chan Pang (Director, Headquarters for Marine Environment, National Fisheries Research & Development Institute, Ministry of Maritime Affairs and Fisheries, Republic of Korea) to speak on behalf of the Korean Government. Dr. Pang addressed the session and his remarks are appended to the report in *OP Endnote 5*.

Dr. Alexander called upon Dr. Samuel Pooley (Director, Pacific Islands Fisheries Science Center, National Oceanic and Atmospheric, Administration, United States of America) to speak on behalf of the Government of the United States of America. Dr. Pooley addressed the session and his remarks are appended to the report in *OP Endnote 6*.

Dr. Alexander asked Dr. Lev N. Bocharov (Director, Pacific Scientific Research Fisheries Center, Federal Agency on Fisheries, Russian Federation) to make a statement on behalf of the Russian Government. Dr. Bocharov addressed the session and his remarks are appended to the report in *OP Endnote 7*.

Dr. Alexander thanked Prof. Gorchakov and all the delegates for their remarks and spoke on behalf of PICES. The text of her address is appended to the report in *OP Endnote 8*.

Wooster Award presentation ceremony

Dr. Alexander and the Science Board Chairman, Dr. Kuh Kim, conducted the Wooster Award presentation ceremony. Dr. Kuh Kim read the following Science Board citation for the 2005 Wooster Award (reading of the Science Board citation was accompanied by a special slide show dedicated to Dr. Daniel Ware):

The Wooster Award was established in 2001 to honour Dr. Warren S. Wooster, the principal founder and first Chairman of PICES, and world-renowned researcher and statesman in the area of climate variability and fisheries production. The award is given annually to an individual who:

- *has made significant scientific contributions to North Pacific marine science;*
- *has achieved sustained excellence in research, teaching, administration or a combination of these in the area of the North Pacific;*

- *has worked to integrate the various disciplines of the marine sciences;*
- *someone who is, or has been, actively involved in PICES activities.*

The late Professor Michael M. Mullin (U.S.A.), Prof. Yutaka Nagata (Japan), Prof. William Pearcy (U.S.A.) and Prof. Paul H. LeBlond (Canada) were honoured with the Wooster Award from 2001-2004.

In April of this year, the Science Board evaluated the nominations and selected Dr. Daniel Ware as the recipient of the Wooster Award in 2005. Sadly, Dr. Ware passed away in late July of this year, but we are fortunate that his wife, Madeleine, is able to join us for this celebration of Dr. Ware's accomplishments.

Dr. Ware began his scientific career in 1967 at the University of British Columbia where his doctoral research was part of a multidisciplinary study of food web structure and dynamics in a lake ecosystem. A move to the Atlantic coast for a decade at the Marine Ecology Laboratory allowed Dr. Ware to conduct theoretical and field research on fish bioenergetics, fisheries oceanography, stock-recruitment theory, and early life history biology of cod, mackerel, and herring. He returned to the Pacific Coast as a scientist at the Pacific Biological Station and served for a period as Head of the herring research section. He collaborated with Japanese scientists in a comparative study of the Oyashio and British Columbia marine ecosystems. Dr. Ware was Adjunct Professor at both the Simon Fraser University and the University of British Columbia. Following his retirement from Fisheries and Oceans Canada in 2000, he was the President of Aquatic Ecosystem Associates, and Chairman of the Science Panel of the Herring Conservation and Research Society.

Dr. Ware is unique among the recipients of this award in that his career was spent in government rather than academia. He tackled both theoretical topics in marine ecosystem science as well as scientific problems associated with the management of fisheries. During the course of his career, he either wrote or contributed to over 50 articles in the primary scientific literature. The most recent of these appeared this year in the prestigious journal, Science. *Co-authored with Dr. Richard Thomson of Fisheries and Oceans Canada, the paper demonstrated a strong bottom-up level link between primary productivity and resident commercial fish yield for the entire west coast of North America, extending from the California Bight to the western Aleutian Islands. As an example of the breadth of his scientific interests, his first paper in* Nature *in 1974, coincidently with the former PICES MEQ Committee Chairman, Dr. Richard Addison, was on contaminants in plankton.*

Dr. Ware is also unique in being the first person to hold the position that I now occupy, Chairman of Science Board. He led PICES through its formative years and was a leading force in the establishment of the PICES/GLOBEC Climate Change and Carrying Capacity Program, or the CCCC Program. After serving his 3-year term at the helm, he continued with the CCCC/MODEL Task Team during the development of the now well-known ecosystem model, NEMURO. He was particularly interested in the role of microbial processes. A special issue of Ecological Modelling *to be published in 2006 will be the first major publication on NEMURO and NEMURO.FISH models, and this issue will be dedicated to Dan.*

In June of this year, Dr. Ware received the Timothy R. Parsons Ocean Science Award from Fisheries and Oceans Canada. It is given to residents of Canada for distinguished accomplishments in multidisciplinary facets of ocean sciences either during their lifetime or for a recent outstanding achievement. Dan was the first recipient of this Award after Dr. Parsons.

Dr. Warren Wooster was the Chairman of PICES during the period when Dr. Ware served as the Science Board Chairman, and they developed a special working relationship.

Dr. Alexander read the following tribute sent by Dr. Wooster:

To a taxonomist, the word "holotype" designates the single specimen used as the basis for the original description of a species. In re-reading the criteria for the Wooster Award, I realized that Dan Ware must have been its holotype. His research was certainly inter-disciplinary as it focused on important aspects of ecosystem response to human and climate interactions. This was a central theme of PICES from the beginning and one that he significantly advanced as first Chairman of the PICES Science Board and then as active participant in its working groups. Both his scientific contributions and his sustained efforts on behalf of our organization clearly qualify him to receive the award. He was a valued friend and colleague, and one who will be greatly missed.

Dr. Alexander presented a commemorative plaque to Ms. Madeleine Ware (a permanent plaque identifying Wooster Award winners resides at the PICES Secretariat in Sidney, British Columbia, Canada), who accepted the award with the following remarks:

In Daniel's name, I would like to thank you all for this award. I do remember how pleased and honoured Dan was when he heard about the nomination. He was truly looking forward to travelling to Vladivostok and to reconnect with his colleagues and friends. PICES, or rather the people connected and involved with it, were close to his heart.

Dan was passionate about his research, and he believed strongly that solid marine ecological research was paramount to manage fish stocks responsibly. He saw his duty as being twofold: firstly, to guarantee the survival of the resource, and secondly, to guarantee the survival of the fishing industry.

Dan wrote his personal "Code of Ethics" that always guided his approach to research as well as the interpretation of the data. Here are his words:

1. *Always err on the side of the Resource.*
2. *Produce a high quality product.*
3. *Always tell the client the "truth", whether he/she wants to hear it or not.*
4. *Work co-operatively with all clients to come up with the best advice.*

Dan was passionate about his work, and he felt fortunate that his work connected him with so many dedicated and talented people, many of whom became close personal friends. I know he would have acknowledged you all by name and thanked you for your support and the myriad ways in which your vision influenced his research.

I would like to close by quoting Dan when he accepted the Timothy Parsons award in Vancouver this spring "I want to thank you all for this award. It is an honour to be acknowledged by your colleagues and peers."

Ms. Marija Krunic, a close friend to Dan and Madeleine, then got on stage and read Madeleine's remarks in Russian.

PICES "Year-in-Review" 2005

Dr. Kuh Kim reviewed PICES' scientific accomplishments since the Thirteenth Annual Meeting (*OP Endnote 9*).

Keynote lecture

The Science Board Chairman introduced the keynote speaker, Dr. Vladimir I. Radchenko (Sakhalin Research Institute of Fisheries and Oceanography, Russian Federation), who gave a keynote lecture titled "*Far-eastern sea shelf ecosystems of yesterday, today, and tomorrow*". The abstract of his presentation is appended to the report in *OP Endnote 10*.

The Opening Session closed at 11:00 a.m.

OP Endnote 1

Welcome addresses on behalf of the host state by Prof. Victor Gorchakov

Dear colleagues, dear organizers and participants of the PICES Fourteenth Annual Meeting, dear foreign visitors! I am glad to welcome all of you to Primorye.

The Opening of the Fourteenth Annual Meeting of the North Pacific Marine Science Organization (PICES) in Vladivostok, which is devoted to problems concerning the world scientific community today, is an important event for the Primorye region, for the Russian Far East and for the whole of Russia. The Primorye region has had positive experience in conducting similar meetings. In 1999, Vladivostok hosted the PICES Eighth Annual Meeting, conducted under the Primorye region Administration patronage, which was also very successful. The upcoming Annual Meeting with the overall theme on the "Mechanisms of climate and human impacts on ecosystems in marginal seas and shelf regions" signifies the enormous work which has been done for today within the context of global tendencies.

There are various aspects of cooperation of the Russian Federation with the largest international scientific fisheries organizations on problems of fishery, marine researches, marine bioresources stock condition, marine biological resources preservation and rational usage in various areas of the World Ocean. In Russia, perspectives of further development of international activities are planned in the field of fishery. In particular, new multilateral agreements (for example, the Convention on preservation and management of fish resources in the southeastern part of Atlantic Ocean (SEAFO)) will also increase the activity of the Russian scientists and experts within the framework of international fishery organizations.

The science must help to keep, increase and correctly use resources of the World Ocean, and not break natural balance and ecological conditions. Complex study of the World Ocean is necessary within the coordination of marine research works conducted by the various countries. There is no doubt that the conducting of scientific conferences is especially significant for the training of the young staff, for the education of highly skilled researchers and scientists, for the attraction of wider scientific scopes, for the propagation of advanced information in the field of ocean science and for the consolidation of scientific cooperation at the international level.

Since the international management of the usage of biological resources of the oceans and seas directly infringe on the interests of the Russian fishery, active Russian participation in international scientific projects, expeditions, conferences and symposia which are connected to commercial fisheries will allow Russian scientists and experts to support a high level of research work and provide protection of the Russian fishermen's interests.

Participation at this meeting by scientists of our country and our neighbors in the Pacific region: Canada, U.S.A., Japan, Republic of Korea and the People's Republic of China, and also representatives of other countries in Europe and Asia, gives a special value to the meeting and helps to consolidate mutual understanding, and creates opportunities of further cooperation in joint research work. The exchange of experiences between experts during the sessions and workshops and generalization of results of this Annual Meeting will not only help to consolidate international connections of our scientists, but will also promote wider international integration of scientific knowledge on various marine disciplines. International cooperation makes it possible to get new data and fundamental and applied knowledge of Pacific Ocean and adjacent seas where scientific monitoring and resource research works by Russian research vessels alone is impossible for now.

I express my hope, that participants of the Annual Meeting, besides discussions of results of the already executed research, will find future directions in which efforts of scientists should be concentrated. In the long-term, it will help

leaders of our country and our commercial fishing industry to manage biological recourses more effectively in the Russian economical zone, and to build a strategy of reviving the Russian commercial fishing in the World Ocean.

I wish participants of this meeting fruitful work, useful contacts and productive discussions. Thank you.

OP Endnote 2

Remarks at the Opening Session by Dr. Laura Richards (Canada)

Madam Chairman, distinguished guests and colleagues: On behalf of Canada and the Canadian delegation, I would like to thank TINRO-Centre and the Russian Federation for inviting us here to Vladivostok.

In particular, I would like to congratulate the TINRO-Centre Foundation on the occasion of their 80th anniversary which was celebrated just this past week. These events remind us of the long history of research in oceanography and fisheries science in the North Pacific – a history of which PICES can now be proud to continue and grow.

PICES has been very active over the past few years. The strategic plan was approved last year and committees are developing their own action plans for future activities to fit within the Strategic plan. Also last year, in 2004, PICES agreed, for the first time in its history, to provide formal advice at the request of a Contracting Party, in this case, the United States. The quality and relevance of the Study Group advice was a testament to the strength of PICES as an organization.

But change will be a necessary part of future growth. We need to bring new people and fresh ideas into PICES in order to maintain the vibrant and dynamic organization that PICES has become. One important opportunity to achieve this goal is through the new integrative program which will succeed the CCCC Program, now moving towards the synthesis stage. I look forward to intense discussions and debates here in Vladivostok on the various ideas for the new integrative program (or programs), such as ecosystem sustainability, that will make PICES relevant for the years to come. The decision on this program will set the future direction for PICES. I hope that all of you will take part in these discussions so that we can benefit from the experience and expertise of all PICES members.

Let's build on our success and ensure a vibrant and dynamic organization! Thank you.

OP Endnote 3

Remarks at the Opening Session by Dr. Tokio Wada (Japan)

Madam Chairperson, distinguished delegates, ladies and gentlemen! On behalf of Japan and the Japanese delegation, I would like to thank the Government of the Russian Federation, the Government of the Primorye Region, and the TINRO-Center for kindly hosting the Fourteenth Annual Meeting of PICES here in Vladivostok.

I would also like to extend my warmest congratulations to Dr. Bocharov and members of the TINRO-Center for celebrating the 80th anniversary. The TINRO-Center has accomplished many remarkable achievements on fisheries science and oceanography. The TINRO-Center has also been a leader of various PICES activities and a good partner with the Japanese fisheries research institutes. I would like to express my sincere respects to the TINRO-Center for its great contribution to North Pacific marine science, and I hope that the TINRO-Center will continue to play its important role in PICES.

During the last decade, we have observed several ecological changes in the North Pacific. One of those is jellyfish blooming. It has been observed in the Bering Sea during the 1990s, and recently it has become a serious problem in the East China Sea and Japan Sea. The ecological changes, such as jellyfish blooming, are signs of ecosystem's response to climatic changes and various human impacts. Marine science is expected to examine both climate and human impacts on marine ecosystems and to elaborate integrated management approaches in order to balance conservation and sustainable utilization.

Integrated ecosystem management is an urgent matter in coastal regions that have high productivity and rich biodiversity but have suffered due to various human activities. PICES has been extending its activities to coastal issues including harmful algal blooms, marine aquacultures, and ecosystem-based management. Dealing with the issues in coastal regions and marginal seas would be a new expected dimension of PICES activities.

Within the context, the theme of this Annual Meeting "Mechanisms of climate and human impacts on ecosystems in marginal seas and shelf regions " is quite a timely one covering various coastal issues. I hope that all presentations and discussions will provide us with comprehensive understandings of the North Pacific marginal seas and shelf regions, and with suggestions on how we can harmonize conservation and sustainable use of their ecosystems. I also believe that these understandings and suggestions would stimulate the discussions on future integrative scientific programs of PICES. Thank you very much.

OP Endnote 4

Remarks at the Opening Session by Mr. Zhi-Xin Chen (People's Republic of China)

Madam Chairman, ladies and gentlemen! Good morning. My colleagues and I have the pleasure to attend the Fourteenth Annual Meeting of PICES in Vladivostok. First of all, I would like to thank the Government of Vladivostok and the Russian delegation for hosting this important meeting in this beautiful city. In preparation for this meeting, the concerned people have made tremendous efforts. This will contribute to the success of the meeting.

In the year 2005, PICES has successfully implemented its work plan. Through the cooperative activities, the member countries have been more closely linked, and the scientific research has contributed to the development of fishery and oceanic sector in respective countries. All these have become true under the leadership of PICES' Chairman, Science Board Chairman and Executive Secretary. Here on this occasion, I would like to extend appreciation to all the efforts they made.

Further, I hope that PICES' future activities could be more oriented to the priorities of the member countries. And I believe that PICES' future will be bright and promising. In conclusion, I wish this Annual Meeting a success.

OP Endnote 5

Remarks at the Opening Session by Dr. Ig-Chan Pang (Republic of Korea)

The Chairperson of PICES, Dr. Vera Alexander, distinguished delegates, guests, colleagues and ladies and gentlemen! On behalf of the Republic of Korea and Korean delegation, it is my great honor to welcome all of you to this Fourteenth Annual Meeting of PICES. I would like to express our sincere thanks to the Government of Russia, the Chairperson of PICES, Dr. Vera Alexander, Executive Secretary of PICES, Dr. Alexander Bychkov, and the local organizing committee for hosting this meaningful meeting.

The North Pacific is densely populated and has high economic activities, which may cause serious pollution and diminishing marine resources in this area. In recent years, rapid changes in the atmosphere, ocean, and earth have caused impacts on human activities. As we attain more and more scientific knowledge, we realize that in every aspect, human and natural activities are related to each other. We need more international and interdisciplinary scientific cooperation as we do under PICES Convention.

Scientific activities in PICES take the lead in fulfilling scientific productivity in North Pacific Ocean in climate change, ecosystem, fisheries, carbon cycling, and so on. The Government of the Republic of Korea realized the importance of international cooperation in ocean science through PICES. Now, our government is getting more interested in PICES and is encouraging young scientists to participate in PICES activities through supporting national programs. We hope the Korean young scientists can play an important role in PICES in the future.

As one of PICES' projects, CREAMS/PICES Program was approved at the Thirteenth Annual Meeting of PICES held in Honolulu in October 2004, as CREAMS' scope was expanded to study effects of climate and long-term changes in the biotic and abiotic environments in the East Asian Marginal Seas. The Government of the Republic of Korea is willing to support this program and will cooperate with PICES member countries to accomplish PICES purposes as the major organization of marine science in the Pacific.

I wish all of you successful achievement at this Fourteenth Annual Meeting with PICES spirit. Thank you.

OP Endnote 6

Remarks at the Opening Session by Dr. Samuel Pooley (U.S.A.)

Dr. Alexander, distinguished delegates and fellow scientists! On behalf of the United States, I would like to express our appreciation and thanks to the Russian Federation for inviting us here to Vladivostok. We are certain this will be a very productive meeting for PICES.

First, let me say that the United States greatly appreciates the outpouring of assistance from the world community for the relief of the destructive hurricane *Katrina*. These generous offers, including those from our host country here today and other members of PICES, are doing much to alleviate the human suffering caused by this storm. Thank you very much.

Second, the challenges facing the international scientific community to enhance our understanding of climate change and marine ecosystems remain daunting, as is turning this understanding into appropriate conservation and management of living marine resources both nationally and on a regional basis. The collaborative nature of the PICES scientific community is a critical step in this regard.

This year PICES will decide on a new integrative scientific program. We view this as an important initiative, and its selection could well mark the direction of PICES itself over the next decade. So we look forward to those deliberations.

We also continue to strongly support the PICES Intern Program and other opportunities for young scientists, which not only support PICES as an organization but also build capacity in our member countries and bring fresh insights from the younger generation into this organization. We welcome all of you younger scientists here today.

Finally, we look forward to seeing many of you again in Honolulu next spring at the symposium on "Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis", co-sponsored by PICES and GLOBEC. Thank you.

OP Endnote 7

Remarks at the Opening Session by Dr. Lev N. Bocharov (Russian Federation)

Distinguished Madam Chairman, Dr. Vera Alexander, esteemed member country representatives, participants, ladies and gentlemen! First of all, with great pleasure I would like to welcome you in Vladivostok, which is the biggest scientific center in the Russian Far East.

I would like to make a special note on the excellent work of the local organizing committee, and express my gratitude to all who made arrangements for this meeting.

During the past thirteen years, the scope of PICES activities has multiplied. Extensive and elaborate work is being done now even between Annual Meetings. The relations and cooperation with other international organizations have significantly strengthened. PICES is being more and more attentively regarded by the international scientific community. The proof of it is the presence of many guests and observers from other scientific organizations which are concerned with the exploration and exploitation of the World Ocean.

Exploration of the World Ocean is an essential priority of the Russian Federation, therefore the creation of PICES and its further development as an international scientific organization has been a priority in Russia.

For the people of the Russian Far East, hosting PICES Annual Meeting in our region is especially important. There is no other Russian region where the economical prosperity and social stability depend so much on marine resources, sea transportation, recreational projects and so on. Conducting two prominent commercial fishing forums in Vladivostok in 2004 and 2005 confirms that. The last of these forums was completed just two weeks ago.

There is no doubt that during the first decade of the 21st century, large challenges will take place in fishery science. The progressive ecosystem management approach would be widely used by all countries for ocean studies, marine resources exploitation and in the development of aquaculture.

I also want to mention that only integrated results are important in international research work in the field of mechanisms of climate and human impacts on ecosystems in marginal seas and shelf regions. Such results give us more realistic basis for the long-term forecasting of marine resources and their exploitation.

Autumn is the best season in the Primorye region. I hope that the meeting participants will not only work on scientific sessions but will also have time to get to know our city more.

At the end of my opening remarks I want to wish all participants of the PICES Fourteenth Annual Meeting productive work. Good luck to the Annual Meeting and thank you.

OP Endnote 8

Welcome Address by Dr. Vera Alexander, Chairman of PICES

The Honorable Professor Gorchakov, distinguished delegates, ladies and gentlemen of the PICES family and welcome guests, it gives me great pleasure to greet you. On behalf of all the PICES members, I thank our hosts for welcoming us to Vladivostok, a city that is not only beautiful, but which has a long tradition of leadership in scientific studies of the North Pacific Ocean. The timing of our meeting here is particularly appropriate, since TINRO has just celebrated its 80th anniversary. Congratulations, TINRO, and best wishes for the next decades. We recognize your excellent contributions and PICES looks forward to our continued productive relationship.

PICES is still a young organization. I suppose we can characterize it as a teen-aged entity.

Compared with our sister organizations such as ICES, we lack a long tradition, but what we do have is a vibrant forward-looking character, open to innovation and responsive to the broad needs for North Pacific marine science.

Political, economic, social, cultural, climate, and conservation issues all relate to the North Pacific Ocean. This vast and awe-inspiring body of water is so huge and has such a strong influence on the nations bordering its shores, that its influence in all these realms cannot be ignored. But PICES is concerned with none of these, but contributes to all. This is the key to the effectiveness of PICES. As a purely scientific organization, PICES can and, indeed, does address all the scientific background issues. The decision that there should be no direct role in the political or commercial aspects of international relations, while remaining open to providing advice when asked, helps to maintain the integrity of the scientific work.

The vast, magical Pacific Ocean unites us. We share it, and it plays an important role in all our lives and in the pulse of the whole planet, influencing its health and sustainability. We must keep in mind the tremendous impact of the Pacific Ocean on the sustainability of life on Earth, and acknowledge the vast impact of climate change.

I see this as an encouraging time. Many good things are happening, albeit clouded by natural and human-induced disasters—hurricanes, typhoons, terrorism, war and famines. So why am I so optimistic? It is because there is increasing and widespread emphasis on improved ways of dealing with and managing resource development, recognizing the fragility of our world and the need to apply complex scientific approaches to activities such as fisheries management. The mantra of ecosystem-based management is not an idle political ploy, but recognizes a true need, even as we don't yet know how to accomplish it. PICES will help.

About 75% of the global capture fisheries are carried out in the Pacific Ocean, 90% of the aquaculture, and 70% of the world's global consumption of fish production. I am not sure how much of this is actually in the North Pacific, but I suspect it is a substantial proportion. While PICES focuses on a specific portion of the North Pacific Ocean, it is open to the broader connections that must be made. Unfortunately, our attempts to recruit Mexico as a member have so far not been successful, but nevertheless, Mexican scientists are involved in PICES activities, and PICES activities have included the California Current as an important region. Increasingly, we are networking with other international organizations such as ICES and IOC, jointly addressing issues of mutual concern. As we approach the International Polar Year in 2007-2008, we may well become involved at more northern latitudes than has been the case previously. In any event, we welcome the attendance at this meeting of representatives from many cooperating organizations, symbolic of our breadth of involvement in world ocean affairs.

Milestones have passed. We have issued the first Ecosystem Status Report for the North Pacific Ocean. PICES has responded to the first request by a member nation for specific advice concerning the management of fisheries in the context of regime shifts. In a few days we will have available a newly published book on the history of PICES. Perhaps the most important, a new group has been established to develop the next major program for PICES (the Future Integrative Scientific Program); we will be hearing about some of its activities at this meeting.

On the other hand, there is also sad news. Dr. Dan Ware, today's recipient of the Wooster Award, passed away recently. He was a PICES pioneer, first Chairman of the Fisheries Science Committee, and subsequently Science Board Chairman. You will hear more about him shortly. Also, I am sad to tell you that our colleague Prof. Al Tyler died unexpectedly three weeks ago at his home in Salt Spring Island, Canada. He had participated in many meetings of PICES, and chaired the working group on the Bering Sea. He served as my Associate Dean at the University of Alaska for ten years, and was a very close friend.

Now, we should move forward with the meeting. Once again, thank you to our hosts, the Government of Primorye and the Association of Scientific Institutions of TINRO, chaired by Dr. Bocharov. Once again, I offer a warm welcome to all delegates, participants and observers. Thank you.

OP Endnote 9

PICES "Year-in-Review" 2005 by Dr. Kuh Kim, Chairman of Science Board

PICES has grown rapidly since its inception in 1992 and has become the primary organization of marine sciences in the North Pacific. In 2005, PICES has built further upon its remarkable history with activities designed to meet the mandate of the Organization stated clearly in Article III of its Convention: firstly, to promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned and of its living resources, and secondly, to promote the collection and exchange of information and data related to marine scientific research in the area concerned.

PICES is known for its excellent publications. The CCCC/BASS Workshop on "*Linkages between open and coastal systems*" held at PICES XII in Seoul, in 2003, produced 9 papers in *Deep-Sea Research, Part II*. Selected papers from the 2004 Symposium on "*Quantitative ecosystem indicators for fisheries management*", co-sponsored by IOC, SCOR, PICES, GLOBEC, *etc*., were published in the *ICES Journal of Marine Science*. In the coming year, 3 special issues are expected to be published in *Progress in Oceanography*, *Deep-Sea Research II*, and *Ecological Modeling*.

It is remarkable that the North Pacific Ecosystem Status Report was published as *PICES Special Publication No. 1* in December 2004, taking only two and a half years. Many of you here were involved in this important task by participating in workshops and meetings and as 14 lead authors and 67 contributors for chapters on Synthesis, Ocean and Climate Changes, and 13 regions in the North Pacific. This report lays a foundation for future scientific activities of PICES.

A parallel collaborative effort between PICES and the Census of Marine Life made it possible to publish "*Marine Life in the North Pacific: The Known, Unknown, and Unknowable*" as *PICES Special Publication No. 2*. This publication was edited by Drs. Ian Perry and Skip McKinnell, who also put in months for the publication of the North Pacific Ecosystem Status Report. PICES should be proud of these two marine scientists who worked so hard and effectively for the last three years to produce the two *PICES Special Publications*.

Completion of the North Pacific Ecosystem Status Report opened the door for new missions. A Study Group on *Fisheries and ecosystem responses to recent regime shifts* was formed to respond to the first ever, formal request (from the U.S. National Marine Fisheries Service) to PICES for scientific advice on the implication of a potential 1998 regime shift. The Study Group, comprised of 21 members from 6 PICES member countries and the PICES Secretariat, published the report as *PICES Scientific Report No. 28*, edited by Dr. Jacquelynne R. King. An executive summary of this report was also published as PICES' first Advisory Report.

The PICES Scientific Report Series has reached 30 volumes. *PICES Scientific Report No. 27* is the proceedings of the MODEL Task Team Second Workshop which was held in March 2003, in Yokohama, Japan, in order to develop a marine ecosystem model of the North Pacific Ocean that includs pelagic fish. *PICES Scientific Report No. 29* is the final report of the Study Group on *Ecosystem-based management science and its application to the North Pacific*, established under FIS and MEQ. *PICES Scientific Report No. 30* is the final report of the Working Group 14 on *Effective sampling of micronekton to estimate ecosystem carrying capacity*.

PICES also fulfills its mandate through scientific meetings. Examples are:

- The first CREAMS/PICES Workshop on "*East Asian Seas Time-series (EAST)*" was held in April 2005, in Seoul, Korea, as part of the CREAMS/PICES Program which was approved by the Science Board last year. Establishing permanent observation stations in the Japan/East Sea was discussed as an initial focus of the Program.
- In May 2005, a 2-day OECOS (Oceanic Ecodynamics COmparison in the Subarctic Pacific) Workshop on "*An east-west comparative study of lower trophic level pelagic ecology in the subarctic Pacific Ocean*" was convened in Corvallis, U.S.A., and co-sponsored by PICES and the Oregon State University.
- Another 2-day CCCC/CFAME Workshop was held also in May 2005, in Victoria, Canada, to develop a workplan for future CFAME (Climate Forcing and Marine Ecosystem Response) Task Team activities and hypothesis for CCCC synthesis.
- PICES and GLOBEC co-sponsored a 5-day symposium on "*Climate variability and sub-Arctic marine ecosystems*" in May 2005, in Victoria, Canada.
- Close collaboration between PICES and ICES continues, and this year, two theme sessions were jointly organized at the ICES Annual Conference which was held just two weeks ago in Aberdeen, Scotland; "*Multidisciplinary approaches to the identification of stock structure of small pelagics: Implications for assessment and sustainable management*" and "*Regional ecosystem pilot projects, ecosystem forecasting, and operational oceanography: Comparing and contrasting scientific tools, strategies, outputs, and applications*".

In conjunction with PICES XIV, four workshops are organized: "*Review of selected harmful algae in the PICES region: I.* Pseudo-nitzscia & Alexandrium" (by MEQ), "*Filling the gaps in the PICES North Pacific Ecosystem Status Report*" (by MONITOR), "*Modeling and iron biogeochemistry: How far apart are we?*" (by IFEP-AP and MODEL) and "*Introduced species in the North Pacific*" (jointly wit ICES).

PICES is developing successful cooperation with regional organizations such as the North Pacific Research Board (NPRB). Through funding from NPRB, a new project has been initiated on "*Integration of Ecological Indicators for the North Pacific with emphasis on the Bering Sea*", and further updates to the North Pacific Ecosystem Status Report will be made. The Continuous Plankton Recorder Monitoring Program for the Eastern North Pacific and Southern Bering Sea will be continued. NPRB also co-sponsored the Symposium on "*Climate variability and sub-arctic marine ecosystems*" and committed funds for the PICES/GLOBEC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*".

PICES evolves as needs arise and new groups emerge. Working Group 19 on *Ecosystem-based management science and its application to the North Pacific* is in place under MEQ and FIS. A Section on *Carbon and climate* is established under BIO and POC, recognizing that PICES has proven its expertise and leadership through earlier activities of Working Groups 13 and 17, to coordinate the scientific problem of carbon cycling in a bottom-up approach on a regional scale, which could then be put into a global scale. PICES now has an Advisory Panel for *the CREAMS/PICES Program in the East Asian Marginal Seas*. Objectives of the CREAMS/PICES Program are first to initiate and oversee a program to study the hydrography, circulation, and biology and their variability in the East Asian Marginal Seas and the effect of climate and long-term changes in the abiotic and biotic environments of this region, and second to facilitate the establishment of permanent observation and data exchange networks in this region.

I would like to especially draw your attention to the development of future scientific program of PICES. Science Board recommended a new Study Group to develop themes for one or more new integrative scientific program(s) to be undertaken by scientists in PICES member countries. Governing Council approved this recommendation in April 2005, and the entire PICES community is expected to be engaged in

the development of the next major program of PICES in the next decade. The announcement of the new theme is planned for PICES XV in 2006.

In coming years, PICES will be busy with several important meetings. In April 2006, PICES will convene a symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" in Honolulu, U.S.A., co-sponsored by GLOBEC. The objective of this symposium is a True Synthesis of all scientific activities of the CCCC Program since its beginning in 1994. In July 2006, a symposium to celebrate the 50th anniversary of sampling along Line P and Station PAPA will be held in Victoria, Canada, co-sponsored by Fisheries and Oceans, Canada. In 2007, the 4th International Zooplankton Production Symposium will be held in Hiroshima, Japan, co-sponsored by PICES, GLOBEC and ICES.

PICES XV will be held from October 13-21, 2006, in Yokohama, Japan with the theme "*Boundary Current Ecosystems*". In 2007, we will meet in Victoria, Canada, for PICES XVI.

All materials in my presentation and up-to-date information of PICES are available real-time on the PICES' website, and I urge you to be part of PICES through this website. Thank you.

OP Endnote 10

"Far-eastern sea shelf ecosystems of yesterday, today, and tomorrow"

Abstract of the keynote lecture by Dr. Vladimir I. Radchenko (SakNIRO, Russian Federation)

Systematical research of the far-eastern shelf began in 1950 with the cruises of the famous R/V *Vityaz*. These studies provided the outline for shelf and continental slope areas, composition and distribution of bottom sediments, general characteristics of physical conditions, fish and invertebrates abundance and distribution. The total area of the far-eastern sea shelves exceeds 1 million km^2. The shelf is extremely rich in living resources, including about 362 million tons of macrozoobenthos, 25 million tons of macrophytobenthos, 165 million tons of macrozooplankton and about 100 million tons of planktonic algae in the warm season. Some of these estimations need a more accurate definition due to the progress of sampling methods and techniques. Benthos quantity estimations can be increased due to the underestimation of bivalve mollusk abundance. Meanwhile, benthic surveys in large parts of the far-eastern shelf conducted at about 20-year intervals have confirmed the relative stability of benthos quantitative characteristics. Fish biomass in the shelf zone could reach 12.5 million tons with a pre-dominance of common pelagic species. Many commercial fish species use the shelf zone as spawning and nursery areas which emphasizes the shelf's significance in the fish productivity. Resources of micro- and meiobenthos, bacterio- and microzooplankton, and large gelatinous macrozooplankton still remain an enigmatic value.

Some important processes and phenomena were recently revealed which can affect shelf biotopes, communities, and ecosystems functioning on long-term time scales. Silt accumulation seems to be a fluctuating process, changing with water circulation intensity under climate change. Sedimentation rates can vary and are sometimes higher than estimated by sediment core studies. Regular acoustic surveys of bottom type and characteristics are promising in the study of these processes. Changes in biological diversity and composition of the shelf communities often reflect the current processes of sea floor landscape deformation. Kelp bushes and sea grass bed replacement by coralline algae, so-called "isoyakes", occur even in areas where human impact is not heavy. The question remains whether these processes are reversible in the long-term.

The shelf zone is first, and to the greatest degree, involved with the anthropogenic activity at sea. Artificial reef installations are widely applied around the world. This activity creates the necessity to accelerate studies of man-made

material biodegradation and biofouling. The territory of the shelf around Russia exceeds 6.2 million km^2, of which 4 million km^2 are promising for oil and gas development. The initial extracted resources of hydrocarbon raw materials from the shelf are evaluated at 136 billion tons of standard fuel (25% of world-wide resources of hydrocarbons). The Ministry of Natural Resources of Russia plans to increase the federal budget expenditure for regional works in shelf exploration from 700 million rubles in 2005 to 2.8 billion rubles by 2020. Dissolved oxygen deficiency, pollution due to toxic organic chemicals and heavy metals can be expected, if shelf resources are to be explored in a reckless way.

REPORT OF GOVERNING COUNCIL

The Governing Council met from 8:30-12:30 on October 4, from 8:30-17:30 on October 8, and from 8:30-12:00 on October 9, under the chairmanship of Dr. Vera Alexander. Dr. Alexander Bychkov served as rapporteur. All Contracting Parties were represented at the three sessions (*GC Endnote 1*). At the first session, the Chairman welcomed attendees, introduced the agenda and suggested the order in which to take up the various items. The agenda was adopted as presented (*GC Endnote 2*). This report summarizes the treatment of each agenda item during the course of the three sessions.

Report on Administration (Agenda Item 3)

The Executive Secretary summarized the activities of the Organization and the Secretariat since PICES XIII. Council reviewed and adopted the report. (*GC Endnote 3*).

Report of 2005 inter-sessional Science Board / Governing Council meeting (Agenda Item 4)

The third inter-sessional Science Board meeting, with the participation of Council members, was held from April 6-7, 2005, at NOAA's Sand Point facilities in Seattle, U.S.A., and hosted by the Alaska Fisheries Science Center and the Northwest Fisheries Science Center. These two organizations provided US $10,000 to offset PICES expenses for the meeting. The report of this meeting is included elsewhere in this Annual Report. An article entitled "*PICES in transition: The 3rd inter-sessional Science Board and Governing Council meeting*" that briefly summarizes the results from the meeting was prepared by Dr. Kuh Kim, Science Board Chairman, and published in PICES Press in July 2005 (Vol. 13, No. 2).

A ½-day Governing Council meeting was convened in the morning of April 8. All Contracting Parties, except China, were represented at the meeting. The agenda and the list of participants for the 2005 inter-sessional Council meeting are appended as *GC Endnote 4*.

The main focus of the meeting was on the report of the Study Group on *Rules of Procedure and Financial Regulations*, presented by Dr. Laura Richards (SG-RPFR Chairman). The proposed amendments to both documents were discussed at length by Council, and further revisions were made by the members present. The Executive Secretary was instructed to circulate the new drafts of the revised Rules of Procedure and Financial Regulations to Contracting Parties immediately after the meeting (implemented on April 14, 2005).

Council reviewed several recommendations from the inter-sessional Science Board meeting, and the following decisions were made:

- To develop recommendations for one or more new integrative scientific program(s) to be undertaken by scientists in PICES member countries, a Study Group on *Future integrative scientific program(s)* has been established under the direction of Council (Decision 05/S/6), with terms of reference as listed in *GC Appendix B*. The Study Group membership should consist of Science Board members (as of April 2005) plus 1 additional member from Canada, Japan and Russia and up to 2 additional members from China.
- To ensure that the important basin–scale problems of carbon cycling in the North Pacific Ocean are adequately addressed, a Section on *Carbon and climate* has been formed under the direction of POC and BIO (Decision 05/S/6), with terms of reference as listed in *GC Appendix B.*
- Due to the unexpected outcome of the three meso-scale iron enrichment experiments encouraged by the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean*, it was agreed that their existing terms of reference be expanded to

include the following item : "*to synthesize, compare and contrast the results of SEEDS-I & II and SERIES, and to develop new experimental strategies and hypotheses to explain the different biogeochemical responses to iron enrichment*".

- Dr. Jeffrey M. Napp (U.S.A.) was appointed as the Chairman of the MONITOR Technical Committee, to replace Dr. Phillip R. Mundy (U.S.A.).

Other items of significance were:

- status of annual and voluntary contributions;
- schedule and financing of future Annual Meetings;
- PICES Intern Program.

Information on these issues can be found under relevant Agenda Items.

Membership and observers from other countries (Agenda Item 5)

The Secretariat did not receive proposals from any country to accede to the PICES Convention in 2005.

Earlier, Council expressed strong interest in encouraging Mexico to accede to the PICES Convention (an initial resolution was adopted at PICES VIII, Decision 99/A/5), and spent significant efforts in doing so. Details can be found in the 1999-2004 PICES Annual Reports.

The Executive Secretary reminded Council that in the letter of July 29, 2004, addressed to Ing. Marco Polo Bernal-Yarahuan (Subsecretario, Subsecretaria de Educación e Investigación Technológicas), Dr. Vera Alexander encouraged continuing collaboration between Mexico and PICES regardless of formal membership, and indicated the importance of having an observer from the Government of Mexico to attend PICES Annual Meetings, as this will provide an opportunity for Mexico to become more familiar with the activities of the Organization. No response was received to Dr. Alexander's letter, and Mexico was not represented as an observer at PICES XIII. On July 27, 2005, the Executive Secretary again sent a letter inviting Mexico to attend PICES XIV as an observer, but again no response was received.

It was indicated that Mexican scientists are still enthusiastic about their involvement in PICES activities. For example, a large group of scientists, led by Dr. Salvador Lluch-Cota, contributed a chapter on the Gulf of California to the North Pacific Ecosystem Status Report (PICES Special Publication, No. 1, 2004). Another group, led by Dr. Jaime Gomez-Gutierrez, provided important materials for the final WG 14 report on *Micronekton in the North Pacific* published as PICES Scientific Report No. 30 (2005). However, without financial support from their government and without travel grants from PICES, the number of Mexican scientists attending PICES Annual Meetings has started to decline: 18 scientists at PICES X (Victoria, Canada) in 2001, 6 scientists at PICES XI (Qingdao, China) in 2002, 2 scientists at PICES XII (Seoul, Korea) in 2003, 7 scientists at PICES XIII (Honolulu, U.S.A.) in 2004, and nobody at PICES XIV (Vladivostok, Russia) in 2005.

Council discussed at length possible expansion of PICES' geographic scope to include member nations from the entire Pacific basin. It was pointed out that:

- much of our improved understanding of how the North Pacific works has been a direct result of the comparative approach where scientists examine forcing and outcomes among various marine ecosystems;
- some of PICES' subsidiary bodies (Section on *Carbon and climate* and WG *on Evaluations of climate change projections*) have terms of reference that explicitly extend beyond the North Pacific, and some have become the *de facto* regional focus of global programs (Sections on *Ecology of harmful algal blooms in the North Pacific* and *Carbon and climate* are two prime examples);
- PICES has been dealing with disentangling the effects of fisheries from the effects of climate, and its most recently established Working Groups are focusing on the science and implementation of ecosystem-based management in marine ecosystems, the emerging issues associated with aquaculture in the ocean, and the growing problem of

invasive species; all topics which are receiving global attention.

Council agreed that there is merit for the Organization to consider the Pacific Ocean in its entirety. Although no formal decision has been taken, the PICES Chairman was requested to make private inquiries to 4 Pacific Rim countries that are currently affiliated members of ICES (Australia, Chile, New Zealand and Peru), to determine their interest in joining PICES if the Organization was to expand its area of scientific interest (Decision 05/A/6). It is expected that the responses from these countries will be considered at the 2006 inter-sessional Council meeting.

Relations with relevant organizations and programs (Agenda Item 6)

Letters of invitation to attend PICES XIV were sent to organizations and programs on the agreed 2004-2005 *Standing List* (with some additions), and the following sent observers:

Alaska Ocean Observing System (AOOS)	Dr. Clarence Pautzke
Census of Marine Life (CoML)	Dr. P. Robin Rigby
Global Ocean Ecosystem Dynamics (GLOBEC)	Dr. Francisco E. Werner
Global Ocean Observing System (GOOS)	Dr. Henrik Enevoldsen
Ecosystem Study of Subarctic Seas (ESSAS)	Dr. George Hunt
International Council for the Exploration of the Sea (ICES)	Dr. Adolf Kellermann
International Geosphere-Biosphere Program (IGBP)	Dr. Francisco E. Werner
Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)	Dr. Hiroaki Saito
Intergovernmental Oceanographic Commission (IOC)	Dr. Henrik Enevoldsen
Northwest Pacific Action Plan (NOWPAP)	Dr. Alexander Tkalin
	Dr. Norio Baba
North Pacific Anadromous Fish Commission (NPAFC)	Mr. Vladimir Fedorenko
	Dr. Vladimir Karpenko
North East Asian Regional GOOS (NEAR-GOOS)	Dr. Vyacheslav Lobanov
North Pacific Research Board (NPRB)	Dr. Clarence Pautzke
Northwest Association of Networked Ocean Observing Systems (NANOOS)	Dr. Jack A. Barth
IOC Sub-Commission for the Western Pacific (WESTPAC)	Dr. Hyung-Tack Huh
Yellow Sea Large Marine Ecosystem project (YSLME)	Dr. Sinjae Yoo

The Science Board Chairman and Executive Secretary reported on communication with the relevant organizations and programs since last year's Annual Meeting (see *GC Endnote* 3 for details). Time was reserved at the 1st session of Council (October 4, a.m.) for representatives of several organizations/programs (CoML, ESSAS, ICES, IMBER, IOC, NANOOS, NPAFC, NPRB, WESTPAC) to express their views on potential areas of collaboration with PICES. These presentations can be found on-line at http://www.pices.int/publications/presentations/PICES_14/PICES_14_default.aspx. The International Ocean Carbon Coordinated Project (IOCCP) and the Scientific Committee on Oceanic Research (SCOR) were unable to send their representatives this year, but provided written reports reflecting their thoughts on cooperation with PICES. Their reports are appended as *GC Endnote 5*.

Dr. Alexander thanked all representatives for attending and presenting their ideas, and assured them that PICES will continue expanding its relationships with relevant organizations and programs, especially those aligned with the PICES ecosystem research focus, and that their proposals will be carefully considered by relevant Committees and Science Board.

The Science Board annually examines and revises the *Standing List of International and Regional Organizations and Programs* (Decision 99/S/6). In addition, it selects a subset of organizations/programs that are considered to have the highest priority for PICES with respect

to scientific cooperation and facilitation in the coming year. This list is used in part to assist the Executive Secretary and Science Board in decisions regarding travel to meetings of other international organizations. Council reviewed and approved the *Standing List* for 2005-2006 as recommended by Science Board (*SB Endnote 7*), and agreed with the identified priorities for interaction (Decision 05/S/7). Council specifically discussed the importance of establishing relations with the Asia Pacific Economic Cooperation (APEP), and suggested that Science Board develop potential areas of cooperation with APEC Working Groups on *Fisheries* (APEC-FWG) and *Marine Resources Conservation* (APEC-MRC).

Report of the Study Group on *Rules of Procedure and Financial Regulations* (Agenda Item 7)

At PICES XIII, Council agreed with the recommendation of the F&A Committee that a thorough review of the PICES Rules of Procedure (RP) and Financial Regulations (FR) is warranted, and established a Study Group on *Rules of Procedure and Financial Regulations* (SG-RPFR), with terms of reference as listed in Decision 04/A/7.

The Study Group was led by the F&A Chairman, Dr. Laura Richards, and included representatives nominated by each Contracting Party and by Science Board. The Executive Secretary and Deputy Executive Secretary served as *ex-officio* members of the Study Group. The full SG-RPFR membership is listed below:

Dr. Laura Richards (Chairman)
Dr. R. Ian Perry (Canada)
Mr. Qian-Fei Liu (China)
Dr. Tokio Wada (Japan)
Mr. Young-Hoon Chung (Korea) [replaced by Dr. Yeong-Jin Yeon in February 2005]
Dr. Victor A. Nazarov (Russia)
Dr. Richard J. Marasco (U.S.A.)
Dr. John E. Stein (Science Board)
Dr. Alexander Bychkov (Secretariat)
Dr. Skip McKinnell (Secretariat)

At the 2005 inter-sessional Council meeting in Seattle (April 8, 2005), Dr. Laura Richards presented the draft report of the Study Group. The proposed amendments to both documents were discussed at length by Council, and further revisions were made by the members present. Recommended changes were incorporated, and drafts of the revised documents were circulated by e-mail to all Contracting Parties on April 14, 2005, and once more on August 2, 2005. Prior to the Annual Meeting, comments were provided by Science Board and all Contracting Parties, except China and Korea.

At PICES XIV (October 4, 2005), Council reviewed the proposed amendments to the Rules of Procedure again, and some concerns on the wording in Rules 3-5 were expressed by China and Korea. As for the Financial Regulations, China requested not only an amended version, but also a document that clearly showed the difference between the new and previous versions. Dr. Richards was asked to address these concerns and circulate new drafts by e-mail to all Contracting Parties to allow at least two months before the next discussion at the 2006 inter-sessional Council meeting. [According to Rule 20(ii) in the existing Rules of Procedure, "*no proposal involving changes in these Rules of Procedure or the Financial Regulations shall be considered at a meeting of the Council unless either: (a) two months' notice of the proposal has been given to the Contracting Parties; or (b) the Council agrees by consensus.*"]

Report of the Study Group on *Future integrative scientific program(s)* (Agenda Item 8)

As discussed under Agenda Item 4, at the 2005 inter-sessional meeting, Council approved a Science Board recommendation to establish a Study Group to develop ideas for one or more new integrative scientific program(s) to be undertaken by scientists in PICES member countries (Decision 05/S/6), with terms of reference as listed in *GC Appendix B*. It was pointed out that: (1) PICES member countries must share common interests in the program(s); and (2) the program should be strategic and

provide an opportunity for PICES to become a world leader and gain international respect beyond the North Pacific.

It was agreed that the membership for the Study Group on *Future integrative scientific program(s)* (SG-FISP) should consist of Science Board members (as of April 2005) plus 1 additional member from Canada, Japan and Russia, and up to 2 additional members from China. Subsequently, Drs. Jake Rice (Canada), Hiroaki Saito (Japan) and Victor Nazarov (Russia) were appointed to the Study Group, but no additional nominations were received from China. The full SG-FISP membership is listed below:

Dr. Harold P. Batchelder (CCCC, U.S.A.)
Dr. Michael J. Dagg (BIO, U.S.A.)
Dr. Michael G. Foreman (POC, Canada)
Dr. Yukimasa Ishida (FIS, Japan)
Dr. Kuh Kim (Science Board Chairman, Korea)
Dr. Suam Kim (CCCC, Korea)
Dr. Jeffrey M. Napp (MONITOR, U.S.A.)
Dr. Victor Nazarov (Russia)
Dr. Fangli Qiao (Science Board, China)
Dr. Jake Rice (Canada)
Dr. Hiroaki Saito (Japan)
Dr. Igor Shevchenko (TCODE, Russia)
Dr. John E. Stein (MEQ, U.S.A.)

The following 6 themes have been submitted (with short 1-page descriptions) for the new PICES scientific program prior to PICES XIV:

- Ecosystem-based fisheries management and sustainable use;
- North Pacific marine ecosystem response to global change;
- North Pacific ocean sustainability;
- Status and trends in marine biodiversity;
- A new integrative scientific program built upon the foundations of the CCCC Program;
- Coastal ocean ecosystems – The human dimension and climate.

The proposed themes were presented, reviewed and assessed at a special meeting of the Study Group convened during PICES XIV (from 19:00-21:00 hours on October 4, 2005). Future directions and timelines for the program development were determined, and subsequently presented by Dr. John Stein (Science Board Vice Chairman) at the PICES XIV Closing Session on October 6, and at the Council meeting on October 8.

Following the SG-FISP terms of reference, Council agreed that the proposed themes and their short descriptions, as well as a Study Group progress report (*e.g.*, PP presentation given by Dr. Stein at the Closing Session) should be posted on the PICES website for comments and advice from the scientific community. Council would also like to encourage scientists to develop new ideas for an integrative scientific program and share these with the Study Group, if the proposed themes do not encompass some important aspect of marine science. Council expects that recommendations on the selected theme(s) will be given at the 2006 inter-sessional Science Board/Governing Council meeting, and that an open forum presentation on the preferred theme(s) and the process of preparing Science and Implementation Plans will be made at the PICES XV.

Governing Council plans for implementing the Strategic Plan (Agenda Item 9)

The PICES Strategic Plan was approved at the 2004 inter-sessional Science Board/Governing Council meeting (Decision 04/A/6(i)), and can be found in the 2004 PICES Annual Report as *GC Endnote 5*, and on the PICES website at http://www.pices.int/about/PICES_strategy.pdf.

All Scientific and Technical Committees and the CCCC Program were requested to develop their own Action Plans for current and future activities that fit within the PICES Strategic Plan. At the 2005 inter-sessional Science Board/ Governing Council meeting, it was agreed that these Action Plans should be prepared using a standard format agreed by Science Board, and should identify how the ideas contained in the PICES Strategic Plan on the short (annual) to medium (~5 years) time scales can be implemented. Council re-iterated that relevance to the PICES Strategic Plan should be indicated for all new activity proposals (Decision 04/A/6(iii)).

Draft Committee Action Plans were discussed at PICES XIV. They will be revised by Committee Chairmen, and upon review in early 2006, the Action Plans would either be endorsed or modified further at the 2006 inter-sessional Science Board/Governing Council Meeting.

During discussion, the Chairman of PICES suggested that Science Board and Standing Committees will meet many of the PICES Strategic Plan goals in their Action Plans, but there are also action items that Council and the Secretariat should consider, especially under Themes D and E.

PICES Intern Program (Agenda Item 10)

The PICES Intern Program was approved in 1999 (Decision 99/A/7) and commenced in 2000. The Intern Program assists in the professional development of marine scientists and managers from PICES member countries, and increases the capacity of the PICES Secretariat to support the work of the Organization. From May 2000 - June 2005, 6 scientists from three countries (2 from China, 3 from Korea and 1 from Russia) have worked as interns at the PICES Secretariat. Reviewing the Intern Program at PICES XIV, Council confirmed again that PICES and member countries are benefiting from the Program, and that it should be continued.

The description of the Intern Program and the guidelines for application and selection of interns are posted on the PICES website at http://www.pices.int/projects/intern.aspx.
The Executive Secretary reminded Council that Mr. Pavel Vorobyov (TINRO-Center, Russia) was selected as the next PICES intern at PICES XIII, and his 8-month term is now expected to start in October 2005. This term could be extended to a maximum of 12 months, depending on the intern's performance, the workload in the Secretariat and availability of funds.

Applications, reviewed by national delegates, should normally be received by the Executive Secretary by the date of the first Governing Council session at the PICES Annual Meeting. Considering that Mr. Vorobyov's term will be completed by July 2006 at the earliest, Council extended the deadline of nominations for the 2006-2007 PICES Internship until the 2006 inter-sessional Science Board/Governing Council meeting (Decision 05/A/7(iii)). China, in particular, was encouraged to nominate candidates for the 2006-2007 term.

The Intern Program has not been budgeted for, and over the years has been financed solely by voluntary contributions. In 2005, the Department of Fisheries and Oceans (DFO, Canada), the National Marine Fisheries Service (NMFS, U.S.A.) and the Pacific Scientific Research Fisheries Center (TINRO-Center, Russia) contributed $14,000, US $15,000 and US $3,000, respectively, to the Trust Fund to finance the PICES Intern Program. DFO and NMFS are the most generous partners for this activity. From 2000-2005, DFO and NMFS had provided $61,500 and $92,330, respectively, to the PICES Trust Fund for the Intern Program. At the recommendation of the F&A Committee, Council requested the Executive Secretary to send a letter to both organizations to thank them for their continuing support of the Intern Program (Decision 05/A/7(i)).

Council also instructed the Executive Secretary to invite Contracting Parties to provide voluntary contributions to support the Program in 2006 and beyond (Decision 05/A/7(ii)). These contributions are crucial, as expenses for the Intern Program in *FY* 2006 are estimated at the level of $30,000, whereas the amount of funds held for the Program is below $20,000. In the absence of voluntary contributions, Council approved the use of registration fees collected from the Annual Meetings to finance the Program (Decision 01/A/4(iv)), but noted that this will limit the ability of the Organization to support other high-priority projects identified by Science Board.

Council confirmed that the stipend be kept at the current level of $2,000 per month, and given the modest stipend, advised Contracting Parties to consider whether the personal circumstances of the intern warrant supplementation (Decision 05/A/7(iv)).

Capacity building activities (Agenda Item 11)

The main discussion was on the activities that were identified at the 2005 inter-sessional Science Board / Governing Council meeting as high-priority PICES capacity building projects. These include:

- PICES/ICES Young Scientists Conference in 2007;
- PICES summer school on marine sciences;
- Workshops on ecological modelling;
- Travel support for young scientists to attend meetings organized and co-sponsored by PICES;
- International student exchange; and
- PICES Intern Program.

Planning for the Young Scientists Conference is in progress. In terms of funding, ICES and PICES envisage that member countries or institutes will support their own young scientists, but some of the less wealthy countries may still need assistance. ICES identified about US $90,000 in their budget that can be provided for the conference. At the recommendation of the F&A Committee, Council approved that $25,000 from the encumbered funds (in the Working Capital Fund) designated for high-priority PICES projects be earmarked for the conference. The importance of fund-raising for this event was highlighted. Possibilities for co-funding include the Alexander von Humboldt Foundation (Germany), the Sloan Foundation and the National Science Foundation (U.S.A.), the Nippon Foundation (Japan) and the Brain Korea 21 Program of the Ministry of Education and Human Resources (Korea). Some of these potential sources were approached informally, and positive indications were received. Formal requests will follow.

A topic for the first PICES summer school on marine sciences, "*Circulation and ecosystem modelling*", was suggested by POC and supported by Science Board. Interest in co-sponsoring this project was expressed by several Korean agencies/institutes (SNU, MOMAF, NFRDI and KORDI), and the agreement was to organize this school in conjunction with the CREAMS/PICES Workshop on "*Model-data inter-comparison for the Japan/East Sea*" to be held in Korea, in summer 2006.

PICES successfully partnered with other organizations and programs to broaden applications of the NEMURO.FISH model. The first workshop on "*Climate interactions and marine ecosystems*" (co-sponsored by the Asia Pacific Network for Global Change Research (APN) and PICES) was convened from October 10-13, 2004, in conjunction with PICES XIII in Honolulu, U.S.A. The second workshop on "*Global comparison of sardine, anchovy and other small pelagics: Building towards a multi-species model*" (co-sponsored by the Fisheries Research Agency of Japan, APN, Scientific Capacity Building Enhancement for Sustainable Development in Developing Countries Program (CAPaBLE) and the Inter American Institute for Global Change Research (IAI), GLOBEC and PICES) was held November 14-17, 2005, in Tokyo, Japan. Both workshops from this ecological modelling workshop series incorporated substantial capacity building elements.

In the discussion on travel support for young scientists to attend PICES Annual Meetings and other symposia/workshops organized or co-sponsored by PICES, the importance of allocating matching funds from national sources was noted. The Executive Secretary pointed out that this approach worked well in 2004 for young Korean scientists who had matching funds from GLOBEC Korea, and this year for young Chinese scientists with matching funds from the State Oceanic Administration, and again for young Korean scientists with matching funds from GLOBEC Korea and KoPICES (a sub-Committee for PICES established under the Korea Oceanographic Commission).

For international student exchange, the suggestion was to explore a possibility for PICES to match funds with the Office of International Science and Engineering at the National Science Foundation.

Improvement of participation in PICES activities (Agenda Item 12)

At the last two Annual Meetings, several recommendations were made to target the improvement of participation and productivity of PICES Standing Committees and their subsidiary bodies (Decisions 03/S/7 and 04/S/7). The Executive Secretary reported on the implementation of these decisions.

Contracting Parties were requested to regularly review their national membership and make changes as appropriate. The Secretariat is updating membership lists on the PICES website (http://www.pices.int/members/default.aspx) as frequently as new information is provided. Following Council's decision, national membership lists were also included as Appendices in the last two Annual Reports (Decision 03/S/7(ii)). This practice will continue as it helps maintain a historical record of PICES membership, and may assist in improving participation in activities of the Organization (Decision 04/S/7(ii)).

At PICES XIII, Council consented that important lessons can be learned from the performance and experience of past temporary groups (Working Groups, Study Groups, Task Teams, Advisory Panels), and instructed Science Board to perform a review of all the groups established since the inception of the Organization (Decision 04/S/7(i)). The purpose of the review is not to evaluate the performance of any single group, but to get an idea of whether the current approach of the formation and financing of these groups is working.

At the 2005 inter-sessional Science Board / Governing Council meeting, it was agreed that a PICES Temporary Group Outline (this document was prepared by the Secretariat detailing terms of reference, activities and products for all temporary groups established since 1992) and responses from leaders of former temporary groups (they were asked to provide their opinions on the influence of their groups on the direction of the science that was the focus of the group, and how procedures in PICES could be improved) be used to perform the assessment. Dr. Michael G. Foreman, POC Chairman, volunteered to carry out this task, and his report was presented to Science Board at PICES XIV (see *SB Report, Agenda Item 8*). Dr. Foreman was requested to use the results of his analysis to draft a set of guidelines for future PICES temporary groups for discussion at the 2006 inter-sessional meeting of Science Board and Governing Council.

The Korean delegation presented information on the structure and functions of KoPICES (a sub-Committee for PICES established under the Korea Oceanographic Commission). The goal of this sub-Committee is to enhance and coordinate involvement of Korean scientists in PICES. KoPICES includes 14 members from MOMAF, NFRDI, KORDI, MRI and several universities, and is chaired by Dr. Hak-Gyoon Kim (NFRDI). Starting *FY* 2005, MOMAF provided special funding to support activities of this sub-Committee. Council thanked Korea for setting an example.

Schedule and financing of future Annual Meetings (Agenda Item 13)

At PICES XIII, Council accepted the proposal of Japan to host the Fifteenth Annual Meeting in 2006 (Decision 04/A/5(i)). The meeting will be held from October 13-21, 2006, in Yokohama. The Japanese government requested that $40,000 be provided by PICES to partially cover Annual Meeting costs, and this request was supported by the F&A Committee and approved by Council at PICES XIV. The theme for PICES XV will be "*Boundary current ecosystems*" (*2004 SB Endnote 12*), and the list of various scientific sessions and workshops to be convened at the meeting can be found in Decision 05/S/1.

At the 2005 inter-sessional meeting, Council approved the proposal of Canada to host the Sixteenth Annual Meeting in Victoria, in 2007 (Decision 05/A/5(i)). Booking of the meeting space was made at the Victoria Conference Center (the same venue as for PICES I and PICES X). It was agreed that the dates for the meeting would have to be decided by the end of 2005. Canada and the Secretariat are requested

to explore the possibility of changing the initially proposed dates (September 28 - October 7, 2007) for PICES XVI to avoid overlap with the extended national holidays in China in early October and with several international scientific meetings to be held at the end of September (including the 2006 ICES Annual Science Conference). The Canadian government indicated that they are not planning to ask PICES for any funds to cover Annual Meeting costs. The Science Board endorsed, with some changes to the proposed description, the theme "*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*" for PICES XVI suggested by Canada (*SB Endnote 8*).

Following the established rotation cycle (Decision 94/A/6), Council invited China to explore the feasibility of hosting the Seventeenth Annual Meeting in 2008, and inform the Secretariat on this matter by March 31, 2006 (Decision 05/A/5(ii)).

Council confirmed that the practice of charging a registration fee for future PICES Annual Meetings should continue, and accepted the same registration fee structure for 2006 as was agreed for 2004 at PICES XII (Decision 05/A/5(iii)). Fees will be collected by the Secretariat and credited to the Working Capital Fund to support high priority projects and the Intern Program, and to cover costs associated with Annual Meetings (Decision 04/A/5(iv)).

Council strongly supported the concept of inter-sessional Science Board meetings with the participation of Council members, but confirmed that the need for such a meeting should be evaluated each year and, given meeting costs and time commitment of the members, an inter-sessional meeting should be held only if the agenda is substantive (Decision 05/A/5(v)).

Even though having inter-sessional Science Board/Governing Council meetings at the location of the Secretariat is the cheapest option for the Organization, the value of rotating the place for these meetings was clearly indicated during discussions at previous Annual Meetings. Council agreed with this approach, but emphasized the importance to keep overall costs for the inter-sessional meeting to the minimum possible. In practice, it was implemented by obtaining financial support from the country hosting an inter-sessional meeting: the 2004 inter-sessional meeting in Jeju was co-sponsored by the Korean Ministry of Maritime Affairs and Fisheries (MOMAF) and the Korean Ocean Research and Development Institute (KORDI), and the 2005 inter-sessional meeting in Seattle was co-sponsored by the U.S. National Marine Fisheries Service (NMFS).

Three potential venues for the 2006 inter-sessional meeting were discussed: (1) at the location of the PICES Secretariat in Sidney/Victoria (Canada); (2) in St. Petersburg (Russia) by invitation of the Russian national delegate, Dr. Lev Bocharov; and (3) in Honolulu (U.S.A.), in conjunction with the PICES/GLOBEC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" to be held April 19-21, 2006. Council approved the holding of the inter-sessional meeting in Honolulu, provided that costs are carefully controlled (Decision 05/A/5(iv)). The Pacific Islands Fisheries Science Center of NMFS committed financial support to offset PICES expenses for the meeting.

Report of Science Board (Agenda Item 14)

The Science Board met under the chairmanship of Dr. Kuh Kim, who presented the report to Council on October 9. The report was approved by Council, and is included elsewhere in this Annual Report. Details are given in *GC Appendix A* (Decisions 05/S/1 – 05/S/7).

Report of F&A Committee (Agenda Item 15)

The Finance and Administration Committee (F&A) met under the chairmanship of Dr. Laura Richards, who presented the report to Council on October 8. The report was approved by Council, and is included elsewhere in this Annual Report. Details are given in *GC Appendix A* (Decisions 05/A/1 – 05/A/8).

15.1 Audited accounts for fiscal year 2004

At the recommendation of the F&A Committee, Council accepted the audited accounts of *FY* 2004 (Decision 05/A/1(i)).

Council retained *Flader & Hale* as the auditor for *FYs* 2006-2008 (Decision 05/A/1(ii)).

15.2 Annual contributions

Council discussed the payment schedule of annual fees to the Organization (*F&A Endnote 4*), and following the F&A Committee's comments, pointed out that there has been an overall improvement in the timeliness of payment for all Contracting Parties but China. This year, five of six annual contributions were received within the first quarter. China was unable to submit their entire contribution in 2005, but indicated that all possible efforts will be made to pay the remainder ($14,500) as soon as possible and not later than in conjunction with the annual fee for 2006.

Council instructed the Executive Secretary to send a letter to Contracting Parties commending them for improved performance in submitting annual contributions in 2005, and describing the difficulties late and partial payment causes the Organization (Decision 05/A/2(i));

Council re-iterated that for the planning of their funding requests for annual contributions, Contracting Parties should continue to use the guideline generally accepted at PICES VIII (Decision 99/A/2(ii)), which states that the annual contributions will increase at the rate of inflation in Canada (Decision 05/A/2(ii)).

15.3 Fund-raising activities

Grants and voluntary contributions received for activities in 2005 and beyond are reflected in *GC Endnote 3* and *F&A Endnote 5*.

In the discussion on fund-raising activities at PICES XIV, Council:

- re-iterated that 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, and therefore, fund-raising continues to be an important component of PICES activities;
- noted that the level of external funding for various activities initiated by PICES has increased significantly over the last several years, and about a third of the current operational budget is now supported by external contributions and partnerships;
- indicated that most of the funding offers have specific product and service requirements, and as partnerships expand, a strategy will be needed to manage the workload of the Secretariat, the size and structure of which have remained unchanged for the last 11 years;
- requested Science Board (Decision 05/A/4) to define the required activities for high-priority PICES projects/initiatives identified at the 2005 inter-sessional Science Board / Governing Council meeting as strong candidates for external funding. These include: (i) activities related to the development of future PICES integrative scientific program(s); (ii) the preparation of the next North Pacific Ecosystem Status Report; (iii) the PICES-ICES Young Scientists Conference; (iv) international exchange and capacity building; and (v) GOOS integration.

15.4 Budget

15.4a Estimated accounts for fiscal year 2005

The estimated accounts for *FY* 2005 were reviewed by the F&A Committee and approved by Council (Decision 05/A/3(i)). It was pointed out that an additional transfer of $14,500 from the Working Capital Fund to the 2005 General Fund might be required if the remainder of the 2005 Chinese annual contribution is not received by the end of the fiscal year.

15.4b Relocation and Home Leave Fund

The status of the Relocation and Home Leave Fund was reviewed. No expenses were charged to the Relocation and Home Leave Fund in 2005. Council approved a transfer of about

$2,100 from the Relocation and Home Leave Fund to the Working Capital Fund to maintain the former at its required level of $110,000 by the end of the fiscal year (Decision 05/A/3(iii)).

15.4c Trust Fund

In *FY 2005*, more than $50,000 from the Trust Fund was used to finance the Intern Program, and to support participation of young scientists from all Contracting Parties and scientists from countries with "economies in transition" to scientific meetings organized and co-sponsored by PICES. These expenditures were only partly compensated for by interest earned by the Fund, the voluntary contributions for the Intern Program, and a travel grant from SCOR. Council approved a transfer (less than $6,000) from the Working Capital Fund to the Trust Fund to recover the 2005 expenses, and to restore the Trust Fund to the level of $110,000 by the end of the fiscal year (Decision 05/A/3(iii)).

Guidelines for operating the Trust Fund were approved at PICES III (Decision 94/A/4), and have remained unchanged since. The F&A Committee suggested that the Trust Fund guidelines be updated to reflect current practices, and presented for review and approval by Council at the 2006 inter-sessional meeting. This would allow the revised guidelines to be in place for decision making for PICES XV travel support.

15.4d Working Capital Fund

The balance in the Working Capital Fund is expected to be about $379,800 at the end of *FY* 2005. Council approved a transfer of $97,000 from the Working Capital Fund to the General Fund for 2006. Council also approved a transfer of less than $6,000 to the Trust Fund to restore it to the level of $110,000, and a transfer of about $2,100 from the Relocation and Home Leave Fund to the Working Capital Fund to maintain the former at its required level of $110,000. After these inter-fund transfers, the Working Capital Fund will total approximately $276,200 at the end of *FY* 2005. This amount includes $175,200 in encumbered funds, leaving a balance in operating funds slightly above the required level of $100,000.

The encumbered funds in the Working Capital Fund include funds held for the 2006 CCCC Symposium, the 2006 Line P Symposium, the remainder of the NPRB contribution for the development of the second NPESR, and funds designated for high-priority PICES projects. As discussed under Agenda Item 11, Council approved $25,000 from these funds to be earmarked for the PICES/ICES Young Scientists Conference (Decision 05/A/8).

15.4e Proposed budget for fiscal year 2006

Council approved the proposed *FY* 2006 budget of $730,000 (*F&A Endnote 6*). The amount of $97,000 will be transferred from the Working Capital Fund to the General Fund to reduce the total annual contribution to $633,000, setting the 2006 annual fee at $105,500 per Contracting Party (Decision 05/A/3(ii)).

15.4f Forecast budget for fiscal year 2007

The *FY* 2007 forecast budget of $740,000 was examined by the F&A Committee and presented to Council for information only. It will be further discussed at PICES XV.

Other business (Agenda Item 16)

No other business was identified by Council members.

GC Appendix A

2005 Governing Council Decisions

05/A/1: Auditor

i. Council accepted the audited accounts for *FY* 2004.
ii. Council retained *Flader & Hale* as the auditor for *FYs* 2006-2008.

05/A/2: Annual contributions

i. Council instructed the Executive Secretary to send a letter to Contracting Parties commending them for improved performance in submitting annual contributions for *FY* 2005, and describing the difficulties that late and/or partial payment causes the Organization.
ii. For planning of their funding requests for annual contributions, Contracting Parties should continue to use the guideline generally accepted at the Eighth Annual Meeting (Decision 99/A/2(ii)), which states that the annual contributions will increase at the rate of inflation (about 3%) in Canada.

05/A/3: Budget

i. Council approved an additional transfer of $14,500 from the Working Capital Fund to the General Fund due to the partial payment of the 2005 annual contribution by China (if the remainder of their contribution is not received by the end of the fiscal year), and with this amendment accepted the estimated accounts for *FY* 2005.
ii. Council approved the 2006 budget of $730,000. The amount of $97,000 will be transferred from the Working Capital Fund to reduce the total required contribution to $633,000, setting the 2006 annual fee at $105,500 per Contracting Party.
iii. The following inter-fund transfers were approved:
    - A transfer of $97,000 from the Working Capital Fund to the General Fund for *FY* 2006;
    - A transfer from the Working Capital Fund to the Trust Fund to recover the 2005 expenses, and to restore the Trust Fund to the level of $110,000 by the end of the fiscal year.
    - A transfer of about $2,100 from the Relocation and Home Leave Fund to the Working Capital Fund to maintain the Relocation and Home Leave Fund at its required level of $110,000 by the end of the fiscal year.

05/A/4: Fund-raising

To assist in future budget planning, Council requested Science Board to define the required activities for high-priority PICES projects and initiatives identified at the 2005 inter-sessional Science Board/Governing Council meeting.

05/A/5: Schedule and financing of future Annual Meetings and inter-sessional Science Board/Governing Council meetings

i. Council approved the proposal of Canada to host the Sixteenth Annual Meeting in Victoria, Canada (approved at the 2005 inter-sessional Governing Council meeting). Dates will be decided by the end of 2005.
ii. Following the established rotation cycle, Council requested China to explore the feasibility of hosting the Seventeenth Annual Meeting in 2008, and inform the Secretariat on this matter by March 31, 2006.
iii. Council accepted the same registration fee structure for 2006 as was agreed for 2004 at PICES XII:

Type	CDN $
Registration fee	225
Early registration fee	150
Students registration fee	50
Spousal registration fee	50

iv. Council approved the holding of an inter-sessional Science Board/Governing Council meeting on April 17-18, immediately prior to the CCCC Symposium on "*Climate variability and ecosystem impacts on the*

North Pacific: A basin-scale synthesis" (April 19-21, 2006, Honolulu, Hawaii), provided that costs are carefully controlled.

v. Council confirmed that the need for an inter-sessional Science Board/Governing Council meeting should be evaluated each year and, given meeting costs and time commitment of the members, an inter-sessional meeting should be held only if the agenda is substantive. Overall costs should be kept to the minimum possible.

05/A/6: Potential PICES membership

The Chairman will make private inquiries to four Pacific Rim countries that are currently affiliated members of ICES, to determine their interest in joining PICES if the Organization was to expand its area of scientific interest. Council will consider the responses from these countries at its 2006 inter-sessional meeting.

05/A/7: Intern Program

i. Council requested the Executive Secretary to send a letter to the Department of Fisheries and Oceans (Canada) and the National Marine Fisheries Service (U.S.A.) to thank them for their continuing support of the Intern Program.

ii. Council instructed the Executive Secretary to invite Contracting Parties to provide voluntary contributions to support the Intern Program in 2006 and beyond.

iii. Council extended the deadline of nominations for the 2006-2007 PICES Internship until the 2006 inter-sessional Science Board/Governing Council meeting.

iv. Council confirmed that the stipend be kept at the current level of $2,000 per month, and given the modest stipend, advised Contracting Parties to consider whether the personal circumstances of the interns warrant supplementation.

05/A/8: Capacity building

Council approved that $25,000 from the encumbered funds designated for high-priority PICES projects be earmarked for the PICES/ICES Young Scientist Conference.

05/S/1: Fifteenth Annual Meeting (October 13-22, 2006, Yokohama, Japan)

The following workshops are to be convened from October 13-15 (a List of Acronyms can be found at the end of the Annual Report):

- a 1-day IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*";
- a 2-day FIS Workshop on "*Linking climate to trends in productivity of key commercial species in the subarctic Pacific*";
- a 1-day MEQ/FIS (WG 19) Workshop on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*";
- a 1-day MEQ (HAB-S) Workshop on "*Review of selected harmful algae in the PICES region: II.* Dinophysis *and* Cochlodinium spp." and ½-day laboratory demonstration on DSP detection;
- a 1-day POC (WG 20) Workshop on "*Evaluation of climate change projections*";
- a 1-day MONITOR/TCODE Workshop on "*Data management, delivery and visualization of high-volume data products*".

The following scientific sessions are to be convened from October 16-20 (a List of Acronyms can be found at the end of the Annual Report):

- a ¾-day Science Board Symposium on "*Boundary current ecosystems*";
- a 1-day BIO/FIS Topic Session on "*The human dimension of jellyfish blooms*";
- a 1-day BIO Topic Session on "*Interactions between biogeochemical cycles and marine food webs in the North Pacific*";
- a 1-day BIO Topic Session on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*";
- a 1-day BIO Topic Session on "*Advances in epi- and meso-pelagic ecosystem research*";
- a ½-day CCCC Topic Session on "*Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy*";
- a ½-day CCCC Contributed Paper Session;
- a 1-day FIS/CCCC Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*";

- a 1-day FIS Contributed Paper Session;
- a 1-day MEQ/FIS Topic Session on "*Aquaculture for sustainable management of the marine ecosystem*";
- a 1-day MEQ Topic Session on "*Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences*";
- a 1-day POC/MONITOR/CCCC Topic Session on "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*";
- a 1-day POC Contributed Paper Session.

05/S/2: Inter-sessional meetings/workshops

The following inter-sessional meetings and workshops are to be convened/co-sponsored in 2005 and beyond (a List of Acronyms can be found at the end of the Annual Report):

- a FRA/APN/IAI/PICES/GLOBEC Workshop on "*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*", November 14-17, 2005, Tokyo, Japan (approved in 2004);
- an International Repeat Hydrography Workshop (co-sponsored by JAMSTEC, CLIVAR and IOCCP) and a meeting of the PICES Carbon and Climate Section, November 14-17, 2005, Shonan Village, Japan;
- a CCCC/CFAME Workshop on "*A comparison of regional mechanisms for fish production: Ecosystem perspectives*", January 12-13, 2006, Tokyo, Japan;
- a panel discussion at the "*Marine Science in Alaska*" Symposium, January 25, 2006, Anchorage, U.S.A., and at the meeting of the North Pacific Fisheries Management Council, February 8, Seattle, U.S.A., to involve the Bering Sea and international communities in the development of a set of operational objectives;
- an inter-sessional Science Board/Governing Council meeting, April 17-18, 2006, Honolulu, U.S.A.;
- a 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. (approved in 2003);
- a PICES/NPRB Workshop on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*", June 1-3, 2006, Seattle, U.S.A.;
- an ESSAS/PICES Workshop to develop comparative studies of the sub-Arctic seas, June 12-14, 2006, St. Petersburg, Russia;
- a Symposium entitled "*Time series of the Northeast Pacific Ocean: A symposium to mark the 50th anniversary of Line-P*" (co-sponsored by DFO), July 5-8, 2006, Victoria, Canada (approved in 2004);
- a CREAMS/PICES Workshop on "*Model-data inter-comparison for the Japan/East Sea*" and a summer school on "*Circulation and ecosystem modelling*", August 2006, location TBD, Korea;
- ICES/PICES theme sessions on "*Large-scale changes in the migration of small pelagic fish and the factors modulating such changes*" and on Operational Oceanography (title TBD) at the ICES Annual Science Conference, September 2006, Maastricht, Netherlands;
- an International Conference on "*The Humboldt Current system: Climate, ocean dynamics, ecosystem processes and fisheries*" (co-sponsored by IMARPE, IRD, NASA, FAO, GLOBEC, ICES and IMBER), November 27-December 1, 2006, Lima, Peru;
- a symposium on "*Marine bioinvasions*" (co-sponsored by ICES and MBC), spring 2007, Washington, D.C., U.S.A. (approved in 2003);
- a 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" (co-sponsored by GLOBEC and ICES), May 28 - June 1, 2007, Hiroshima, Japan (approved in 2003);
- an ICES/PICES Young Scientists Conference, spring or summer 2007, location TBD (approved in 2003);
- An ICES/PICES/IOC Symposium on "*Effects of climate change on the world's ocean*", spring 2008, Gijón, Spain.

05/S/3: Travel support

PICES will provide travel support for:

PICES XV

- Invited speakers for Topic Sessions at the Annual Meeting with the normal allocation of approximately $5,000 per Committee and CCCC Program (additional requests are subject to fund availability);
- 1 invited speaker for the IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*";
- 1 invited expert from Europe to the MEQ (HAB-S) Workshop on "*Review of selected harmful algae in the PICES region: II.* Dinophysis *and* Cochlodinium spp.";
- 1 invited speaker to the MEQ/FIS (WG 19) Workshop on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*";
- 1 invited speaker to the POC (WG 20) Workshop on "*Evaluation of climate change projections*".

Inter-sessional meetings

- PICES representative to attend the 2005 CalCOFI Conference and the PaCOOS Board meeting (December 2005, La Jolla, U.S.A.);
- PICES observer to participate in the NEAR-GOOS meeting (January 2006, Pusan, Korea; may or may not require travel support);
- 2 scientists (1 Russian and 1 Chinese) to attend the CCCC/CFAME Workshop on "*A comparison of regional mechanisms for fish production: Ecosystem perspectives*" (January 2006, Tokyo, Japan);
- TCODE representative to attend the meeting of the ICES Working Group on *Marine Data Management* (dates and venue TBD);
- PICES representative to attend the meetings of the ICES/IOC/IMO Working Group on *Ballast Waters and Other Ship Vectors* and the ICES Working Group on *Introductions and Transfers of Marine Organisms* (March 2006, Oostende, Belgium);
- Dr. Kenneth A. Rose (U.S.A.) to present MODEL contribution to the April 2006 CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*";
- 1 scientist to participate in the ESSAS/PICES Workshop to develop comparative studies of the sub-Arctic seas (June 2006, St. Petersburg, Russia);
- PICES representative to attend the IOC Executive Committee meeting (June 2005, Paris, France);
- 1 invited speaker to the CREAMS/PICES Workshop on "*Model-data inter-comparison for the Japan/East Sea*" and 1 lecturer to the summer school on "*Circulation and ecosystem modelling*" (August 2006, location TBD, Korea);
- PICES convenors to the joint ICES/PICES theme sessions at the ICES Annual Science Conference (September 2006, Maastricht, Netherlands);
- Dr. Sergej Olenin (co-funding with ICES) to attend the first meeting of the PICES Working Group on *Non-indigenous aquatic species* (October 2006, Yokohama, Japan), to discuss and demonstrate the Delivering Alien Invasive Species Inventories for Europe (DAISIE) database (EU project);
- PICES representative to attend the SCOR General meeting (October 2006, Concepción, Chile);
- PICES representative to attend the NPAFC Fourteenth Annual Meeting (October 2006, Vancouver, Canada).

Science Board Chairman to attend

- 2006 inter-sessional Science Board/ Governing Council meeting (April 17-18, 2006, Honolulu, U.S.A.);
- 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.);
- 2006 ICES Annual Science Conference (September 2006, Maastricht, Netherlands);
- PICES Fifteenth Annual Meeting (October 2006, Yokohama, Japan).

05/S/4: Publications

The following publications will be produced:

PICES Scientific Report Series, 2006

- Final report of WG 16 on *Climate change, shifts in fish production, and fisheries management* (approved in 2002 for publication in 2004, delayed till 2006, pending review by POC and CCCC; Editors: R. Beamish and A. Yatsu);
- Report of the 2005 OECOS (Oceanic Ecodynamics COmparison in the Subarctic Pacific) Workshop (Editors: T. Ikeda and C. Miller);
- Guide to best practices for oceanic CO_2 measurements and data reporting (approved in 2002 for publication in 2004, delayed till 2006; Editor: A. Dickson);
- Findings of the data-sharing project for federated meta-data on North Pacific ecosystems (approved in 2004; Editors: A. Macklin and B. Megrey);
- Report from the project on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*" (Editors: S. McKinnell, A. Bychkov, G. Jamieson, G. Kruse, P. Livingston and J. Overland);
- Proceedings from the CREAMS/PICES Workshop on "*Model-data inter-comparison for the Japan/East Sea*" and the summer school on "*Circulation and ecosystem modelling*" (Editor: K.-I. Chang and TBD);
- WG 18 report based on the national reports on the current status and trends in aquaculture in PICES member countries (Editors: I.-K. Chung and C. Friedman);

Special issues of primary journals, 2006-2007

- *Progress in Oceanography* (2006; Guest Editors: G. Hunt and S. McKinnell) – selected papers from the PICES XIII Topic Session on "*Mechanisms that regulate North Pacific ecosystems: Bottom up, top down, or something else?*" (approved in 2004);
- *Deep-Sea Research II* (2006; Guest Editors: W. Sydeman, R. Brodeur, A. Bychkov, C. Grimes and S. McKinnell) – selected papers from the PICES XIII Topic Session on "*Hot spots and their use by migratory species and top predators in the North Pacific*" (approved in 2004);
- *Ecological Modelling* (2006; Guest editors: M. Kishi, B. Megrey, S.-I. Ito and F. Werner) – selected papers on NEMURO and NEMURO.FISH models (approved in 2004);
- *Deep-Sea Research II* (2006; Guest Editors: P. Boyd and P. Harrison) – selected papers from the IFEP SERIES experiment;
- *Progress in Oceanography* (2007; Guest editors: K. Drinkwater, G. Hunt, D. Mackas and S. McKinnell) – selected papers from the ESSAS Symposium on "*Climate variability and sub-arctic marine ecosystems*";
- *Progress in Oceanography* (2007; Guest editors: H. Batchelder and S. Kim) – selected papers from the CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*";
- *Progress in Oceanography* (2007; Guest editors: A. Peña and TBD) – selected papers from the symposium on "*Time series of the Northeast Pacific Ocean: A symposium to mark the 50th anniversary of Line-P*".

Other publications, 2006

- American Fisheries Society book (formal title TBD) on regional comparisons in the NE Pacific (Guest editors: R. Brodeur, C. Grimes, L. Haldorson and S. McKinnell);
- PICES Handbook and Handbook for Chairmen and Convenors.

05/S/5: Future of current groups

- WG 16 on *Climate change, shifts in fish production and fisheries management* (under the direction of FIS) should be disbanded. The final report is pending review, and its publication is expected in 2006;
- WG 17 on *Biogeochemical data integration and synthesis* (under the direction of POC) should be disbanded and replaced by the Section on *Carbon and climate* (under the direction of BIO and POC). The completion of "Guide to best practices for oceanic CO_2

measurements and data reporting" is still pending;
- Responsibility for the Advisory Panel on *Continuous Plankton Recorder (CPR) survey in the North Pacific* should move from the CCCC Program to the MONITOR Technical Committee.
- Responsibility for the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean* should move from the CCCC Program to BIO.

05/S/6: New PICES groups

- A Study Group on *Future integrative scientific program(s)* has been established under the direction of Governing Council, with terms of reference as listed in *GC Appendix B* (approved at the 2005 inter-sessional Governing Council meeting);
- A Section on *Carbon and climate* has been formed under the direction of POC and BIO, with terms of reference as listed in *GC Appendix B* (approved at the 2005 inter-sessional Governing Council meeting);
- A Working Group on *Evaluations of climate change projections* has been established under the direction of POC, with terms of reference as described in *GC Appendix B*;
- A Working Group on *Non-indigenous aquatic species* has been formed under the direction of MEQ, with terms of reference as described in *GC Appendix B*;
- A Study Group to develop a strategy for GOOS has been established under the direction of MONITOR, with terms of reference as described in *GC Appendix B*.

05/S/7: Relations with other organizations and programs

Council approved the revised *Standing List of International Organizations and Programs*, and agreed with the identified priorities for interaction in 2005-2006.

GC Appendix B

Terms of reference for the Study Group on *Future integrative scientific program(s)*

1. Solicit ideas (short 1-page descriptions) from PICES Committees, the CCCC Program, and more broadly as appropriate, concerning future major scientific endeavors for PICES;
2. Compile, review and assess the responses; develop themes of potential interest to all member countries, and present the results to Governing Council at PICES XIV, indicating preferences of the Study Group if more than one theme is recommended;
3. Disseminate findings and recommendations after meeting with Governing Council, and seek feedback from the PICES scientific community;
4. Present revised themes and recommendations for proceeding with the implementation of the selected theme(s) to Governing Council at its inter-sessional meeting in spring 2006;
5. Provide the final report to Governing Council and make an open forum presentation on the preferred theme(s) at PICES XV.

Terms of reference for the Section on *Carbon and climate*

1. Coordinate and encourage ongoing and planned national and international syntheses of carbon cycle research studies in the North Pacific and, where necessary and appropriate, for the larger Pacific basin;
2. Ensure effective two-way communication with other international scientific groups that have a responsibility for the coordination of ocean carbon studies, such as the International Ocean Carbon Coordination Project (IOCCP), and the SOLAS/IMBER implementation group for carbon research;
3. Review the existing biogeochemical information on carbon cycling within the North Pacific, identify gaps in our

knowledge and make prioritized recommendations for future research;
4. Periodically review the status of the methodology of CO_2 measurements including the preparation of standards and reference materials, and advise on inter-calibration and quality control procedures;
5. Identify suitable data sets on the oceanic CO_2 system in the Pacific region as they become available, and recommend the mechanisms of data and information exchange;
6. Carry out and publish (in the refereed literature) basin-scale syntheses of carbon cycling in the North Pacific, including new data whenever appropriate, and encourage scientific interpretation of these evolving data sets;
7. Organize symposia, workshops, or Annual Meeting sessions on carbon cycle and climate studies in the North Pacific.

Terms of reference for WG 20 on *Evaluations of climate change projections*

1. Analyse and evaluate climate change projections for the North Pacific and its marginal seas based on predictions from the latest global and regional models submitted to the Inter-governmental Panel on Climate Change (IPCC) for their 4th assessment report;
2. Facilitate analyses of climate effects on marine ecosystems and ecosystem feedbacks to climate by, for example computing an ensemble of the IPCC model projections for the North Pacific and making these projections available to other PICES groups such as CFAME;
3. Facilitate the development of higher-resolution regional ocean and coupled atmosphere-ocean models that are forced by, and take their boundary conditions from, IPCC global or regional models;
4. Facilitate the development of local and regional data sets (*e.g.*, SST, river flow, sea ice cover) by incorporating information from climate model projections as well as observations and historical re-analyses;
5. Ensure effective two-way communication with CLIVAR;
6. Convene workshops/sessions to evaluate and compare results;
7. Publish a final report summarizing results.

Terms of reference for WG 21 on *Non-indigenous aquatic species*

1. Complete an inventory of all non-indigenous aquatic species in all PICES member countries, together with compilation and definitions of terms and recommendations on use of terms. Summarize the situation on bioinvasions in the Pacific and compare and contrast to other regions (*e.g.*, Atlantic, Australia, *etc.*);
2. Complete inventory of scientific experts in all PICES member countries on non-indigenous aquatic species subject areas and of the relevant national research programs/projects underway;
3. Review and evaluate initiatives on mitigation measures (*e.g.*, ICES Code of Practice for the Introduction and Transfer of Marine Organisms; IMO Ballast Water Management Convention and others such as the Canadian Introductions and Transfers Code);
4. Summarize research related to best practices for ballast water management;
5. Coordinate activities of the PICES WG on non-indigenous aquatic species with related WGs in ICES through a joint back to back meeting of the PICES and ICES Working Groups on invasive species in 2007/8;
6. Develop and recommend an approach for formal linkages between PICES and ICES on non-indigenous aquatic species;
7. Publish final report summarizing results and recommendations.

Terms of reference for a Study Group to develop a strategy for GOOS

1. Identify and describe the major observing systems (present and proposed) in the PICES region. Descriptions should include general data types, contact information, and data transmission (real-time *vs*. delayed);
2. Provide a recommendation and justification to MONITOR on whether or not PICES should propose a North Pacific GOOS pilot project to IGOOS.

GC Endnote 1

Participation list

Canada
Serge Labonté
Laura Richards
Darlene Smith (advisor, October 8 only)

Japan
Tokimasa Kobayashi (advisor, October 4 only)
Hideki Nakano (alternate delegate)
Yoshihide Tsuda (advisor, October 8 and 9 only)

People's Republic of China
Zhi-Xin Chen (alternate delegate, October 4 only)
Chuanlin Huo (advisor)
Qian-Fei Liu (advisor)
Fangli Qiao (advisor, October 4 and 9 only)
Dongmei Tang (alternate delegate, October 8 and 9 only)

Republic of Korea
Haeng Nok Oh (alternate delegate)
Ig Chan Pang
Hak Yeol You (advisor)

Russia
Lev N. Bocharov
Vladimir Radchenko (advisor, October 4 only)
Pavel Vorobyov (advisor)

U.S.A.
George W. Boehlert
Samuel Pooley
Elizabeth J. Tirpak (advisor)

Other
Vera Alexander (Chairman, PICES)
Alexander Bychkov (Executive Secretary)
Hyung-Tack Huh (Past-Chairman, PICES)
Kuh Kim (Chairman, Science Board, October 4 and 9 only)
Skip McKinnell (Deputy Executive Secretary, October 9 only)
John E. Stein (Vice-Chairman, Science Board, October 9 only)

GC Endnote 2

Governing Council meeting agenda

1. Opening remarks
2. Adoption of agenda and meeting procedures
3. Report on administration
4. Report of 2005 inter-sessional Science Board/Governing Council meeting
5. Membership and observers from other countries
6. Relations with relevant international and regional organizations
7. Report of the Study Group on *Rules of Procedure and Financial Regulations*
8. Report of the Study Group on *Future integrative scientific program(s)*
9. Governing Council plans for implementing the Strategic Plan
10. PICES Intern Program
11. Capacity Building activities
12. Improvement of participation in PICES activities
13. Schedule and financing of future Annual Meetings
14. Report and recommendations of Science Board
15. Report and recommendations of F&A Committee
16. Other business

GC Endnote 3

Preliminary Report on Administration for 2005

I. Annual contributions

According to Financial Regulation 5(ii), all national contributions to PICES are payable by the first day of the financial year (January 1) to which they relate. Dues for 2005 were paid as follows:

Canada	December 24, 2004
U.S.A.	January 10, 2005
Japan	March 2, 2005
Republic of Korea	March 30, 2005
Russian Federation	March 31, 2005
People's Republic of China	September 22, 2005 (Partial payment $88,000 or ~86%)

II. External and additional funding

Since the Thirteenth Annual Meeting (October 2004), efforts from the PICES scientific community, national delegates and F&A members, and the PICES Secretariat resulted in the following extra-budgetary contributions for various activities initiated/co-sponsored by PICES:

Special projects

- The United States of America contributed $110,000 to support high priority PICES projects.
- The North Pacific Research Board (NPRB, U.S.A.) approved a grant of US $99,957 to support a PICES project entitled "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea: A workshop approach*" (to be completed in 2006).
- The North Pacific Research Board (NPRB, U.S.A.) approved funding $90,000 for the production of the next North Pacific Ecosystem Status Report (expected to be published in 2007).
- The PICES Advisory Panel on *Micronekton inter-calibration experiment* (Dr. Orio Yamamura) succeeded in securing a 7-day ship time aboard the research vessel *Hokko Maru* (Fisheries Research Agency of Japan) during September 25 – October 3, 2005, for a second experiment in the subarctic North Pacific to evaluate the efficiency of sampling gears and procedures employed by different agencies to sample micronekton.
- The sample collection and analysis of the PICES Continuous Plankton Recorder (CPR) survey of the North Pacific and southern Bering Sea continues, utilizing funding provided in 2003, support for the east-west transect is by a grant from NPRB (US $185,000 total, from July 2003 to June 2005), and for the north-south transect by a grant from EVOS (US $120,000 per year, from 2004 to 2006).

Publications

- The National Science Foundation (NSF, U.S.A.) provided a grant of US $15,000 for the publication of a book on the history of PICES by Dr. Sara Tjossem entitled "The journey to PICES: Scientific cooperation in the North Pacific" (previously NSF had supported the writing of the book through a grant to the University of Alaska Fairbanks). Funds for the project are managed by the Chairman of PICES, Dr. Vera Alexander. The Alaska Sea Grant College Program and the Alaska Fisheries Science Center committed additional monetary and "in-kind" support for this publication.

Meetings/symposia/workshops

- The *Exxon Valdez* Oil Spill Trustee Council (EVOS, U.S.A.) allocated US $15,000 for PICES workshops consistent with goals and activities of the Gulf of Alaska Ecosystem Monitoring and Research Program (GEM) of EVOS.
- The Alaska Fisheries Science Center (AFSC, U.S.A.) and the Northwest Fisheries

Science Center (NWFSC, U.S.A.) provided US $10,000 to offset PICES expenses for the 2005 inter-sessional SB/GC meeting (April 6-8, 2005, Seattle, U.S.A.).

- The North Pacific Research Board (NPRB, U.S.A.) and GLOBEC contributed US $25,000 and $11,300, respectively, to the 2005 ESSAS Symposium on "*Climate variability and sub-Arctic marine ecosystems*" (May 16-20, Victoria, Canada).
- The Ocean Research Institute (ORI, Japan) and SOLAS-Japan provided funding for a 2-day workshop (October 17-18, 2005, Tokyo, Japan) to synthesize results from the SEEDS-II iron enrichment experiment in the western subarctic Pacific. Funds for the project are managed by Dr. Atsushi Tsuda (member of the PICES IFEP-AP).
- The North Pacific Fisheries Management Council (NPFMC, U.S.A.) and the Pacific Islands Fisheries Science Center (PIFSC, U.S.A.) provided US $5,000 and US $10,000, respectively, for the 2006 CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" (April 19-21, 2006, Honolulu, Hawaii).
- The Department of Fisheries and Oceans (DFO, Canada) contributed $10,000 for the 2006 Symposium to mark the 50th anniversary of Line-P (July 5-7, 2006, Victoria, Canada).

Capacity building

- The Department of Fisheries and Oceans (DFO, Canada), the National Marine Fisheries Service (NMFS, U.S.A.) and the Pacific Scientific Research Fisheries Center (TINRO-Center, Russia) contributed $14,000, US $15,000 and US $3,000, respectively, to the Trust Fund to finance the PICES Intern Program.
- The Alaska Fisheries Science Center (AFSC, U.S.A.) contributed $3,630 to the Trust Fund to support travel of young scientists to PICES meetings.
- The Scientific Committee on Oceanic Research (SCOR) provided a travel grant of US $5,000 for scientists from countries with "economies in transition" to attend PICES XIV; SCOR also committed US $7,500 each for travel of scientists from countries with "economies in transition" to PICES XV and the 2006 CCCC Symposium.
- The Fisheries Research Agency of Japan (FRA), the Asia Pacific Network (APN) and the Intra-American Institute (IAI) provided funding for a 4-day MODEL workshop (November 14-17, 2005, Tokyo, Japan) to extend the NEMURO.FISH model to fish stocks in other geographic regions. Funds for the project are managed by members of the PICES MODEL TT, Drs. Shin-ichi Ito (FRA), Michio Kishi (APN) and Francisco Werner (IAI).

PICES Secretariat

- Korea contributed $19,200 to support a part-time position at the PICES Secretariat.

III. Inter-sessional meetings

Since PICES XIII (October 2004), the following inter-sessional meetings were convened/co-sponsored, for which financial, travel and logistical arrangements were made:

- Third inter-sessional Science Board/ Governing Council meeting, April 6-8, 2005, Seattle, U.S.A.;
- CREAMS/PICES Workshop on "*East Asian Seas Time-series*", April 21-22, 2005, Seoul, Korea;
- Workshop to develop a CFAME work plan, May 14-15, 2005, Victoria, Canada;
- GLOBEC Symposium on "*Climate variability and sub-Arctic marine ecosystem*", May 16-20, 2005, Victoria, Canada (PICES was a co-sponsor and local host for the symposium);
- OECOS Workshop to plan "*An east-west comparative study of lower trophic level pelagic ecology in the subarctic Pacific Ocean*", May 23-24, 2005, Corvallis, U.S.A.;
- ICES/PICES theme sessions on "*Fisheries, ecology and life history of small pelagic fish*" and on "*Comparing and constructing the scientific strategies and output of regional ecosystem projects*" at the ICES Annual Science Conference, September 2005, Aberdeen, Scotland;

- ORI/PICES Workshop to synthesize results from the second *in situ* iron enrichment experiments in the western subarctic North Pacific (SEEDS-II), October 17-18, 2005, Tokyo, Japan;
- NPAFC/PICES Symposium on "*The status of Pacific salmon and their role in North Pacific marine ecosystems*", October 30-November 1, 2005, Jeju, Korea;
- FRA/APN/IAI/GLOBEC/PICES workshop to extend NEMURO.FISH to fish stocks in other geographic regions, November 14-17, 2005, Tokyo, Japan.

The following workshops are to be convened in conjunction with PICES XIV in Vladivostok, Russia:

- MEQ Workshop on "*Review of selected harmful algae in the PICES region*: I. Pseudo-nitzschia *and* Alexandrium", September 29-30, 2005;
- MONITOR Workshop on "*Filling the gaps in the PICES North Pacific Ecosystem Status Report*", October 1, 2005;
- IFEP/MODEL Workshop on "*Modeling and iron biogeochemistry: How far apart are we?*", October 2, 2005;
- PICES/ICES Workshop on "*Introduced species in the North Pacific*", October 4-5, 2005.

Preparations, arrangements or planning are in progress for:

- 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.;
- PICES/NPRB Workshop on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*", May 24-26 or May 31-June 2, 2006, Seattle, U.S.A.;
- Symposium on "*Time series of the Northeast Pacific Ocean: A symposium to mark the 50th anniversary of Line-P*" (co-sponsored by DFO and PICES), July 5-7, 2006, Victoria, Canada;
- ICES/PICES/MBIC Symposium on "*Marine bioinvasions*", May 2007, Washington, DC, U.S.A.;
- 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" (co-sponsored by PICES, ICES and GLOBEC), May 28 - June 1, 2007, Hiroshima, Japan;
- ICES/PICES Young Scientists Conference, summer 2007, venue TBD.

IV. Publications

Publications produced after PICES XIII or still in progress include:

Primary journals, 2005-2006

- Linkages between open and coastal systems (Guest Editors: S. McKinnell and G. McFarlane) - *Deep-Sea Research II*. 2005. Vol. 52, Nos. 5-6, pp. 665-843 (special issue from the 2003 CCCC workshop at PICES XII);
- Quantitative ecosystem indicators for fisheries management (Guest Editor: N. Daan) - *ICES J. Mar. Res*. 2005. Vol. 62, No. 3, pp.307-613 (special issue from the 2004 Ecosystem Indicators Symposium).

Peer-review process is in progress for three special issues with publication in mid-2006:

- Selected papers on NEMURO and NEMURO.FISH models (Guest Editors: M. Kishi, B. Megrey, S.I. Ito and F. Werner) - *Ecological Modelling*;
- Mechanisms that regulate North Pacific ecosystems: Bottom up, top down, or something else? (Guest Editors: G. Hunt and S. McKinnell) - *Progress in Oceanography* (special issue from the 2004 Topic Session at PICES XIII);
- Hot spots and their use by migratory species and top predators in the North Pacific (Guest Editors: W. Sydeman, A. Bychkov, R. Brodeur, C. Grimes and S. McKinnell) - *Deep-Sea Research II* (special issue from the 2004 Topic Session at PICES XIII).

PICES Special Publications 2004-2005

- Marine ecosystems of the North Pacific. 2004. PICES Spec. Publ. No. 1, 280 p.
- Perry, R.I. and McKinnell, S.M. (Eds.) 2005. Marine life in the North Pacific Ocean: The known, unknown and unknowable. PICES Spec. Publ. No. 2, 46 p.

PICES Scientific Report Series

- Kishi, M.J. (Ed.) 2004. Report of the MODEL Task Team Second Workshop to Develop a Marine Ecosystem Model of the North Pacific Ocean including Pelagic Fishes. PICES Sci. Rep. No. 27, 49 p.
- King, J. (Ed.) 2005. Report of the Study Group on Fisheries and Ecosystem Responses to Recent Regime Shifts. PICES Sci. Rep. No. 28, 162 p.
- Jamieson, G. and Zhang, C.I. (Eds.) 2005. Report of the Study Group on Ecosystem-Based Management. PICES Sci. Rep. No. 29, 72 p.
- Brodeur, R. and Yamamura, O. (Eds.) 2005. Micronekton of the North Pacific (Working Group 14 Final Report). PICES Sci. Rep. No. 30, 115 p.
- Takeda, S. and Wong, C.S. (Eds.) 2005 (publication is expected in November). Proceedings of the 2004 Workshop on *In Situ* Iron Enrichment Experiments in the Eastern and Western Subarctic Pacific. PICES Sci. Rep. No. 31.

Other publications, 2005

- PICES Advisory Report on Fisheries and ecosystem responses to recent regime shifts in the North Pacific. 2005, 12 p.
- Tjossem, S. 2005. The journey to PICES: Scientific cooperation in the North Pacific (book on the history of PICES)
- PICES 2004 Annual Report
- Final announcement, poster and book of abstracts for PICES XIV

PICES Press - Newsletters

- Two regular issues: Vol. 13, No. 1 (January 2005) and Vol. 13, No. 2 (August 2005)

V. Travel and representation at other organization meetings

- Drs. Vera Alexander (PICES Chairman) and Kuh Kim (Science Board Chairman) and members of the Secretariat travelled in April 2005, to Seattle, U.S.A., for the 3rd inter-sessional Science Board/Governing Council meeting; and in October 2005 to Vladivostok, for PICES XIV;
- Full travel support was provided for 1 invited speaker (Dr. Yury Zuenko, Russia) to the CREAMS/PICES Workshop on "*East Asian Time-series*" (April 2005, Seoul, Republic of Korea); travel support for other invited speakers was provided by the School of Earth & Environmental Sciences of SNU and the Ministry of Maritime Affairs and Fisheries;
- Full travel support was provided for 1 invited speaker (Dr. Kazuaki Tadokoro, Japan) to the CCCC Workshop to develop a CFAME work plan (May 2005, Victoria, Canada);
- Full travel support was provided for Dr. Akihiko Yatsu (WG 16 Co-Chairman) to work with Dr. Richards Beamish (WG 16 Co-Chairman) to complete the Working Group report (May 2005, Nanaimo, Canada);
- Full travel support was provided for 1 invited speaker (Dr. Victor Lapko, Russia) and two young Korean scientists (from the Trust Fund) to attend the ESSAS Symposium on "*Climate variability and sub-arctic marine ecosystems*" (May 2005, Victoria, Canada);
- Partial travel support was provided to 13 scientists from Canada, Japan and U.S.A. to attend the OECOS workshop on "*An east-west comparative study of lower trophic level pelagic ecology in the subarctic Pacific Ocean*" (May 2005, Corvallis, U.S.A.);
- Full travel support was provided to Dr. Jacquelynne R. King (FERRRS Chairman) to present the FERRRS report at the meeting of the Pacific Fishery Management Council (June 2005, San-Francisco, U.S.A.);
- Partial travel support was provided to Dr. Igor Shevchenko (TCODE Chairman) to attend the Symposium on "*GIS in Fishery and Aquatic Sciences*" (August 2005, Shanghai, People's Republic of China);
- Full or partial travel support was provided to 1 Korean scientist and 2 U.S. scientists to participate in two meetings (September 2005, in Seattle, U.S.A. and October 2005, in Pusan, Republic of Korea) of the "*Federated metadata project*";
- Full travel support was provide to PICES convenors (Drs. Douglas Hay and Skip

McKinnell) to the joint ICES/PICES theme sessions on "*Fisheries, ecology and life history of small pelagic fish*" and "*Comparing and constructing the scientific strategies and output of regional ecosystem projects*" at the ICES Annual Science Conference (September 2005, Aberdeen, Scotland); partial travel support is provided to 1 invited speaker (Dr. Robin Waples, U.S.A.) to the first of these sessions;

- Full or partial travel support was provided for 3 invited speakers (Drs. Stephan Bates, Charles Trick and Satoshi Nagai) to the MEQ Workshop on "*Review of selected harmful algae in the PICES region*: I. Pseudo-nitzschia *and* Alexandrium", 1 invited speakers (Naoke Yoshie) to the IFEP/MODEL Workshop on "*Modeling and iron biogeochemistry: How far apart are we?*", 2 invited speakers (Drs. Helge Botnen and Sergej Olenin) to the PICES/ICES Workshop on "*Introduced species in the North Pacific*", and 3 invited speakers (Drs. R. Ian Perry, Jacqueline Alder and Robin Rigby) to the MONITOR workshop on "*Filling the gaps in the PICES North Pacific Ecosystem Status Report*" at PICES XIV;
- Full or partial travel support was provided to 11 invited speakers of scientific sessions at PICES XIV;
- Partial travel support was provided to 15 Chinese, 3 Japanese, 1 Indian, 11 Korean, 17 Russian (mostly registration fees) and 3 US scientists to attend PICES XIV. The majority of these scientists are younger than 35 years of age;
- Full travel support was provided to Mrs. Madeleine Ware (widow of Dr. Daniel Ware, the recipient of the 2005 Wooster Award) to attend PICES XIV;
- Partial travel support was provided to Dr. Hyung-Tack Huh (Past-Chairman of PICES) to attend PICES XIV;
- Full travel support was provided to 1 invited speaker (Dr. Maurice Levasseur, Canada) to the ORI/PICES Workshop to synthesize results from the second *in situ* iron enrichment experiments in the western subarctic North Pacific (October 2005, Tokyo, Japan);
- Full travel support will be provided to 2 invited speakers and PICES convenor of the NPAFC/PICES Symposium on "*The status of Pacific salmon and their role in North Pacific marine ecosystems*", October 30-November 1, 2005, Jeju, Korea;
- Full or partial travel support will be provided to two scientists (Drs. Salvador Lluch-Cota, Mexico, and Francisco Chavez, U.S.A.) to participate in the FRA/APN/IAI/GLOBEC/PICES Workshop to extend NEMURO.FISH to fish stocks in other geographic regions (November 2005, Tokyo, Japan).
- Dr. Sei-ichi Saitoh (Co-Chairman, MONITOR Task Team) represented PICES at the 12th NPAFC Annual Meeting (October 2004, Sapporo, Japan); and at the 9th NEAR-GOOS Coordinating Committee meeting (November 2004, Sendai, Japan);
- Dr. Mark Wells (HAB Section member) represented PICES at the meetings of the ICES/IOC/IMO *Working Group on Ballast and Other Ship Vectors* (March 2005, Arendal, Norway);
- Dr. Ian Perry represented PICES at the NPAFC CSRS (Committee on Scientific Research and Statistics) meeting (April 2005, Nanaimo, Canada);
- Dr. Skip McKinnell (Deputy Executive Secretary) represented PICES at the meeting of the PaCOOS Governing Board (March 2005, Seattle, U.S.A.) and at the meeting of the ICES-GOOS Steering Group (June 2005, Brest, France); it is expected that he will also represent PICES at the PaCOOS Governing Board meeting to be held in December, in La Jolla, U.S.A.;
- Dr. Suam Kim (Co-Chairman, CCCC Program) represented PICES at the GLOBEC SSC meeting (June 2005, in Rome, Italy); it is expected that he will also represent PICES at the 13th NPAFC Annual Meeting to be held in October 2005, in Jeju, Republic of Korea;
- Dr. Alexander Bychkov (Executive Secretary) represented PICES at the GCP (Global Carbon Project) SSC meeting and at the 23rd Assembly of the Intergovernmental Oceanographic Commission held consecutively in June 2005, in Paris, France.

VI. Relations with international scientific organizations and programs

The following reflects relationships with international scientific organizations and programs of regional and global scale, and with regional scientific and monitoring efforts in the North Pacific:

Argo - International Program for Deployment of profiling floats

- A 1-day joint PICES/Argo Topic Session on "*Application of Global Observing Systems to physics, fisheries, and ecosystems*" was held on October 19, 2004, at PICES XIII.

International Research Programme on Climate Variability and Predictability (CLIVAR)

- A 2-day joint PICES-CLIVAR workshop on "*Scale interactions of climate and marine ecosystems*" was held October 23-24, 2004, in conjunction with PICES XIII.
- PICES is in the process of creating a new POC Working Group on *Evaluation of Climate Change Projections*, which should enhance future collaboration with CLIVAR via its Pacific Panel. If the working group and its membership are formally established in early 2006, CLIVAR will be invited to co-host a topic session or workshop at PICES XV in Yokohama.

Census of Marine Life program (CoML)

- A baseline CoML report entitled "Marine life in the North Pacific Ocean: The known, unknown and unknowable" was published in the PICES Special Publication Series (Perry, R.I. and McKinnell, S.M. (Eds.) 2005. PICES Spec. Publ. No. 2, 46 p.). An interactive fully searchable version of the report (the core report and 8 additional supporting files) was placed on the PICES website.

Global Ocean Ecosystem Dynamics project (GLOBEC)

- The PICES Climate Change and Carrying Capacity (CCCC) Program provides a mechanism for integrating national GLOBEC research programs in the North Pacific and is a regional component of the international GLOBEC effort.
- PICES co-sponsored and served as the local organizer for the GLOBEC Symposium on "*Climate variability and sub-arctic marine ecosystems*" held May 16 - 20, 2005, in Victoria, Canada. The symposium brought together 230 scientists from 12 countries (including all six PICES member countries) to present current knowledge of the structure and function of sub-arctic marine ecosystems and to discuss, at two special workshops, the Implementation Plans of a new GLOBEC regional program on ***E**cosystem **S**tudies of **S**ub-**A**rctic **S**eas* (ESSAS) and of the U.S. national program on the ***B**ering **E**cosystem **St**udy* (BEST). PICES is prepared to actively support future ESSAS activities, *e.g*., comparative regional workshops.
- Several theme sessions of scientific interest to GLOBEC will be convened at PICES XIV to be held September 28 - October 9, 2005, in Vladivostok, Russia. Examples include: "*Mechanisms of human and climate impacts on ecosystems in marginal seas and shelf regions*" (S1), "*The comparative responses of different life history strategists to climate shifts*" (S4), and "*Modeling climate and fishing impacts on fish recruitment*" (S5).
- PICES and GLOBEC are both involved in organizing a FRA/APN/IAI/GLOBEC/ PICES workshop to extend NEMURO.FISH to fish stocks in other geographic regions, to be held November 14-17, 2005, in Tokyo, Japan.
- GLOBEC will co-sponsor the CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" to be held April 19-21, 2006, in Honolulu, U.S.A. The primary scientific objective of this symposium is to present a synthesis of the effects of seasonal to multi-decadal variability on the structure and function of the North Pacific that goes beyond the analysis and understanding developed from studies of a single trophic level, process or region—a True Synthesis. The symposium will be a part of GLOBEC synthesis efforts, and the GLOBEC SSC is

planning to meet in conjunction with this event.
- PICES and GLOBEC are working together to organize the 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" to be held May 28 - June 1, 2007, in Hiroshima, Japan (other sponsors/organizers are ICES, the Plankton Society of Japan and the Japanese Society of Fisheries Oceanography).

Global Ocean Observing System (GOOS)
- PICES carries on a few projects of direct relevance to GOOS: North Pacific Ecosystem Status Report, Continuous Plankton Recorder (CPR) survey of the North Pacific, inter-calibration of micronekton sampling gears and procedures, *etc*.
- At the 2005 inter-sessional Science Board/Governing Council meeting, GOOS integration was identified as a high priority PICES activity.
- PICES is actively communicating with regional monitoring efforts in the eastern North Pacific to develop options for international coordination of observing resources of the California Current, Gulf of Alaska and the Bering Sea.
- PICES is working with NEAR-GOOS (North-East Asian Regional GOOS) and participating in NEAR-GOOS meetings, with the idea of broadening the program to an ecosystem-based effort.

International Council for the Exploration of the Sea (ICES)
- PICES co-sponsored two Topic Sessions on "*Fisheries, ecology and life history of small pelagic fish*" and on "*Comparing and constructing the scientific strategies and output of regional ecosystem projects*" held at the 2005 ICES Annual Science Conference (Aberdeen, Scotland). Drs. Douglas E. Hay and Stewart M. (Skip) McKinnell served as PICES co-convenors for these sessions.
- ICES accepted PICES' invitation to co-sponsor a workshop on "*Introduced species in the North Pacific*" at PICES XIV (October 4-5, 2005, Vladivostok, Russia). Dr. Stephan Gollasch served as the ICES co-convenor for this workshop.
- A joint ICES/PICES/MBIC Symposium on "*Marine bioinvasions*" will be held in May 2007, in Washington, DC, U.S.A. Dr. Yasuwo Fukuyo (Japan) will serve as the PICES co-convenor and a member of the Scientific Program Committee for the Symposium.
- ICES is one of the co-sponsors (with PICES, GLOBEC, the Plankton Society of Japan and the Japanese Society of Fisheries Oceanography) for the 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" to be held May 28 - June 1, 2007, in Hiroshima, Japan.
- Planning is in progress for a joint ICES/PICES Young Scientist Conference on Marine Sciences in 2007. This conference is intended to bring together "early career" scientists from around the globe.
- To discuss/initiate possible co-operation in specific areas, PICES representatives attended annual meetings of the following ICES Groups:
  - Dr. Mark Wells (PICES HAB Section) attended the meeting of the ICES/IOC/IMO *Working Group on Ballast and Other Ship Vectors* held in March 2005, in Arendal, Norway.
  - Dr. Skip McKinnell (PICES Secretariat) attended the meeting of the ICES-GOOS Steering Group held in June 2005, in Brest, France.

Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)
- Dr. Julie Hall (IMBER SSC Chairman) attended PICES XIII and presented an overview of this project to the PICES scientific community (at the session on "*The impacts of large-scale climate change on North Pacific marine ecosystems*") and to Governing Council. Council accepted the recommendation of Science Board that PICES should assist in the implementation of IMBER in the North Pacific.
- A brief proposal entitled "North Pacific Marine Ecosystem Response to Global

Change" has been submitted for PICES to consider issues of marine biogeochemistry and food webs that would link with IMBER as a potential topic for a new PICES scientific integrative program.

- A joint Topic Session focused on IMBER-aligned science is proposed to be held at PICES XV in Yokohama, Japan.

Intergovernmental Oceanographic Commission (IOC)

- In 2002, IOC and PICES agreed to cooperate on four fronts: (i) monitoring (PICES - GOOS cooperation, see under GOOS); (ii) ecosystem indicators (PICES - SCOR/IOC WG 119, see under SCOR); (iii) CO_2 data integration and synthesis (see under IOCCP); and (iv) harmful algal blooms (see below).
- IOC and PICES agreed (a formal agreement was signed in June 2005) to establish a partnership in systematically compiling, storing and presenting on-line, records on harmful algal events. Event records will be compiled and stored annually in the format specified in the HAE-DAT database. HAE-DAT is hosted at the IOC server in Paris and will be presented with equal credit to the partner organizations. ICES is acknowledged as an equal partner in HAE-DAT. The HAE-DAT partnership is open to other appropriate and complementary regional organizations as to achieve global coverage of HAE-DAT. Building a common data resource will allow inter-comparison of HAB species composition and the magnitude of environmental and economic impacts.

International Ocean Carbon Coordinated Project (IOCCP)

- IOCCP is designed to interface with existing regional-scale research and observation groups that have an interest in ocean carbon. IOCCP is working on establishing international agreements on observation methods, best practices, data management, and data sharing that will lead to the joint development of global data products and synthesis activities documenting the ocean carbon cycle. PICES, through its Working Groups on *CO_2 in the North Pacific* (WG 13, 1998-2001) and *Biogeochemical data integration and synthesis* (WG 17, 2002-2005), has been long acting as a regional coordinator for these activities. It is expected that a new PICES Section on *Carbon and climate* will provide clear channels of communication to IOCCP, and to large-scale IGBP programs such as SOLAS and IMBER.
- A joint PICES/IOCCP Topic Session on "*The impacts of climate change on the carbon cycle in the North Pacific*" was convened October 20-21, 2004, at PICES XIII. The session comprised of 18 oral presentations together with a number of posters. Special time was allocated at the session to present the main findings from the joint NOAA/GCP/PICES workshop on "*Understanding North Pacific carbon-cycle changes: Data synthesis and modeling*" (June 2-4, 2004, in Seattle, U.S.A.).
- IOCCP and PICES are co-sponsoring the preparation of the "*Guide to best practices for oceanic CO_2 measurements and data reporting*" to be published in the PICES Scientific Report Series in 2006.

North Pacific Anadromous Fish Commission (NPAFC)

- NPAFC accepted PICES' invitation for the Chairman of NPAFC's Committee on Scientific Research and Statistics (CSRS) to present annual updates on the status of Pacific salmon in the North Pacific to the MONITOR Technical Committee. Every third year, the CSRS Chairman will make a more complete presentation on the status of Pacific salmon in the North Pacific as input to update the North Pacific Ecosystem Status Report. A representative of PICES will present the North Pacific Ecosystem Status Report to NPAFC Annual Meetings.
- A 3-day NPAFC/PICES Symposium on "*The status of Pacific salmon and their role in North Pacific marine ecosystems*" will be held October 30-November 1, 2005, in Jeju, Republic of Korea. PICES' convenor for the symposium is Dr. V. Radchenko; and PICES members of the Scientific Steering Committee are Y. Ishida, S. Kim, I. Perry

and J. Stein. Selected papers from the symposium will be published in a special issue of *Fisheries Research* and/or, alternatively, in the NPAFC Bulletin.

Scientific Committee on Oceanic Research (SCOR)

Relationships with GLOBEC, SOLAS, IMBER and IOCCP are reflected separately. Other collaborations between PICES and scientific projects and groups established/co-sponsored by SCOR are listed below.

- Collaboration with SCOR-IOC Working Group 119 started with PICES' involvement in planning and organizing the International Symposium on "*Quantitative ecosystem indicators for fisheries management*" (March 31-April 3, 2004, in Paris, France). The project was completed this year by the publication of a special issue (Guest Editor: N. Daan) in *ICES J. Mar. Res*., Vol. 62, No. 3, pp.307-613.
- In October 2004, PICES established a new Working Group on *Ecosystem-based management science and its application to the North Pacific*. This Working Group will definitely benefit from activities of SCOR-IOC WG 119. One of the terms of reference for PICES WG 19 directly states "Evaluate the indicators from the 2004 Symposium on "*Quantitative ecosystem indicators for fisheries management*" for usefulness and application to the North Pacific".
- In December 2004, PICES published its first North Pacific Ecosystem Status Report (PICES Special Publication No. 1). The report contains not just descriptive summaries of physical and biological conditions in the North Pacific, but also quantitative indices of ecosystem status and trends. This effort is seen as a work-in-progress, and publication of the second version is planned for 2007. The report opens new opportunity for cooperation with SCOR-IOC WG 119 that could assist in identifying what should be addressed in the North Pacific Ecosystem Status Report, using relevance to management decisions as selection criteria.
- A workshop on "*Climate variability, zooplankton abundance and distribution – comparative opportunities from the world's oceans*" convened during the 3rd PICES/ICES/GLOBEC Zooplankton Production Symposium (May 2003, Gijón, Spain) led to a proposal submitted to SCOR for a Working Group on *Global Comparisons of Zooplankton Time Series*. This proposal was approved at the 27th SCOR General Meeting in September 2004. PICES strongly supported the formation of this Working Group and agreed to provide funding for one additional member from the North Pacific (Dr. Harold P. Batchelder, Oregon State University, U.S.A.) to participate in its activities. Some future meetings of this SCOR WG 125 are planned to be held in conjunction with symposia organized by PICES: the symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" (April 2006) and the 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" (May 2007).
- Starting in 2005, the PICES HAB Section will convene an annual series of workshops to document the existing knowledge on the eco-physiology of HAB species that impact all, or most, countries in the North Pacific. A 1-day workshop at PICES XIV will focus on two genera, *Pseudo-nitzschia* and *Alexandrium*. The SCOR GEOHAB Program is invited to co-sponsor future workshops of this series.
- SCOR provided a travel grant of US $5,000 to support participation of scientists from countries with "economies in transition" to attend sessions/workshops of PICES XIV; SCOR also committed US $7,500 each for travel of scientists from countries with "economies in transition" to PICES XV and the 2006 CCCC Symposium.

Surface Ocean-Lower Atmosphere Study (SOLAS)

- Meso-scale iron enhancement experiments are an important part in the agenda of both SOLAS and PICES. Three international collaborative field projects were developed under the umbrella of PICES, through its Advisory Panel on the *Iron Fertilization*

Experiment in the Subarctic Pacific Ocean (IFEP) established in 2000. SERIES (**S**ubarctic **E**cosystem **R**esponse to **I**ron **E**nrichment **S**tudy) was performed in the eastern subarctic Pacific in summer of 2002, and SEEDS-I and SEEDS-II (**S**ubarctic Pacific Iron **E**xperiment for **E**cosystem **D**ynamics **S**tudy) were conducted in the western subarctic Pacific in the summers of 2001 and 2004, respectively. Important new findings from the first two experiments were published recently in *Science* (SEEDS-I: Tsuda *et al.* 2003, 300: 958-961) and *Nature* (SERIES: Boyd *et al.* 2004, 428: 549-553). More detailed results from these experiments can be found in special issues of *Progress in Oceanography* (SEEDS-I) and *Deep-Sea Research II* (SERIES) to be published in 2005. SEEDS-II was completed in August 2004, and results are underway.

- Proceedings of the 2004 PICES Workshop on "*In Situ* iron enrichment experiments in the eastern and western subarctic Pacific" will be published as PICES Sci. Rep. No. 31 in late 2005.
- A 1-day workshop on "*Modeling and iron biogeochemistry: How far apart are we?*" will be held October 2, 2005, at PICES XIV. The goal of this workshop is to examine the structure of iron biochemical models with respect to what is known about iron biogeochemistry. It is expected that this workshop will enhance communication between experimentalists and modelers, and establish a framework for organizing a 2-3 day workshop (hopefully, jointly with SOLAS) that will address this problem in detail and compare ecological models that describe how plankton ecosystem respond to meso-scale iron enrichment in the high-nutrient, low-chlorophyll waters of the subarctic Pacific.
- A 2-day workshop on SEEDS-II, co-sponsored by the Ocean Research Institute (University of Tokyo), SOLAS-Japan and PICES, will be held October 17 - 18, 2005, in Tokyo, Japan. The goals of this workshop are: (1) to synthesize results from the second *in situ* iron enrichment experiments in the western subarctic North Pacific (SEEDS-II); and (2) to discuss differences in magnitude, biology and export between SEEDS-I and SEEDS-II.

<u>*Exxon Valdez* Oil Spill Trustee Council (EVOS)</u>

- The sample collection and analysis for the north-south transect of the PICES Continuous Plankton Recorder (CPR) survey of the North Pacific is supported by a grant from EVOS (US $120,000 per year, from 2004 to 2006).
- In 2002-2004, EVOS provided US $42,800 for the development of the North Pacific Ecosystem Status Report.
- EVOS allocated US $15,000 for PICES workshops (to be convened during the time period October 1, 2004 – September 30, 2005) consistent with goals and activities of the Gulf of Alaska Ecosystem Monitoring and Research Program (GEM).

<u>North Pacific Research Board (NPRB)</u>

- The sample collection and analysis for the east-west transect of the PICES Continuous Plankton Recorder (CPR) survey of the North Pacific is supported by a grant from NPRB (US $185,000, from July 2003 to June 2005).
- NPRB provided US $25,000 for the ESSAS Symposium on "*Climate variability and sub-arctic marine ecosystems*" held May 16-20, 2005, in Victoria, Canada. PICES was a co-sponsor and a local organizer for this symposium.
- NPRB approved a grant of $90,000 for the production of the next North Pacific Ecosystem Status Report (expected to be published in 2007).
- A PICES proposal entitled "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*" was funded by NPRB (a grant of US $99,957). The 3-day Bering Indicator Workshop of intermediate scope is envisioned as the major component of this proposal. The goal of the workshop, to be held in late spring or early summer of 2006, is to provide a report on the merits and recommendations for use of various classes of ecosystem indicators, through the application of selection criteria and their correspondence to operational

objectives developed before and during the workshop.

Pacific Coastal Ocean Observing System (PaCOOS)

- An international alliance for monitoring the California Current's natural resources and ecosystems is needed to coordinate existing observing activities in the EEZs of the three countries (Canada, U.S.A. and Mexico) and international waters, integrate new initiatives as they arise, and provide early warning of ocean ecosystem change for all dependent coastal communities. Upon a request from PaCOOS, PICES developed options for such an alliance and presented them to the PaCOOS Governing Board meeting for consideration.

VII. PICES Intern Program

See GC Agenda item 10.

GC Endnote 4

Participation list of the 2005 inter-sessional Governing Council meeting

Canada
Robin Brown (alternate delegate)
Laura Richards (delegate)

Japan
Yukimasa Ishida (advisor)
Tokio Wada (delegate)

People's Republic of China
not represented

Republic of Korea
Chul Park (delegate)
Dong-Sil Park (alternate delegate)
Jae-Soo Park (advisor)

Russia
Lev N. Bocharov
Igor Shevchenko (advisor)

U.S.A.
George Boehlert (delegate)
Patricia Livingston (advisor)
Samuel Pooley (delegate)

Other
Vera Alexander (Chairman, PICES)
Alexander Bychkov (Executive Secretary)
Kuh Kim (Chairman, Science Board)
Skip McKinnell (Deputy Executive Secretary)

2005 inter-sessional Governing Council meeting agenda

1. Report of Study Group on *PICES Rules of Procedure and Financial Regulations*
2. Financial and administrative matters
   - 2.1 Auditor's report for *FY* 2004
   - 2.2 Status of annual and voluntary contributions
   - 2.3 Administrative matters
3. Schedule and financing of future Annual Meetings
4. PICES Intern Program
5. Approval of the recommendations from the interim Science Board meeting
6. Other business

GC Endnote 5

Report to PICES from the Scientific Committee on Oceanic Research (SCOR)
(by Dr. Edward Urban, Executive Director of SCOR)

SCOR has been working since 1957 to bring together international groups of ocean scientists to plan new research projects and to work together to overcome barriers to ocean science and highlight new research areas. According to SCOR's parent, the International Council for Science (ICSU), "…every oceanographer is familiar with at least some of SCOR's impressive list of accomplishments. This

organization has a rich history of successes with working groups that have vetted methods of sample collection and analysis, and brainstormed topics for future research. Well known is the reputation of SCOR for its extensive outreach to scientists, laboratories, and research organizations in the developing world. Over the last 45 years, many developed country oceanographers made their first contacts with developing country scientists through SCOR meetings and reports. Prior to its first major programmatic accomplishment - the Indian Ocean Expedition in the early 1960s - major oceanographic expeditions were largely the works of individual nations or individual laboratories. SCOR, more than any other organization, is responsible for the widespread international cooperation that is characteristic of modern ocean science."

In the past year, SCOR-related projects have produced the following publications of interest to PICES:

- From Basin-Scale Meeting funded through IOC: de Young, B., M. Heath, F. Werner, F. Chai, B. Megrey, and P. Monfray. 2004. Challenges of modeling ocean basin ecosystems. *Science* 304: 1463-1466.
- From IGBP/SCOR Global Iron Cycle Fast-Track Initiative: Jickells, T.D. et al. 2005. Global iron connections between desert dust, ocean biogeochemistry, and climate. *Science* 308: 67-71.
- From SCOR/IOC WG 119 on Quantitative Ecosystem Indicators for Fisheries Management: Daan et al. (eds.). 2005. Quantitative Ecosystem Indicators for Fisheries Management. *ICES Journal of Marine Science* 62: 307-614.
- From SCOR/IMAGES WG 113 on Evolution of the Asian Monsoon in Marine Records: Comparison Between Indian and East Indian Subsystems: Wang, P. et al. 2005. Evolution and variability of the Asian monsoon system: State of the art and outstanding issues. *Quaternary Science Reviews* 24: 595-629.
- Two publications resulted from the symposium on The Oceans in a High-CO_2 World: Cicerone et al. 2004. The Ocean in a High-CO_2 World. *Oceanography* Magazine 17(3): 72-78 and Cicerone et al. 2004. The Ocean in a High CO_2 World. *EOS* 85: 351, 353.
- From the Global Ocean Ecosystem Dynamics (GLOBEC) project: Hunt, G.L., Jr and K.F. Drinkwater (Eds.). 2005. *Ecosystem Studies of Sub-Arctic Seas (ESSAS) Science Plan.* GLOBEC Report No.19 and Maury, O. and P. Lehodey (Eds.). 2005. *Climate Impacts on Oceanic TOp Predators (CLIOTOP). Science Plan and Implementation Strategy*. GLOBEC Report No.18.
- From the Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) program: GEOHAB. 2005. *Research Plan on HABs in Upwelling Systems*. IOC, Paris.

Other recent news from SCOR is given in SCOR Newsletter #3. SCOR will hold its 37th Executive Committee Meeting in Cairns, Queensland, Australia on August 29-September 1, 2005. The meeting will review all ongoing SCOR activities and will also select two new working groups to begin supporting in 2006, out of 6 groups proposed. The 2006 SCOR General Meeting will be held in Concepción, Chile.

SCOR appreciates that continued regional support that PICES contributes to help implement SCOR activities in the North Pacific region. PICES is a major regional participant in the Global Ocean Ecosystem Dynamics (GLOBEC) project, through the PICES/GLOBEC Climate Change and Carrying Capacity (CCCC) Program. PICES also contributes to other SCOR-sponsored international research projects, including the Surface Ocean-Lower Atmosphere Study (SOLAS), the Integrated Marine Biogeochemistry and Ecosystem Research (IMBER), and the Global Ecology and Oceanography of Harmful Algal Blooms Program (GEOHAB).

The International Ocean Carbon Coordinated Project (IOCCP), co-sponsored by SCOR and IOC, is designed to interface with existing regional-scale research and observation groups that have an interest in ocean carbon. IOCCP is working to establish international agreements on observation methods, best practices, data management, and data sharing that will lead to the joint development of global data

products and synthesis activities documenting the ocean carbon cycle. PICES, through its Working Groups on *CO_2 in the North Pacific* (WG 13, 1998-2001) and *Biogeochemical data integration and synthesis* (WG 17, 2002-2005), has been long acting as a regional coordinator for these activities. PICES established (in 2005) a Section on *Carbon and Climate*, which should provide clear channels of communication to IOCCP, and to SOLAS and IMBER.

PICES has also helped SCOR with recent SCOR working groups. PICES collaboration with SCOR-IOC Working Group 119 on *Quantitative Ecosystem Indicators for Fisheries Management* started with PICES' involvement in planning and organizing the International Symposium on "Quantitative ecosystem indicators for fisheries management" (March 31-April 3, 2003, in Paris, France). In October 2004, PICES established a new Working Group (WG 19) on *Ecosystem-based management science and its application to the North Pacific*. This Working Group will definitely benefit from activities of SCOR-IOC WG 119. One of the terms of reference for PICES WG 19 directly states "Evaluate the indicators from the 2004 Symposium on "Quantitative Ecosystem Indicators for Fisheries Management" for usefulness and application to the North Pacific.

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Intergovernmental Oceanographic Commission of UNESCO
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Dear Dr. Bychkov,

The IOCCP would like to congratulate PICES on its decision to create a permanent section on *Carbon and Climate*. The IOCCP was established as a pilot project in 2003 out of the recognized necessity for international coordination of ocean carbon observations, and since its inception, has looked to PICES for regional leadership in the Pacific. The establishment of a *Carbon and Climate* section will strengthen the interactions between our two activities and provide the IOCCP with a solid and sustained partner in the Pacific for global coordination of ocean carbon observations and research.

Over the last 2 years, the IOCCP has had several successful partnerships with PICES:

- Co-sponsorship of an international workshop on "Ocean Surface pCO_2: Data Integration and Database Development, (Tsukuba, 2004), which brought together 44 participants from 12 countries,

and resulted in the development of recommended formats for oceanic pCO_2 data and metadata, and recommended practices for data integration;
- Co-sponsorship of the PICES WG 17 project to develop a Guide of Best Practices on Oceanic CO_2 Measurement and Data Reporting; and,
- Agreements between the PICES PICNIC database, the CDIAC Ocean CO_2 Project, and the WDC-MARE data center to work together to provide a globally coordinated data services for ocean carbon.

Beginning in July 2005, the IOCCP will be operating under revised Terms of Reference (see next page) that broaden its mandate to include coordination and communication services for ocean carbon research as well as observations, and to deal with the full range of ocean carbon rather than only focusing on inorganic carbon. The IOCCP will also be working closely with the global research programs, SOLAS and IMBER, to provide coordination services as needed for process study implementation, data synthesis activities, and integration with activities of national and regional programs. To meet these challenges, the IOCCP has established a Scientific Steering Group to guide its activities. Several of these SSG members participate directly in PICES carbon and climate activities. In addition, the project office will benefit from an additional staff member (post-doctoral fellow) beginning in September to help implement this expanded range of activities.

As you will see from the Terms of Reference, the IOCCP will continue to emphasize its role in standardization, facilitation of data set development and coordinated data management practices, and observation program coordination. These are areas in which PICES' Working Groups have played a leading role, both regionally and internationally, and we would like to express our desire to continue our partnership with PICES and its new carbon and climate section.

In November of this year, the IOCCP will jointly host a repeat hydrography data management workshop with CLIVAR in Shonan Village, Japan. The issues we will be discussing are very relevant to PICES and the new section on *Carbon and Climate*. We would like to invite PICES to contribute to this workshop by sponsoring two relevant international scientists from the PICES member nations to participate in the workshop. Since we anticipate that many of the section members will be attending the repeat hydrography workshop it might also be a good opportunity for PICES to host the first meeting of the new section. The section meeting could be run as a one day add-on to the repeat hydrography workshop. Please let us know if you are interested in pursuing this.

We look forward to the development and implementation of this new section, and to our continued partnership with PICES.

Yours sincerely,

Christopher Sabine

Dr. Christopher L. Sabine, Chair
International Ocean Carbon Coordination Project

REPORT OF THE FINANCE AND ADMINISTRATION COMMITTEE

The Finance and Administration Committee (hereafter F&A) met from 08:30-12:30 hours on October 5, and from 11:00-12:30 on October 6, under the chairmanship of Dr. Laura Richards.

Opening remarks (Agenda Item 1)

The Chairman called the meeting to order, welcomed participants and requested an introduction of members for each delegation. All Contracting Parties were present at the meeting (*F&A Endnote 1*).

Adoption of agenda (Agenda Item 2)

The Committee reviewed and adopted the agenda as presented (*F&A Endnote 2*).

Audited accounts for *FY* 2004 (Agenda Item 3)

The Auditor's Report for *FY* 2004 (*F&A Endnote 3*) was circulated by e-mail to all Contracting Parties in early April 2005, and distributed again at the inter-sessional Governing Council meeting on April 8, 2005 (Seattle, U.S.A). In the auditor's opinion, the financial statements are an accurate representation of the financial position of the Organization as of December 31, 2004. The Committee reviewed the Auditor's Report and recommended it for approval by Council.

The Committee also recommended that Council retain the current auditors (*Flader & Hale*) for *FYs* 2006-2008.

Annual contributions (Agenda Item 4)

As stated in Financial Regulation 5(ii), 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 reported on the 2005 annual fee payment dates, and provided information on the payment schedule of national contributions for the last six years (*F&A Endnote 4*). China explained that they were unable to submit their entire contribution in 2005, but that the remainder ($14,500) would be paid in full in conjunction with the annual fee for 2006.

The Committee noted that the annual contributions were received within the first quarter from all Contracting Parties but China. The Committee recommended that Council instruct the Executive Secretary to send a letter to Contracting Parties commending them for their performance in submitting annual contributions in 2005, and describing the difficulties that late and partial payment causes the Organization. It was also recommended that for planning purposes, Contracting Parties should continue to use the guideline generally accepted at the Eighth Annual Meeting (Decision 99/A/2(ii)), which states that "the annual contributions will increase at the rate of inflation in Canada". This should assist member countries in preparing timely funding requests to cover annual contributions, and the Executive Secretary in developing future budgets.

The Executive Secretary reviewed the history of annual contributions for the last 10 years and pointed out that the total budget is growing faster than these contributions, and that PICES has become dependent on fund-raising activities. Every year since 1999, a significant amount was transferred from the Working Capital Fund to the General Fund to offset this deficit. The practice of transferring such surpluses from the Working Capital Fund is a viable approach to balance accounts, but only if the required transfer does not exceed the income from fund-raising activities and voluntary contributions.

At the request of the Executive Secretary, the Committee had an extensive discussion on the need to maintain PICES activities within the budget available. The high expectations on PICES suggest that a case could be made to raise the contributions from Contracting Parties.

Dr. Richards requested that Committee members consider which activities could be scaled back or dropped in order to operate PICES within the current (or a lower) budget, and to send their suggestions to the Executive Secretary via e-mail no later than December 31, 2005. The Committee recommended that the Executive Secretary use these suggestions to prepare a background paper for discussion at the next F&A meeting describing which activities could be reduced or dropped and the consequences of any such decision. This analysis is needed to assess the relevance of any significant increase in annual contributions.

Fund-raising activities (Agenda Item 5)

The Executive Secretary reported on fund-raising efforts in 2005 (F&A *Endnote 5*). It was indicated that the level of external funding for various activities initiated by PICES has increased significantly over the last several years, but remains heavily dependent on U.S. funding sources. The Executive Secretary noted that Japan has also provided considerable support in hosting meetings, but since the funds were not transferred to PICES accounts, the amounts were not reflected in the summary tables.

The Committee pointed out that about a third of the current operational budget is supported by external contributions and partnerships. Fund-raising continues to be an important component of PICES activities. As partnerships expand, a strategy will be needed to manage the workload of the Secretariat.

Last year, Council instructed Science Board to prepare a list of high priority PICES activities that are strong candidates for external funding (Decision 04/A/4(i)). These were identified at the 2005 inter-sessional Science Board meeting as (i) the preparation of the next North Pacific Ecosystem Status Report and (ii) activities related to the development of future PICES integrative scientific program(s). Next in priority were (iii) the PICES-ICES Young Scientists Conference, (iv) international exchange and capacity building, and (v) GOOS integration. The Committee recommended that Science Board be requested to define the required activities for these projects/initiatives to assist in future budget planning.

Budget (Agenda Item 6)

Estimated accounts for *FY* 2005 (Agenda Item 6a)

The Committee reviewed the estimated accounts for *FY* 2005 and noted that an additional transfer of $14,500 from the Working Capital Fund to the General Fund is required due to the partial payment of the annual contribution by China. With this amendment, the Committee recommended that Council accept the estimated accounts for *FY* 2005.

Interest and other income (Agenda Item 6b)

In *FY* 2005, the total income (excluding annual fees from Contracting Parties) is estimated at approximately $378,000, but only about 26% of this amount is from permanent "guaranteed" sources such as bank interest, tax rebates, income tax levies from foreign staff, and registration fees from Annual Meetings. The remainder is the voluntary contributions and grants as listed in *F&A Endnote 5*.

Relocation and Home Leave Fund (Agenda Item 6c)

No expenses were charged to the Relocation and Home Leave Fund in 2005. The Committee recommended a transfer of about $2,100 to the Working Capital Fund to maintain the Relocation and Home Leave Fund at its required level of $110,000 by the end of the fiscal year.

Trust Fund (Agenda Item 6d)

Approximately $53,000 from the Trust Fund will be used by the end of *FY* 2005, to finance the PICES Intern Program, and to support participation of scientists in meetings organized and co-sponsored by PICES. These expenditures are partly compensated for by interest earned by the Fund, the voluntary contributions for the Intern Program, and a travel grant from SCOR. The Committee

recommended a small transfer (less than $6,000) from the Working Capital Fund to the Trust Fund to recover the 2005 expenses, and to restore it to the level of $110,000 by the end of the fiscal year. The exact amount of the transfer can be determined once the travel expenses for PICES XIV are known.

Working Capital Fund (Agenda Item 6e)

The balance in the Working Capital Fund is expected to be about $379,800 at the end of *FY* 2005. The Committee recommended a transfer of $97,000 from the Working Capital Fund to the General Fund for 2006. The Committee also recommended a transfer of less than $6,000 to the Trust Fund as mentioned above. After these transfers, the Working Capital Fund will total approximately $276,200 at the end of *FY* 2005. This amount includes $175,200 in encumbered funds, leaving a balance in operating funds of approximately $101,000, slightly above the required amount of $100,000.

The Committee noted that about $122,200 of the encumbered funds was designated for high-priority PICES projects, but that the specific projects were not indicated. The Committee recommended that Council earmark $25,000 from these funds for the PICES/ICES Young Scientists Conference. The Committee also recommended that expenditures required for the future PICES integrative scientific program(s) be identified as the next priority for these funds, since the North Pacific Ecosystem Status report was more likely to receive support through targeted fund-raising activities.

Budget for *FY* 2006 (Agenda Item 6f)

The Committee reviewed the proposed *FY* 2006 budget of $730,000 (*F&A Endnote 6*) and recommended its approval by Council. The budget was noted to be consistent with the guideline generally accepted at the PICES Eighth Annual Meeting (Decision 99/A/2(ii)), stating that the annual contribution will increase at the rate of inflation in Canada. The Committee recommended a transfer of $97,000 from the Working Capital Fund to reduce the total annual contribution to $633,000, setting the 2006 fees at $105,500 per Contracting Party.

Forecast budget for *FY* 2007 (Agenda Item 6g)

The Executive Secretary presented the *FY* 2007 forecast budget of $740,000, and noted that this budget is prepared based on preliminary information available as of August 25, 2005, and is only 1.4% higher than in *FY* 2006. It was indicated that if the inflation rate in Canada remains the same, then under the adopted guidelines, the 2007 annual fee should be set at a level of $108,500 per Contracting Party. Then the total annual contribution would be $651,000, and a transfer of $89,000 from the Working Capital Fund would be required to balance the budget. A transfer of this magnitude will be possible only if additional funds can be raised.

The Committee submitted the *FY* 2007 forecast budget to Council for information only.

PICES Intern Program (Agenda Item 7)

The Committee reviewed the current status of the Intern Program. At PICES XIII, Pavel Vorobyov (TINRO-Center, Russia) was selected as the next PICES intern, and his 8-month term is now expected to start in October 2005. This term could be extended to a maximum of 12 months, depending on the intern's performance, the workload in the Secretariat and availability of funds.

Applications, reviewed by national delegates, should normally be submitted to the Executive Secretary by the date of the first Governing Council session at the PICES Annual Meeting. Considering that Mr. Vorobyov's term will not be completed before July 2006, the Committee recommended that Council extend the deadline for nominations for the 2006-2007 PICES Internship until the 2006 inter-sessional Council meeting, or until the end of March 2006 if no inter-sessional meeting will be held. China, in particular, was encouraged to advertise the Intern Program broadly in order to solicit high-quality candidates for the 2006-2007 term.

The Executive Secretary reminded the Committee that the Intern Program remains unbudgeted, and over the years has been financed solely by voluntary contributions. The Committee recommended that Council thank the Department of Fisheries and Oceans (Canada) and the National Marine Fisheries Service (U.S.A.) for their continuing support of the Intern Program, and instructed the Executive Secretary to invite Contracting Parties to provide voluntary contributions supporting the Program in 2006 and beyond.

The Committee reviewed the level of stipends for the interns and discussed whether this stipend is sufficient to cover the cost of living in Canada. It was recommended that the stipend be kept at the current level of $2,000 per month, and given the modest amount, that Contracting Parties consider whether personal circumstances warrant supplementation.

Review of current Trust Fund guidelines (Agenda Item 8)

The PICES Trust Fund was established in 1994, in accordance with Financial Regulation 6, to facilitate the participation of a broad spectrum of scientists in activities of the Organization. Guidelines for operating the Trust Fund were approved at PICES III (Decision 94/A/4), and have remained unchanged. Since the guidelines were very general, the Committee asked the Executive Secretary to explain how decisions were made about which scientists were supported through the Trust Fund. The Committee was pleased with the decisions, but requested that for transparency, the Trust Fund guidelines be updated to reflect current practice. Ms. Elizabeth Tirpak (U.S.A.) and Mr. Serge Labonté (Canada) agreed to work with the Executive Secretary to update the guidelines in time for review and approval by Council at the inter-sessional meeting, or by the end of March 2006 if no inter-sessional meeting will be held. This would allow the revised guidelines to be in place for decision making for PICES XV travel support.

PICES capacity building (Agenda Item 9)

The Committee reviewed the high-priority capacity building activities that were identified at the 2005 inter-sessional Science Board / Governing Council meeting. The main discussion was on funding for the PICES/ICES Young Scientists Conference. As discussed under Agenda Item 6e, the Committee recommended that $25,000 be earmarked for the conference from the encumbered funds designated for high-priority PICES projects.

Schedule and financing of future Annual Meetings (Agenda Item 10)

At PICES XIII, Council approved the proposal of Japan to host the Fifteenth Annual Meeting in 2006 (Decision 04/A/5(i)). Later by correspondence, it was agreed that the meeting will be held from October 13-21, 2006, in Yokohama. The Japanese government requested that $40,000 be provided by PICES to partially cover Annual Meeting costs. This amount includes expenses for printing the announcement, poster and book of abstracts, as well as expenses for the Chairman's Reception, which are normally PICES own expenses. It is expected that in November 2005 representatives from the PICES Secretariat will visit Yokohama to meet with local organizers and to inspect the venue and hotels.

At PICES XIII, Council requested Canada to explore the possibility of holding the Sixteenth Annual Meeting in 2007, and inform the Secretariat on this matter by May 31, 2005 (Decision 04/A/5(ii)). The Canadian government subsequently confirmed their intention to host PICES XVI, and indicated that they are not planning to ask PICES for any funds to cover Annual Meeting costs. The meeting will be held at the Victoria Conference Center (the same venue as for PICES I and PICES X), from September 28 – October 7, 2007.

The Committee recommended that in keeping with the 6-year rotation cycle, China be invited to explore the feasibility of hosting PICES XVII in 2008. Mr. Qian-Fei Liu indicated that

information will be provided to the Secretariat by March 31, 2006.

At PICES X, Council approved the charging of a registration fee for future Annual Meetings of the Organization (Decision 01/A/4(iv)), and indicated that the registration fee structure should be reviewed annually. At PICES XIII, Council accepted the same registration fee structure for 2005 as was agreed for 2004 at PICES XII (Decision 04/A/5(iii)). The Committee again reviewed the fee structure and recommend that Council maintain the same registration fee structure for 2006:

Type	CDN $
Registration fee	225
Early registration fee	150
Students registration fee	50
Spousal registration fee	50

Fees will be collected by the Secretariat and credited to the Working Capital Fund to support high-priority projects and the Intern Program, and to cover costs associated with Annual Meetings.

The Committee also considered and supported an inter-sessional Science Board meeting, with the participation of Council members, for 2006 because of the importance of the discussion on the future integrative science program(s). However, the Committee believed 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 also emphasized the need to keep overall costs to the minimum possible.

Administrative matters (Agenda Item 11)

The Committee reviewed the progress on the status of income tax levies for personnel at the PICES Secretariat. Consultation by the Executive Secretary with the appropriate agencies in Canada is ongoing and the extension of the tax levy practice to all staff may be possible. This would provide additional revenue for PICES activities.

Space, facilities and services for the PICES Secretariat (Agenda Item 12)

Space and certain general administrative services are traditionally provided to the Secretariat by the Government of Canada through the Department of Fisheries and Oceans (DFO). The original agreement commenced on April 1, 1992, and continues indefinitely with a periodic review. According to the current agreement (signed in 2001, and amended on April 1, 2002), PICES is to pay an annual sum of $28,000 (in quarterly payments of $7,000), which includes $23,500 for postage, $2,500 for telephone and fax lines, and $2,000 for janitorial/ maintenance services. It is expected that the agreement between PICES and DFO will be renewed in 2005.

Other business (Agenda Item 13)

No other business was identified by Committee members.

Adoption of F&A report and recommendations to Council (Agenda Item 14)

The Committee approved the F&A Report and its recommendations to Council.

F&A Endnote 1

Participation list

Canada
Robin M. Brown
Serge Labonté

Japan
Tokimasa Kobayashi (advisor)
Hideki Nakano (alternate member)

People's Republic of China
Qian-Fei Liu

Republic of Korea
Haeng Nok Oh (alternate member)
Ig Chan Pang (advisor)
Hak Yeol You (advisor)

Russia
Victor Nazarov (advisor)
Igor Shevchenko

U.S.A.
Elizabeth J. Tirpak
Samuel Pooley (advisor)

Other
Laura Richards (F&A Chairman)
Vera Alexander (Chairman, PICES)
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* 2004
4. Annual contributions
5. Fund-raising activities
6. Budget
   a. Estimated accounts for *FY* 2005
   b. Interest and other income
   c. Relocation and Home Leave Fund
   d. Trust Fund
   e. Working Capital Fund
   f. Proposed budget for *FY* 2006
   g. Forecast budget for *FY* 2007
7. PICES Intern Program
8. Review of the current Trust Fund guidelines
9. Capacity Building activities
10. Schedule and financing of future Annual Meetings
11. Administrative matters
12. Space, facilities and services for the PICES Secretariat
13. Other business
14. F&A report and recommendations to Council

F&A Endnote 3

Auditor's report (2004) to the Organization

To the Council of the
North Pacific Marine Science Organization

We have audited the statement of financial position of North Pacific Marine Science Organization as at December 31, 2004 and the statement of operations and changes in fund balances for the year then ended. These financial statements are the responsibility of the organization's management. 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 plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the organization as at December 31, 2004 and the results of its operations and changes in fund balances for the year then ended in accordance with Canadian generally accepted accounting principles.

Flader & Hale
Chartered Accountants
9768 Third Street
Sidney, B.C.,
Canada. V8L 4B2
Phone: 1-250-656-3991
Fax: 1-250-656-6486
E-mail: mail@fladerandhale.ca

Sidney, B.C.
March 27, 2005

NORTH PACIFIC MARINE SCIENCE ORGANIZATION
STATEMENT OF FINANCIAL POSITION
AS AT DECEMBER 31, 2004

ASSETS

	2004	2003
CURRENT ASSETS		
Cash and short term deposits	$ 722,791	$ 554,475
Accounts receivable	1,825	4,630
Prepaid expenses	3,096	5,814
	$ **727,712**	$ **564,919**

LIABILITIES

CURRENT LIABILITIES		
Accounts payable	$ 34,886	$ 36,667
Funds held for contracting parties (Note 3)	102,500	100,000
	137,386	136,667

FUND BALANCES

WORKING CAPITAL FUND (Note 4)	370,326	189,474
TRUST FUND	110,000	128,778
RELOCATION AND HOME LEAVE FUND	110,000	110,000
	590,326	428,252
	$ **727,712**	$ **564,919**

STATEMENT OF OPERATIONS AND CHANGES IN FUND BALANCES
FOR THE YEAR ENDED DECEMBER 31, 2004

	General	Working Capital	Trust	Relocation and Home Leave	2004	2003
FUND BALANCES, beginning of year	$ -	$ 189,474	$ 128,778	$ 110,000	$ 428,252	$ 460,766
SOURCES OF FUNDS						
Contributions from Contracting Parties	600,000	21,200	-	-	621,200	564,800
Budgeted transfer to General Fund	79,000	(79,000)	-	-	-	-
Voluntary contributions and grants (Note 5)	-	199,987	38,722	-	238,709	165,804
Interest and other income (Note 6)	-	103,730	1,412	7,367	112,509	66,752
	679,000	245,917	40,134	7,367	972,418	797,356
FUND BALANCES, before expenditures	679,000	435,391	168,912	117,367	1,400,670	1,258,122
EXPENDITURES						
Personnel services	352,000	7,929	-	-	359,929	340,909
Annual Meeting	19,273	-	-	-	19,273	49,884
Workshops	57,242	8,541	-	-	65,783	64,629
Travel	85,476	4,202	36,878	-	126,556	130,267
Printing	67,005	-	-	-	67,005	74,025
Communication	33,839	-	-	-	33,839	30,980
Equipment	10,018	-	-	-	10,018	9,909
Supplies	7,510	-	-	-	7,510	7,584
Contractual services	22,733	-	-	-	22,733	26,389
Miscellaneous	3,281	-	-	-	3,281	4,901
Intern program	-	-	35,738	-	35,738	26,799
Ecosystem Status Report	-	13,289	-	-	13,289	28,702
FERRRS Report	-	33,429	-	-	33,429	-
Relocation	-	-	-	7,367	7,367	7,538
Foreign exchange loss (Note 7)	4,594	-	-	-	4,594	27,354
	662,971	67,390	72,616	7,367	810,344	829,870
NET FUNDS AVAILABLE	16,029	368,001	96,296	110,000	590,326	428,252
TRANSFER FROM WORKING CAPITAL FUND (Note 8)	(16,029)	16,029	-	-	-	-
INTERFUND TRANSFERS (Note 9)	-	(13,704)	13,704	-	-	-
FUND BALANCES, end of year (Note 10)	$ -	$ **370,326**	$ **110,000**	$ **110,000**	$ **590,326**	$ **428,252**

NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2004

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 (WCF) 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 (TRF) 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 (RHLF) was established in 1996 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. This fund is set at $110,000.

(b) Capital Assets

Capital assets acquired by the Organization are expensed in the year of acquisition. During the current year the organization purchased $10,018 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.

(d) Income Tax

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

(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. FUNDS HELD FOR CONTRACTING PARTIES

The funds held for contracting parties are advance contributions from Canada ($102,500).

4. WORKING CAPITAL FUND

Of the total amount in the Working Capital Fund, $124,435 is restricted for specific designated projects.

5. VOLUNTARY CONTRIBUTIONS AND GRANTS

Contributions/grants	WCF, $	TRF, $
NMFS contribution for FERRRS activities	60,412	
AFSC contribution for high priority projects	56,844	
EVOS contribution for NPESR	10,723	
IOC contribution for Ocean Carbon Project	12,345	
AFSC contribution for PICES XIII	7,896	
GLOBEC/AFSC/NPRB contributions for ESSAS Symposium	51,767	
Contributions to Intern Program: DFO Canada Alaska Fisheries Science Center		 10,000 23,556
SCOR grant for PICES XIII		5,166
	199,987	**38,722**

6. INTEREST AND OTHER INCOME

	WCF, $	**TRF, $**	**RHLF, $**
DFO postage reimbursement	16,161		
Interest income	5,640	1,412	2,402
Income tax levies	25,045		4,965
GST, PST & WCB rebates	10,154		
Registration Fees	45,876		
Other income	854		
	103,730	**1,412**	**7,367**

7. FOREIGN EXCHANGE LOSS

At year-end all funds held in foreign currency (US $45,528) 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 (2004 =1.2020, 2003 =1.2965), and not by the actual purchase or sale of any foreign currencies.

8. TRANSFER TO/FROM WORKING CAPITAL FUND

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

9. INTERFUND TRANSFERS

The Governing Council approved the transfer of $13,704 from the Working Capital Fund to restore the Trust Fund to $110,000.

10. WORKING CAPITAL FUND SURPLUS

Pursuant to decision 04/A/3(iii) of the Governing Council, $95,500 of the funds held in the Working Capital Fund will be transferred to the General Fund to reduce 2005 contributions.

11. 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 contributions, 2000-2005[1]

	Canada	China	Japan	Korea	Russia	U.S.A.
2000	Feb. 9, 00	**Aug. 29, 00**	Nov. 30, 99	**June 1, 00**	**Nov. 2, 00**	Jan. 18, 00
2001	Jan. 24, 01	**Dec. 10, 01**	Dec. 13, 00	**Aug. 23, 01**	**May 18, 01**	Jan. 3, 01
2002	Jan. 21, 02	**Oct. 8, 02**[2]	Nov. 27, 01	**Aug. 26, 02**	**June 10, 02**[3]	Dec. 24, 01
2003	Jan. 13, 03	**Oct. 3, 03**[4]	Dec. 11, 02	**May 5, 03**	**Apr. 2, 03**[5]	Dec. 6, 02
2004	Jan. 5, 04	**Aug.10, 04**	Dec. 26, 03	Mar. 24, 04	Mar. 2, 04	**Feb. 9, 04**[6]
2005	Dec. 24, 04	**Sept. 22, 04**[7]	Mar. 2, 05	Mar. 30, 05	Mar. 31, 05[8]	Jan. 10, 05

1 late payments are indicated in bold
2 partial (95.7%) payment, remainder paid October 3, 2003 (21 months overdue)
3 partial (72%) payment, remainder paid October 10, 2002 (9 months overdue)
4 partial (78%) payment, remainder paid Aug. 10, 2004 (19 months overdue)
5 partial (96.5%) payment, remainder paid July 18, 2003 (6 months overdue)
6 partial (50%) payment, remainder paid September 8, 2004 (8 months overdue)
7 partial (86%) payment (8 months overdue)
8 partial (96.6%) payment, remainder paid April 25, 2005

F&A Endnote 5

External funding and special contributions received since PICES XIII

For the period since the Thirteenth Annual Meeting (October 2004), efforts from the PICES scientific community, national delegates and F&A members, and the PICES Secretariat resulted in the following extra-budgetary contributions for various activities initiated/co-sponsored by PICES:

Special projects

- The United States of America contributed $110,000 to support high-priority PICES projects.
- The North Pacific Research Board (NPRB, U.S.A.) approved a grant of US $99,957 to support a PICES project entitled "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea: A workshop approach*" (to be completed by February 2007).
- The North Pacific Research Board (NPRB, U.S.A.) approved the amount of $90,000 for the production of the next North Pacific Ecosystem Status Report (expected to be published in 2007).
- The PICES Advisory Panel on *Micronekton inter-calibration experiment* (Dr. Orio Yamamura) succeeded in securing a 9-day ship time aboard the research vessel *Hokko Maru* (Fisheries Research Agency of Japan) during September 25 – October 3, 2005, for a second experiment in the subarctic North Pacific to evaluate the efficiency of sampling gears and procedures employed by different agencies to sample micronekton.

Publications

- The National Science Foundation (NSF, U.S.A.) provided a grant of US $15,000 for the publication of a book on the history of PICES by Dr. Sara Tjossem entitled "*The journey to PICES: Scientific cooperation in the North Pacific*" (previously NSF had supported the writing of the book through a grant to the University of Alaska Fairbanks). Funds for the project are managed by the Chairman of PICES, Dr. Vera Alexander. The Alaska Sea Grant College Program and the Alaska Fisheries Science Center (U.S.A.) committed additional monetary and in-kind support for this publication.

Meetings/symposia/workshops

- The *Exxon Valdez* Oil Spill Trustee Council (EVOS, U.S.A.) allocated US $15,000 for PICES workshops consistent with goals and activities of the Gulf of Alaska Ecosystem Monitoring and Research Program (GEM) of EVOS.
- The Alaska Fisheries Science Center (AFSC, U.S.A.) and the Northwest Fisheries Science Center (NWFSC, U.S.A.) provided US $10,000 to offset PICES expenses for the 2005 inter-sessional Science Board/Governing Council meeting (April 6-8, 2005, Seattle, U.S.A.).
- The North Pacific Research Board (NPRB, U.S.A.) and GLOBEC contributed US $25,000 and $11,300, respectively, to the 2005 ESSAS Symposium on "*Climate variability and sub-Arctic marine ecosystems*" (May 16-20, Victoria, Canada).
- The Ocean Research Institute (ORI, Japan) and SOLAS-Japan provided funding for a 2-day workshop (October 17-18, 2005, Tokyo, Japan) to synthesize results from the SEEDS-II iron enrichment experiment in the western subarctic Pacific. Funds for the project are managed by Dr. Atsushi Tsuda (member of the PICES IFEP-AP).
- The North Pacific Fisheries Management Council (NPFMC, U.S.A.), the Pacific Islands Fisheries Science Center (PIFSC, U.S.A.), and the North Pacific Research Board (NPRB, U.S.A.) committed US $5,000, US $10,000, and US $20,000, respectively, for the 2006 CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" (April 19-21, 2006, Honolulu, Hawaii).
- The Department of Fisheries and Oceans (DFO, Canada) contributed $10,000 for the 2006 Symposium on "*Long time series in the North Pacific: A symposium to mark the 50th anniversary of Line-P*" (July 5-7, 2006, Victoria, Canada).

Capacity building

- The Department of Fisheries and Oceans (DFO, Canada), the National Marine Fisheries Service (NMFS, U.S.A.) and the Pacific Scientific Research Fisheries Center (TINRO-Center, Russia) contributed $14,000, US $15,000 and US $3,000, respectively, to the Trust Fund to finance the PICES Intern Program.
- The Alaska Fisheries Science Center (AFSC, U.S.A.) contributed $3,630 to the Trust Fund to support travel of young scientists to PICES meetings.
- The Scientific Committee on Oceanic Research (SCOR) provided a travel grant of US $5,000 for scientists from countries with "economies in transition" to attend PICES XIV; SCOR also committed US $7,500 for travel of scientists from countries with "economies in transition" to PICES XV and the 2006 CCCC Symposium.
- The Fisheries Research Agency of Japan (FRA), the Asia Pacific Network (APN) and the Intra-American Institute (IAI) provided funding for a 4-day MODEL workshop (November 14-17, 2005, Tokyo, Japan) to extend the NEMURO.FISH model to fish stocks in other geographic regions. Funds for the project are managed by members of the PICES MODEL TT, Drs. Shin-ichi Ito (FRA), Michio Kishi (APN) and Francisco Werner (IAI).

PICES Secretariat

- Korea contributed $19,200 to support a part-time position at the PICES Secretariat.

F&A Endnote 6

Budget for fiscal year 2006

Category	**Allotment**
Personnel Services	396,000
Annual Meeting	40,000
Special Meetings	71,000
Travel	84,000
Printing	72,000
Communication	34,000
Equipment	6,000
Supplies	7,500
Contractual Services	16,000
Miscellaneous	3,500
Total	**730,000**

Source	**Contribution**
Contributions from six Contracting Parties	633,000
Transfer from Working Capital Fund	97,000
Total	**730,000**

2006 Annual Fee for each Contracting Party	**105,500**

REPORT OF 2005 INTER-SESSIONAL SCIENCE BOARD MEETING

The third inter-sessional Science Board meeting, with the participation of Governing Council, was held at the NOAA/Alaska Fisheries Science Center in Seattle, U.S.A., from April 6-7, 2005. Science Board Chairman, Dr. Kuh Kim, welcomed participants and thanked them for attending the meeting. Dr. Gary Stauffer, Divisional Director of NOAA/RACE, gave a welcoming address to the guests at the Facilities. Before turning the meeting back to Dr. Kim, Dr. Stauffer stated briefly that having good science was necessary for managing fisheries resources. Meeting participants are identified in, and the agenda is provided in *SB-IM Endnote 2*.

Mid-term updates on activities of Committees and Programs (Agenda Item 2)

BIO Committee

BIO Chairman, Dr. Michael Dagg, presented his Committee's inter-sessional report. Highlights of his report included changes in membership in the Advisory Panel on *Micronekton sampling inter-calibration experiment* (MIE-AP), and updates on the status of the MIE-1 and MIE-2 cruises, terms of references for the Advisory Panel on *Marine bird and mammals* (MBM-AP), and publications and symposia.

Dr. Michael Seki (U.S.A.) of MIE-AP has stepped down as Co-Chairman, but will remain a member. Dr. Orio Yamamura (Japan) was recommended as Co-Chairman to the MIE-AP, pending a Science Board decision. Other new members to the MIE-AP include Drs. Alexei Baitalyuk and Oleg Ivanov (Russia), but additional members from China and Korea are still needed.

The first cruise, MIE-1, aboard the NOAA ship *Oscar Elton Sette* was completed off Hawaii prior to PICES XIII. Data analysis is now taking place and some preliminary results were reported in PICES Press Vol. 13(1). Plans to conduct a second cruise, MIE-2, in the Bering Sea (possibly in conjunction with a BASIS cruise) will be discussed when BASIS meets in Nanaimo, Canada, at the end of April. An attempt to obtain funding from the North Pacific Research Board through the 2004-05 request for proposals to support MIE-2 was not successful. Dr. Yamamura has proposed two cruises (July 5-11 and September 27-October 3) aboard the Japan Fisheries Agency research vessel *Hokko Maru* to conduct MIE-2 in the western Pacific off Kushiro, Japan. However, no firm decision has been made by MIE-AP on how to proceed with MIE-2.

No progress has been made regarding the special publication from the 2003 and 2004 MBM-AP workshops on "*Combining data sets on diet of marine birds and mammals*" at PICES XIII. Selected papers from the PICES XIII Topic Session on *Hot spots and their use by migratory species and top predators in the North Pacific* will be published in *Deep Sea Research II* in 2006. A poster on bird and mammal observations along the E–W CPR survey track will be presented at the GLOBEC/PICES Symposium on *Ecosystem Studies of Sub-Arctic Seas (ESSAS)* May 16-20, 2005. No specific plans for publications have been made for the Topic Sessions in PICES XIV.

There was discussion at PICES XIII that the terms of reference of the Advisory Panel on *Marine bird and mammals* (MBM-AP) might want to be revised, in regard to the extension beyond its 5-year term, and changes in PICES activities. However, it has been decided to keep the terms of reference as they stand. Executive Secretary, Dr. Alexander Bychkov, pointed out that the biggest problem regarding this AP is that it is essentially a Japan/U.S.A. bi-lateral group; changes in membership were recommended at PICES XIII. Since then, membership has been partly resolved, with Canada and Russia each appointing one bird and one mammal expert to the AP. As yet, no one from China or Korea has been appointed.

A symposium, celebrating the 50-year anniversary of the sampling along Line P, is planned for July 5-7, 2006 in Victoria, Canada. Requests have been made to PICES for logistical support and travel.

Drs. Charles Miller (U.S.A.) and Tsutomu Ikeda (Japan) have been planning a workshop to compare the eastern and western gyres of the subarctic Pacific under the OECOS (Oceanic Ecodynamics Comparison in the Subarctic Pacific) project. The workshop is scheduled for May 23-24, 2005 in Corvallis, U.S.A.

The 4th International Zooplankton Production Symposium, scheduled for 2007 in Hiroshima, Japan, is being organized by Dr. Shin-ichi Uye. Two BIO members are among the organizers, as well as members from ICES and GLOBEC.

ACTION:
***Dr. Dagg*:**

2.BIO.1 Decide how to proceed with MIE-2;

2.BIO.2 Resolve mesh size to be used in the MIE-2 cruise;

2.BIO.3 Look into reason for lack of progress on the special publication for the 2003 and 2004 workshops held at PICES XIII;

2.BIO.4 Look into appointing MIE-AP and MBM-AP experts from China and Korea;

2.BIO.5 BIO Committee support for the Line P Symposium;

2.BIO.6 Table a proposal to house IFEP-AP at the BIO Committee meeting at PICES XIV.

FIS Committee

FIS Chairman, Dr. Yukimasa Ishida, made a brief presentation stating that there were no changes in FIS activities discussed at PICES XIII. He reported that Drs. Richard Beamish (Canada) and Akihiko Yatsu (Japan) have prepared a draft WG 16 report on *Climate change, shifts in fish production, and fisheries management*. FIS has requested financial support from PICES for the authors to complete the report. The U.S.A. contribution will be prepared by Dr. Loh-Lee Low, of the Alaska Fisheries Science Center, but the target date of late summer 2005 for completion of the report will be delayed. Dr. Ishida did not have any information on when the report would be completed. Dr. Bychkov requested that the FIS Chairman use his influence to have the report prepared by the end of summer 2005.

ACTION:
***Dr. Ishida*:**

2.FIS.1 Complete the WG 16 report on *Climate change, shifts in fish production, and fisheries management* by the end of summer 2005.

MEQ Committee

MEQ Chairman, Dr. John E. Stein, reported that the report of the Study Group on *Ecosystem-Based Management Science and its Application to the North Pacific* was published as PICES Scientific Report No. 29 in January 2005. The main task of the SG was to establish the Working Group on *Ecosystem-based management and its application to the North Pacific* under the direction of the FIS and MEQ Committees, with a 3-year duration and the terms of reference as listed in Annual Report 2004 *SGEBM Endnote 4*.

In 2003, the *Harmful Algal Bloom* Section (HAB-S) was established in order to develop and implement annual bloom reporting procedures that would be consistent with ICES reporting procedures, and therefore, could be linked to the ICES Harmful Algae Event Data Base (HAE-DAT) in order to assess the impacts of HAB events, and to be used as a research tool to understand the patterns that will lead to increased prediction capability. Work is progressing on the development of procedures. It is hoped that a joint ICES/PICES website can be developed, which will strengthen ICES-PICES collaboration and exchange of science. Assistance is being requested from the NOAA Coastal Data Development Center. HAB-S will select two alga species as a focus of their study, and will also investigate topics of importance to PICES member nations. HAB-S plans to develop terms of reference for a working group on invasive species. A 1-day workshop on

"*Review of selected harmful algae in the PICES Region: I.* Pseudo-nitzschia & Alexandrium", will be preceded by a ½-day laboratory demonstration on algal toxins detection techniques at PICES XIV.

The HAB Section requires more specific expertise to fill in the gaps in knowledge. Only one Russian member has been nominated; other countries have not reacted to the request.

Dr. Wells attended the ICES/PICES topic session on "*Natural and anthropogenic introductions of marine species*" at PICES XIII, and has been active in representing PICES at meetings of the ICES/IOC/IMO Working Group on *Ballast waters and other ship vectors* and the ICES Working Group on *Introductions and transfers of marine organisms*, held consecutively in March 2005 in Norway.

WG 18 on *Mariculture in the 21st century – The intersection between ecology, socio-economics and production* has received national reports on the status and projected trends in marine aquaculture from all member countries except Russia.

The term of the MEQ Chairman is expiring and nominees are being sought to replace him. Dr. Stein reported that there is currently no Chinese representation on the MEQ committee. Science Board indicated they would also try to contact Chinese delegates. The Executive Secretary stated that there has been a serious problem with membership in MEQ. Although activities were occurring under its auspices, membership is down. Canada has only one member who was acting in dual roles of MEQ member and EBM Co-Chairman. The U.S. had 3 members in MEQ, but Dr. Stein is currently doing the work for all three. Japan has introduced a new member, Dr. Yuji Adachi, and Korea has two new members. Weak participation might be attributed to the nature of the lead agencies for PICES in each member country; MEQ issues tend to be national, so agencies in member counties do not see the need to work internationally. Therefore, perhaps MEQ should just step back and see if their goals were being met even though their membership is small.

ACTION:
***Dr. Stein*:**

2.MEQ.1 Determine the status of the Russian national report for WG 18;

2.MEQ.2 Contact Chinese delegates to identify potential candidates for Co-chairmanship in MEQ;

2.MEQ.3 Fill in the gaps in expertise for the HAB Section.

POC Committee

POC Chairman, Dr. Michael Foreman, reported that Dr. Andrew G. Dickson is continuing preparation on the "Guide to best practices for oceanic CO_2 measurements and data reporting" which should be complete by summer 2005. NPDB-AP Technical Coordinator, Mr. Ron McLaren (Canada), has retired and will be replaced by Mr. Al Wallace (Canada). Mr. Craig Engler (U.S.A.) has been appointed as Coordinator. Dr. James E. Overland, POC Committee member, was named a member of the CFAME Task Team. Dr. Foreman stated that this was an important placement as there is an important role for POC to play in the climate forcing aspect of CFAME's work. Dr. Foreman also said the next series of climate models, with biological feedback, will be soon available from Lawrence Livermore Laboratories, U.S.A., and it would be appropriate for PICES/POC to begin looking at these models to make predictions.

No action has been taken yet to identify a POC Vice-Chairman. Dr. Foreman stated that the positions of Chairman and Vice-Chairman should be from opposite sides of the Pacific.

Dr. Foreman relayed an update from Dr. Vyachelav Lobanov on the activities of NEAR-GOOS. At the annual meeting of the IOC/WESTPAC Coordinating Committee (CC) for NEAR-GOOS (9^{th} Session), 3 Technical Subcommittees were established:

(1) Drifter and Buoy Monitoring, headed by Dr. D.-K. Lee (Korea),
(2) New Generation SST Project, headed by Professor H. Kawamura (Japan),
(3) Data Management, headed by Mr. T. Yoshida (Japan).

Mr. Takashi Yoshida (Japan) was elected as the new Chairman of the NEAR-GOOS CC.

A new POC Working Group to work with CFAME will be proposed at PICES XIV. Its members will examine climate forcing in the North Pacific and work with CFAME to apply these models to biological components. Several new IPCC climate models are available and it is important to examine the variability among them, and their implications for the North Pacific.

ACTION:
***Dr. Foreman*:**
2.POC.1 Identify candidates for POC Vice-Chairman;
2.POC.2 Invite a climate modeller to the POC Paper Session at PICES XIV;
2.POC.3 Develop draft terms of reference for a new POC Working Group.

TCODE
Dr. Igor I. Shevchenko, Chairman of the TCODE Committee, stated that a "federated search" test program involving the Korean Ocean Data Center (KODC) and the North Pacific Ecosystem Metadatabase (NPEM), will be carried out to establish a federated sharing capability between KODC and NPEM. The NPEM team (Drs. S. Allen Macklin and Bernard A. Megrey) has completed some of the program and will visit KODC either prior to, or following, PICES XIV. The KODC Team (Drs. Hee-Dong Jeong and Hae-Seok Kang) has obtained visas to visit NPEM soon, and will proceed similarly with the test plan. The Executive Secretary pointed out that communications related to this project were largely between Korean and U.S. members, and that broader communication within TCODE was necessary. Dr. Shevchenko reported that the website will inform the members when a meeting will be planned.

Dr. Shevchenko requested PICES funding to support the travel of a TCODE representative to the 3rd International Symposium on GIS/Spatial Analysis in Fishery and Aquatic Sciences August 22-26, 2005 in Shanghai. The Secretariat will find money in the existing budget.

Dr. Shevchenko discussed the need for Chinese participation in TCODE. TCODE needs an updated national report from China, but that there was no representation from China at their recent meeting. Science Board Chairman suggested sending a letter to the Chinese.

TCODE is due to replace its chairman at PICES XIV.

ACTION:
***Dr. Shevchenko*:**
2.TCODE.1 Update TCODE website concerning NPEM meetings.

MONITOR
Dr. Jeffrey M. Napp, acting on behalf of the MONITOR Technical Committee, reported that a workshop on "*Filling the gaps in the PICES North Pacific ecosystem status report*" will be convened by MONITOR at PICES XIV. The Continuous Plankton Recorder (CPR) Advisory Panel has been placed under the MONITOR Technical Committee. Dr. Napp reported that two Korean members, Professor Young Jae Ro and Dr. Young Sang Suh, have been added to the Committee. Terms of reference for the GOOS Advisory Panel will be formulated by PICES XIV.

ACTION:
***Dr. Napp*:**
2.MONITOR.1 Provide terms of reference for the GOOS Advisory Panel.

CCCC Program
The CCCC Co-Chairmen reported that Dr. Batchelder is due to rotate off as Co-Chairman at PICES XIV and that Dr. Suam Kim's Co-Chairmanship term will expire at PICES XV.

The CCCC Program now consists of two Task Teams: MODEL and CFAME. MODEL has been very proactive in obtaining funding for its workshops (see below). The newly formed CFAME Task Team will examine the large-scale aspects of climate forcing in ecosystems.

Co-Chairmen are Drs. Akihiko Yatsu (Japan) and Kerim Aydin (U.S.A.), who have a 2-year and 3-year term respectively.

A CFAME workshop on "*The development of a CFAME work plan and hypothesis for CCCC synthesis*" will be held in Victoria, Canada on May 14-15, 2005. Drs. Kazuaki Tadokoro (Japan) and Jurgen Alheit (Germany) were invited to help to finalize the Task Team's terms of reference and to develop a plan to define goals.

CCCC/MODEL is planning a workshop in Tokyo, Japan, on November 14-17, 2005 to extend the NEMURO.FISH model from herring and saury to multispecies of fish. Co-sponsors for this workshop are APN, FRA, and IAI. Funding is in place to run the workshop. The Task Team requested funds to have a users' manual translated from English to other languages as a capacity building contribution, but it was not approved by SB, given that an English version was not available for review. Dr. Francisco E. Werner (U.S.A.) agreed to continue as MODEL Co-Chairman for one more year. Dr. Thomas C. Wainwright (U.S.A.) will begin serving as Co-Chairman at PICES XIV.

The MODEL Task Team held an Asia Pacific Network–Fisheries Research Agency of Japan (APN–FRA) meeting at Louisiana State University, U.S.A., on March 5-10, 2005, where the present APN project on Pacific herring was reviewed. Papers on NEMURO models and activities were also assessed and 12-20 manuscripts were submitted to *Ecological Modelling* for publication near the end of 2005.

A proposal was made to FRA to support an international workshop on "*Global comparison of sardine, anchovy and other small pelagics – Building towards a multi-species mode*l". Another proposal was submitted to APN's CAPaBLE program to continue to advance capacity building in the study of the global fluctuations of sardines and anchovies. If the proposal is accepted, MODEL will request travel support from PICES for two scientists. At PICES XIII, the MODEL Task Team adopted the objectives of (1) geographic variation in fish growth, (2) the understanding of fish regime shifts, and (3) global climate change effects on energy pathways and fish production as the targets suitable for CCCC. The Task Team's plan was to continue to develop these activities, and it was hoped that these objectives would be considered for the next major integrating program for PICES.

The Advisory Panel on the *Iron fertilization experiment in the subarctic Pacific Ocean* was a subsidiary of the BASS Task Team, which has disbanded. It was temporarily placed under the auspices of the CCCC Program, but will be once again looking for a more permanent home at PICES XIV. BIO Committee has agreed to table a proposal to house IFEP-AP at their meeting at PICES XIV.

The APN grant for 2004 called for the creation of an internet site for all NEMURO model source code on an AFSC website. A restricted access portal was established, but Dr. Werner reported that access will be provided and that the site will act more as a repository for code and documentation than a place to upload data. A User's Manual for NEMURO will be published on the PICES website. The plan is to publish it in four other languages if this is approved by PICES Science Board.

The CCCC Program would like to see a new program in place by 2009-10 so the CCCC Program can start to ramp down. The GLOBEC Scientific Steering Committee will be meeting in Rome on June 1-3, 2005, and Dr. Suam Kim will attend on behalf of PICES/CCCC.

ACTION:

***Dr. Batchelder/Dr. S.Kim*:**

2.CCCC.1 Seek approval from SB to publish the NEMURO manual in four languages;

2.CCCC.2 Dr. Kim to report on GLOBEC SSC meeting.

Draft Action Plans for each Committee and the PICES Action Plan (Agenda Item 3)

The BIO Strategic Plan was revised to be consistent with the PICES Strategic Plan. SB adopted the basic format of BIO's Strategic Plan for all Committees. A draft Action Plan covering from 2-5 years will be reviewed by SB and sent to GC for approval by October. It was agreed that the Action Plan product/outcome will be posted on the web when finalized.

In the future, the Organization should maintain an archive of versions of Committee Action Plans. Science Board will be asked to identify commonalities among committees in these plans.

ACTION:
***SB*:**
3.1 Review draft Action Plans for submission to GC for approval by PICES XIV.
Dr. Stein:
3.2 Develop one Strategic Plan template to be used for all Committees.
***PICES Secretariat*:**
3.3 Post approved Action Plans on the PICES website.

Biogeochemical issues within PICES (WG 17 and IFEP-AP) (Agenda Item 4)

Invited speaker, Dr. Richard A. Feely, member of WG 17, made a presentation on the future of carbon cycle studies in PICES. He stated that PICES has done an outstanding job in facilitating the international activities of Working Groups 13 and 17, and leads the way in providing a prototype for a regional coordination group focused on the scientific problem of Carbon and Climate. To meet the needs related to this issue, Dr. Feely proposed that a new Section on Carbon and Climate be formed as a regionally (rather than globally) focused group that would play a pivotal role in ensuring that basin-scale scientific problems were addressed appropriately.

Discussion revolved around what the goals of the IOCCP were, what were the Pacific components, and what could PICES bring to the table. Dr. Sabine stated that the scientific objectives could be found in the SOLAS/IMBER documents. What was needed was a group to coordinate a program and bring people together through a PICES venue. PICES had the structure, expertise and leadership to offer, which would be used in a bottom-up approach on a regional scale, which could then be put into a global context. It was suggested during discussion that a PICES Carbon and Climate Activity might be a joint section of both the POC and BIO Committees. No consensus on this was reached.

The Executive Secretary provided SB/GC with a brief background and update of the Advisory Panel on the *Iron fertilization experiment in the subarctic Pacific Ocean* (AP-IFEP). Based upon unexpected outcomes of the 2001 joint Japan/Canada Subarctic Pacific Iron Experiment for Ecosystem Dynamic Study (SEEDS-I), the 2002 Canada/Japan Subarctic Ecosystem Response to Iron Enrichment Study (SERIES), and the 2004 Japan/U.S. SEEDS-II, the Advisory Panel felt it important to add an additional term of reference. SB agreed to the addition of a fourth term of reference, "To synthesize, compare and contrast the results of conducted experiments (SEEDS-I & II and SERIES), and to develop new experimental strategies and hypotheses to explain the different biogeochemical responses to iron enrichment".

Concerning a new parent group for IFEP, suggestions were offered to place IFEP under either MEQ or BIO. BIO Chairman, Dr. Dagg, agreed to propose to BIO Committee that IFEP be included as an advisory panel of BIO at the PICES XIV.

Integration and conclusion of the CCCC Program (Agenda Item 5)

As the Climate Change and Carrying Capacity Program nears its end, a 3-day Symposium on "*Climate viability and ecosystem impacts on the North Pacific: A basin-scale synthesis*", co-

sponsored by GLOBEC, will be held in Honolulu, U.S.A. on 19-21 April 2006. Each day is devoted to a different theme. Closing presentations will be given by Dr. Makoto Kashiwai (Japan) and Dr. John Davis (Canada) who were asked to provide their impressions of the success and failures of the PICES CCCC Program, and if we had failures, what we might have done differently to achieve success. Their talks will be followed by a panel discussion. The Executive Secretary suggested that the summaries prepared by the closing speakers might be published in a PICES Scientific Report. He felt that it was important to record the strengths and weaknesses of the Program in a PICES report.

The CCCC Program will remain part of PICES activities for as long as GLOBEC activities continue, until 2009/2010. The CCCC Program may require a 2- to 3-year follow-up, after this date, to answer carrying capacity issues.

Committee Chairman and Vice-chairman positions (Agenda Items 6 and 21)

The issue of establishing a Vice-Chairman position for each Committee was discussed at PICES XIII, and to date there still was no consensus. Science Board recommended that a Vice Chairman position should be from the opposite side of the Pacific as the Chairman. Council agreed to amend the Rules of Procedure to include Vice-Chairman or Co-Chairman positions, at the discretion of the Committee, and that a term for Vice-Chairman cannot be longer than 3 years.

Science Board and Council agreed that there needs to be flexibility for the extension of terms for Chairmen.

ACTION:
***Governing Council*:**

6.1 Amend Rules of Procedure to provide flexibility in choosing either Vice-Chairman or Co-Chairman positions for Committees;

6.2 Prepare a draft on rules for selecting a Chairman and circulate to Committees before PICES XIV;

6.3 Standardize Rules of Procedure and Current Practices.

MONITOR Technical Committee (Agenda Item 7)

New Chairman, Dr. Jeffrey Napp, will be developing the Action Plan in the coming months.

ACTION:
***Dr. Napp*: Develop MONITOR Action Plan.**

Identify list of high-priority PICES activities that are candidates for external funding (Agenda Items 8 and 15)

The Executive Secretary reported that the Finance and Administration Committee (F&A) and Governing Council had questions regarding fund raising. GC/F&A often do not know what the funding opportunities are within countries and requested Science Board to list high priority projects that warranted support (*SB-IM Endnote 3*).

Suggestions were made that PICES could match funds with the Office of International Science and Engineering at the National Science Foundation in order to send students to international labs. Science Board Chairman suggested that PICES organize a summer school for students. Interest in this was expressed from Governing Council and the Secretariat, and it was recommended that this be put on PICES XIV agenda. CCCC Co-Chairman, Dr. Kim, provided an example of Korea/GLOBEC fund matching for students, and recommended that the Secretariat use money to support Koreans to go to PICES. FIS Chairman, Dr. Yukimasa Ishida recommended that the Nippon Foundation (http://www.nippon-foundation.or.jp/eng/index.php3) be approached internally by Japan. Nippon will match funds at 80:20 if PICES can show a commitment. There is a

possibility that Nippon could support PICES young scientists as well.

ACTION:
***SB*:**
8.1 PICES summer school to be put on PICES XIV agenda;
8.2 Consider having PICES match funds with Korea/GLOBEC.

Analysis of performance/input from past and existing PICES working groups (Agenda Item 9)

At the 2004 inter-sessional Science Board/Governing Council meeting, Council instructed Science Board to review Working Groups performance using the SCOR approach of contacting ex- and active chairmen for input. A list of all PICES working groups from 1992 to the present was provided by the Executive Secretary. SB was asked to consider which working groups were successful, or not, in terms of:

- clear (and realistic) terms of reference, in particular with objectives and deliverables;
- capable and committed Chairmen;
- committed, available, and interested members;
- adequate resources (time and funding);
- active communication with (and guidance from) the parent committee;
- frequent reporting deadlines.

POC Committee Chairman, Dr. Foreman, volunteered to perform the analysis which will be used to help draft a set of guidelines for future Working Groups. Gordon Kruse (U.S.A.) was also identified as a leader in this activity. It was suggested that it would also be valuable to have a member from Japan active in this. The report is to be completed by PICES XIV.

ACTION:
***Dr. Foreman*:**
9.1 Prepare analysis of 15 PICES Working Groups and submit results at PICES XIV.

Status of proposed publications (Agenda Item 10)

The Executive Secretary provided a review of publications that had just recently been published and those that were expected to be. Deputy Executive Secretary, Dr. McKinnell, reviewed the status of special issues of peer-related journals and of special publications. Dr. McKinnell also stated that a new Special Publications series had been initiated and that Special Publication No. 1, "*Marine Ecosystems of the North Pacific*", had recently been published, and that Special Publication No. 2, "*Marine Life in the North Pacific Ocean: The Known, Unknown and Unknowable*" was in press.

Status of preparations for PICES XIV (Agenda Item 11)

Progress in organizing sessions for PICES XIV has been slow. The Executive Secretary noted that some convenors are having difficulty finding invited speakers for their sessions because the top people are booked elsewhere. Speakers need to be identified and contacted as soon as possible to ensure the success of PICES XIV.

Status of proposed inter-sessional workshops/ symposia (Agenda Item 12)

The Executive Secretary reported that funding to support travel by invited speakers to the symposium on "*The status of Pacific salmon and their role in North Pacific marine ecosystems*", to be held in Jeju, Korea, October 30 to November 1, 2005, will take priority over travel support for Steering Committee members.

PICES has agreed to provide logistical support for the "Line-P" symposium to be held in Victoria, Canada on July 5-7, 2006. If funding is available from the Office of Naval Research (U.S.A.), then the CREAMS/PICES workshop on "*East Asian marginal seas circulation: what we know and how well can we forecast?*" can be held near Vladivostok, Russia in 2006. If not,

the workshop will be combined with PICES XV in Yokohama, Japan in 2006.

Though the PICES/ICES Young Scientists Conference is scheduled in early 2007, ICES has not yet identified their scientists for the Conference Steering Committee. The possibility of fund-raising from the Nippon Foundation was discussed.

Wooster Award (Agenda Item 13)

Nominations for the 2005 Wooster Award were reviewed by Science Board *in camera*, and a recipient was selected.

Process to develop the next major integrating program for PICES (Agenda Item 14)

A summary of the development of the CCCC Program was provided by former PICES Chairman, Dr. Warren Wooster.

Council directed SB to prepare terms of reference for a new study group that would develop candidates for the next major integrating program. The SG would include all persons on SB on April 7, 2005, plus additional representatives appointed by member nations with less than two representatives on the study group. It was suggested that preliminary one-page theme proposals be put on each PICES Committee website to elicit comments by June 1, 2005. The one-page proposals would then be ranked by SB at PICES XIV, and given to GC for review. At the 2006 inter-sessional Governing Council/Science Board meeting, reviews and feedback would be provided by Council, and a tentative topic selected for further discussion at PICES XV in 2006.

ACTION:

***SB Committee Chairmen*:**

14.1 prepare terms of reference for a new study group;

14.2 solicit nominations for new members, up to a maximum of two, from each member country;

14.3 discuss with committee members and prepare one-page themes for the next major integrating program by June 1, 2005 and place on the PICES website for review and comments;

14.4 discuss and rank the themes at PICES XIV, and present to Governing Council for review.

Governing Council:

14.5 review and provide feedback to SB at the 4th intersessional meeting in 2006.

Status of proposed changes in membership for subsidiary bodies (Agenda Item 16)

MONITOR Chairman, Dr. Phillip Mundy, due to other commitments, was unable to attend this year's SB/GC inter-sessional Meeting, or to continue in his capacity as Chairman. In his place, Dr. Jeffrey Napp (U.S.A.) was unanimously endorsed as MONITOR Chairman by Science Board. Dr. Mundy, who will continue as a member of the Technical Committee, was thanked, *in absentia*, for the contributions he had made. Dr. Orio Yamamura was recommended as Co-Chairman of the AP-MIE. SB unanimously endorsed his nomination.

Status of planned proposals to support PICES activities (Agenda Item 17)

The Executive Secretary provided updates on funding by the North Pacific Research Board (NPRB) to support PICES activities. In March 2005, NPRB funded the proposal on the Bering Sea Indicators Workshop in the amount of US$99,957, and approved CDN$90,000 for the production of the next version of the North Pacific ecosystem status report. Three funding projects (APN, FRA, NMFS) related to the activities of the MODEL Task Team (see Agenda Item 2) have been proposed. Decisions on funding for the APN and FRA proposal are expected some time in April 2005. BIO's 2004-2005 request for funding from NPRB to support MIE-2 was not successful. A proposal for the same activity has been submitted to Canada's Natural Science and Engineering Research

Council and a decision is expected by summer 2005.

Capacity building (Agenda Item 18)

Suggestions were made to provide funds to students awarded best presentation and to offer proposal writing courses. This item was also discussed under Agenda Items 1.1 and 7.

Interactions with other organizations/ programs (Agenda Item 19)

Dr. McKinnell is an *ex officio* member of the PaCOOS Governing Board. PaCOOS is the Pacific Coastal Ocean Observing System of NOAA/Fisheries. It recently established three committees: data management, ocean observing, and data analysis and interpretation. The Board was asked to nominate members to each committee. Science Board suggested that Dr. William Peterson (U.S.A.) could serve as the PICES representative on the ocean observing committee. A full report of PICES interactions will be given at the Annual Meeting.

PICES communications (Agenda Item 20)

The Executive Secretary described how the Secretariat was asked by Science Board to improve its website/database. It was now endeavouring to increase the "science content" on the site, but needed input from Committees and Working Groups. There has been little or no response from members. Dr. Batchelder, Chairman of the Web Committee, was of the view that he was there for quality control, and that Committee Chairmen were to contribute the content. Council congratulated the Secretariat on the huge improvement of the organization ad functionality of its website. Committee Chairmen found it to be timely updated and were satisfied with the fast retrieval of information.

ACTION:
***Committee Chairmen*:**

20.1 Populate committee web pages with interesting science.

Other items (Agenda Item 22)

PICES Chairman, Dr. Vera Alexander, proposed the development of a new fisheries management science that would take an ecosystem-based approach. PICES could play a lead role in coordinating the main components of this science, either in consort with an ecosystem-based management activity, or as a separate PICES initiative.

BIO Chairman, Dr. Dagg, proposed the concept of green travel, by allowing travelers to calculate air or auto travel in terms of CO_2 production. For awareness purposes, perhaps PICES could list an internet calculator on its website.

Dr. Dagg reported that he will be co-hosting a symposium entitled "*Coastal ecosystem responses to changing nutrient inputs from large temperate and sub-tropical rivers, with emphasis on comparison among Mississippi (U.S), Pearl (China), Yangtze (China), and Rhone (France) Rivers*" in Xiamen, China, in May/June 2005. The next symposium will be held in 2007 or 2008 to discuss impacts of North Pacific rivers on the coastal ocean, and Dr. Dagg inquired if PICES would be interested in co-hosting and sponsoring such a symposium. It was suggested that this request be put forth formally at PICES XIV.

ACTION:
***Dr. Dagg*:**

22.1 Make a formal request at PICES XIV to have PICES co-host/sponsor a symposium on coastal rivers and basins for 2007/08.

SB-IM Endnote 1

Participation list

Science Board members

Harold P. Batchelder (Co-Chairman, CCCC-IP)
Michael J. Dagg (Chairman, BIO)
Michael Foreman (Chairman, POC)
Yukimasa Ishida (Chairman, FIS)
Kuh Kim (Chairman, Science Board)
Suam Kim (Co-Chairman, CCCC-IP)
Igor I. Shevchenko (Chairman, TCODE)
John E. Stein (Chairman, MEQ)

Governing Council members and advisors

Vera Alexander (Chairman, PICES)
Robin Brown (Canada, alternate delegate)
Lev N. Bocharov (Russia, national delegate)
George Boehlert (U.S.A., national delegate)
Dong Sil Park (Korea, alternate delegate)
Chul Park (Korea, national delegate)
Jae-Soo Park (Korea, advisor)
Samuel Pooley U.S.A., national delegate)
Laura Richards (Canada, national delegate)
Tokio Wada (Japan, national delegate)

PICES Secretariat

Alexander Bychkov (Executive Secretary)
Stewart M. McKinnell (Deputy Executive Secretary)

Invited Guests

Norman Bartoo (SWFSC, U.S.A.)
Richard Feely (PMEL, U.S.A.)
Jeffrey M. Napp (AFSC, U.S.A.)
Christopher Sabine (U.S.A.)
Warren Wooster (UW; Past Chairman, PICES)
Usha Varanasi (NWFSC, U.S.A.)

SB-IM Endnote 2

Science Board/Governing Council inter-sessional meeting agenda

Wednesday, April 6, 2005

1. Welcome, introductions, logistical details, purpose of meeting
2. Updates from Scientific Committees and Programs
   - 2.1 BIO (Dagg)
   - 2.2 FIS (Ishida)
   - 2.3 MEQ (Stein)
   - 2.4 POC (Foreman)
   - 2.5 TCODE (Shevchenko)
   - 2.6 MONITOR (Napp)
   - 2.7 CCCC (Batchelder/Kim)
3. Draft Action Plans for each Scientific Committee and Program and the complete PICES Action Plan
4. Biogeochemical issues within PICES
5. Integration and conclusion of CCCC Program
6. Committee Chairman and Vice-Chairman positions
7. MONITOR Technical Committee
8. High priority PICES activities that are strong candidates for external funding
9. Analysis of performance/input from past and existing PICES working groups
10. Status of proposed publications

Thursday, April 7, 2005

11. Status of preparations for PICES XIV
12. Status of proposed inter-sessional workshop/symposia
13. 2005 Wooster Award
14. Process to develop the next major integrating program for PICES
15. High priority PICES activities that are strong candidates for external funding (Agenda Item 8, continued)
16. Status of proposed changes in membership for subsidiary bodies
17. Status of planned proposals to support PICES activities
18. Capacity building actions
19. Interactions with other organizations/ programs
20. PICES communications
21. Committee Chairman and Vice-Chairman positions (Agenda Item 6, continued)
22. Other items

SB-IM Endnote 3

High Priority PICES activities that are strong candidates for external funding

High Priority PICES activities:

Rank	Topic	Show of hands
1	Study Group on *Future Integrative Scientific Program(s)*	5
1	North Pacific Ecosystem Status Report	5
3	Young Scientists Conference	4
4	International Exchange and Capacity Building	3
5	GOOS integration into PICES	2
6	Matching funds	1

REPORT OF SCIENCE BOARD

The Science Board met on October 2, 2005 (12:30-13:30), to review the agenda and discuss initial items relating to the upcoming PICES scientific sessions. On October 4 (19:00-20:00), a special meeting for the Study Group on *Future integrative scientific program(s)* was convened. Science Board met again on October 8 (08:30-17:30) to deal with the remainder of the agenda. Ms. Rosalie Rutka served as rapporteur for the Science Board and special meetings. (See *SB Endnote 1* for list of participants.)

October 2, 2005

Science Board Chairman, Dr. Kuh Kim, welcomed participants and called the meeting to order. The agenda was discussed and adopted as presented in *SB Endnote 2*.

Review on procedures for Best Presentation Awards and Closing Session (Agenda Item 3)

Dr. Kim reviewed the criteria for Best Presentation Awards and the procedure for the Closing Session, based on the procedures adopted for PICES X. It was re-stated that young scientists should be the recipients of all but the Science Board Award. Young scientists eligible for the award were identified from information they provided on their registration forms. Science Board used the procedure whereby each Committee nominated one member to serve on a Poster Award Committee to determine the Best Poster. The name of the winning poster was then submitted to Science Board. For PICES XIV, the Poster Award Committee consisted of Drs. Georgiy Moiseenko, Michael Schirripa, Darlene Smith, William J. Sydeman, Francisco E. Werner, Sinjae Yoo, and Yury I. Zuenko.

It was decided that the Closing Session would consist of an introduction by Dr. John E. Stein, Science Board Vice-Chairman, of themes proposed for the next major scientific program(s) of PICES, followed by a presentation of the Best Presentation Awards and the PICES Service Award to retiring FIS Committee Chairman, Dr. Yukimasa Ishida, a look towards PICES activities in the coming year, including the theme of the upcoming Annual Meeting, and brief presentation by Dr. Hideki Nakano regarding preparations for PICES XV, and a few final words of thanks from the PICES Chairman.

Review of procedures for documentation of PICES scientific sessions (Agenda Item 4)

Documentation of scientific sessions and workshops is required by session/workshop convenors (*SB Endnote 3*). Science Board members agreed to be responsible for relevant sessions and workshops, and to ensure that session convenors completed their descriptions prior to the conclusion of PICES XIV.

Completion of Science Board recommendations and Governing Council decisions from PICES XIII and the 2005 inter-sessional SB/GC meeting (Agenda Item 5)

Science Board accepted the report on decisions and recommendations from PICES XIII and the 2005 inter-sessional SB/GC meeting, which were of relevance to Science Board (*SB Endnote 4*).

October 4, 2005

Special meeting for the Study Group on *Future integrative scientific program(s)*

A special meeting of the Study Group on *Future integrative scientific program(s)* was convened by Science Board Chairman, Dr. Kuh Kim, on October 4, 2005 (19:00-21:00), to discuss the next major integrative program of PICES. The new Study Group included all Science Board members plus representatives from member nations and invited guests (see *FISP Endnote 1* located at the end of SB Endnotes). Six

proposals for potential themes from Study Group members and invited guests were presented, reviewed, and assessed. Keywords, goals, future directions, and timelines for program development were determined, which would then be presented by Dr. Stein, at the Closing Session on October 6, 2005. A formal presentation would then be given to Governing Council on Saturday, October 8. Upon acceptance by Council, the proposals would then be posted on the PICES website for comments and advice from the PICES community by December 1, 2005.

October 8, 2005

Elections of new Committee Chairmen and Vice-Chairmen, and membership changes (Agenda Items 6, 7 and 9a)

Dr. Gordon Kruse (U.S.A.) was elected as the new FIS Chairman, replacing Dr. Yukimasa Ishida (Japan). Dr. John Stein (MEQ Chairman) and Dr. Igor Shevchenko (TCODE Chairman) will continue for 1 additional year. Dr. Stein will also continue for 1 more year as Vice-Chairman of Science Board. Dr. Ishida noted that the nationalities of the current Committee Chairmen are strongly weighted on North America and that the balance of representation of Science Board and other Committee memberships should be considered in the future.

Drs. Hideki Nakata (Japan) and Ichiro Yasuda (Japan) were elected as MEQ Vice-Chairman and POC Vice-Chairman, respectively, for 1 year. Dr. Bernard A. Megrey was nominated as Vice-Chairman of TCODE. He accepted the proposal in principle, but needs permission from his head of laboratory.

CCCC-IP/EC proposed that Mr. Gordon (Sandy) A. McFarlane (Canada) succeed Dr. Harold Batchelder as North American Co-Chairman of the CCCC Program effective May 1, 2006. Science Board supported the replacement of Dr. Francisco E. Werner as MODEL Co-Chairman by Dr. Thomas C. Wainwright (U.S.A.).

Analysis of performance of PICES Working Groups (Agenda Item 8)

Dr. Michael Foreman (POC Chairman) presented a report on the analysis of performance/input from PICES Working Groups, dating from 1992 to the present. Questionnaires were sent to 63 former chairmen and 12 responses were obtained. A synthesis of replies indicated that the key ingredients for a successful Working Group were: (1) focus with a clear mandate, (2) resources (funding and time), (3) collaboration with outside organizations, (4) leadership, with the ability to delegate, (5) enthusiasm, (6) active and dedicated members, and (7) frequent communications. Dr. Foreman will use the results to draft a set of guidelines for future Working Groups, to be presented at the 2006 inter-sessional Science Board meeting.

Reports of Committees and Program under Science Board (Agenda Item 9)

Existing and proposed new subsidiary bodies (Agenda Item 9b)

Science Board recommends that:

- WG 16 on *Climate change, shifts in fish production and fisheries management* (under the direction of FIS) be disbanded. The final report is pending review, and its publication is expected in 2006 as a PICES Scientific Report;
- WG 17 on *Biogeochemical data integration and synthesis* (under the direction of POC) be disbanded and replaced by the Section on *Carbon and climate* (under the direction of BIO and POC). The completion of "Guide to best practices for oceanic CO_2 measurements and data reporting" is still pending;
- Responsibility for the Advisory Panel on *Continuous Plankton Recorder (CPR) survey in the North Pacific* move from the CCCC Program to the MONITOR Technical Committee;
- Responsibility for the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean* move from the CCCC Program to BIO.

Science Board recommends the following new subsidiary bodies:

- a Section on *Carbon and climate* under the direction of POC and BIO Committees (approved at the 2005 inter-sessional Governing Council meeting);
- a Working Group on *Evaluations of climate change projections* under the direction of POC (*POC Endnote 5*);
- a Working Group on *Non-indigenous aquatic species* under the direction of MEQ (*MEQ Endnote 3*);
- a Study Group to develop a strategy for GOOS under the direction of MONITOR (*MONITOR Endnote 4*).

Terms of reference for the proposed Section and Groups can be found in *GC Appendix B*.

Inter-sessional symposia, workshops; Working Group, Section and CCCC Program meetings proposed for 2005 and beyond (Agenda Item 9c)

The following inter-sessional meetings/ workshops are to be convened/co-sponsored in 2005 and beyond (a List of Acronyms can be found at the end of the Annual Report):

- a SEEDS-II Experiment Workshop (co-sponsored by the Ocean Research Institute (University of Tokyo) and PICES) to synthesize results from the second *in situ* iron enrichment experiments in the western subarctic North Pacific (SEEDS II), and to discuss differences in magnitude, biology and export between SEEDS I and SEEDS II, October 17-18, 2005, Tokyo, Japan;
- a symposium, co-sponsored with NPAFC, on "*The status of Pacific salmon and their role in North Pacific marine ecosystems*", October 30-November 1, 2005 (in conjunction with the NPAFC Annual Meeting), Jeju, Korea;
- an FRA/APN/IAI/PICES/GLOBEC Work-shop to extend NEMURO.FISH to fish stocks in other geographic regions, November 14-17, 2005, Tokyo, Japan (approved in 2004);
- an International Repeat Hydrography Workshop (co-sponsored with JAMSTEC, CLIVAR and IOCCP) and a meeting of the PICES Carbon and Climate Section, November 14-16, 2005, Shonan Village, Japan;
- a CCCC/CFAME Workshop on "*A comparison of regional mechanisms for fish production: Ecosystem perspectives*", January 12-13, 2006, Tokyo, Japan;
- a panel discussion at the "*Marine Science in Alaska*" Symposium, January 25, 2006, Anchorage, U.S.A., and a session during the North Pacific Fisheries Management Council meeting, week of February 6, Seattle, U.S.A., to involve the Bering Sea and international communities in the development of a set of operational objectives;
- an inter-sessional Science Board/Governing Council meeting, April 17-18, 2006, Honolulu, U.S.A.;
- a 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. (approved in 2003);
- a PICES/NPRB Workshop on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*", June 1-3, 2006, Seattle, U.S.A.;
- an ESSAS/PICES Workshop to develop comparative studies of the sub-Arctic seas, June 12-14, 2006, St. Petersburg, Russia;
- a Symposium entitled "*Time series of the Northeast Pacific Ocean: A symposium to mark the 50th anniversary of P-line*" (co-sponsored with DFO), July 5-8, 2006, Victoria, Canada (approved in 2004);
- a CREAMS/PICES Workshop on "*Model-data inter-comparison for the Japan/East Sea*", and summer school on "*Circulation and ecosystem modeling*" August 21-25, 2006, Busan, Korea;
- ICES/PICES theme sessions on "*Large-scale changes in the migration of small pelagic fish and the factors modulating such changes*" and on Operational Oceanography (title TBD) at the ICES Annual Science Conference, September 2006, Maastricht, The Netherlands;
- an International Conference on "*The Humboldt Current system: Climate, ocean dynamics, ecosystem processes and fisheries*" (co-sponsored with IMARPE,

IRD, NASA, FAO, GLOBEC, ICES and IMBER), November 27-December 1, 2006, Lima, Peru (*SB Endnote 5*);
- a Symposium on "*Marine bioinvasions*" (co-sponsored with ICES and MBC), spring 2007, Washington, D.C., U.S.A. (approved in 2003)
- a 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" (co-sponsored by GLOBEC and ICES), May 28 - June 1, 2007, Hiroshima, Japan (approved in 2003);
- an ICES/PICES Young Scientists Conference, spring or summer 2007, location TBD (approved in 2003);
- an ICES/PICES/IOC Symposium on "*Effects of climate change on the world oceans*", spring 2008, Gijón, Spain.

Proposed Scientific Sessions and Workshops for next Annual Meeting and draft schedule (Agenda Items 9d and 12)

The theme of PICES XV is "*Boundary current ecosystems*" (see description in *SB Endnote 6*). The following list of sessions and workshops to be convened at (or in conjunction with) PICES XV from October 16-20, 2006, was endorsed by GC (a List of Acronyms can be found at the end of the Annual Report):

Science Board Symposium (¾-day)
Boundary current ecosystems (*SB Endnote 6*)

BIO/FIS Topic Session (1-day)
The human dimension of jellyfish blooms (BIO Endnote 6a)

BIO/IMBER Topic Session (1-day)
Interactions between biogeochemical cycles and marine food webs in the North Pacific (BIO Endnote 6b)

BIO (IFEP-AP) Topic Session (1-day)
Synthesis of in situ *iron enrichment experiments in the eastern and western subarctic Pacific (IFEP-AP Endnote 6)*

BIO (MIE-AP) Topic Session (1-day)
Advances in epi- and meso-pelagic ecosystem research (*MIE-AP Endnote 2*)

CCCC/MODEL Topic Session (½-day)
Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy (MODEL Endnote 4)

CCCC Contributed Paper Session (½-day)
Patterns and process of North Pacific ecosystem responses to physical forcing and climate change

FIS Contributed Paper Session (1-day)

FIS/CCCC Topic Session (1-day)
Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data (CFAME Endnote 5)

MEQ/ FIS Topic Session (1-day)
Aquaculture for sustainable management of the marine ecosystem (WG 18 Endnote 4)

MEQ Topic Session (1-day)
Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences (HAB Endnote 4)

POC Contributed Paper Session (1-day)

POC/MONITOR/CCCC Topic Session (1-day)
Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability (POC Endnote 7)

TCODE E-Poster Session

The following workshops are to be convened from October 13-15 (a List of Acronyms can be found at the end of the Annual Report):

IFEP/MODEL Workshop (1-day)
Modeling iron biogeochemistry and ocean ecosystems (IFEP-AP Endnote 5)

FIS Workshop (2-day)
Linking climate to trends in productivity of key commercial species in the subarctic Pacific (FIS Endnote 3)

MEQ/FIS (WG 19) Workshop (1-day)
Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area (WG 19 Endnote 5)

MEQ (HAB-S) Workshop (1-day)
Review of selected harmful algae in the PICES region: II. Dinophysis *and* Cochlodinium spp. followed by a ½-day laboratory demonstration on DSP detection *(HAB-S Endnote 3)*

POC (WG 20) Workshop (1-day)
Evaluation of climate change projection

MONITOR/TCODE Workshop (1-day)
Data management, delivery and visualization of products (MONITOR Endnote 5)

Draft Schedule (Dec. 12, 2005)

Time		Events					
Fri. Oct. 13	09:00-12:30	FIS Workshop (W3)		IFEP Workshop (W1)	MIE-AP Meeting	WG 21 Meeting	WG 19 Meeting
	14:00-18:00		HAB-S Lab. (W5)		MBM-AP Meeting		
Sat. Oct. 14	09:00-18:00	FIS Workshop (W2)	HAB-S Workshop (W4)	WG 20 Workshop (W5)	CC-S Meeting	WG 18 Meeting	WG 19 Meeting
	18:00-20:00	CPR-AP Meeting					
Sun. Oct. 15	09:00-12:30	TCODE/MONITOR Workshop (W6)		HAB-S Meeting	CC-S Meeting	CFAME Meeting	WG 19 Workshop (W4)
	12:30-14:00	SB Lunch Meeting *					
	14:00-18:00	TCODE/MONITOR Workshop (W6)		HAB-S Meeting	CC-S Meeting	MODEL Meeting	WG 19 Workshop (W4)
	18:00-20:00	CCCC IP/EC Meeting*					
Mon. Oct. 16	09:00-10:30	Opening Session					
	11:00-18:00	Science Board Symposium (S1)					
Tues. Oct. 17	09:00-12:30	BIO Topic Session (S4)		MEQ Topic Session (S9)	CCCC Topic Session (S6)		Governing Council Meeting *
	14:00-18:00				CCCC Paper Session		
	18:00-20:00	SG-GOOS Meeting					
Wed. Oct. 18	09:00-15:30	BIO Topic Session (S5)		FIS Paper Session	POC Paper Session		F&A Meeting *
	16:00-19:30	BIO Meeting	FIS Meeting	MEQ Meeting	POC Meeting	TCODE Meeting	MONITOR Meeting
Thurs. Oct. 19	09:00-18:00	BIO Topic Session (S3)		FIS/CCCC Topic Session (S7)		FIS/MEQ Topic Session (S8)	
	18:00-20:30	Poster Session and E-Posters				SG-FISP Meeting	
Fri. Oct. 20	09:00-17:30	BIO/FIS Topic Session (S2)			POC/MONITOR/CCCC Topic Session (S10)		
	17:30-18:30	Closing Session					
Sat. Oct. 21	09:00-18:00	Science Board Meeting *			Governing Council Meeting *		
Sun. Oct. 22	09:00-13:00	Governing Council Meeting *					

* Closed Session

Travel support requests (Agenda Item 9e)

PICES will provide travel support for:

PICES XV

- Invited speakers for Topic Sessions at the Annual Meeting with the normal allocation of approximately $5,000 per Committee and Program (additional requests are subject to fund availability);
- 1 invited speaker for the joint IFEP/MODEL Workshop on "*Modeling iron biogeo-chemistry and ocean ecosystems*";
- 1 invited speaker from Europe to the MEQ (HAB-S) workshop on "*Review of selected harmful algae in the PICES region: II.* Dinophysis *and* Cochlodinium spp.";
- 1 invited speaker to the MEQ/FIS (WG 19) Workshop on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*";
- 1 invited speaker to the POC (WG 20) Workshop on "*Evaluation of climate change projections*".

Inter-sessional meetings

- PICES representative to attend the 2005 CalCOFI Conference and the PaCOOS Board meeting (December 2005, La Jolla, U.S.A.);
- PICES observer to participate in the NEAR-GOOS meeting (January 2006, Pusan, Korea; may or may not require travel support);
- 2 scientists (1 Russian and 1 Chinese) to attend the CCCC/CFAME Workshop on "*A comparison of regional mechanisms for fish production: Ecosystem perspectives*" (January 12-13, 2006, Tokyo, Japan);
- PICES representative to attend the meetings of the ICES/IOC/IMO Working Group on *Ballast Waters and Other Ship Vectors* and the ICES Working Group on *Introductions and Transfers of Marine Organisms* (March 2006, Oostende, Belgium);
- TCODE representative to attend the meeting of the ICES Working Group on *Marine Data Management* (dates and venue TBD);
- Dr. Kenneth A. Rose (U.S.A.) to present MODEL contribution to the April 2006 CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*";
- 1 scientist to participate in the ESSAS/PICES workshop to develop comparative studies of the sub-Arctic seas (June 12-14, 2006, St. Petersburg, Russia);
- PICES representative to the IOC Executive Committee meeting (June 2006, Paris, France);
- 1 invited speaker to the CREAMS/PICES Workshop on "*Model/data intercomparison for the Japan/East Sea*" and 1 lecturer to the CREAMS/PICES summer school on "*Ocean circulation and ecosystem modeling*" (August 21-25, 2006, Busan, Korea);
- PICES convenors to the joint ICES/PICES theme sessions at the ICES Annual Science Conference (September 2006, Maastricht, The Netherlands);
- Dr. Sergej Olenin (co-funding with ICES) to attend the first meeting of the PICES Working Group on *Non-indigenous aquatic species* (October 2006, Yokohama, Japan), to discuss and demonstrate Delivering Alien Invasive Species Inventories for Europe (DAISIE) database (EU project);
- PICES representative to attend the SCOR General Meeting (October 2006, Concepción, Chile);
- PICES representative to attend the NPAFC Fourteenth Annual Meeting (October 2006, Vancouver, Canada).

Science Board Chairman to attend:

- inter-sessional Science Board/Governing Council meeting (April 17-18, 2006, Honolulu, U.S.A.);
- 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.);
- 2006 ICES Annual Science Conference (September 2006, Maastricht, The Netherlands);
- PICES Fifteenth Annual Meeting (October 2006, Yokohama, Japan).

Proposed publications (Agenda Item 9f)

Special issues of primary journals, 2006-2007:

- *Progress in Oceanography* (2006; Guest Editors: G. Hunt and S. McKinnell) – selected papers from the PICES XIII Topic Session on "*Mechanisms that regulate North Pacific ecosystems: Bottom up, top down, or something else?*" (approved in 2004);
- *Deep-Sea Research II* (2006; Guest Editors: W. Sydeman, A. Bychkov, R. Brodeur, C. Grimes, H. Kato and S. McKinnell) – selected papers from the PICES XIII Topic Session on "*Hot spots and their use by migratory species and top predators in the North Pacific*" (approved in 2004);
- *Ecological Modelling* (2006; Guest editors: M. Kishi, B.A. Megrey, S.-I. Ito, and F.E. Werner) – selected papers on NEMURO and NEMURO.FISH models (approved in 2004);
- *Deep-Sea Research II* (2006; Guest Editors: P. Boyd and P. Harrison) – selected papers from the IFEP SERIES experiment;
- A leading international journal (2007) – on "Seabirds as Indicators", including dietary analyses based on the 2003 and 2004 MBM-AP workshops on "Combining data sets on diet of marine birds and mammals" that was approved in 2004;
- *Progress in Oceanography* (2007; Guest editors: K. Drinkwater, G. Hunt, D. Mackas and S. McKinnell) – selected papers from the ESSAS Symposium on "*Climate variability and sub-arctic marine ecosystems*";
- *Progress in Oceanography* (2007; Guest editors: H. Batchelder and S. Kim) – selected papers from the CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*";
- *Progress in Oceanography* (2007; Guest editors: A. Peña and TBD) – selected papers from the symposium on "*Time series of the Northeast Pacific Ocean: A symposium to mark the 50th anniversary of Line-P*".

PICES Scientific Report Series, 2005-2006

- Final report of WG 16 on *Climate change, shifts in fish production, and fisheries management* (approved in 2002 for publication in 2004, delayed till 2006, pending review by OC and CCCC; Editors: R. Beamish, and A. Yatsu);
- Guide to best practices for oceanic CO_2 measurements and data reporting (approved in 2002 for publication in 2004, delayed till 2006; Editor: A. Dickson);
- Findings of the data-sharing project for federated meta-data on North Pacific ecosystems (approved in 2004; Editors: A. Macklin and B. Megrey);
- Report of the 2005 OECOS (Oceanic Ecodynamics COmparison in the Subarctic Pacific) Workshop (Editors: T. Ikeda and C. Miller);
- Report from the project on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*" (Editors: S. McKinnell, A. Bychkov, G. Jamieson, G. Kruse, P. Livingston and J. Overland);
- Proceedings from the CREAMS/PICES Workshop on "*Model/data intercomparison for the Japan/East Sea*" and the summer school on "*Circulation and ecosystem modeling*" (Editor: K.-I. Chang and TBD);
- WG 18 report based on the national reports on the current status and trends in aquaculture in PICES member countries (Editors: I.-K. Chung and C. Friedman).

Other publications, 2006–2007

- American Fisheries Society book on regional comparisons in the NE Pacific (formal title TBD). (Guest editors: R. Brodeur, C. Grimes, L. Haldorson and S. McKinnell);
- PICES Handbook and Handbook for Chairmen and Convenors.

Other items with financial implications (Agenda Item 9g)

- MEQ requested funding from PICES to purchase test kits for Russian scientists to help in HAB lab capacity building in Russia.

High-priority projects (Agenda Item 10)

The Executive Secretary reported that the Finance and Administration (F&A) Committee and Governing Council (GC) had questions regarding fund raising. The GC and F&A often do not know what the funding opportunities are within countries and requested SB to list high-priority projects that warranted support (*SB-IM Endnote 3*).

1. Study Group on *Future Integrative Scientific Program(s)*
2. North Pacific Ecosystem Status Report
3. Young Scientists Conference
4. International Exchange and Capacity Building
5. GOOS integration into PICES
6. Matching funds

Science Board agreed that the above ranking would still remain the same.

MEQ Chairman, Dr. Stein, indicated that he would make a proposal to the Asia Pacific Network for funding to supply monitoring test kits for Russian scientists to monitor events in the western Pacific in a HAB training workshop. (This item arose during discussion of Agenda Item 15, but is placed here for clarity.)

Relations with other programs/organizations (Agenda Item 11)

The Standing List of International Organizations and Programs facilitates PICES interactions with other programs and indicates high priority organizations/programs to whose meetings PICES should regularly send a representative (see *SB Endnote 7* for the revised list).

Selection of PICES XVI theme and description (Agenda Item 13)

Canada suggested a theme entitled "*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*" for the Sixteenth Annual Meeting to be held in Victoria in 2007. Science Board approved the theme after minor editorial changes (*SB Endnote 8*).

Review of Committee Action Plans (Agenda Item 14)

Science Board agreed that all Committee Action Plans should have a standardized format and would be placed on the PICES website for review and comparison by December 2005. Upon review in early 2006, the Plans would either be endorsed or modified further at the 2006 inter-sessional Science Board/Governing Council meeting.

Discussion of PICES capacity building opportunities/PICES-ICES Young Scientist Conference (Agenda Item 15)

Dr. Adolf Kellermann, Head of the ICES Science Program, and Dr. Skip McKinnell, PICES Deputy Executive Secretary, were to draft a letter by the end of October 2005 to the PICES/ICES Young Scientist Conference Steering Committee requesting the Committee to commence development of session topics, schedule, and venue by January 31, 2006.

Inter-sessional Science Board meeting (Agenda Item 16)

The third inter-sessional Science Board meeting, with the participation of Governing Council, took place April 6-7, 2005, at the NOAA Sand Point facilities in Seattle, U.S.A. The report from this meeting is provided elsewhere in this Annual Report.

Science Board agreed that a fourth inter-sessional meeting will be held in Honolulu, U.S.A. in 2006, in conjunction with the CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*". The main topics for further discussion will be:

- the further development of FISP;
- finalization of Action Plans.

Other business (Agenda Item 17)

No other business was brought forward.

Best Presentation and Poster Awards

Dr. William Peterson (U.S.A.) received the Best Presentation Award at the Science Board Symposium for his presentation (co-authored with Rian Hooff and Robert Emmett) entitled, "*Extreme climate variability in the northern California Current: Can we explain the current anomalous warm state and its effects on the coastal upwelling ecosystem off Washington and Oregon?*"

The Best Poster Award went to Hanna Na for her poster (co-authored with Dr. Kuh Kim) entitled "*Temporal variation of the estimated volume transport through the Korea and Tsugaru Straits*".

The term "young scientist" was clarified and several suggestions were made to expedite the judging of posters for the next Annual Meeting. SB Chairman, Dr. Kim, endorsed the suggestion to have a Best Poster for each Committee, which would be open to all ages, although each Committee could decide if the posters would be weighted towards young scientists. SB would also carry a Best Poster competition, eligible to all participants. Best Presentation from each committee would remain restricted to young scientists. The PICES Secretariat, in consultation with Science Board, will draft the rules for selecting best posters.

Awards given by Committees and Program can be found elsewhere in the Annual Report. The Science Board meeting concluded at 1730 h.

SB Endnote 1

Participation list

Members

Harold P. Batchelder (Co-Chairman, CCCC-IP)
Michael G. Foreman (Chairman, POC)
Yukimasa Ishida (Chairman, FIS)
Kuh Kim (Chairman, Science Board)
Suam Kim (Co-Chairman, CCCC-IP)
David L. Mackas (acting for BIO Chairman, Michael J. Dagg)
Jeffrey M. Napp (Chairman, MONITOR)
Fangli Qiao (SB, representative of China)
Igor I. Shevchenko (Chairman, TCODE)
John E. Stein (Chairman, MEQ)

Observers

Adolf Kellerman (Head, Science Programme, ICES)
Stewart (Skip) M. McKinnell (Deputy Executive Secretary, PICES)
Rosalie Rutka (PICES Administrative Assistant)

SB Endnote 2

Science Board meeting agenda

October 2, 2005 (12:30 – 13:30)

1. Welcome and opening remarks
2. Adoption of agenda
3. Review of procedures for Best Presentation Awards and Closing Session
4. Review of procedures for documentation of PICES scientific sessions
5. Completion of Science Board recommendations and Governing Council decisions from PICES XIII and the 2005 inter-sessional SB/GC meeting

October 5, 2005 (19:00 – 21:00)

Special Meeting for the Study Group on *Future Integrative Scientific Programs*

October 8, 2005 (08:30 – 17:30)

6. Elections of new Committee Chairmen

7. Election of Science Board Vice Chairman
8. Analysis of performance/input from PICES Working Groups
9. Reports of Committees and Program under Science Board:
   a) Brief summary report of the group's activities in the past year, including membership changes
   b) Proposed list of any future groups along with Terms of Reference and a list of potential members
   c) Inter-sessional meetings proposed for 2005 and beyond (symposia; workshops; Working Group, Section, and CCCC Program meetings)
   d) Proposed titles for Scientific Sessions and Workshops for the next Annual Meeting, including draft session descriptions and proposed convenors
   e) Travel support requests
   f) Proposed publications (PICES Scientific Report Series and primary journals) for 2005 and beyond
   g) Other items with financial implications
10. High priority projects
11. Relations with other international programs/organizations
12. Develop PICES XV draft schedule of scientific sessions and workshops
13. Selection of PICES XVI theme and description
14. Review of Committee Action Plans
15. Discussion of PICES capacity building opportunities / PICES-ICES Young Scientist Conference
16. Inter-sessional Science Board meeting
17. Other business

SB Endnote 3

Review of procedures to enhance documentation of PICES scientific sessions

(From: PICES Annual Review 2001, SB Endnote 11, p. 52)

For the last few years, PICES has only included information of the proposed Topic Sessions for the upcoming year in its Annual Report, and has not provided details regarding the actual scientific sessions after their conclusion, particularly with regard to any key discussions or recommendations that such sessions might have generated. It became clear to those who are preparing reviews of PICES scientific accomplishments over the last decade, that we have not well-documented the science contained in our Annual Meetings, with the exception of papers that were compiled later into PICES Scientific Reports or other publications.

If we are to better track the state of our knowledge and future needs for improvement, it seems we should have a better system for documenting our scientific sessions and the discussions and recommendations that come from those. One possible system would be that employed by ICES in their Annual Report. (See a copy of their latest annual report on the web at http://www.ices.dk/products/AnnualRep/2001 annualreport.pdf). The section devoted to the Annual Science Meeting puts forth the following information:

- keynote lectures and abstracts
- science meeting agenda (session schedules)
- details of each scientific session

The last item, details of each scientific session, contains an organized description of each session that includes:

- purpose of the session (derived from the initial session description);
- details of the content of the papers presented in summary form;
- summary of the discussions and conclusions of the session with regard to: research gaps that need to be filled; recommendations for future sessions or groups, or work; recommendations for other actions; and
- list of the documents (author and title) presented.

PICES has struggled to enhance the discussions at our Topic Sessions, and if we ask convenors to document the sessions and the discussions, we may see a better organization of Topic Sessions

in this regard. We would also have a more organized way to provide scientific recommendations for action to the parent Committee(s) that sponsored the session.

Recommendation: Session convenors be asked to provide a summary of their session that includes the four points listed above, and these summaries be included in the PICES Annual Report. This practice would begin with the PICES Eleventh Annual Meeting in 2002. Also, session convenors should be requested to include a fixed amount of discussion time at the end of their sessions (15 minutes) in order to provide for proper discussion of the papers and issues raised by the papers.

SB Endnote 4

Status of Science Board recommendations and Governing Council decisions from PICES XIII and the 2005 inter-sessional SB/GC meeting

04/S/1: Inter-sessional meetings/workshops

The following inter-sessional meetings were convened or co-sponsored:

- A 3-day Science Board/Governing Council meeting, April 6-7, 2005, Seattle, U.S.A.;
- A 2-day CREAMS/PICES Workshop on "*East Asian Seas Time-series (EAST-I)*" as part of the CREAMS/PICES project, April 21-22, 2005, Seoul, Korea (co-sponsored by PICES, Ministry of Maritime Affairs and Fisheries (Korea) and School of Earth and Environmental Sciences (BK21) of Seoul National University);
- A 2-day CCCC/CFAME workshop to develop a workplan for future CFAME (*Climate Forcing and Marine Ecosystem Response*) Task Team activities and hypothesis for CCCC synthesis, May 14-15, 2005, Victoria, B.C., Canada;
- A 5-day ESSAS Symposium on "*Climate variability and sub-Arctic marine ecosystems*" (Co-sponsored with GLOBEC and several other organizations), May 16-20, 2005, Victoria, Canada;
- A 2-day OECOS Workshop to plan "*An east-west comparative study of lower trophic level pelagic ecology in the subarctic Pacific Ocean*" (Co-sponsored by PICES and OSU), May 23-24, 2005, Corvallis, U.S.A.;
- A 1-day ICES/PICES Theme Session on "*Multidisciplinary approaches to the identification of stock structure of small pelagics: Implications for assessment and sustainable management*" at the ICES Annual Science Conference, September 20-24, 2005, Aberdeen, Scotland;
- A 1-day ICES/PICES Theme Session on "*Regional ecosystem pilot projects, ecosystem forecasting, and operational oceanography: Comparing and contrasting scientific tools, strategies, outputs, and applications*" at the ICES Annual Science Conference, September 20-24, 2005, Aberdeen, Scotland.

The following were held in conjunction with PICES XIV in Vladivostok, Russia:

- A 2-day HAB/MEQ Workshop on "*Review of selected harmful algae in the PICES region: I.* Pseudo-nitzschia *and* Alexandrium", September 29-30, 2005;
- A 1-day MONITOR Workshop on "*Filling the gaps in the PICES Ecosystem Status Report*", October 1, 2005;
- A ½-day IFEP/MODEL Workshop on "*Modelling and iron biogeochemistry: How far apart are we?*", October 2, 2005;
- A 2-day MEQ Workshop on "*Introduced species in the North Pacific*" (Co-sponsored with ICES), October 4-5, 2005.

04/S/2: Travel Support

Full or partial travel support was provided to:

PICES XIV

- 3 invited speakers (Drs. Stephen Bates, Charles Trick, Satoshi Nagai) to the MEQ/HAB Workshop on "*Review of selected harmful algae in the PICES region*";

- 3 invited speakers (Drs. R. Ian Perry, Jacqueline Alder, Robin Rigby) to the MONITOR Workshop on "*Filling the gaps in the PICES Ecosystem Status Report*";
- 2 invited speakers (Drs. Peter Croot, Naoki Yoshie) to the IFEP/MODEL Workshop on "*Modelling and iron biogeochemistry: How far apart are we?*";
- 2 invited speakers (Drs. Helge Botnen, Sergei Olenin) to the PICES/ICES Workshop on "*Introduced species in the North Pacific*";
- 11 other invited speakers of scientific sessions at PICES XIV;
- 15 Chinese, 3 Japanese, 1 Indian, 11 Korean, and 17 Russian (mostly registration fees) and 3 U.S. scientists to PICES XIV.

Inter-sessional meetings

- PICES representative, Dr. Sei-Ichi Saitoh, to attend the NPAFC Twelfth Annual Meeting (November 2004, Sapporo, Japan);
- MONITOR Co-Chairman, Dr. Sei-Ichi Saitoh, to represent PICES at the NEAR-GOOS Coordinating Committee meeting (November 2004, Sendai, Japan);
- TCODE Chairman, Dr. Igor Shevchenko, to participate in the Ocean Biodiversity Data Symposium (November 2004, Shanghai, People's Republic of China);
- PICES representative, Dr. Mark Wells, to attend the meeting of the ICES/IMO/IOC Working Group on *Ballast waters and other ship vectors*, (March 14-18, 2005, Arendal, Norway);
- PICES representative, Dr. Skip McKinnell (Deputy Executive Secretary) to attend the PaCOOS Governing Board (March 2005, Seattle, U.S.A.);
- 1 invited speaker, Dr. Yury Zuenko (Russia), to attend the CREAMS/PICES Workshop on "*East Asian Seas time series*" (April 2005, Seoul, Republic of Korea);
- PICES representative, Dr. Ian Perry, to attend the NPAFC CSRS (Committee on Scientific Research and Statistics) meeting (April 2005, Nanaimo, Canada);
- Co-Chairman, CCCC Program, Dr. Suam Kim to represent PICES at the GLOBEC SSC meeting (June 2005, Rome, Italy);
- Invited speaker, Dr. Kazuaki Tadokoro, Japan, to the 2005 CFAME inter-sessional workshop (May 2005, Victoria, Canada);
- PICES WG 16 Co-Chairman, Dr. Akihiko Yatsu, to work with Dr. Richard Beamish (WG 16 Co-Chairman) to finish the Working Group report (May 2005, Nanaimo, Canada);
- 1 invited speaker, Dr. Victor Lapko (Russia), and 2 young Korean scientists (from the Trust Fund) to the ESSAS Symposium on "*Climate variability and sub-Arctic marine ecosystems*" (May 16-20, 2005, Victoria, Canada);
- 13 scientists (6 from Japan and 7 from Canada and the U.S.A.) to attend the OECOS Workshop on "*An east-west comparative study of lower trophic level pelagic ecology in the subarctic Pacific Ocean*" (May 2005, Corvallis, U.S.A.);
- PICES representative, Dr. Skip McKinnell (Deputy Executive Secretary) to attend the meeting of the ICES-GOOS Steering Group (June 2005, Brest, France);
- PICES representative, Dr. Alexander Bychkov (Executive Secretary), to attend the GCP (Global Carbon Project) SSC meeting and the 23rd Assembly of the Inter-governmental Oceanographic Commission held consecutively in June 2005, Paris, France;
- FERRRS Chairman, Dr. Jacquelynne King, to present the FERRRS report of the Pacific Fishery Management Council (June 2005, San Francisco, U.S.A.);
- TCODE Chairman, Dr. Igor Shevchenko to attend Symposium on GIS in Fishery and Aquatic Sciences (August 2005, Shanghai, People's Republic of China);
- PICES convenors, Drs. Douglas Hay and Stewart McKinnell) to the joint ICES/PICES Theme Sessions on "*Fisheries, ecology and life history of small pelagic fish"* and *"Comparing and constructing the scientific strategies and output of regional ecosystem projects*" at the 2005 ICES Annual Science Conference (September 2005, Aberdeen, Scotland);
- 1 Korean scientist and 2 U.S. scientists to participate in two meetings (September 2005, in Seattle, U.S.A.; and October 2005, in Pusan, Republic of Korea) of the "Federated metadata project".

04/S/3: Publications

Publications produced after the Thirteenth Annual Meeting include:

Special issues of primary journals in 2005

- *ICES Journal of Marine Science* (Vol. 62(3), May 2005) – selected papers from the 2004 Symposium on "*Quantitative ecosystem indicators for fisheries management*" (Guest editor: Niels Daan), includes 40 papers by authors from Europe, South Africa, Australia, and North America;
- *Deep-Sea Research II* (Vol. 52(5–6), 2005) – selected papers from the 2003 PICES Workshop on "*Linkages between open and coastal systems*" (Guest editors: S. McKinnell and G. McFarlane).

PICES Scientific Report series

- PICES Scientific Report No. 27 (November 2004), Report of the MODEL Task Team *Second workshop to develop a marine ecosystem model of the North Pacific Ocean including pelagic fishes,* Kishi, M.J. (Ed.), 49 p.
- PICES Scientific Report No. 28 (January 2005), Report of the Study Group on *Fisheries and ecosystem responses to recent regime shifts*, King, J. (Ed.), 162 p.
- PICES Scientific Report No. 29 (January 2005), Report of the Study Group on *Ecosystem-Based Management Science and its application to the North Pacific,* Jamieson, G. and Zhang, C.I. (Eds.), 77 p.
- PICES Scientific Report No. 30 (May 2005), Final Report of PICES Working Group 14 on *Micronekton of the North Pacific,* Brodeur, R. and Yamamura, O. (Eds.), 115 p.

PICES Special publications

- Marine Ecosystems of the North Pacific, PICES Special Publication 1, 2004, 280 p.
- Marine life in the North Pacific Ocean: The known, unknown and unknowable, PICES Special Publication 2, 2005, 46 p.

Other publications

- Advisory Report on "*Fisheries and ecosystem responses to recent regime shifts in the North Pacific*", PICES, 2005, 12 p. (brochure)
- "*The journey to PICES: Scientific cooperation in the North Pacific*", Tjossem, S. 2005 (a book on the history of PICES)

PICES Press - Newsletters

- Two regular issues: Vol. 13, No. 1 (January 2005) and Vol. 13, No. 2 (September 2005).

04/S/4: Future of current Working Groups and Scientific Programs

- CCCC *Basin Scale Studies* (BASS) and *Regional Experiment* (REX) Task Teams and *Nemuro Experimental* Planning Team (NEXT) completed their tasks and were disbanded (approved at the 2004 inter-sessional Science Board/Governing Council meeting).
- Study Group on *PICES Strategic Issues* (under Governing Council) completed its terms of reference and was dissolved.
- Study Group on *Fisheries and ecosystems responses to recent regime shifts* (under Science Board) completed its report and was disbanded.
- Study Group on *Ecosystem-based management science and its application to the North Pacific* (under MEQ and FIS) submitted its report and was disbanded.
- WG 14 on *Effective sampling of micronekton* (under BIO) completed its report and was disbanded.
- WG 16 on *Climate change, shifts in fish production and fisheries management* (under FIS) has submitted a final report which is in review. The group was disbanded.
- Accomplishments of the Advisory Panel on *Marine birds and mammals* (under BIO) were reviewed and rated highly by the parent committee, and the Panel will continue for another 5-year term.
- Advisory Panel on *Continuous Plankton Recorder survey in the North Pacific* (CPR-AP) was moved outside the CCCC Program and is under the direction of the MONITOR Technical Committee.

- Due to disbanding BASS, the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean* will report directly to the BIO Committee.

04/S/5: New PICES Groups

- The MONITOR Task Team was moved outside the CCCC Program to become a Technical Committee directly under Science Board (approved at the 2004 inter-sessional Science Board/Governing Council meeting).
- A Task Team on *Climate Forcing and Marine Ecosystem Response* (CFAME) was established under the CCCC Program (approved at the 2004 inter-sessional Science Board/Governing Council meeting).
- A Working Group on *Ecosystem-based management science and its application to the North Pacific* was formed under the direction of FIS and MEQ.
- An Advisory Panel for a *CREAMS/PICES Program in East Asian Marginal Seas* was established under POC.

SB Endnote 5

"The Humboldt Current system: Climate, ocean dynamics, ecosystem processes and fisheries"

Date: November 27 –December 1, 2006
Conveners: Arnaud Bertrand (IRD), Renato Guevara Carrasco (IMARPE), Pierre Soler (IRD)
Venue: Lima, Peru
Sponsored by: IMARPE, IRD, NASA, FAO, GLOBEC, ICES, PICES, IMBER

Scope of the Conference

The ocean off the west coast of South America is notable for several reasons. First, it produces more fish per unit area than any other region in the world oceans. Second, it is an area of low oxygen and intense denitrification contributing significantly to global budgets. Third, it is intimately linked to the ocean-atmosphere coupling over the tropical Pacific, and therefore subject to large year-to-year and decade-to-decade fluctuations in regional ocean climate. Finally, these processes have combined to preserve a detailed ecosystem history in the sediments over the past millennium and beyond.

An outstanding synthesis on the dynamics of the Peruvian Upwelling System was produced by IMARPE in conjunction with ICLARM (now World Fish Center) and the Deutsche Gesellschaft für Technische Zusammenarbeit during the mid 1980s and published as conference proceedings in 1987 and 1989. These efforts continue to serve as major references for the Humboldt Current System (HCS).

Since the 1980s, important technical and conceptual advances have transformed many areas of marine science. These changes provide a new background to re-examine the question surrounding the linkages between climate, ocean circulation, biogeochemical cycles and fish production. New observing capabilities, data synthesis and analysis, and improved ocean mapping and modelling tools can now provide a view of the dynamics of the HCS ecosystem within a multidisciplinary context.

Operational fisheries management is also evolving away from a monospecific to an "Ecosystem-Based" paradigm. This new approach appears to be particularly appropriate for the HCS, where the uncertainty associated with decadal variability and regime shifts represent major challenges for Ecology and Fisheries research.

There is clearly a need, and an opportunity now, to undertake a new integration and synthesis to advance our understanding of the Humboldt Current System. The challenges include synthesis of available data, application of improved numerical models and integration across disciplines and habitats.

The objectives of this Conference are to initiate this new regional integration and synthesis and to foster exchanges among regional and international experts. Contributions that update

the early synthesis with work done in the region during the last two decades are especially encouraged as are modelling and integrative efforts. Similar syntheses from other eastern boundary systems are invited, especially if they are carried out within a comparative framework. New observations and conceptual models are also encouraged.

SB Endnote 6

PICES XV Theme (Yokohama, Japan)
"Boundary current ecosystems"

The North Pacific is surrounded by boundary currents (*e.g.*, Kuroshio, Tsushima, Oyashio, California, Alaska, Bering Slope) that support a diversity of ecosystems. These ecosystems are highly variable in space and time due to combinations of climate change, decadal "regime" shifts, ENSO and other interannual variability, seasonal and event mesoscale dynamics. This variability has lead to dramatic changes at both low and high trophic levels, including productivity, range extensions, and species dominance. This theme will provide opportunities to address questions such as 1) How will climate variation and projected climate change influence the dynamics and variability of boundary currents? 2) How will boundary current ecosystems respond to these physical property and transport changes? 3) How does human activity (*e.g.*, fishing, hatcheries) alter the sensitivity of boundary current ecosystems to natural environmental forcing?, and 4) What are appropriate management strategies to maintain healthy, sustainable living marine resources in boundary current systems that experience large environmental variations? Presentations that describe, compare and/or contrast biology, fisheries, physics, geochemistry of boundary currents and the ecosystems they support are encouraged.

SB Endnote 7

Revised Standing List of International Organizations and Programs

PICES is expanding its relationships with international scientific organizations of regional and global scale, and with regional scientific and monitoring efforts in the North Pacific that are aligned with the PICES ecosystem research focus. These regional programs may involve several PICES member countries and cover international areas of high ecological importance. Annually, the Science Board examines and revises the *Standing List of International and Regional Organizations and Programs*. Additionally, it selects a subset of organizations and programs that are considered to have the highest priority (marked by *) for PICES with respect to scientific cooperation and facilitation in the coming year.

The 2005 additions to the list, below, are: Ecosystem Studies of Sub-Arctic Seas (ESSAS)*, International Maritime Organization (IMO), Bering Ecosystem Study (BEST)*, North Pacific Fishery Management Council (NPFM), Northwest Association of Networked Ocean Observing Systems – Integrated Ocean Observing System (NANOOS-IOOS) which replaces Pacific Northwest Integrated Ocean Observing System (PNW-IOOS), and Global Earth Observing System (GEOS). This list will be used, in part, to assist the Executive Secretary and Science Board in decisions regarding travel to meetings of other international organizations.

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 WG, Asia Pacific Economic Cooperation
APEC-FWG*	Fisheries Working Group, Asia Pacific Economic Cooperation
APFIC	Asia-Pacific Fisheries Commission
APN	Asia-Pacific Network for Global Change Research
Argo*	International Program for deployment of profiling floats (linked with GOOS)
BEST*	Bering Ecosystem Study
CLIVAR*	Climate Variability and Predictability Program
CoML*	Census of Marine Life
CREAMS*	Circulation Research in the East Asian Marginal Seas
DBCP	Data Buoy Cooperation Panel
ECOR	Engineering Committee on Oceanic Resources
ESSAS*	Ecosystem Studies of Sub-Arctic Seas
FAO	Food and Agriculture Organization
GCOS*	Global Climate Observing System
GEM*	Gulf of Alaska Ecosystem Monitoring and Research Program of *Exxon Valdez* Oil Spill Trustee Council (EVOS)
GEOS	Global Earth Observing System
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GIPME	Global Investigation of Pollution in the Marine Environment
GLOBEC*	Global Ocean Ecosystem Dynamics
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
ICSU	International Council of Scientific Unions
IGBP*	International Geosphere-Biosphere Program
IGOSS	Integrated Global Ocean Services System
IMBER*	Integrated Marine Biogeochemistry and Ecosystems Research (former OCEANS)
IMO	International Maritime Organization
IOC*	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
IPCC*	Intergovernmental Panel on Climate Change
IPHC	International Pacific Halibut Commission
IWC	International Whaling Commission
NAFO	Northwest Atlantic Fisheries Organization
NANOOS-IOOS	Northwest Association of Networked Ocean Observing Systems – Integrated Ocean Observing 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
NPFM	North Pacific Fishery Management Council
NPRB*	North Pacific Research Board
PaCOOS*	Pacific Coast Observing System
PORSEC	Pacific Ocean Remote Sensing Conference
PSA	Pacific Science Association
PSC	Pacific Salmon Commission
PSG	Pacific Seabird Group
SAHFOS*	Sir Alister Hardy Foundation for Ocean Science
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
WCRP	World Climate Research Program
WESTPAC*	Cooperative Study of the Western Pacific, IOC Sub Committee for the Western Pacific
WMO	World Meteorological Organization

SB Endnote 8

Theme for PICES XVI (Victoria, Canada, 2007)
"**The changing North Pacific: Previous patterns, future projections, and ecosystem impacts**"

The PICES Special Publication, "Marine Ecosystems of the North Pacific", concluded that "during the past five years profound changes have occurred in the North Pacific climate system, in the composition, abundance and distribution of its living marine resources, and in the human societies that depend on the North Pacific Ocean and its resources". This session will build on studies of climate variability and other anthropogenic impacts in the North Pacific and its marginal seas, the latest North Pacific climate projections (whose results have been summarized in the Fourth Assessment Report of the Inter-governmental Panel for Climate Change), future scenarios for direct human forcing by population growth and fishing, and the combined impacts that these changes have already had, and can be expected to have, on North Pacific ecosystems. This theme will address issues such as: 1) trends versus variability; 2) synergisms between climate and direct human forcing; 3) ecosystem indicators and their applicability in the future; 4) impacts arising from regional changes (*e.g.*, less ice-cover in the Bering Sea and Sea of Okhotsk, aquatic bioinvasions); 5) the effects of terrestrial climate change (*e.g.*, river discharge); 6) how projected global change and anthropogenic impacts may alter sustainability of the North Pacific; and 7) what should be the key messages for policy makers regarding sustainability of the North Pacific. Talks describing links with climate change in the Arctic and the International Polar Year Projects are also welcome.

FISP Endnote 1

Study Group on *Future integrative scientific program(s)* meeting participation list

Members

Harold P. Batchelder (CCCC/U.S.A.)
Michael G. Foreman (POC/Canada)
Yukimasa Ishida (FIS/Japan)
Kuh Kim (SB/Korea)
Suam Kim (CCCC/Korea)
Serge Labonté (acting for Dr. Jake Rice, Canada)
David L. Mackas (acting SGFISP member for Michael J. Dagg (BIO/U.S.A.))
Jeffrey M. Napp (MONITOR/U.S.A.)
Fangli Qiao (SB/China)
Hiroaki Saito (Japan)
John E. Stein (MEQ/U.S.A.)
Igor I. Shevchenko (TCODE/Russia)

Observers

George W. Boehlert (GC/U.S.A.)
Stewart (Skip) M. McKinnell (Deputy Executive Secretary, PICES)
William Peterson (CCCC/U.S.A.)
Samuel Pooley (GC/U.S.A.)
Rosalie Rutka (PICES Administrative Assistant)

REPORT OF BIOLOGICAL OCEANOGRAPHY COMMITTEE

The Biological Oceanography Committee (BIO) met from 08:30-15:30 hours on October 7, 2005. Due to the effects of hurricane Katrina in New Orleans, the Chairman, Dr. Michael J. Dagg, was unable to attend the meeting. Dr. Dagg and the PICES Secretariat asked Dr. David L. Mackas (Canada) to be the on-site substitute. Dr. Mackas called the meeting to order and welcomed members and observers (*BIO Endnote 1*). Drs. Angelica Peña and Michio Kishi agreed to be rapporteurs. The proposed agenda was approved without additions (*BIO Endnote 2*).

Progress reports of existing subsidiary bodies (Agenda Item 3)

The full reports of existing subsidiary bodies can be found elsewhere in this Annual Report. The following are summaries:

Working Group on *Effective sampling of micronekton to estimate ecosystem carrying capacity* (WG 14)

WG 14 published "*Micronekton of the North Pacific*" as PICES Scientific Report No. 30 in May 2005. This report was the final product of the BIO-sponsored group that was formed in 1998. The report was edited by Drs. Richard D. Brodeur and Orio Yamamura and contains contributions from Canadian, Japanese, Korean, Mexican, Russian and U.S. scientists.

Advisory Panel on *Micronekton intercalibration sampling experiment* (MIE-AP)

Dr. Evgeny Pakhomov, Co-Chairman of the Panel, reviewed their terms of reference and described MIE-AP activities in 2005. The second MIE-AP inter-calibration cruise (MIE-2) was just completed off Hokkaido, and plans for a 2006 (MIE-3) cruise in the Bering Sea are proposed to coincide with the 2006 NPAFC BASIS program activities in this area. Attempts will be made to obtain financial support for MIE-3 from the North Pacific Research Board in 2006. So far, no financial support has been obtained for these experiments. At the next Annual Meeting, MIE-AP would like to convene a 1-day workshop on "*Synthesis of MIE-AP sampling inter-calibration experiments*" and a 1-day Topic Session on "*Micronekton biology: Advances in epi- and meso-pelagic ecosystem research*" (*MIE-AP Endnotes 1-2*). This was discussed in more detail under Agenda Item 7.

Advisory Panel on *Marine birds and mammals* (MBM-AP)

MBM-AP held a business meeting on October 5, 2005 and subsequently, Dr. William J. Sydeman, Co-Chairman of the Panel, reported to the BIO Committee on their accomplishments and activities in 2004-2005. The main activities of the group included a joint CPR-AP/MBM-AP monitoring project using ships of opportunity, and an upcoming special *Deep Sea Research II* issue of selected papers from the PICES XIII Topic Session on "*Hot spots and their use by migratory species and top predators in the North Pacific*". An overview of PICES XIV Topic Session on "*Factors affecting distribution, foraging ecology, and life histories of top predators in the northwestern Pacific Ocean and its marginal seas*" was presented. MBM-AP also proposed a Topic Session for PICES XV entitled "*Synchrony in responses of marine top predators to large-scale climate variability: Mechanisms of environmental forcing*" (*MBM-AP Endnote 3*). This was discussed in more detail under Agenda Item 7.

MBM-AP has continuing concern about lack of membership from all PICES member countries.

Proposals for new subsidiary bodies (Agenda Item 4)

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

Recognizing the need for a regional group that has a longer life-time than the typical Working Group, and which will allow PICES to maintain its pre-eminence in this arena while ensuring that the important problems of carbon cycling in the North Pacific are adequately addressed, a Section on *Carbon and climate* was established, under POC and BIO, at the inter-sessional Science Board/Governing Council meeting in April 2005. BIO welcomes the new Section and an enhanced PICES focus on biogeochemistry scientific issues.

The original idea for CC-S came from the POC WG 17 on *Biogeochemical data integration and synthesis* (now disbanded). At the time, Science Board revised the proposed terms of reference for this Section to accommodate more biological issues associated with carbon and climate (*BIO Endnote 3*). BIO reviewed these terms of reference and recommends two additional scientific topics: (1) estimates of the biological pump and (2) potential adverse effects on ocean biota of warming and/or increased CO_2 loading. Also, BIO recommends adding/replacing members to the Section so that more biologists and maybe a BIO member liaison can be added.

Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean* (IFEP-AP)

Dr. Jun Nishioka gave a presentation on the recent and planned activities of IFEP-AP. There was an IFEP/MODEL Workshop at PICES XIV to initiate discussions on incorporating the iron cycle into ecosystem models. A SEEDS-II Workshop will be held in Tokyo on October 17-18, 2005. Several papers on the results of the iron fertilization experiments initiated by the Panel in the subarctic North Pacific have been published. The Panel requested a 1-day joint IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystem*" (*IFEP-AP Endnote 5*) and a 1-day BIO Topic Sessions on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*" (*IFEP-AP Endnote 6*) to be convened at PICES XV. The details of this proposal were discussed under Agenda Item 7.

BIO members unanimously approved re-organizing IFEP-AP under BIO. However, the Committee expressed concern about the duration of IFEP-AP activities and the need to work on a timetable for completion of these activities. These issues will be discussed at the next meeting of IFEP-AP.

Concept for a Working Group on *Euphausiids*

Dr. William T. Peterson summarized the BIO Topic Session (S2) on "*Life history and ecology of euphausiids in coastal and oceanic waters around the Pacific Rim"*, and followed up with a review of current developments toward a PICES-sponsored "Year of the euphausiid" program (see *SB Endnote 10* in the 2004 Annual Report). Possibilities range from a synthesis paper to be presented in April 2006 at the CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*", to establishing a Working Group on *Euphausiids* at PICES XV, if there is sufficient interest (especially from the western Pacific). A document on "*Live euphausiid experimental protocols*" was prepared and circulated to attendees, and will be posted on the PICES website.

Inter-sessional PICES-sponsored meetings and workshops for 2005 and beyond (Agenda Item 5)

2005 OECOS Workshop

A workshop on "*Oceanic Ecodynamics COmparison in the Subarctic Pacific (OECOS)*" was organized in May 2005, in Corvallis, U.S.A., by Drs. Charles B. Miller and Tsutomu Ikeda. This workshop was co-sponsored by PICES and the Oregon State University. Japanese and North American scientists discussed the fundamental questions and observational details of proposed comparative studies of ecological processes in the upper waters of the oceanic subarctic Pacific (*BIO Endnote 4)*.

Dr. Harold P. Batchelder gave a presentation summarizing the OECOS Workshop and an update on OECOS future activities. This included a Japanese proposal for a western Pacific cruise on R/V *Hakuho-Maru* in 2007, between Sakhalin Island and Hokkaido (partly in Russian territorial waters). The funding for the proposal will be known by December 2005. Dr. Ikeda sent a letter to Dr. Vladimir I. Radchenko inviting Russian scientists to join this cruise and is awaiting a response.

Dr. Radchenko stated that Russian scientists are negotiating with Moscow and some difficulties remain. If a Russian ship was used, it would be much simpler, politically, but this is likely not feasible due to specific logistic requirements for berthing space and laboratory facilities.

Dr. Young-Shil Kang requested that Korean scientists be included into the OECOS project. BIO suggests that this request be passed to Drs. Ikeda and Miller.

2006 Line-P Symposium

A status report was given by Dr. Angelica Peña on the symposium titled "*Time series of the Northeast Pacific: A symposium to mark the 50th anniversary of Line-P*". The symposium will be held from July 5-8, 2006, in Victoria, Canada, co-sponsored by Fisheries and Oceans Canada and PICES. Selected papers (oral and posters) will be published in a special issue of *Progress in Oceanography*. A symposium web page will soon be developed and launched on the PICES website.

4th Zooplankton Production Symposium

The symposium, co-sponsored by ICES, PICES and GLOBEC, will be held from May 28–June 1, 2007, at the International Conference Center in Hiroshima, Japan. The primary organizer of this meeting is Dr. Shin-ichi Uye (Japan). Some details of the current status of organization are provided in *BIO Endnote 5*. Dr. Mackas reported that the symposium is on track and will include a special session on comparison of zooplankton time-series.

Proposal for an ICES/PICES/IOC Symposium on "*Effects of climate change on the world's oceans*"

This is proposed to be held in spring 2008, in Gijon, Spain (site of the PICES/ICES/GLOBEC 3rd Zooplankton Production Symposium in 2003). The intended focus and definition for climate change is "global warming trend", not "decadal variability". The BIO Committee endorses the symposium but no member from BIO expressed interest in being a member of the Scientific Steering Committee.

Interactions with international scientific organizations and programs (Agenda Item 6)

Census of Marine Life

Dr. Robin Rigby presented an overview of the Census of Marine Life (CoML) program. So far, there is no regional implementation committee in the North Pacific. A collaborative initiative between CoML and PICES to look at North Pacific eco-regions was discussed. This collaboration could be implemented by having joint workshops, scientific exchanges (scientific internships for young scientists) and publications (*e.g.* an updated look at North Pacific ecosystems). CoML would like to have a more active participation of BIO members on this program since the activities of CoML are most relevant to BIO and MONITOR activities. The BIO Committee suggests that CoML be invited to participate as observer in future BIO meetings to maintain and strengthen PICES interactions with CoML.

Joint sponsorship of scientific session(s) at the 2006 ICES Annual Science Conference

ICES provided a list of topic sessions for its next Annual Science Conference and asked if PICES would like to co-sponsor one or more. The topics were discussed and broadly endorsed by BIO members, but none of the proposed topics is very closely related to BIO Committee activities. BIO supports having joint sessions with ICES but it will not propose co-sponsorship for 2006.

ESSAS/GLOBEC

Dr. George L. Hunt described a new GLOBEC regional program on *Ecosystem Studies of Sub-Arctic Seas* (ESSAS) and tabled a proposal for a joint ESSAS/PICES Workshop on comparing four sub-Arctic ecosystems (the Bering Sea, the Okhotsk Sea/Oyashio region, the Barents Sea and the Newfoundland/Labrador Shelf) to be held in spring 2006, St. Petersburg, Russia (*CCCC Endnote 3*). BIO broadly endorsed ESSAS objectives, but did not propose travel support from BIO for workshop attendees.

Sessions and workshops at PICES XV (Agenda Item 7)

The PICES XV theme is "*Boundary current ecosystems*". BIO received proposals for a total of 10 scientific sessions/workshops to take place before and during PICES XV (*BIO Endnote 6*). The total number of requests exceeds both the scheduling capacity (9 session-days for all PICES committees) and travel support budget (~$5K for BIO). BIO Committee rankings and recommendations follow:

1. A 1-day Workshop or Topic Session on "*Ocean environmental change and jellyfish*" was proposed as a joint BIO/FIS/MEQ event by Dr. Tokimasa Kobayashi (*BIO Endnote 6a*). The proposal was rated very high by BIO members, especially from Asian nations. BIO recommends a 1-day session and travel support for 1 invited speaker.
2. A 1-day Topic Session on "*Interactions between biogeochemical cycles and marine food webs in the North Pacific*" was proposed by Drs. Angelica Peña and Hiroaki Saito (*BIO Endnote 6b*). This was rated very high. BIO recommends a 1-day session and travel support for 1 invited speaker. This session could be co-sponsored by IMBER, which would fund an additional invited speaker.
3. A ½-day Topic Session on "*Ecosystem responses to climate induced changes in along- and cross-shelf transport*" was suggested by Dr. Michael Dagg (*BIO Endnote 6c*) as a joint BIO/POC event. This topic was initially rated very high by BIO, however it was not supported by POC due to scheduling concerns. The topic is sufficiently inter-disciplinary as to require POC participation for success. BIO chose to postpone, and allocate the slot to the next highest-ranking session (see 5, below).
4. A 1-day Workshop on "*Synthesis of MIE-AP sampling inter-calibration experiments*" and a 1-day Topic Session on "*Micronekton biology: Advances in epi- and meso-pelagic ecosystem research*" were recommended by MIE-AP (*MIE-AP Endnotes 1-2*). The workshop will allow time to analyze data from the two MIE cruises, and the session is a follow-up to WG 14 activities. BIO recommends a 1-day workshop, and merging the session into proposal 5 (below).
5. A ½- or 1-day BIO Topic Session on "*The composition and functioning of mid-water ecosystems*" was proposed by Dr. Alexei Orlov (*BIO Endnote 6d*). This topic is relevant to WG 14 and MIE-AP, and also to the "shadow zone" component of IMBER. This topic was ranked high by BIO, but initially left unscheduled for PICES XV due to lack of time. However, after BIO learned that POC would not be co-sponsoring the proposed joint session (see 3, above), BIO recommends a 1-day session (combined with 4, above) and travel support for 1 invited speaker.
6. A 1-day IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystem"* and a 1-day BIO Topic Session on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*", and travel support for 2 invited speakers were requested by IFEP-AP (*IFEP-AP Endnotes 5-6*). BIO felt that these are useful, but that there would not be sufficient time and meeting space available during the meeting. IFEP-AP agreed to propose both as workshops, and to seek travel support elsewhere.
7. A 1-day Topic Session on "*Comparative ecology of North Pacific copepods in genus* Neocalanus" was suggested by Drs. Toru Kobari and Michael Dagg (*BIO Endnote 6e*). BIO did not support the session this year. Although it is a good topic, BIO felt that important new information would be

available after at least one year of sampling during the OECOS project.

8. A 1-day Topic Session on "*Synchrony in responses of marine top predators to large-scale climate variability: Mechanisms of environmental forcing*" was proposed by MBM-AP (*MBM-AP Endnote 3*). Travel support is requested for 4 scientists. This was not supported for this year. The MBM-AP has held workshops and/or sessions at each of the last three PICES Annual Meetings. BIO felt that papers on this topic can fit in the Science Board Symposium on "*Boundary current ecosystems*" (*SB Endnote 6*) or in the POC/MONITOR/CCCC Topic Session on "*Synchronous and asynchronous responses of North Pacific boundary currents systems to climate variability*" (*POC Endnote 7*).

Theme for PICES XVI (Agenda Item 8)

PICES XVI will be held in 2007, in Victoria, Canada. The host country proposed a theme "*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*" (*SB Endnote 8*) for this meeting. BIO members endorsed the theme.

Financial requests (Agenda Item 9)

BIO recommends allocating CND $5,000 available for invited speakers of BIO-supported Topic Sessions at PICES XV, as described under Agenda Item 7.

BIO Action Plan (Agenda Item 10)

BIO reviewed the draft Action Plan prepared by BIO Chairman, Dr. Michael Dagg, and suggested only a few minor revisions and additions. These will be passed to Dr. Dagg for final editing.

Future integrative scientific program(s) of PICES (Agenda Item 11)

Dr. Mackas summarized discussions from the Science Board meeting of October 2. BIO endorses the general outline, and the new goal of making forecasts and predictions, but cannot comment further until the proposals are posted on the PICES website.

BIO web page (Agenda Item 12)

Dr. Harold Batchelder (Chairman of the *ad hoc* website committee) described plans to date. Most of the discussion was on his suggestion that the PICES website should include a current events component on "hot topics" or "PICES science in the news". This could be added as links to other sites where the information can be found (*e.g*. newspapers, program websites, *etc.*). Dr. Batchelder asked members to be proactive and send information to the PICES Secretariat when something unusual or interesting happens. Discussion points and questions from BIO included:

- Cost and labor needed to maintain this by PICES;
- Archival and quality control/peer review;
- Need to obtain copyright permission for any reproduction of media articles.

BIO sees considerable value in Dr. Batchelder's proposal, but also numerous potential problems, and recommends that such a "Current Events" page should be tested for a year as a "closed" (password protected) page, and evaluated for successes and problems next year.

2005 BIO Best Presentation Award

A quorum of BIO Committee members met before the Closing Session to select a winner of the BIO Best Presentation Award. The award was given to Dr. Jaime Jahncke (U.S.A.) for his excellent presentation on "*Krill and krill-predators: Habitat associations in the dynamic Gulf of Farallones, California*" (co-authored with Benjamin L. Saenz, Chris Rintoul and William J. Sydeman).

The Committee thanks Dr. Sinjae Yoo, who represented BIO on the Best Poster Award Committee.

BIO Endnote 1

Participation list

Members

Young-Shil Kang (Korea)
Michio J. Kishi (Japan)
David L. Mackas (Canada, Acting Chairman)
Hideki Nakano (Japan)
Alexei Orlov (Russia)
Angelica Peña (Canada)
Vladimir I. Radchenko (Russia)
Sinjae Yoo (Korea)

Observers

Harold P. Batchelder (U.S.A.)
George L. Hunt Jr. (U.S.A.)
H-K. Kang (Korea)
Jun Nishioka (Japan)
Evgeny Pakhomov (Canada)
William T. Peterson (U.S.A.)
Robin Rigby (CoML)
Tracy Shaw (U.S.A.)
William J. Sydeman (U.S.A.)

BIO Endnote 2

BIO meeting agenda

1. Welcome and introductions of members and observers, appointment of rapporteur
2. Approval of agenda
3. Progress reports of existing subsidiary bodies:
   - MIE-AP
   - MBM-AP
   - WG 14 final report
4. Proposals for new subsidiary bodies
   - Biogeochemical issues
   - "Year of the euphausiid" program
5. Inter-sessional PICES-sponsored meetings and workshops for 2005 and beyond:
   - 2005 OECOS Workshop
   - 2006 Line-P Symposium
   - 2007 Zooplankton Symposium
6. Interactions with international scientific organizations and programs
7. Sessions and workshops at PICES XV
8. Theme for PICES XVI
9. Financial requests
10. BIO Action Plan
11. Future integrative scientific program(s) of PICES
12. BIO web page
13. Other business

BIO Endnote 3

Terms of reference for Section on *Carbon and climate* (April 2005)

1. Coordinate and encourage ongoing and planned national and international syntheses of carbon cycle research studies in the North Pacific and, where necessary and appropriate, for the larger Pacific basin;
2. Ensure effective two-way communication with other international scientific groups that have a responsibility for coordination of ocean carbon studies, such as the International Ocean Carbon Coordination Project (IOCCP), and the SOLAS/IMBER implementation group for carbon research;
3. Review the existing biogeochemical information on carbon cycling within the North Pacific, identify gaps in our knowledge and make prioritized recommendations for future research;
4. Periodically review the status of the methodology of CO_2 measurements including the preparation of standards and reference materials, and advise on inter-calibration and quality control procedures;
5. Identify suitable data sets on the oceanic CO_2 system in the Pacific region as they become available, and recommend the mechanisms of data and information exchange;

6. Carry out and publish (in the refereed literature) basin-scale syntheses of carbon cycling in the North Pacific, including new data whenever appropriate, and encourage scientific interpretation of these evolving data sets;
7. Organize symposiums, workshops, or annual meeting sessions on carbon cycle and climate studies in the North Pacific.

BIO Endnote 4

Scientific issues posed by the OECOS project

The physical setting in the subarctic Pacific was well described by Favorite *et al*. (*Bull. Intl. North Pacific Fish. Comm.*, 3: 1-187, 1976). North of the latitude, about 43°N, where the 33 pss salinity isocline turns vertical and surfaces, the water column is characterized by a 1 pss halocline at about 100 meters, a density gradient which supports substantial internal waves. It is also a barrier to vertical mixing throughout the year, preventing (1) full replenishment of surface nutrients to deep concentrations and (2) complete removal of euphotic zone biota during winter mixing. From spring through autumn, there is also a seasonal thermocline, usually at about 35 m, which divides the euphotic zone into two distinct habitats. The region is a current gyre with slow, disperse flow along the southern side, slow at least east of the dateline, and stronger flow with rapid central cores (the Alaska 'stream') along the northern side. Flow is northward along the British Columbia-Alaska coast (the Alaska Current) and southward past Kamchatka, the Okhotsk Sea entrance and northern Japan (the Oyashio). There is also evidence, although not particularly clear evidence, that this gyre divides into two south of the central Aleutians, with partially closed western and eastern subarctic gyres.

Oceanic sectors of the seas are defined as far from the influence of land. The cores of both western and eastern gyres (whether or not they are indeed separate) definitely qualify as oceanic. In the Gulf of Alaska at sufficient distance from shore, oceanic character includes HNLC conditions, high-nitrate (HN) and low-chlorophyll (LC) throughout the year. Despite the presence of high concentrations of major nutrients (*e.g*., nitrate always greater than 6 μM), phytoplankton never bloom. The bulk of phytoplankton are always nanoplankton, cells smaller than about 5 μm, and chlorophyll levels rarely exceed 0.5 μg l^{-1}.

It is established that the high-nitrate, low-chlorophyll (HNLC) character of subarctic Pacific waters far from land is attributable to limited availability of iron in the euphotic zone (suggested by Martin and Fitzwater, *Nature*, 331: 341-343, 1988). Several mesoscale iron-addition experiments, the Japanese SEEDS project (Tsuda *et al*., *Science*, 300: 958-961, 2003) and Canadian SERIES experiment (Boyd *et al*., *Nature*, 428; 549-553, 2004) have shown that adding soluble iron to the upper mixed layer induces strong increases in standing stocks of microplanktonic (>5 μm) diatoms, algae that without iron addition are present in very low abundance. Part of the explanation of the low chlorophyll condition (Miller *et al*., *Limnol. Oceanogr.*, 36: 1600-1650, 1991) is that microheterotroph (protozoan) grazers capable of rapid increase can eat the consistently small phytoplankton. With iron-limitation firmly established, it remains to explain fully the processes and variations of the lower trophic levels under normal circumstances without iron addition.

Despite the continuously low chlorophyll concentrations in oceanic sectors, there is substantial seasonality of phytoplankton production rates. In the course of the spring transition, during thermal stratification, rates more than double (Harrison *et al*., *Prog. Oceanogr.*, 43: 205-234, 1999; Welschmeyer *et al*., *Prog. Oceanogr*., 32: 101-136, 1993). This surely is attributable to the reduced extent of vertical mixing and consequent increase in cellular light exposure. Nitrate levels are reduced in this period. This is the time that the production *vs*. grazing balance of the HNLC

regime must be most challenged by increasing growth potential of the phytoplankton. In the east, there are oscillations in chlorophyll levels between about 0.15 and 0.6 μg/l, which imply shifting in trophic relations among phytoplankton, protozoa and possibly higher levels including copepods. It is in this period that a suite of copepod species (3 species of *Neocalanus* and *Eucalanus bungii*), which mostly reside at depth in diapause stages the rest of the year, run through active recruitment to older stages, grow and prepare for return to diapause after accumulation of large lipid stores. At least in the eastern gyre these copepods do not eat much phytoplankton directly, as shown by the absence of chlorophyll in their guts (Dagg *et al*., *DSR-I*, 40: 1431-1445, 1993; *Prog. Oceanogr.*, 32: 163-183, 1993), but they grow (Miller, *Prog. Oceanogr*., 32: 1-15, and 32: 295-317, 1993) and thus must be eating foods without green pigments, presumably protozoa. Thus, a food chain of at least three or four steps is implied just in getting to copepods.

For the eastern sector, the dynamics of phytoplankton oscillations have been a subject of speculation (Strom *et al*., *Mar. Ecol. Prog. Ser.*, 193: 19-31, 2000), but there has been as yet little direct research. One aim of OECOS is to understand the control of these oscillations. A section is devoted to this below.

In the western sector, atmospheric dust transport extends farther to sea, allowing spring blooms dominated by diatoms to extend well out into the western gyre, although it appears that the core of the gyre is persistently HNLC. After the bloom passes, apparently due to onset of iron limitation, HNLC conditions are established for the remainder of the year, since major nutrients are not exhausted. The spring bloom creates an opportunity to compare aspects of subarctic ecology with (east) and without (west) iron limitation, at least during the spring transition. The bloom should be fully characterized from before its onset to its termination. Nutrient drawdown, floristics, fate of primary organic matter and the feeding and growth responses of the copepod complex should be characterized in detail. The dominant spring copepods are the same species with the same prolonged diapause phases as inhabit the eastern subgyre, so the comparison of growth under field conditions should be very informative. It is expected that the availability of large phytoplankton will shorten the food chain, provide much more food and allow much more rapid growth.

OECOS participants propose that much can be learned from parallel studies and comparisons of processes in eastern and western subarctic sectors, taking advantage of both differences (bloom *vs*. continuous HNLC conditions) and similarities (identical copepod communities) between them.

BIO Endnote 5

4th International Zooplankton Production Symposium

Dates and venue
May 28 – June 1, 2007, Hiroshima, Japan.

Scientific focus
Human and climate forcing of zooplankton populations

Symposium sponsors
PICES, ICES, GLOBEC

Local sponsors
The Plankton Society of Japan
The Japanese Society of Fisheries Oceanography

Symposium conveners
Dr. Michael J. Dagg (PICES/U.S.A.)
Dr. Roger Harris (GLOBEC/U.K.)
Dr. Luis Valdés (ICES/Spain)
Dr. Shin-ichi Uye (Japan)

Scientific steering committee
Dr. Michael J. Dagg (PICES/U.S.A.)
Dr. Ruben Escribano (GLOBEC/Chile)
Dr. Steven Hay (ICES/U.K.)
Dr. Roger Harris (GLOBEC/U.K.)
Dr. David L. Mackas (PICES/Canada)
Dr. Sun Song (China)
Dr. Luis Valdés (ICES/Spain)

Local organizing committee
Dr. Shin-ichi Uye, Chief (Hiroshima University)
Dr. Hideaki Nakata (Nagasaki University)
Dr. Shuhei Nishida (University of Tokyo)
Dr. Michio Kishi (Hokkaido University)

Program
May 28 (Mon.): workshops
May 29 (Tues.): opening, oral session, reception
May 30 (Wed.): oral and poster sessions
May 31 (Thur.): oral and poster sessions, excursion, conference dinner
June 1 (Fri.): oral and poster sessions, closing

Proceedings
To be published in the *ICES Journal of Marine Science*

Other news:
- Dr. Shin-ichi Uye met the manager of the Hiroshima International Conference Center to discuss the possible room arrangement for the Symposium.
- Dr. Shin-ichi Uye submitted an application to Hiroshima City Office for financial support to the Symposium; a favorable answer was obtained, although the amount is not large.
- A preliminary announcement of the Symposium that was posted on the PICES website and on the ASLO website.
- Dr. Hiroaki Saito (Japan), a member of the IMBER SSC submitted a request to organize a topic session entitled "*Biogeochemical circulation and zooplankton*" (tentative).

BIO Endnote 6

Workshops and Topic Sessions proposed for PICES XV

a) 1-day BIO/FIS/MEQ Topic Session on *"Ocean environmental change and jellyfish"* [later re-named "*The human dimension of jellyfish blooms*"]

We can detect changes of ocean environment by observing natural phenomena. The massive jellyfish bloom is one of them. New knowledge has been recently accumulating on the role of jellyfish in the production and food web of the ocean ecosystem. With the progress of the jellyfish study, their importance in the vertical material flow and in the relationship between fish populations has been recognized. It has also been noted that their biomass changes in accordance with changes in the ocean environment and the population size of major marine species. Large jellyfish blooms are becoming increasingly common in many marginal seas in the North Pacific, and may be important regulators of marine ecosystems. In the Bering Sea, the biomass of jellyfish increased in the 1990s and decreased after that. Recently, jellyfish bloomed on a massive scale in the East China Sea, and along both the Japan/East Sea and Pacific coast of Japan. They damaged coastal and offshore fisheries, even in semi-closed fishing grounds. It is suggested that those phenomena are influenced by changes in the marine ecosystem. Therefore it is timely to discuss the role of jellyfish in the marine ecosystems with lower and higher trophic level of production, including climate and human impacts to the environment. The themes for the proposed session include:

- Life history and ecology of jellyfish, and the effect of environmental change on these;
- Role of jellyfish in the production and food web of the ecosystem;
- Relationship between the fluctuation of fish resources and the frequency of jellyfish blooms.

Recommended convenors: Richard D. Brodeur (U.S.A.), Hiroshi Iizumi (Japan), Young-Shil Kang (Korea) and TBD (China).

b) 1-day BIO/IMBER Topic Session on *"Interactions between biogeochemical cycles and marine food webs in the North Pacific"*

Marine food webs and their components respond to, as well as influence, the abundance and distribution of biogenic elements in the ocean. A better understanding of the fundamental interactions between biogeochemical cycles and food webs is necessary to advance our

understanding of the response of marine ecosystems to natural and anthropogenic perturbations, such as changes in physical dynamics and carbon cycle chemistry, dust events, eutrophication and marine harvest. The North Pacific and adjacent seas include a wide range of ecosystems and some unique environmental conditions (*e.g.*, high silicic acid concentration relative to nitrate, iron-limited HNLC region), providing the opportunity to investigate and compare the role of biological processes on biogeochemical cycles under varying environmental conditions. This session will review existing knowledge on the interaction between biogeochemical cycles and marine food webs in the North Pacific Ocean, and identify gaps in current knowledge for eventual prediction of the effect of human activities and climate change on marine ecosystems.

Recommended convenors: Angelica Peña (Canada), Hiroaki Saito (Japan) and Sinjae Yoo (Korea).

c) 1-day BIO/POC Topic Session on "*Ecosystem responses to climate induced changes in along- and cross-shore transport*"

No description available.

Recommended convenors: Michael J. Dagg (U.S.A.) and Michael G. Foreman (Canada).

d) 1-day BIO Topic Session on "*The composition and functioning of mid-water ecosystems*"

The meso-pelagic realm is arguably among the largest and one of the least variable ecosystems on the planet. Most mesopelagic organisms undertake extensive vertical migrations either on a daily or seasonal basis, occupying productive surface waters at night and descending to mid-water during the daytime to reduce predation or undertake the diapause on seasonal scales. These migrations appear to contribute significantly to the rapid vertical transport of organic material from epi-pelagic to meso-pelagic zones. Micronekton is one of the important components of marine ecosystems linking mesozooplankton and higher trophic levels. Due to the intermediacy and mobility, quantitative sampling of micronekton has long been regarded as problematic.

Biological removal of carbon from the upper, euphotic zone and export to the deeper waters, so called the "biological pump", plays a critical role in determining the CO_2 exchange at the surface. Greater than 90% of organic matter exported from the euphotic zone is likely re-mineralized within the meso-pelagic layer (~100 to 1000 m) and returned to the surface as nutrients, microelements and CO_2 on decadal scales or less, while the remaining organic material is transferred to the deep ocean interior, where it is stored for millennia. The meso-pelagic layer, therefore, plays a critical role in controlling marine productivity on global change time scales and impacting climate (possible negative feedback to global warming). It is becoming increasingly clear that gas exchange between the ocean and atmosphere is not simply a function of the biological pump, but rather dependent on carbon sequestration below the meso-pelagic layer.

One of the most important ecosystem components controlling biogeochemical cycling is food-web structure. An extensive food web network may operate within a mesopelagic zone decomposing passively settling organics and consuming vertical migrants. Micronektonic organisms may also be consumed by epipelagic predators, including salmonids, in the near-surface waters, large nekton such as tunas, sharks and swordfishes that migrate daily with the micronekton, and in the deep waters when deep-sea fishes migrate up to mid-water.

e) 1-day BIO Topic Session on "*Comparative ecology of North Pacific copepods in genus* Neocalanus"

The large copepods *Neocalanus plumchrus*, *N. flemingeri* and *N. cristatus* dominate the mesozooplankton across the entire North Pacific Ocean. They are important components of the pelagic food web and ecosystem. This session invites scientific papers that review and discuss

Neocalanus spp. biology, ecology, and contributions to North Pacific ecosystems. Topics include but are not limited to: long-term patterns of population abundance, spatial (regional) and/or temporal comparisons of life history patterns, responses to climate change; population structure and its controls, feeding, growth, development, reproduction, and lipid storage, controls on ontogenetic migration and diapause, and biogeochemical cycling of key materials such as carbon and nitrogen.

Recommended convenors: Michael J. Dagg (U.S.A.) and Toru Kobari (Japan).

REPORT OF FISHERY SCIENCE COMMITTEE

The meeting of the Fishery Science Committee (FIS) was held from 08:30-15:30 hours on October 7, 2005. The Chairman, Dr. Yukimasa Ishida, called the meeting to order and welcomed the participants. The meeting was attended by 11 FIS members and 8 observers representing all PICES member countries except China (*FIS Endnote 1*). Dr. Elizabeth A. Logerwell served as rapporteur.

The Chairman reviewed the draft agenda (*FIS Endnote 2*), and all members agreed that the North Pacific Ecosystem Status Report and the Committee schedule during the Annual Meeting should be discussed under Agenda Item 13. The agenda was approved as presented.

Nominations and election of FIS Chairman (Agenda Item 3)

Dr. Gordon H. Kruse (U.S.A.) was nominated and elected as the incoming FIS Chairman with a 3-year term of his appointment to begin immediately after the Annual Meeting. FIS noted that the nationalities of the current Committee Chairmen are strongly weighted on North America and recommends that the balance of the Science Board and other Committee memberships should be considered in the future. The Committee expressed its gratitude to Dr. Yukimasa Ishida for his leadership and valuable contribution to FIS activities over the years.

Implementation of PICES XIII decisions (Agenda Item 4)

At PICES XIV, FIS co-sponsored a ½-day Topic Session (with CCCC) on "*Evidence of distributional shifts in demersal fish in relation to short- and long-term changes in oceanographic conditions*", a ½-day Topic Session (with MEQ) on "*Current and emerging issues of marine and estuarine aquaculture in the Pacific region: Carrying capacity, ecosystem function, and socioeconomics*", a 1-day Topic Session (with MEQ) on "*Ecosystem indicators and models*", and a 1-day FIS Contributed Paper Session. Summaries of the sessions are included elsewhere in this Annual Report. The Committee noted that the FIS Paper Session provides opportunities for young scientists to present their work. Another advantage is that scientists can participate even when Topic Sessions change from year to year. Also, it provides opportunities for scientists who must make a presentation as a condition of their attendance at the meeting. So FIS decided to continue the FIS Paper Session in the future.

Progress report of WG 16 on *Climate change and fisheries management* (Agenda Item 5a)

Dr. Richard J. Beamish submitted both paper and electronic copies of the draft report to the FIS Chairman. WG 16 is awaiting final comments from the United States after which the report can be prepared for publication by PICES. Dr. Beamish proposed a 2-day workshop at PICES XV as a follow-up to WG 16 activities (*FIS Endnote 3*). The intent of the workshop would be to agree on key species to be studied and to identify the relationships between climate and fish production and distribution.

Progress report of WG 18 on *Mariculture in the 21st century* (Agenda Item 5b)

The FIS/MEQ WG 18 met on October 1, 2005. The report of WG 18 can be found elsewhere in the Annual Report. The WG 18 Co-Chairman, Dr. Ik Kyo Chung, described the results of the meeting and a WG 18 workplan. Also, he outlined a possible related Topic Session for PICES XV (*WG 18 Endnote 4*).

Progress report of WG 19 on *Ecosystem-based management science* (Agenda Item 5c)

The FIS/MEQ WG 19 met on September 28-30, 2005. The report of WG 19 can be found

elsewhere in this Annual Report. The WG 19 Co-Chairman, Dr. Glen Jamieson, described the results of the meeting. The presentation concluded with a suggestion to convene a Topic Session at PICES XV, either half- or full-day, on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" (*WG 19 Endnote 5*).

Proposal for new Working Groups (Agenda Item 6)

There were no proposals for new Working Groups by FIS, because currently FIS is co-sponsoring, jointly with MEQ, WG 18 and WG 19. FIS cautioned against having too many Working Groups, not only by FIS but also by other Committees.

Inter-sessional meetings (Agenda Item 7)

No inter-sessional meetings are proposed between PICES XIV and PICES XV.

Proposed publications (Agenda Item 8)

The final report of WG 16 will be published in the PICES Scientific Report Series in 2006. There is also an interest to publish a related brochure, based on the Executive Summary.

Requests for travel support (Agenda Item 9)

FIS expects that funds (~CDN $5,000) will be available for invited speakers of FIS-supported Topic Sessions at PICES XV. Travel support is not needed for workshops.

Relations with other international programs and organizations (Agenda Item 10)

Dr. Richard Beamish, NPAFC convenor for the joint NPAFC/PICES Symposium on "*The status of Pacific salmon and their role in North Pacific marine ecosystems*", provided an update on the symposium planning. Included in his report was also information on salmon and ecosystem status. One key reason for the symposium was to use its success to establish an international program with funding from outside sources to understand how climate and ocean affect the recruitment of salmon throughout their range. PICES and NPAFC have a Memorandum of Understanding that can facilitate such an approach. The NPAFC BASIS program is an example of successful international integration and cooperation, and follow-up will be important.

FIS reviewed a proposal for an ICES/PICES/IOC Symposium on "*Effect of climate change on the world's ocean*" to be held in spring 2008, in Spain. FIS noted that the proposal is interesting but the scope is too big. Also, there is possible overlap with future PICES symposia (2007) and others being planned for the International Polar Year (2008). FIS does not strongly support this proposal at this time. FIS offers caution about making too many commitments without considering other proposals. FIS is interested to see how this proposal develops; the potential role of PICES should be clarified in the priority statement.

Dr. Robin Rigby provided information on a proposal for PICES and CoML to collaborate on an examination of North Pacific eco-regions.

Dr. George L. Hunt, representing a new GLOBEC regional program on *Ecosystem Study of Sub-Arctic Seas* (ESSAS), offered a proposal for a joint ESSAS/PICES Workshop comparing four sub-arctic marine ecosystems, to be held in June 2006, in Moscow or St. Petersburg, Russia. The purpose would be to develop recommend-dations for determining how climate variability impacts ecosystems, and to provide some feedback for strengthening of the next edition of the PICES North Pacific Ecosystem Status Report. Dr. Hunt requested moral support from FIS and travel funds for PICES members to attend the workshop. FIS does not strongly support this proposal at this time.

Planning for PICES XV (Agenda Item 11)

The PICES XV Annual Meeting theme is "*Boundary current ecosystems*". FIS considered the following sessions and workshops in association with the meeting:

(1) Dr. Richard Beamish presented a proposal for a 2-day FIS Workshop on "*Linking climate to trends in productivity of key commercial species in the subarctic Pacific*" as a follow-up to WG 16 activities (*FIS Endnote 3*). It was indicated that MONITOR supported this proposal.

FIS had some questions about how this related to activities of WG 19. It was noted that the focus is on key commercial species as opposed to ecosystem indicators. FIS suggested not limiting the topic to changes in climate, but to expand it to include oceanographic changes as well.

The planned products for this workshop would include an agreement on key commercial species of the North Pacific, and refinement of climate and oceanographic factors that affect productivity. The plan is to accumulate the existing information, not to conduct a modeling effort. If this effort is successful, it would be ideal to maintain the information so that it can be published in the PICES North Pacific Ecosystem Status Report.

(2) Dr. Ik Kyo Chung proposed a 1-day MEQ/FIS Topic Session on "*Aquaculture for sustainable management of marine environment and ecosystem*" (*WG 18 Endnote 4*). FIS noted the need for a Chinese convener, as well as the need to ensure China's participation in WG 18 activities. Accordingly, the proposal should reflect needed input on aquaculture issues that are relevant to China.

FIS also recommended that the proposal should be revised so as to address both the opportunities of aquaculture in addition to the associated habitat impact issues.

(3) Dr. Glen Jamieson presented a proposal for a 1-day MEQ/FIS Topic Session on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" (*WG 19 Endnote 5*). FIS wants to provide the opportunity for WG 19 to be successful in their tasks, but concern was expressed that the proposed topic was too narrow for a scientific session. FIS feels that this task could be accomplished either within the Working Group itself or during a workshop.

(4) A 1-day workshop on "*Ocean environmental change and jellyfish*" was proposed as a joint BIO/FIS/MEQ event (*BIO Endnote 6a*). Jellyfish are increasing in the western Pacific, causing problems for set net fisheries. Jellyfish increases had also been observed in the eastern Pacific. The goal of the workshop would be to bring together data and to share findings among the eastern and western Pacific.

FIS discussed this proposal and considered whether it would be more appropriate as a Topic Session. Last year's meeting had a jellyfish Topic Session, so if there should be another one next year, it has to be more focused, *e.g.* "*The role of the jellyfish on fish production*". Dr. Yukimasa Ishida agreed to work on this issue.

(5) CFAME proposed a 1-day CCCC/FIS Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" (*CFAME Endnote 5*). It was noted that this proposal was similar to the WG 16 proposal, except that this one focuses more on modeling efforts.

FIS indicated the need to include other countries as conveners. For instance, Korea has interest in this topic and could provide another convener. It was also pointed out that this proposal was very similar to proposal (6) below, so FIS recommended merging (6) into (5), and requested Dr. Paul Spencer, who proposed Topic Session (6), to work with Topic Session (5) conveners to incorporate his ideas into this session.

(6) Dr. Paul Spencer proposed a Topic Session on "*Modeling the responses of life-history strategies of higher trophic levels to oceanic variability*". Like Topic Session (5), this proposal involves simulation modeling and theoretical analyses, as opposed to descriptive comparisons. The proposal goes beyond recruitment and would strive to quantify recommendations, such as "preserve age structure".

FIS noted that the topic "life history" is very broad and needs to be focused. For instance, perhaps it would focus on longevity and effects on total biomass over time. FIS did not support this proposal, but instead encourages collaboration with conveners of proposal (5).

(7) A Topic Session on "*Cold and deep sea corals: Their role in fisheries ecology and fisheries management*" was proposed by Drs. M.E. Clark (U.S.A.) and T.N. Molodtsova (Russia). The proposal suggests the need for an overview of the ecology of corals, impact of bottom trawling on habitat-forming corals and mapping of coral areas. Japan seems an appropriate venue. This proposal did not specify the length, but FIS indicated that a ½-day session may be appropriate. FIS also discussed the potential for joint sponsorship with MEQ, particularly with respect to identification of sensitive areas.

FIS expressed concern that the topic does not embrace shallow corals of interest to other PICES member countries. Expansion of the topic to contrast deep and shallow water corals might require a 1-day session. Given that there is a symposium on corals this fall in the United States, there was some concern that there will be enough interest for the session.

In an overview, FIS established the following priorities. FIS supports both workshops (1) and (4), and suggests that proposal (3) should be a workshop or WG 19 activity, and not a session, as was proposed. Regarding sessions – FIS gives the highest priority to a full-day FIS Contributed Paper Session and Topic Session (5), high priority to Topic Session (2) (although note requirements for changes to proposal with respect to Chinese participation), and lower priority to Topic Session (7).

Theme for PICES XVI (Agenda Item 12)

Dr. Laura Richards presented a proposal for the theme for PICES XVI: *The changing North Pacific: Previous patterns, future projections, and ecosystem impacts.* Dr. Richards explained that there was an opportunity to link the North Pacific with the Arctic in the context of the International Polar Year. There is a need to understand structure and process from primary producers to top-level consumers, including fisheries. FIS feels that this theme is sufficiently broad for an Annual Meeting and supported it.

FIS Action Plan (Agenda Item 13)

PICES requires an Action Plan from each Committee. The FIS Action Plan should identify how FIS intends to achieve the goals of the PICES Strategic Plan, including, for instance, future workshops and sessions sponsored by FIS at Annual Meetings. At the FIS meeting, a deadline was proposed for June 1, 2006, for the first draft. Also, at the Science Board meeting, it was suggested that Committee Action Plans should follow the template used by MEQ. So, new FIS Chairman, Dr. Gordon Kruse, agreed to put the draft FIS Action Plan into the proposed format and send it for review to FIS members. As time will be short, it is important that FIS members review the Action Plan as soon as possible.

Potential topics towards next major PICES scientific program(s) (Agenda Item 14)

After the special meeting for the Study Group on *Future integrative scientific program(s)* on October 5, a brief report on a possible theme for a new integrated PICES scientific program was presented during the Closing Session. The proposed themes will be posted on the PICES website. Individual scientists are encouraged to provide their comments by December 15, 2005.

PICES website: Contributions from FIS (Agenda Item 15)

Dr. Gordon Kruse is the FIS representative on the *ad-hoc* PICES website publishing/oversight committee. FIS received his report in which he suggested to FIS that the overall design, web links, and FIS contact information is good. Improvements that were identified include: updating news items, deletion of notification of changes in membership that are more than one year old, and adding other newsworthy events. News could include "news from the Chairman" and perhaps FIS-related items, such as reports of

unusual observations of warm-water species in Alaska. Dr. Kruse also recommended the posting of announcements of other international fishery meetings with links to those meeting websites.

Other business (Agenda Item 16)

North Pacific Ecosystem Status Report

FIS briefly reviewed the North Pacific Ecosystem Status Report and recommended that Committees be asked to provide suggestions for improvements when the next report is drafted.

Committee meetings

FIS discussed the fact that this year's FIS Committee meeting was held at the end of the Annual Meeting. Previously, the Committee meetings were ½-day meetings held during the week, whereas this year it was a full-day. An alternative is for two ½-day meetings during the Annual Meetings. FIS did not provide strong advice, but noted some concerns about holding the Committee meetings at the conclusion of the Annual Meeting: (1) Committee members are unable to provide comment on the draft FIS report before it is presented to the Science Board; (2) attendance may suffer if the FIS meeting is held at the end of the Annual Meeting; and (3) more observers may attend committee meetings when they are held mid-week during the Annual Meeting.

FIS Best Presentation Award and Poster Award Committee

Following practices of previous years, the convenors of the FIS-sponsored sessions were asked to make the selection. The 2005 FIS Best Presentation Award went to Eun Jung Kim for her paper on "The vertical and horizontal distribution of bigeye (*Thunnus obesus*) and yellowfin tuna (*Thunnus albacares*) related to ocean structure" (co-authored with Suam Kim, Dae-Yeon Moon and Jeong-Rack Koh).

The Committee thanks Dr. Michael Schirripa, who served as a member of the Best Poster Award Committee.

FIS Endnote 1

Participation list

Members

Richard J. Beamish (Canada)
Elena P. Dulepova (Russia)
Toyomitsu Horii (Japan)
Yukimasa Ishida (Japan, Chairman)
Jin Yeong Kim (Korea)
Gordon H. Kruse (U.S.A.)
Elizabeth A. Logerwell (U.S.A., Rapporteur)
Toshikuni Nakatani (Japan)
Laura Richards (Canada)
Michael Schirripa (U.S.A.)
Hyoung-Chul Shin (Korea)

Observers

Vera Alexander (PICES Chairman)
Alexander Bychkov (PICES Executive Secretary)
George W. Boehlert (U.S.A.)
Tokimasa Kobayashi (Japan)
R. Ian Perry (Canada)
Paul Spencer (U.S.A.)
Mikhail Stepanenko (Russia)
William J. Sydeman (U.S.A.)

FIS Endnote 2

FIS meeting agenda

1. Welcome, introductions, and nomination of rapporteur
2. Adoption of agenda
3. Election of FIS Chairman
4. Implementation of PICES XIII decisions
5. Report of the existing Working Group's activities in the past year
   a. WG 16 on *Climate change, shift in fish production, and fisheries management*
   b. WG 18 on *Mariculture in the 21st century*
   c. WG 19 on *Ecosystem-based management science and its application to the North Pacific*
6. Proposals for new Working Groups
7. Inter-sessional meetings proposed for 2005 and beyond
8. Publications proposed for 2005 and beyond
9. Travel support requests
10. Relations with other international programs and organizations
11. Planning for PICES XV
12. Theme for PICES XVI
13. FIS Action Plan
14. Potential topics towards next major PICES scientific program(s)
15. PICES website: Contributions from FIS
16. Other business
17. Adoption of FIS report and recommenddations to Science Board

FIS Endnote 3

Proposal for a 2-day FIS Workshop at PICES XV on
"Linking climate to trends in productivity of key commercial species in the subarctic Pacific"

Working Group 16 has completed its report on the impacts of climate and climate change on the key commercial species in subarctic Pacific. An important conclusion was that climate is a major factor affecting the productivity of virtually all key species. The mode of climate variability varied among species, but it was clear that climate-related trends in production were common. It was also apparent that a relatively small number of species made up a large percentage of all commercial landings. Assessing the impacts of climate and climate change on commercial fisheries was one of the main reasons that PICES was established. As a follow-up to the Working Group 16 report, FIS could focus on these key commercial species and make substantial progress on this original objective of PICES. FIS could hold a workshop that will further identify the specific linkages between climate and trends in production. An objective of this workshop could be to achieve consensus on a list of 12 -15 of the most important commercial species. After this agreement is achieved and there is further clarification of the effects of climate variability, the key species would then become an index of climate-related impacts. With time, this could become an important forecasting tool for industry and governments. Linking annual trends in key species production with climate and ocean indices would also introduce a dimension to the PICES North Pacific Ecosystem Status Report, which will add a meaning to the report and attract a more general audience, including the popular press. It is interesting that several PICES activities are converging on this general approach of using key species to monitor climate impacts. FIS could cooperate with groups such as MONITOR, CFAME, POC, BIO and others when organizing the workshop for 2006.

Recommended convenors: Richard J. Beamish (Canada), Anne B. Hollowed (U.S.A.), Masahide Kaeriyama (Japan), Suam Kim (Korea) and Vladimir Radchenko (Russia).

REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

The meeting of the Marine Environmental Quality Committee (MEQ) was held from 08:30 to 18:00 hours on October 7, 2005. The Chairman, Dr. John E. Stein, called the meeting to order and welcomed the participants (*MEQ Endnote 1*). The Committee reviewed the draft agenda (*MEQ Endnote 2*), and it was adopted.

Business from PICES XIII (Agenda Item 3)

There were no pressing issues pending from last year's meeting in Honolulu, U.S.A. The Chairman summarized in some detail the report of the inter-sessional Science Board meeting, with the participation of Governing Council members, held in April 2005, in Seattle, U.S.A.

Membership and chairmanship of MEQ (Agenda Item 4)

A new member, Dr. Darlene Smith (Fisheries and Oceans Canada), was introduced to the Committee. Dr. Stein acknowledged Canada's appointment of Dr. Smith to MEQ.

The Committee expressed again its concern that there was no official participation in MEQ from China this year, nor has there been for the previous few years. The Committee also noted that there was minimal participation this year by the United States.

There continues to be the overall issue of having full participation in MEQ by all PICES member countries. At PICES XIV, only 5 of 17 MEQ members were in attendance.

This was the fifth year of Dr. Stein's chairmanship of MEQ, and it was the intent of the Committee to elect a new Chairman at PICES XIV. However, efforts to identify a candidate from the western Pacific were again not successful. The Committee requested Dr. Stein to serve for one more year, and he agreed. The Committee will identify a candidate before PICES XV. The preferred choice is a candidate from the western Pacific. If unsuccessful, then the Committee will identify a candidate from the eastern Pacific.

The Committee supported the proposal to establish a Vice-Chairman position, and Dr. Hideaki Nakata (Japan) was elected as MEQ Vice-Chairman for a period of one year.

Progress reports of subsidiary bodies under the direction of MEQ (Agenda Items 5-7)

HAB Section

Dr. Hak Gyoon Kim, Co-Chairman of the MEQ Section on *Ecology of harmful algal blooms in the North Pacific* (HAB-S), reviewed activities of the Section since PICES XIII. His presentation included reports on the Section's meetings held October 1 and 2, 2005, and a report of the MEQ Workshop on "*Review of selected harmful algae in the PICES region*: I. Pseudo-nitzschia *and* Alexandrium spp." held September 29-30. These two reports are included elsewhere in this Annual Report.

The Section made the following recommendations to the Committee:

- to convene a 1-day MEQ (HAB-S) Workshop at PICES XV to focus on 2 additional species: *Dinophysis* and *Cochlodinium* spp., and to fund travel of 1 invited speaker from Europe to attend the workshop (*HAB-S Endnote 3*);
- to hold, immediately prior to the workshop, a ½-day laboratory demonstration on Diarrhetic Shellfish Poisoning (DSP) detection at the National Fisheries Research Institute in Yokohama;
- to convene a 1-day MEQ (HAB-S) Topic Session on "*Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences*", and to fund travel of 1 invited speaker to attend the session (*HAB-S Endnote 4*);

- to encourage all PICES member countries to support monitoring programs for shellfish toxins;
- To strongly encourage participation of all member countries in HAB-S activities.

Working Group 18 on Mariculture

Dr. Ik-Kyo Chung, Co-Chairman of the MEQ/FIS Working Group 18 on *Mariculture in the 21st century – The intersection between ecology, socio-economics and production*, reported on their activities in 2005, including the results of the MEQ/FIS Topic Session on "*Current and emerging issues of marine and estuarine aquaculture in the Pacific region: Carrying capacity, ecosystem function and socioeconomics*" held on October 5, 2005. The report of the WG 18 meeting and the summary of the session are included elsewhere in this Annual Report. With the report from Russia, WG 18 has now reports on the status and projected trends in marine aquaculture from all PICES member countries, and intends to prepare a publication in the PICES Scientific Report series based on these national reports. The Working Group also recommends to convene a 1-day MEQ/FIS Topic Session at PICES XV on "*Aquaculture for sustainable management of marine environment and ecosystem*", and to fund travel of 1 invited speaker to attend this session (*WG 18 Endnote 4*).

Working Group 19 on Ecosystem-based management science

Dr. Glen Jamieson, Co-Chairman of the MEQ/FIS Working Group on *Ecosystem-based management and its applications to the North Pacific*, reported on their activities in 2005, including the results of their meeting held from September 28-30, 2005, and the MEQ/FIS Topic Session on "*Ecosystem indicators and models*". The full report of WG 19 and the summary of the session can be found elsewhere in the Annual Report. The Working Group requests a 3-day business meeting and a 1-day MEQ/FIS Topic Session on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" at PICES XV (*WG 19 Endnote 5*).

PIBOC research on *"Physiologically active compounds from North Pacific marine organisms"* (Agenda Item 8)

Dr. Dimitry Aminin, Pacific Institute of Biochemical Organic Chemistry (PIBOC), reviewed research done at his institute on isolation and characterization of pharmacologically active compounds from marine organisms. The Committee suggested that Dr. Aminin prepare a proposal for a workshop to be considered at next year's Annual Meeting.

Introduced species (Agenda Items 9 and 10)

Following PICES XII, there was further communication with ICES to foster interactions with the ICES Working Group on *Introductions and Transfers of Marine Organisms* (WGITMO) and the ICES/IOC/IMO Working Group on *Ballast and Other Ship Vectors* (WGBOSV). The study of introductions and spread of non-indigenous species continues to be an area of considerable interest to the Committee both scientifically and for building collaboration with ICES. On behalf of PICES/MEQ, Dr. Mark L. Wells of the HAB Section attended the WGBOSV meeting held in March 2005, in Arendal, Norway. A PICES/ICES Workshop on "*Introduced species in the North Pacific*" was held October 4-5, 2005, at PICES XIV. Dr. Stephan Gollasch (Germany/ICES) served as a co-convenor of the workshop, and Drs. Sergej Olenin (Lithuania/ICES) and Helge Botnen (Norway/ICES) were invited speakers. A summary of this workshop can be found under Session Summaries in the Annual Report.

Proposals for new subsidiary bodies (Agenda Item 11)

Based on discussions at this year's PICES/ICES Workshop on "*Introduced species in the North Pacific*" (Agenda Item 9), the Committee proposes a Working Group on *Non-indigenous aquatic species* to be coordinated with related Working Groups in ICES. Terms of reference, suggested members, and possible Co-Chairmen were provided (*MEQ Endnote 3*).

Planning for PICES XV (Agenda Item 12)

The Committee proposes the following sessions and workshops for PICES XV:

- a 1-day MEQ (HAB-S) Workshop on "*Review of selected harmful algae in the PICES region: II*. Dinophysis *and* Cochlodinium spp.", preceded by a ½-day laboratory demonstration on DSP detection (*HAB-S Endnote 3*);
- a 1-day MEQ Topic Session on "*Harmful Algal Blooms in the PICES region: New trends and potential links with anthropogenic influences*" (*HAB-S Endnote 4*);
- a 1-day MEQ/FIS Topic Session on "*Aquaculture for sustainable management of marine environment and ecosystem*" (*WG 18 Endnote 4*);
- a 1-day MEQ/FIS Topic Session on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" (*WG 19 Endnote 5*);
- a ½-day BIO/FIS/MEQ Topic Session or Workshop on "*Ocean environmental change and jellyfish*" (*BIO Endnote 6a*).

Theme for PICES XVI (Agenda Item 13)

Canada suggested a theme "*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*" for PICES XVI, to be held in 2007, in Victoria, Canada. MEQ endorsed the theme but recommends the following changes (in italics and underlined) to the proposed description (*SB Endnote 8*):

- "This session will build on studies of climate variability *and other anthropogenic impacts* in the North Pacific…";
- "*e.g*., less ice-cover in the Bering Sea and Sea of Okhotsk, *aquatic bioinvasions*)…";
- "6) How projected global change *and anthropogenic impacts* may alter sustainability of the North Pacific…".

MEQ Action Plan (Agenda Item 14)

Dr. Stein reviewed the draft Action Plan for MEQ activities for the next 3–5 years. The Committee then revised the draft, and the revised version is appended as *MEQ Endnote 4.*

Next major PICES scientific program (Agenda Item 15)

Dr. Stein reported on the progress of the Study Group on *Future integrative scientific program(s)*. No further action was taken by the Committee.

PICES web site: MEQ contribution (Agenda Item 16)

The Committee encouraged the HAB Section and WG 18 to examine reports and presentations from this year's Annual Meeting for possible inclusion on the MEQ web page.

Future MEQ activities (Agenda Item 17)

This agenda item was covered in discussion and revision of the MEQ Action Plan.

Relations with other international programs and organizations (Agenda Item 18)

The main focus for MEQ interactions with other international organizations is with ICES and its WGs on *Ballast and Other Ship Vectors* (jointly with IOC and IMO) and *Introductions and Transfers of Marine Organisms*.

Items with financial implications (Agenda Item 19)

Inter-sessional meetings for 2006 and beyond

- a symposium on "*Marine bioinvasions*" co-sponsored with ICES and MBC), spring 2007, US east coast (approved in 2003);

Publications for 2006 and beyond

- a WG 18 report in the PICES Scientific Reports series based on the national reports on the current status and trends in aquaculture in PICES member countries (2006-2007);
- a WG 19 report in the PICES Scientific Reports series and a brochure on ecosystem-based management; the brochure would be an executive summary of the final report of

the working Group and would follow the template of the well-received approach used by the PICES Study Group on *Fisheries and ecosystem responses to recent regime shifts*.

Travel support requests

- 1 invited expert from Europe on *Dinophysis* to attend the MEQ Workshop "*Review of selected harmful algae in the PICES region: II*. Dinophysis *and* Cochlodinium spp." at PICES XV;
- 1 invited speaker for the MEQ Topic Session on "*Harmful Algal Blooms in the PICES region: New trends and potential links with anthropogenic influences*";
- 1 invited speaker for the MEQ/FIS Topic Session on "*Aquaculture for sustainable management of marine environment and ecosystem*";
- 1 invited speaker for the MEQ/FIS Topic Session on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*";
- Dr. Sergej Olenin (Lithuania) to attend the first meeting of the Working Group on *Non-indigenous aquatic species*;
- A PICES representative to attend meetings of the ICES WGITMO and ICES/IOC/IMO WGBOSV to be held in March 2006, in Oostende, Belgium;
- Registration fee for Dr. Carolyn Friedman to attend the 3rd International Symposium on "*Stock enhancement and sea ranching*" to be held in September 2006, in Seattle, U.S.A.

Other items

Dr. George L. Hunt described a proposal for a joint ESSAS/PICES Workshop to compare four sub-Arctic marine ecosystems (Bering Sea, Sea of Okhotsk/Oyashio region, Barents Sea and Newfoundland/Labrador Shelf) to be held in June 2006, in Moscow or St. Petersburg, Russia (*CCCC Endnote 3*). He also described a request to Science Board for travel support for 4 scientists to attend the workshop. MEQ members supported the workshop proposal, with no comment on the request for travel support.

2005 MEQ Best Presentation Award (Agenda Item 20)

The MEQ Best Presentation Award was given to Xuelei Zhang (China) for his paper (co-authored with R.J. Wu, Z.H. Zhang, and Z.F. Dong) on "*Benzene toxicity to the scallop,* Chlamys farreri, *and the shrimp*, Penaeus japonicus" presented at the MEQ Topic Session on "*Ecological effects of offshore oil and gas development and oil spills*".

MEQ Endnote 1

Participation list

Members

Glen Jamieson (Canada)
Hak-Gyoon Kim (Korea)
Olga Lukyanova (Russia)
Hideaki Nakata (Japan)
Darlene Smith (Canada)
John E. Stein (U.S.A., Chairman)

Observers

Dmitry Aminin (Russia)
Ik Kyo Chung (Korea)
Stephan Gollasch (Germany/ICES)
Chuanlin Huo (China)
Chang-Gu Kang (Korea)
Chang Kyu Lee (Korea)
Sam Guen Lee (Korea)
Yasunori Watanabe (Japan)

MEQ Endnote 2

MEQ meeting agenda

1. Welcome and introductions
2. Approval of agenda
3. Business from last year's meeting
4. Membership and chairmanship of MEQ
5. Progress report from Section on *Ecology of harmful algal blooms in the North Pacific*
6. Progress report from WG 18 on *Mariculture in the 21st century*
7. Progress report from WG 19 on *Ecosystem-based management science and its application to the North Pacific*
8. PIBOC research on "*Physiologically active compounds from North Pacific marine organisms*" by Dimitry Aminin
9. Report on the PICES/ICES Workshop on "*Introduced species in the North Pacific*"
10. Report on inter-sessional meetings
11. Proposals for new subsidiary bodies
12. Planning for PICES XV
13. Theme for PICES XVI
14. MEQ Action Plan
15. Next major PICES scientific program(s)
16. PICES website: MEQ contribution
17. Discussion of future MEQ activities
18. Relations with other international programs and organizations
19. Items with financial implications
20. 2005 MEQ Best Presentation Award
21. Preparation of report and recommendations to Science Board

MEQ Endnote 3

Proposal for a Working Group on *Non-indigenous aquatic species* (acronym: WGNIAS)

Proposed terms of reference

1. Complete an inventory of all aquatic non-indigenous species (NIS) in all PICES member countries, together with compilation and definitions of terms and recommendations on use of terms. Summarize the situation on bioinvasions in the Pacific and compare and contrast to other regions (*e.g.*, Atlantic, Australia, *etc.*);
2. Complete inventory of scientific experts in all PICES member countries on aquatic NIS subject areas and of the relevant national research programs/projects underway;
3. Review and evaluate initiatives on mitigation measures (*e.g.*, ICES Code of Practice for the Introduction and Transfer of Marine Organisms, IMO Ballast Water Management Convention and others such as the Canadian Introductions and Transfers Code);
4. Summarize research related to best practices for ballast water management;
5. Coordinate activities of the PICES WG on aquatic non-indigenous species with related WGs in ICES through a joint back-to-back meeting of the PICES and ICES Working Groups on invasive species in 2007/8;
6. Develop and recommend an approach for formal linkages between PICES and ICES on aquatic non-indigenous species;
7. Publish final report summarizing results and recommendations.

Possible Co-Chairmen

MEQ recommends Dr. Yasuwo Fukuyo or alternate from Japan as the Asian Co-Chairman, and Drs. Glen Jamieson or Darlene Smith (Canada) as the North American Co-Chairman.

MEQ also proposes a PICES representative to join as a Co-Chairman for the ICES/IOC/IMO Working Group on *Ballast and Other Ship Vectors* and/or the ICES Working Group on *Introductions and Transfers of Marine Organisms*, and the reverse, have an ICES representative (*e.g.*, Dr. Stephan Gollasch) as Co-Chairman of the proposed PICES Working Group on *Non-indigenous aquatic species*. Joining an ICES Working Group allows connections on global issues, such as IMO

guidelines that are relevant to ballast water management.

Recommended membership

Canada: Tom Therriault, Dorothee Kieser, Michel Gilbert, Glen Jamieson (if not Co-Chairman)

China: Lijun Wang, Hao Guo
Korea: Kyung Soon Shin, Chang-Kyu Lee, Sam Geon Lee
Japan: Shinichi Hanayama, Hiroshi Kawai, Toshio Furota
Russia: Alexander Zvyagintsev, Vadim Panov
U.S.A: Mark Wells, Ted Grosholz, Henry Lee, Blake Feist, Greg Ruiz, Judith Pederson.

MEQ Endnote 4

MEQ Action Plan (October 2005)

Mission

The MEQ Committee will expand its science from physical/chemical quality as related to toxic contaminants to include: structure, process, and function of the marine system that sustains both ecosystem and human health. Ecosystem health will ultimately affect human health. Rather than focusing on physical drivers of ecosystem change, MEQ is concentrating on anthropogenic drivers of marine ecosystem health.

The Committee notes that each nation has a different approach and management structure for insuring marine environmental quality, which in turn influences the direction and relative priority for research and science advice. In other words, each culture and society has a different view of what quality represents. It is important to make sure that the efforts of MEQ include and are useful to each PICES member country.

Ecological health issues can include:
- Disease, biological pollution, bacteria, HABs;
- Biodiversity; species introductions and unintentional introductions of exotic species;
- Sustainability of the ecosystem; future use of resources;
- Integrated coastal zone management; ecosystem-based management;
- Predictive models, ecological forecasting.

Given the above view of the Committee's mission, the Committee made the following revisions to the list of issues in the current MEQ Strategic Plan:

Issues deleted because the focus is too narrow or they are the purview of another PICES Scientific Committee:
- Impacts of climate change on coastal ecosystems;
- Biogeochemical processes regulating contaminant dynamics in sediments;
- Harmonization of existing methods used in PICES countries;
- Scientific criteria for protection of marine ecosystems from contaminants.

Issues remaining unchanged, altered to broaden focus, or included *de novo* are as follows:
- Mariculture;
- Biological and physical transport of anthropogenic substances in the marine environment;
- Anthropogenic impacts on benthic habitat (formerly in the Plan as "trawling effects on benthic habitat");
- Identification and assessment of emerging chemical and biological pollutants (including exotic species), and their impacts on marine ecosystems;
- Defining indicators or biological markers of marine ecosystem health, with relevance to human health and welfare;
- Needing further clarification is a topic addressing: anthropogenic impacts on trophic dynamics and biodiversity that impact system sustainability.

Strategy of the MEQ Committee

The PICES mission has five central themes:
A. Advancing scientific knowledge;
B. Applying scientific knowledge;

C. Fostering partnerships;
D. Ensuring a modern organization in support of PICES activities; and
E. Distributing PICES scientific information.

Specific goals are identified within each of these themes. The Actions of the MEQ Committee will seek to meet goals under each of the themes.

Theme A. Advancing scientific knowledge

Goal 1. Understand the physical, chemical, and biological functioning of marine ecosystems

Action 1.1 Address the substantial need for improved data and information on the occurrence and mechanisms of harmful species in the North Pacific.

Task 1.1.1 Conduct a workshop on HAB species (*Dinophysis* and *Cochlodinium*) in 2006;

Task 1.1.2 Convene a scientific session on HAB research in the western Pacific in 2006;

Task 1.1.3 Initiate discussion of the role of cnidarians and ctenophores in the marine environment.

Action 1.2 Develop a process for conducting holistic assessments of the impact of human activities, and identify a suite of indicators or variables that will facilitate the monitoring of ecosystem status. This will be achieved by the following activities:

Task 1.2.1 Produce an assessment of the spatial and temporal patterns of contaminants for inclusion in the North Pacific Ecosystem Status Report;

Task 1.2.2 In conjunction with 1.2.1, initiate assessment of relationship between contaminant levels and their effects on marine ecosystems.

Goal 2. Understand and quantify the impacts of human activities and climate on marine ecosystems

Action 2.1 Evaluate and increase knowledge in PICES of the potential impacts of aquaculture on ecosystems of the North Pacific.

Task 2.1.1 Convene a scientific session on "*Aquaculture and the sustainable management of the marine environment*";

Task 2.1.2 Hold a workshop to train PICES scientists in methods to conduct risk assessments on aquaculture activities (note the ICES Code of Practice for Introductions and Transfer of Marine Organisms).

Action 2.2 Evaluate and increase knowledge on the potential impacts of intentional and accidental introductions of non-native species and their vectors of introductions, and collaborate with ICES on introductions and transfers of non-indigenous organisms, including genetically modified organisms.

Task 2.2.1 Propose a PICES Working Group on introduced species (2006);

Task 2.2.2 Participate in the International Marine Bioinvasions Symposium (2007);

Task 2.2.3 Conduct a joint PICES/ICES workshop on introduced species (2007/8).

Action 2.3 Evaluate and increase understanding of how human health issues are inextricably linked to ocean conditions, primarily in coastal areas.

Task 2.3.1 Conduct a workshop/session on "*Oceans and human health*" issues in the North Pacific.

Action 2.4 Develop the scientific basis for an ecosystem approach to management, including assessments and the provision of scientific advice. Specifically, the following activities are needed:

Task 2.4.1 Identify and evaluate the use of indicators for assessing the achievement of ecosystem-based management;

Task 2.4.2 Continue and expand the development of ecosystem models that facilitate the assessment of monitoring and scientific knowledge of ecosystem functions in a holistic manner;

Task 2.4.3 Hold a scientific session on approaches to designating eco-regions and areas that are ecologically and biologically significant (2006);

Task 2.4.4 Develop country reports on approaches to ecosystem-based management (2006);
Task 2.4.5 Convene a symposium on the science of ecosystem-based management.

Goal 3. Provide advice on methods and tools to guide scientific activities

Action 3.1 Examine and assess methods for measuring HAB species and toxins for use by scientists and agencies of PICES member countries
Task 3.1.1 Conduct a workshop at PICES XIV to review selected harmful algae, such as *Pseudo nitzschia* and *Alexandrium*;
Task 3.1.2 Work to develop capacity for Russian scientists to assess and monitor HAB species and toxin levels;
Task 3.1.3 Conduct a laboratory demonstration of DSP detection.

Theme B. Applying scientific knowledge

Goal 4. Provide scientific advice towards wise use of the North Pacific Ocean

Action 4.1 None

Theme C. Fostering partnerships

Goal 5. Promote collaboration with organizations, scientific programs, and stakeholders that are relevant to the PICES goals

Action 5.1 Develop an approach for formal linkages with ICES/IOC/IMO WGBOSV (WG on *Ballast and Other Ship Vectors*) and/or the ICES WGITMO (WG on *Introductions and Transfers of Marine Organisms*) over the long term.

Goal 6. Promote collaboration among scientists within PICES

Action 6.1 Develop and maintain joint activities of PICES scientists with IOC in development of an international HAB database (HAE-DAT).
Task 6.1.1 Prepare event reports for 2001.

Action 6.2 Provide input to the implementation of GEOHAB activities in the PICES area, such as the HAB event database (see 6.1) and IOC Intergovernmental Panel on Harmful Algal Blooms.

Theme D. Ensuring a modern organization in support of PICES activities

Goal 7. Provide an effective infrastructure to support PICES programs

Action 7.1 None

Theme E. Distributing PICES scientific information

Goal 8. Make the scientific products of PICES accessible

Action 8.1 Publish Working Group reports
Task 8.1.1 Publish country reports on status of mariculture in PICES member countries in the PICES Scientific Report series;
Task 8.1.2 Publish WGNIAS inventories for PICES member countries in the PICES Scientific Report series;
Task 8.1.3 Publish a brochure on ecosystem-based management.

REPORT OF MONITOR TECHNICAL COMMITTEE

The MONITOR Technical Committee met from 8:30 to 16:00 hours on October 2, 2005, to review accomplishments of the preceding year and begin planning for the next year. The Chairman and Vice Chairman, Drs. Jeffrey Napp and Sei-ichi Saitoh, welcomed the Committee members and observers (*MONITOR Endnote 1*) and the meeting began with introductions. A total of 22 scientists from 5 countries were in attendance. Nine of 16 MONITOR members were present. The draft agenda was reviewed and adopted (*MONITOR Endnote 2*).

PICES North Pacific Ecosystem Status Report (Agenda Item 2)

Drs. R. Ian Perry and Phillip R. Mundy provided an overview of the workshop on "*Filling the gaps in the PICES North Pacific Ecosystem Status Report*" held on October 1. It was well-attended, and did an excellent job of identifying some of the important elements missing from the first version of the report (PICES Special Publication No. 1, 2004). The summary of the workshop is included elsewhere in this Annual Report.

The first endeavour was considered a pilot project. The workshop co-conveners stated that MONITOR was not obligated to use the same procedure or format to produce the next report.

Five key issues for the North Pacific Ecosystem Status Report were identified at the workshop: (1) target audience, (2) type of information, (3) form of publication, (4) frequency of publication, and (5) who would accomplish the task. The Chairman proposed that a Study Group be formed to resolve these issues and report their recommendations back to the Committee. The PICES Deputy Executive Secretary, Dr. Skip McKinnell, discouraged the Committee from tasking a Study Group to resolve these issues due, in part, to the length of time needed to form and convene this group. He encouraged the Committee to make these decisions themselves and then report back to the Science Board as soon as possible. At the time of the meeting there did not appear to be a consensus on the issues. The Chairman asked the MONITOR members to provide their recommendations by the end of the week on each of these 5 issues. He will then circulate their comments and attempt to reach consensus by the end of January 2006.

PICES website: Contributions from MONITOR (Agenda Item 3)

The Committee discussed the value of promoting PICES-sponsored programs on the MONITOR web pages. At present, only the reports of the Committees are posted on the website. Dr. Saitoh volunteered to work with the *ad hoc* PICES web publishing/oversight committee to accomplish this. The recommendation is adding two types of content: products from PICES projects, and products from general monitoring/observation programs.

In the first category, links to the following were suggested:

- North Pacific Continuous Plankton Recorder project (*e.g.*, reports, papers, SAHFOS);
- Bird/mammal observations along the east-west transect of the North Pacific CPR Program (*e.g.*, reports, papers);
- North Pacific Ecosystem Status Report;
- North Pacific Ecosystem Metadatabase;
- PICES Press articles on status of regional oceans.

In the second category, links to the following were suggested:

- "Ecosystems Considerations" chapter that is prepared annually for the North Pacific Fishery Management Council;
- Pacific Scientific Advice Review Committee Ocean Status Report;
- GOOS and GEOSS;
- Oceans.US;

- All regional Ocean Observing Systems in the PICES region (*e.g*., AOOS, PaCOOS, NaNOOS, NEAR-GOOS, *etc*.).

MONITOR Action Plan (Agenda Item 4)

The PICES Governing Council requested that each Committee prepare an Action Plan. This plan will follow a prescribed template using the PICES Strategic Plan. The Action Plan will help the Committee to be more forward thinking, and it will help Council to understand how each Committee's actions or proposals contribute to the overall goals and mission of PICES. The Chairman distributed a draft MONITOR Action Plan and asked that Committee members provide their comments on the draft by October 6.

Status of the Continuous Plankton Recorder (CPR) Program (Agenda Item 5)

Drs. David W. Welch (presenting for Dr. Sonia Batten) and William J. Sydeman gave reports on the status of the North Pacific CPR Program and seabird/marine mammal surveys done on ships of opportunity. A report from the Chairman of the Advisory Panel on *Continuous Plankton Recorder Survey in the North Pacific* (Dr. Charles B. Miller) was also distributed (*MONITOR Endnote 3*). The program is continuing to collect biological data, and new physical data (sea surface temperature and salinity) have been added to the east-west line. Data analysis is revealing new insights into spatial and temporal distribution patterns of the target organisms, and the work is being published in peer-reviewed journals. The Committee was very pleased with the results of the two programs. The Committee recognized the value of adding continuous underway temperature, salinity, and chlorophyll fluorescence to the north–south transect, either on the towed body or in a sea chest.

The programs are in need of stable financial support for the future. The ideal situation would be funding that did not require frequent renewal via proposals. The east-west CPR transect supported by the North Pacific Research Board (NPRB) has been given one additional year of funding, and is now funded through the summer of 2007. Funding for the seabird/marine mammal observations will support data collection through March 2006, and then *ca*. 6 months of support to complete data analysis and reporting. Data collection beyond March 2006 will require a new proposal to NPRB or another funding agency. Funding for the north-south transect will end in summer of 2006, unless the Gulf Ecosystem Monitoring (GEM) program of the *Exxon Valdez* Oil Spill Trustee Council renews its commitment. GEM may not be soliciting proposals this year, and the north-south line will be lost unless replacement funding is obtained. MONITOR agreed to write the CPR program a strong letter of support/ endorsement, and the Chairman will discuss the program with the Executive Director of the Alaska Ocean Observing System.

Co-sponsorship of the CREAMS Advisory Panel with POC (Agenda Item 6)

POC requested that MONITOR consider co-sponsoring the Advisory Panel for *the CREAMS/PICES Program in East Asian Marginal Seas* that was approved in 2004. This inter-disciplinary program has as its second term of reference, "*To facilitate the establishment of permanent observation and data exchange networks in this region*." Dr. Kuh Kim, Science Board Chairman, spoke to the Committee regarding the role of monitoring in CREAMS, and encouraged MONITOR to co-sponsor the Panel and actively provide scientific advice. The Committee briefly discussed the issue and agreed to be a co-sponsor.

Committee membership (Agenda Item 7)

The Chairman reported that Committee membership is supposed to be restricted to 3 scientists from each member country. The United States currently has 5 members on the Committee. In the future it may be necessary for MONITOR to establish a Section to deal with some of its ongoing issues. At that time the "extra" members can serve on the Section and then the number national representatives allowed will not be an issue.

PICES and GOOS (Agenda Item 8)

Dr. Vyacheslav B. Lobanov gave a brief introduction on the structure of International GOOS (Global Ocean Observing System) and the relatively new Global Earth Observing System of Systems (GEOSS). PICES has been supportive of the Northeast Asian Regional (NEAR) component of GOOS. China, Japan, Korea, and Russia are members of NEAR-GOOS. PICES is also a co-sponsor of the CREAMS program. In addition, PICES, with support from PaCOOS and GEM, organized a workshop on the regional observation systems of the west coast of North America in the fall of 2003, in Victoria, Canada. Thus, a topical question for MONITOR and PICES is "*What role should PICES have in the coordination and participation in GOOS?*" The Committee recommends that a Study Group be established to answer this question (*MONITOR Endnote 4*). The Study Group is expected to provide the answer to MONITOR within one year of its formation.

Future integrative scientific program(s) of PICES (Agenda Item 9)

The Chairman provided an update on the process to select a new integrative scientific program for PICES. A Study Group on *Future integrative scientific program(s)* (SG-FISP) was formed that comprises the Science Board members (as of April 2005) plus scientists from member countries under-represented on the Board. Proposals for the program theme were submitted to the Study Group before the Annual Meeting and discussed at a special meeting of the Study Group during PICES XIV. A brief report of this meeting was presented at the Closing Session on October 7 and at the Governing Council meeting on October 8. Theme proposals will be posted on the PICES website, and the entire scientific community will be encouraged to provide their comments on the proposed themes and to develop new ideas and share them with SG-FISP. The Study Group assessment will be presented at the inter-sessional Science Board/Governing Council meeting in April 2006, and an open forum presentation on the preferred theme(s) will be given at PICES XV in October 2006, in Yokohama, Japan. At that time, recommendations will be made on how to proceed with the implementation of selected theme(s).

National reports of relevant monitor and observation activities (Agenda Item 10)

All member countries but China reported on national monitor and observation activities.

Canada (D. Mackas)

Canada currently has ongoing ship-based monitoring in 4 regions, continues to release Argo floats, and plans to add a cabled observatory in the near future. The sites visited by research vessels are: Line P/Station P, west Vancouver Island, Strait of Georgia, Hecate Strait, and the northern British Columbia coast. Line P/Station P may be visited fewer times in 2006 than in years past as the principal research vessel *John P. Tully* will have a mid-life refit this year.

Japan (K. Hidaka and S.-I. Saitoh)

There are at least 2 oceanographic lines being monitored around Japan by universities or national laboratories. The A-Line has been occupied for the past 15 years, and is visited 5 to 8 times per year. The O-Line, which crosses the Kuroshio Current, has been monitored for more than 3 years. There are also many other relevant projects in Japan. The Odate project (Tohoku National Research Institute of Fishery Science) is in the process of analyzing plankton samples collected between 1949 and 2003. There is also a single location in the western sub-arctic gyre, Station KNOT that is occupied 3-4 times per year. Occupation of the station is not regularly scheduled and most of the measurements are for process studies. One issue of concern is the loss of plankton samples. Each prefecture with access to the ocean has a local monitoring program. These programs have collected many plankton samples over the years, but have no obligation to archive the samples. Those samples are being discarded as the local programs run out of space. Lastly, Hokkaido University, in close collaboration with JODC,

assembled the observations collected by the T/S *Oshoro Maru* and *Hokusei Maru* since 1957, in a Long-Term Fisheries and Oceanographic Data Base (HUFO-DAT) for distribution as a CD. Volume 1 which contains hydrographic station data, nutrients, oxygen, zooplankton wet weight, and chlorophyll *a* concentration will be available soon for general distribution to the community. Volume 2, currently in preparation, will include experimental fishing and associated biological data.

Korea (K. Kim)

CREAMS (Circulation Research of the East Asian Marginal Seas) is Korea's major observation program and was presented earlier in the meeting (see also POC Agenda Item 5b).

Russia (G. Kantakov and V. Lobanov)

In the Far East, Russia monitors 2 lines in the Japan/East Sea and 4 lines in the Sea of Okhotsk. The lines have been sampled since 1984 and are occupied twice each year, in spring and fall. In addition, the Pacific Research Fisheries Center (TINRO) has regular fisheries surveys in the Sea of Okhotsk and the Bering Sea. There are also coastal stations in Primorye, Peter the Great Bay and the Amur River delta.

United States (J. Barth, J. Bengtson, P. Mundy, J. Napp and T. Royer)

Monitoring programs or sites in Alaska include: the Alaska Ocean Observing System (AOOS), moorings on the eastern Bering Sea shelf (M2, M4, M5) and in the Bering Strait, the Bering Sea and Aleutian Islands NMFS groundfish, mid-water, and marine mammal surveys, and the Bering Aleutian Salmon International Survey (BASIS). In the Gulf of Alaska, there is monitoring at Station GAK 1, the Seward Line, a ferry run between Homer-Kodiak-Seward, the north-south CPR transect (Anchorage-Tacoma), the Prince William Sound Ocean Observing System, the NMFS groundfish, mid-water, and marine mammal surveys, and several coastal monitoring stations in the southeast of Alaska.

Farther south off the coast of the states of Washington, Oregon and California, three regional OOS programs have formed: NaNOOS (Northwest Association of Networked Ocean Observing Systems), CeNCOOS (Central and Northern California Ocean Observing System), and SCCOOS (Southern California Coastal Ocean Observing System). These programs cover the entire west coast of the United States. NOAA has also begun a federal program, PaCOOS (Pacific Coastal Ocean Observing System), which intends to supply the critical fisheries components of the integrated observing systems throughout the U.S. California Current Large Marine Ecosystem. PaCOOS is also working to enable easy data access through Live Access Server and OpenDAP. PICES previously (November 2003) facilitated a workshop of all the west coast of North America observing systems (including those off Baja California, Mexico).

Monitoring off the coast of Oregon continues with support from several sources. Samples are obtained twice each month from a small number of stations close to shore, and a much longer transect is occupied 4 times per year. NMFS conducts annual hake and groundfish surveys along the west coast, and scientists have started to use gliders to replace or augment CTD surveys. The NSF is considering support of a cabled observatory off the coasts of Oregon and Washington.

A presentation on Alaska pinniped surveys was made. The populations of several of these species are in decline or at a very small size. To understand why they are declining various projects are attaching satellite tags to animals to study their migration and foraging habits. The animals migration range is very large with some of the tagged animals moving tens of kilometers each day away from the rookeries. Several of the tagged animals interacted with oceanographic eddies during their travels. Temperature/depth sensors could be placed on the animals for a relatively low cost enabling oceanographers to use the pinnipeds as "ships of opportunity".

PICES Best Poster Award (Agenda Item 11)

Each Committee has one representative to judge PICES XIV posters for the Best Poster Award. Dr. William J. Sydeman volunteered to represent MONITOR. The Best Poster Award is not restricted to "young" scientists, and it was a hardship to have each judge review each of almost 160 posters at PICES XIV. The recommendation for PICES XV is to have each judge first review the posters from their own session, and to suggest the top two posters from that section for further review. All judges would then review this reduced number of posters and pick a winner from this group of semi-finalists.

Planning for PICES XV (Agenda Item 12)

The Committee proposes a 1-day joint MONITOR/TCODE Workshop (with electronic-posters) on "*Data management, delivery and visualization of products from Ocean Observing Systems in major boundary currents*" (*MONITOR Endnote 5*). Travel support for 1 invited speaker is requested. [Later, the workshop title was changed to "*Data management, delivery and visualization of high-volume data products*".]

The Committee also agreed to co-sponsor a 1-day Topic Session, with POC and CCCC. The session would focus on synchronicity in responses among boundary current ecosystems to climate variability, and the use of data from OOS in major boundary currents to construct and run prognostic models (*POC Endnote 7*). These models are a critical element for testing hypotheses regarding the structure and function of large marine ecosystems.

MONITOR Endnote 1

Participation list

Members

Jack Barth (U.S.A)
Kiyotaka Hidaka (Japan)
Vyacheslav B. Lobanov (Russia)
David L. Mackas (Canada)
Phillip R. Mundy (U.S.A)
Jeffrey M. Napp (U.S.A., Chairman)
Thomas C. Royer (U.S.A.)
Sei-ichi Saitoh (Japan, Vice Chairman)
William J. Sydeman (U.S.A.)

Observers

David Fluharty (U.S.A.)
Kuh Kim (Science Board, Chairman)
Skip McKinnell (Deputy Executive Secretary)
Franz Mueter (U.S.A.)
R. Ian Perry (Canada)
Fangli Qiao (China)
Peter Rand (U.S.A.)
Robin Rigby (CoML)
Hirofumi Shimizu (Japan)
Darlene Smith (Canada)
John E. Stein (U.S.A.)
David W. Welch (Canada)

MONITOR Endnote 2

MONITOR meeting agenda

1. Welcome and introductions
2. PICES North Pacific Ecosystem Status Report
3. PICES website: Contributions from MONITOR
4. MONITOR Action Plan
5. Status of Continuous Plankton Recorder (CPR) Program
6. Co-sponsorship of the CREAMS Advisory Panel with POC
7. MONITOR membership
8. PICES and GOOS

9. Future integrative scientific program(s) of PICES
10. National reports of relevant monitor and observation activities
11. PICES Best Poster Award
12. Planning for PICES XV
13. Other business

MONITOR Endnote 3

Report of the Advisory Panel on *Continuous Plankton Recorder (CPR) Survey in the North Pacific*

(submitted by Dr. Charles B. Miller, CPR-AP Chairman)

The Action Plan for the North Pacific CPR Program is to keep towing continuous plankton recorders along the AC (Alaska-California) and VJ (Vancouver-Japan) lines (see below) for as many late winter-spring periods as possible, that is, deep into the future. Action includes continuous work-up of the CPR samples by SAHFOS (Sir Alister Hardy Foundation for Ocean Sciences, Plymouth, U.K.) and its associated workers, and reporting on ecological insights from the results as insights develop. We would also like to keep the seabird observation program on the VJ line active as long as practicable. Strong inter-annual and sub-regional differences in plankton life history scheduling and bird species composition are already evident in sampling from 2000 on.

The status of the North Pacific CPR Program has not changed much since PICES XIII (October 2004). The program, operated by SAHFOS, continues to be managed by Dr. Sonia Batten. Neither Dr. Batten nor Dr. Charles Miller (CPR-AP Chairman) will be at Vladivostok to report to MONITOR at PICES XIV. Dr. David Welch, associated with Dr. Batten from the inception of the North Pacific CPR Program, will attend and can report on recent results and developments.

Again in 2005, the Alaska to Pacific Northwest CPR lines were from Cook Inlet (Anchorage) to Tacoma in Washington State (AT route), rather than along the original route from Valdez to Long Beach (AC route). The MV *Horizon Kodiak* has towed CPRs on the new line. The new route is shorter, allowing six monthly tows instead of five. The AT-Line crosses the AC-Line, and samples closely equivalent habitat in the central Gulf of Alaska. Most of the work-up of 2004 samples is complete. In addition, a Vancouver to Japan route has again been sampled from the Ro-Ro *Skaubryn*, which has also supported seabird observations by Mr. Michael Henry of Point Reyes Bird Observatory, supervised by Dr. William Sydeman. Various combinations of hull-mounted seawater temperature sensors and towed CTDs (on the CPR units) have been recording physical conditions on these runs as well.

Preliminary results for 2004 have been published by Dr. Batten in the 2004 SAHFOS Annual Report. Ocean temperatures were above normal, and maturation of large inter-zonal migratory copepods (signature zooplankton of the subarctic Pacific) occurred earlier than in all other years sampled to date (2000 to 2004), about three weeks earlier than in 2000. This is in agreement with initial North Pacific CPR results (Batten, S. *et al*. 2003. *Fisheries Oceanography*, 12: 201-208) showing that oceanic zooplankton mature earlier in warmer, southern parts of the range than in cooler northern parts. Bird results from the VJ runs show very strong sub-regional distinctions in bird species present and dominance along different sectors of the track.

Funding for the North Pacific CPR Program is secure for the present period, but there is great uncertainty for long-term, stable funding. The AT runs are supported by funds from the Gulf Ecosystem Monitoring (GEM) program of the *Exxon Valdez* Oil Spill Trustee Council (EVOS). The current contract is for 2004-2006. If renewal of funding for existing programs is possible, then the call for proposals would most likely occur in 2006. New project starts for the GEM program overall have been suspended for 2006 by the EVOS Trustee Council. The Council is reconsidering all aspects of the use of

funds from the *Exxon Valdez* Oil Spill Trust Fund, and new starts for GEM projects may or may not be resumed in 2007. The North Pacific Research Board (NPRB) grant will support the VJ runs (including seabird and mammal observations) to June 2006. Whether NPRB could or would fund the entire North Pacific CPR program (AT and VJ Lines) after 2006 is unknown. Proposals to NPRB will be due in early December 2005.

MONITOR should be alert to new sources of funds that could sustain the North Pacific CPR program, as monitoring time-series gain value as their duration is extended. Wholly new funding arrangements may be required to keep this valuable program in operation.

Specific actions that would be useful to the PICES CPR Program:

- Securing funding – perhaps with a lobbying effort by PICES/MONITOR (see above for current problems);
- Obtain recognition of the North Pacific CPR program from AOOS, with areas covered by the CPR routes becoming parts of that observing system;
- Expansion of the seabird/mammal observations to include the north-south route;
- Using the CPR data set in developing the PICES North Pacific Ecosystem Status Report, with a member of the CPR Advisory Panel participating in the report and associated meetings.

MONITOR Endnote 4

Terms of reference for a Study Group to develop a strategy for GOOS

1. Briefly identify and describe the major observing systems (present and proposed) in the PICES region. Descriptions should include general data types, contact information, and data transmission (real-time *vs*. delayed).
2. Provide a list of action items to dictate how PICES will begin to coordinate/facilitate communication among IGOOS and national OOS efforts within the PICES region.
3. Should PICES propose an open ocean North Pacific GOOS pilot project to IGOOS? If yes, then provide a letter of intent that describes the scope of the project.

MONITOR Endnote 5

Proposal for a 1 day MONITOR/TCODE Workshop on "*Data management, delivery and visualization of products from Ocean Observing Systems in major boundary currents*"

[later re-named "*Data management, delivery and visualization of high-volume data products*"]

"*Swimming in the data stream without drowning in the flood*" or "*How to drink from a fire hose*"

Long-term monitoring of multi-disciplinary data in boundary currents is a high priority for PICES nations. Boundary currents are locations where many monitoring activities now take place. They are very important economically and also highly variable in both space and time. Dense near-real-time data from many disciplines are vital to describe the systems or the timely management of the coastal resources. Rapid analysis of the data is essential, however, increased data rates and their diversity are challenging the users. Cabled arrays and satellite altimeter, color and scatterometer (wind) measurements are examples of these new dense data sets. This workshop will discuss the availability of such data, and how we can effectively use them, focusing especially on availability, uses, GIS applications and other methods of display and analysis tools. A re-population of the North Pacific Metadata Base will be emphasized. Demonstrations of data archiving, displays and real-time availability are welcome.

Recommended convenors: David L. Mackas (Canada), Thomas C. Royer (U.S.A.) and Sei-Ichi Saitoh (Japan).

REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

The meeting of the Physical Oceanography and Climate Committee (POC) was held from 8:30-15:30 hours on October 7, 2005. The Chairman, Dr. Michael G. Foreman, called the meeting to order and welcomed members and observers (*POC Endnote 1*). Dr. James Christian served as rapporteur. The Chairman introduced Drs. Kyung-Il Chang (Korea) and James Christian (Canada) as new members of the Committee. The draft agenda was reviewed and adopted (*POC Endnote 2*).

Completion of PICES XIII decisions (Agenda Item 4)

- Working Group 17 on *Biogeochenical data integration and synthesis* (whose term ends in 2005) was transformed into the new Section on *Carbon and climate* reporting to POC and BIO.
- The Advisory Panel for *the CREAMS/PICES Program in East Asian Marginal Seas* was established under POC. It was suggested that BIO and MONITOR should consider co-sponsoring this Advisory Panel with POC.
- POC Committee member Dr. James E. Overland was named a member of CFAME.
- The first version of the POC Action Plan has been drafted.
- At the 2004 Annual Meeting, Science Board clarified that Committees could elect a Vice-Chairman if they so choose. The POC Committee felt this would be a good way to provide alternative participation at meetings that the Chairman could not attend. Dr. Ichiro Yasuda (Japan) was elected to this position at PICES XIV.
- A 1½-day POC Paper Session was convened at PICES XIV. Two invited speakers gave interesting presentations related to global climate model results that have been submitted to the Inter-governmental Panel on Climate Change for their 4th Assessment Report. Twenty-seven oral and 21 poster presentations were given. The summary of the session is included elsewhere in this Annual Report.
- A 2-day CREAMS/PICES Workshop on "*East Asian Seas Time-series*" was held April 21-22, 2005, in Seoul, Korea.
- The POC suggestion of "*Boundary current ecosystems*" as a theme for PICES XV was accepted by Science Board.
- Science Board approved the Symposium on "*Time series of the Northeast Pacific Ocean: A symposium to mark the 50th anniversary of Line-P*" to be held from July 5-8, 2006, in Victoria (Canada), co-sponsored by Fisheries and Oceans Canada and PICES. Planning is underway and talks will be requested from other time-series programs in the North Pacific.
- The Young Scientists Conference (joint with ICES) has been approved by Science Board and tentatively scheduled for the summer of 2007. Funds have been allocated by PICES and ICES, and a Steering Committee, comprised of two senior and two early-career scientists from each organization, has been appointed.

Progress report of WG 17 on *Biogeochemical data integration and synthesis* (Agenda Item 5a)

Dr. Andrew G. Dickson, WG 17 Co-Chairman, was not able to attend the meeting and sent a brief review of Working Group activities. As this Working Group is scheduled to end in 2005, a final report has been requested.

Progress report of CREAMS/PICES Advisory Panel (Agenda Item 5b)

This report of the Advisory Panel for *the CREAMS/PICES Program in East Asian Marginal Seas* was presented by Dr. Kyung-

Ryul Kim, and the objectives, observation plan, and time table of the CREAMS/PICES Program in East Asian Marginal Seas are included as *POC Endnote 3*. Dr. Kim stated that the first phase of the program focused on the Japan/East Sea and East Asian Time-series I (EAST I). A workshop on "*East Asian Seas Time-series*", co-sponsored by the Korean Ministry of Maritime Affairs and Fisheries (MOMAF), the School of Earth and Environmental Sciences of the Seoul National University, and PICES, was held April 21-22, 2005, at the Seoul National University. More than 50 marine scientists from 7 countries attended the workshop, which included presentations from existing time-series programs, and provided a forum for exchange of scientific information and expertise, and to explore how earlier experiences of time-series studies might assist in the development of future East Asian Seas Time-series. Emphasis for the workshop was on reviewing prior research and monitoring programs in the Japan/East Sea (JES), and on developing a framework for a future JES program. This was envisioned as the beginning of a workshop series that will eventually generate implementation plans for other East Asian seas (*e.g.*, Okhotsk Sea, Bohai/Yellow Sea, East China Sea and South China Sea). The proceedings have been published and are available from Dr. Kyung-Ryul Kim. A summary of the workshop can be found in PICES Press (Vol. 13, No. 2).

A ten-year time-series program will be initiated in 2006, and a request has been made to the Korean government for financial support. This program will have three main components: HydroEAST, CarboEAST, and EcoEAST. An inaugural workshop will be held soon, hopefully in the spring of 2006.

Dr. Kyung-Ryul Kim (Korea) and Dr. Yasunori Sakurai (Japan) were nominated as Co-Chairmen of the Advisory Panel.

Progress report of North Pacific Data Buoy Advisory Panel (Agenda Item 5c)

A report (*POC Endnote 4*) was prepared by the Panel Technical Coordinator, Mr. Al Wallace, and a summary was presented to POC by Dr. Foreman.

Proposals for new subsidiary bodies (Agenda Item 5d)

Dr. Foreman presented draft terms of reference (*POC Endnote 5*) for a new Working Group on *Evaluation of climate change projections* that would report to POC and be affiliated with the new CFAME Task Team. As previous climate change analyses within PICES have primarily focused on retrospective studies, and the Inter-governmental Panel for Climate Change is currently preparing their 4th Assessment Report based on results submitted from over twenty global climate models, the timing is right for climate analyses that look into the future.

The underlying objective of the Working Group would be to make climate change projections accessible to other PICES committees, groups, and any new Science Programs, and to evaluate the implications of these projections for the oceanography of the North Pacific and its marginal seas. A short discussion ensued on the merits of the new Working Group, the draft terms of reference (ToR), and prospective membership. Dr. Francisco E. Werner suggested that the second ToR be amended to reflect ecosystem impacts. He also mentioned that he will soon be attending a workshop entitled "*Toward integrative science at NCAR: building links between climate and ecosystem impact research communities*", and agreed to be a PICES liaison. The Committee supported the new Working Group.

Science Board issues (Agenda Item 6)

The Chairman briefly reviewed a draft POC Action Plan that followed the template sent out by the Science Board. This Plan identified specific POC actions on the short (annual) to medium (~5 years) time scale relating to points in the PICES Strategic Plan. Modifications were made to some of the action items, and the Plan was accepted for presentation at the next inter-sessional Science Board meeting. This is where all Committee Action Plans will be discussed

and, possibly, merged into one PICES Action Plan.

Dr. George L. Hunt presented a proposal for an ESSAS/PICES Workshop to be held in June 2006, in Russia (*CCCC Endnote 3*). POC supported the concept, and it was recommended that Science Board should provide travel support for 1-2 PICES members to attend.

Dr. Kyung-Ryul Kim proposed a POC/PICES Workshop on "*Model-data inter-comparison for the Japan/East Sea*" and a summer school on "*Circulation and ecosystem modeling*" to be held in the summer of 2006, in Korea. A draft of this proposal has been included as *POC Endnote 6*. Travel support was requested for 1 lecturer and 1 invited speaker. The Committee also supported this proposal.

Potential topics towards next major PICES scientific program(s) (Agenda Item 7)

The Chairman briefly discussed the 6 themes that have been put forward for the next major PICES scientific program to start after the CCCC Program ends. (This was a continuation of the presentation made by Dr. John E. Stein, Science Board Vice-Chairman, at the Closing Session.) Noting that there was considerable overlap among the proposals, the Chairman stated that his objective, as a member of the Study Group on *Future integrative scientific program(s)* that was tasked with soliciting and recommending a final choice (or choices), was to ensure a role for POC activities. The deadline for discussion of the proposed themes is December 1, 2005. Comments should be sent to Science Board and copied to the POC Chairman. The tentative acronym for the program is FUTURE – *Forecasting and Understanding Trends and Uncertainties in Ecosystem Response*. Dr. Yury Zuenko noted that it was important that "prediction" be a key component of the new program. Dr. Shin-ichi Ito indicated that proposals 2, 3 and 4 are similar and consistent with POC priorities. He felt that they should be supported but modified to emphasize prediction. Dr. Foreman suggested that the first four letters in the proposed acronym tie in well with the new POC Working Group. It was concluded that key words in the new scientific program should include: *understanding mechanisms, forecasting, evaluating uncertainties*.

Planning PICES XV (Agenda Item 8)

Dr. Shin-ichi Ito proposed a 1-day Topic Session on "*Responses of North Pacific boundary current systems and its ecosystems to climate variability*", to be co-sponsored jointly with MODEL and MONITOR (*POC Endnote 7*). Travel funding for 1 invited speaker was requested. This proposal was supported by POC. [Later, the session title was changed to "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*".]

A ½-day joint BIO/POC Topic Session on "*Ecosystem responses to climate induced changes in along- and cross-shelf transport*" was suggested by BIO, but was not supported as no details of the proposal were provided.

The Chairman proposed a 1-day POC Paper Session and a 1-day Inaugural Workshop for the new Working Group on *Evaluation of climate change projections*. Travel funding for 1 invited speaker for the workshop was requested. This proposal was also supported by POC.

Possible invited speakers for the Science Board Symposium on "*Boundary current ecosystems*" were discussed, and the following suggestions (in order of preference) were put forward: Bo Qiu (U.S.A.), Guo Hong Fang (China), Alec MacCall (U.S.A.), and Mark Wimbush (U.S.A.).

PICES XVI theme (Agenda Item 9)

The theme "*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*" proposed by Canada for PICES XVI was discussed (*SB Endnote 8*). Dr. Zuenko and others suggested that alternative titles could be "*Climate change(s) in subarctic seas*" and "*Climate change(s) in the subarctic Pacific and its adjacent seas*". It was agreed that these alternatives should be carried forward to Science Board.

Relations with international programs and organizations (Agenda Item 10)

Dr. Vyacheslav Lobanov described the status of the GOOS and NEAR-GOOS projects. The expected shift from strategic planning to implementation of GOOS required a strengthening of both administration and funding mechanisms for the project. The recent consolidation of world-wide GOOS Regional Alliances (GRA) is currently supported through the GRA Network Development (GRAND) project of the European Commission (www.grandproject.org). Recognition of GOOS by GEO as an ocean component of the developing GEOSS (Global Earth Observation System of Systems) is crucial for further progress of the project. As a regional component of GOOS, NEAR-GOOS provides oceanographic data and products both in real-time and delayed mode, and is working on the development of a sustained monitoring system for the region.

A proposal for an ICES/PICES/IOC Symposium on "*Effects of climate change on the world's oceans*", tentatively scheduled of the spring of 2008, in Gijón (Spain), was briefly discussed. Noting that the title should perhaps be revised to reflect two-way interactions, *effects of the oceans on climate* as well as *effects of climate on the ocean*, the Committee recommended support for the proposal.

Items with financial implications (Agenda Item 11)

Inter-sessional meetings for 2006 and beyond:

POC requests travel support for:

- 1 invited speaker for the POC Workshop on "*Model-data inter-comparison for the Japan/East Sea*", and 1 lecturer for the summer school on "*Circulation and ecosystem modeling*";
- 1-2 scientists to attend the ESSAS/PICES Workshop on comparing sub-arctic ecosystems (to be shared with other committees).

POC also discussed an inter-sessional workshop of the new Working Group on *Evaluation of climate change projections* with CFAME in April 2007, and agreed to defer this request to PICES XV.

A PICES observer was also requested at the NEAR-GOOS meeting to be held in January 2006, in Busan, Korea, but this may or may not require travel support.

Publications for 2006 and beyond:

None is anticipated except "Guide to best practices for oceanic CO_2 measurements and data reporting" for which funds have already been allocated.

Travel support requests for PICES XV:

- 1 invited speaker for POC Topic Session on "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*";
- 1 invited speaker for the Inaugural Workshop for the new Working Group on *Evaluation of climate change projections*.

2005 POC Best Presentation Award (Agenda Item 12)

Drs. Foreman, Lobanov and Yasuda acted as judges for the POC Paper Session. Satoshi Osafune (Japan) and Yuri Nikonov (Russia) were named co-winners for their respective presentations "*Bidecadal variability in the intermediate waters of the northwestern subarctic Pacific and the Okhotsk Sea in relation to the 18.6 year nodal tidal cycle*" (co-authored by Ichiro Yasuda) and "*Water and chlorophyll circulation modeling of Aniva Gulf according to oceanographic data from the year 2002*" (co-authored by Valeriy Chastikov and Ludmila Gavrina).

POC members thanked Dr. Yury I. Zuenko for volunteering to serve on the Best Poster Award Committee. The winner was Hanna Na (Korea) for her poster (submitted to the POC Paper Session) "*Temporal variation of the estimated volume transport through the Korea and Tsugaru Straits*" (co-authored by Kuh Kim).

Adoption of POC report (Agenda Item 14)

The preceding report has been circulated and approved by Committee members. All recommendations were brought forward by Dr. Foreman at the Science Board meeting on October 8, 2005.

POC Endnote 1

Participation list

Members

Kyung-Il Chang (Korea)
James Christian (Canada)
Michael G. Foreman (Canada, Chairman)
Shin-ichi Ito (Japan)
Hee-Dong Jeong (Korea)
Vyacheslav B. Lobanov (Russia)
Young-Gyu Park (Korea)
Ichiro Yasuda (Japan)
Yury I. Zuenko (Russia)

Observers

Hiroyasu Hasumi (Japan)
Sok Kuh Kang (Korea)
Kyung-Ryul Kim (Korea)
Vadim Navrotsky (Russia)
Ig-Chan Pang (Korea)
Fangli Qiao (China)
Muyin Wang (U.S.A.)
Francisco Werner (U.S.A.)

POC Endnote 2

POC meeting agenda

1. Welcome, introductions, opening remarks
2. Adoption of agenda, appointment of rapporteur
3. Welcome new members (Jim Christian, Kyung-Il Chang)
4. Completion of PICES XIII decisions
5. Reports of existing subsidiary bodies and proposals for new subsidiary bodies
   a. Progress report of WG 17
   b. Progress report of CREAMS/PICES Advisory Panel
   c. Progress report of North Pacific Data Buoy Advisory Panel
   d. Proposal for new subsidiary bodies
6. Discussion of Science Board issues
7. Potential topics towards next major PICES scientific program(s)
8. Planning PICES XV
9. PICES XVI theme
10. Relation with other international programs and organizations
11. Items with financial implications
12. 2005 POC Best Presentation Award
13. Other business
14. Adoption of POC report and recommendations to Science Board.

POC Endnote 3

CREAMS/PICES Program in East Asian Marginal Seas

Program objectives

1. To understand the hydrography and circulation and their variability in the East Asian marginal seas;
2. To understand the effect of climate and long-term changes in physical and chemical environments on the East Asian marginal seas ecosystems;
3. To establish permanent observation stations and a data exchange network in East Asian marginal seas.

The initial focus of the Program will be on the Japan/East Sea. The schedule and observational plan for the program is given in the following.

Time table

Dec. 2004: Establish CREAMS/PICES Advisory Panel
Mar. 2005: 132°E cruise
Spring 2005: Open CREAMS/PICES Office and hold 1st workshop on East Asian Seas Time-series, co-sponsored by MOMAF, RIO/SNU and PICES
Spring 2006: 132°E cruise; start of permanent stations
June 2006: Hold 2nd workshop on "East Asian Marginal Seas circulation: What we know and how well can we forecast?"
Spring 2007: 132°E cruise
Oct. 2007: Hold 3rd workshop on "Progress in studies of physical processes their impacts to the Japan/East Sea ecosystem" at PICES XVI

Observation plan

1. Hydrography baseline: 132°E;
2. Permanent stations: EAST-I (Ulleung Basin) and EAST-II (Western Japan Basin);
3. Mooring stations: Western Japan Basin and Ulleung Basin;
4. Profiling floats, surface drifters, SST and satellite data.

POC Endnote 4

Report of the *North Pacific Data Buoy Advisory Panel* (NPDB-AP) for 2004/2005

Summary of activities for September 2004 – August 2005

The NPDB-AP was officially accepted as an entity reporting to the Data Buoy Co-operation Panel (DBCP) and PICES at the 18th session of DBCP held in October 2002. This is the Panel's 3rd Annual Report as an official body of DBCP.

During the period September 1, 2004 to August 31, 2005, an average of 64 drifting buoys per month reported to MEDS from the North Pacific Ocean (30°N to 65°N and 110°E to 110°W). These buoys produced approximately 28,000 messages per month. These numbers are roughly the same as last year with 66 buoys and 24,000 messages per month. As of August 2005, 109 buoys were reporting, 28 with barometric pressure. Tables and figures showing breakdowns of the number of buoys in operation and the number of messages received were compiled by MEDS and are available on the NPDBAP website at http://npdbap.noaa.gov.

Meetings

October 17, 2004

A meeting was held during the 20th session of the Data Buoy Co-operation Panel (DBCP – XX) in Chennai, India. NPDB-AP and DBCP representatives from Canada, United States, Japan and the WMO were in attendance.

Summary of activities for 2004 - 2005

Canada

- 3 moored 6-meter NOMAD buoys deployed year round (deep sea);
- 13 moored 3-meter Discus buoys deployed year round (coastal);
- 1 developmental 3-meter Discus buoy (Pat Bay) – not reporting on GTS;
- 9 drifters

Reporting on GTS (31/07/05): 16 moored buoys, 9 drifting buoys

Four SVP/B (Surface Velocity Profiler with Barometer) drifters will be deployed in the Central North Pacific in summer/early fall 2006. Ten barometer upgrades are scheduled on U.S. drifter buoys in cooperation with GDP for deployment in the Pacific.

Japan

From September 2004 to August 2005, Japan deployed a total of 160 buoys (20 surface

drifting buoys, 117 profiling floats, 23 moored buoys) in the seas around Japan, North Pacific, Tropical Pacific, South Pacific, Indian Ocean, Southern Ocean, Arctic Ocean and Antarctic Ocean for oceanographic research and operational purposes by JMA (Japan Meteorological Agency), JCG (Japan Coast Guard), JAMSTEC (Japan Agency for Marine-Earth Science and Technology), Tohoku University, NIPR (National Institute of Polar Research) and FRA (Fisheries Research Agency).

JMA deployed 12 drifting buoys with air pressure, SST, significant wave height and period sensors in the seas around Japan. The data are distributed on the GTS, with header from "SSVB01 RJTD" to "SSVB19 RJTD".

United States

National Data Buoy Centre (NDBC)

- 3 moored buoys were deployed in the North Pacific in 2005;
- 1 Deep Ocean Assessment and Reporting of Tsunamis (DART) was deployed in the North Pacific in 2005. This program will increase six-fold over the next two years with DART buoys being deployed throughout the North Pacific;
- All 4 APEX (Automated Profiling EXplorer) floats that report water column temperature and salinity profiles every 10 days ceased reporting in 2005;
- No drifters were acquired or deployed in 2005.

Naval Oceanographic Office (NAVOCEANO)

10 SVP-B drifters were deployed in the eastern North Pacific. Environment Canada funded the upgrade of buoys.

Global Ocean Observing System Center

- 47 SVP-B drifters were deployed by the Atlantic Oceanographic and Meteorological Laboratory (AOML/ONR/NOAA) using Voluntary Observing Ships. Upgrades of buoys funded by NOAA/NDBC.
- 10 SVP drift buoys were deployed by research vessels in the North Pacific. The GDP worked with Environment Canada to upgrade 10 SVP buoys with barometers. These buoys were air deployed by the Naval Oceanographic Office.

Overview of plans for 2005 - 2006

The next NPDB-AP meeting is scheduled for Sunday, October 16th 2005, from 14:00 to 17:00, prior to the 21st session of the Data Buoy Co-operation Panel (DBCP – XXI). The meetings will take place at the Regente Palace Hotel, Buenos Aires, Argentina. It was felt that this would permit maximum attendance of active DBCP and NPDB-AP members while minimizing travel costs to attend a meeting in a different location.

Deployments and new initiatives for 2005 - 2006

Planned buoy deployments and other related activities for the next year are as follows.

Canada

Meteorological Survey of Canada

- Two SVP/BW drifter buoys awaiting deployment in fall 2005 in the Pacific in support of NPDB-AP;
- Eight SVP/B drifter buoys awaiting deployment in early fall 2005 in the Central and Western North Pacific in support of NPDB-AP;
- 2 SVP/BW drifters to be deployed in summer 2006 in the Central North Pacific;
- 4 SVP/B drifters are scheduled for deployment in summer/early fall of 2006 in the Western North Pacific.

Marine & Environmental Data Service (MEDS)

- MEDS would like to re-design the look and content of the Drifting Buoy/RNODC section of the website for easier maintenance and to include more graphs and statistics on their archive and its contents;
- Drifting buoy data is currently quality-controlled on a monthly basis, but the need for drifter data in a more timely manner is increasing. MEDS will be looking into changing their processing system to a weekly or even daily operation.

- Complete and implement new BUFR software.

Japan

From September 2005 to August 2006, a total of 163 buoys (18 surface drifting buoy, 122 profiling float, 23 moored buoy) are scheduled to be deployed in the seas around Japan, North Pacific, Tropical Pacific, South Pacific, Indian Ocean, Southern Ocean, Arctic Ocean and Antarctic Ocean for oceanographic research and operational purposes by JMA, JCG, JAMSTEC, Tohoku University, NIPR and FRA.

United States

NDBC/GDP
Forty SVP drifters are being upgraded to SVP-B by the National Data Buoy Center (NDBC), and are scheduled for deployment in the North Pacific in 2005/06. These 40 SVP-B buoys are in addition to the usual number of SVP buoys that are deployed in the North Pacific over time.

POC Endnote 5

Draft terms of reference for a Working Group on *Evaluation of climate change projections*

1. To analyse and evaluate climate change projections for the North Pacific and its marginal seas based on predictions from the latest global and regional models submitted to the Inter-governmental Panel on Climate Change (IPCC) for their 4th assessment report;
2. To facilitate analyses of climate effects on marine ecosystems and ecosystem feedbacks to climate by, for example computing an ensemble of the IPCC model projections for the North Pacific and making these projections available to other PICES groups such as CFAME;
3. To facilitate the development of higher-resolution regional ocean and coupled atmosphere-ocean models that are forced by, and take their boundary conditions from, IPCC global or regional models;
4. To facilitate the development of local and regional data sets (*e.g.*, SST, river flow, sea ice cover) by incorporating information from climate model projections as well as observations and historical re-analyses;
5. To ensure effective two-way communication with CLIVAR;
6. To convene workshops/sessions to evaluate and compare results;
7. To publish a final report summarizing results.

POC Endnote 6

Proposal for a POC Workshop on "*Model-data inter-comparison for the Japan/East Sea*" and a summer school on "*Circulation and ecosystem modeling*"

Background

Water dynamics are important for physical processes, ecosystem dynamics and human activity. Given the growing importance of operational oceanographic information and forecasts (*e.g.* in relation to the development of regional coastal components of GOOS like NEAR-GOOS, and to PICES activities such as the North Pacific Ecosystem Status Report and the CREAMS/PICES Program), it is timely to ask what is known, and whether reliable forecasts can be made for the circulation in the Japan/East Sea (JES). Intensive field observations over recent years have increased our knowledge of the water dynamics in the JES, while at the same time, there have been further developments in numerical modeling. Are these observational and modeling advances interactive and comparable with each other? What have been the achievements and gaps? What would be an approach to create a reliable regional model?

Goals

- To review the most recent observations of physical and biogeochemical processes in the JES;
- To share results from simulations of physical and ecosystem processes, and to compare model results with observational data. Particular attention will be given to those data obtained during CREAMS II (ONR-JES program for 1999~2001, and other experiments) in order to identify common responses, to discover major disagreements among models, and to identify any extreme responses in individual models that might warrant further investigation;
- Share methodologies and approaches for analysis and diagnosis of simulations and propose more quantitative strategies for model-model and model-data inter-comparison;
- To introduce and share results from present state-of-art nowcast/forecast systems operating in the JES, and to evaluate their strengths and weaknesses with regard to circulation variability and ecosystem response;
- To introduce efforts that are developing regional coupled physical-biological models in North Pacific regions and to encourage such efforts in the JES;
- To gather together early-career scientists and motivate their involvement in research on "modeling the climate variability and ecosystem response" (dedicated PICES' capacity-building summer school).

Dates, venue and tentative schedule

Five days in summer 2006 (Monday to Friday) at location TBD in Korea. Two days will be dedicated to the workshop (inter-comparisons - 1.5-day; and nowcast/ forecast system and coupled modeling - 0.5-day) and three days to the summer school.

Expected participants

An attendance of 20-25 people is anticipated. Modelers as well as observationalists working on the physical and biological oceanography of the Japan/East Sea from Japan, Korea, Russia, and U.S.A. are expected to attend the workshop. Two lecturers (on circulation modeling and ecosystem modeling – NEMURO) will be invited for the summer school.

Funding

Potential funding sources would be the Korea CREAMS/PICES Program, the Seoul National University (Brain Korea 21 Program), the Korea Ocean Research and Development Institute (KORDI), IOC/WESTPAC, ONR-Asia, the Russian Academy of Sciences, and other organizations. Speakers and participants attending the workshop and summer school are required to cover their own expenses. Limited funding will be available for some workshop speakers and young scientists attending the summer school. PICES is requested to make an official announcement of the workshop and school, to recommend appropriate invited speakers and lecturers, and to provide funds for one speaker for workshop and one lecturer for the summer school.

Workshop outcome

- Extended abstracts of papers presented at the workshop and a summary of lecture notes for the summer school will be published in the PICES Scientific Report Series;
- Publication of selected papers from the workshop in a special issue of a relevant journal will be considered.

Conveners

Kyung-Il Chang (SNU, Korea)
Sok-Kuh Kang (KORDI, Korea)
Vyacheslav Lobanov (POI, Russia)
Christopher N. K. Mooers (U. Miami, U.S.A.)
TBD (Japan)

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POC Endnote 7

Proposal for a 1-day POC/MONITOR/CCCC Topic Session on

"Responses of North Pacific boundary current systems and its ecosystems to climate variability"

[later renamed "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*"]

A number of hypotheses have attempted to explain the synchronous low-frequency fluctuations in sardine populations off California and Japan. One hypothesis proposes that since the Kuroshio Current (subtropical western boundary current) and California Current (subtropical eastern boundary current) are driven mainly by wind stress, their variability should be closely related through basin-scale atmospheric teleconnections. However, basin-scale climate signals may be modulated by regional meso-scale processes, and both systems are impacted by a range of variability from decadal (*e.g.*, regime shifts), to interannual (*e.g.*, ENSO), to seasonal and shorter time scales. This variable forcing may lead to divergent and asynchronous ecosystem responses. This session will provide a comparative review of the physical and ecosystem variability of the boundary currents, discuss the degree of synchronicity of this variability, and facilitate understanding of the connectivity between North Pacific boundary current systems. A more comprehensive understanding of the boundary current systems requires modeling approaches, although the data for model validation is often limited. This session will also provide consideration of observing system requirements and techniques for monitoring boundary current circulation and ecosystems, in particular the necessary combination of data and models.

Recommended convenors: Jack Barth, Steven Bograd (U.S.A.), Shin-ichi Ito, Kosei Komatsu (Japan) and Vyacheslav B. Lobanov (Russia).

REPORT OF TECHNICAL COMMITTEE ON DATA EXCHANGE

The meeting of the Technical Committee on Data Exchange (TCODE) was held from 8:30-17:30 hours on October 7, 2005. The Chairman, Dr. Igor I. Shevchenko, called the meeting to order and welcomed the participants. The meeting was attended by 8 TCODE members and 3 observers representing all PICES member countries (*TCODE Endnote 1*). Mr. Robin Brown served as rapporteur. The Committee reviewed the provisional agenda, and it was adopted as presented (*TCODE Endnote 2*).

Review progress on items in the 2004/2005 Workplan (Agenda Item 3)

TCODE Topic Session on "*Marine data management and delivery systems to support ecosystem monitoring*"

This was the first scientific session organized by TCODE. Papers covered topics of real-time data delivery between ships-at-sea and land-based laboratories, marine data exchange protocol options and standards, merging and aggregating data sets and data streams from diverse sources, and metadata search and federated systems. Eleven oral papers and 5 posters were presented. The session was received very well by PICES scientists and attendance was high. The session clearly demonstrated that TCODE can contribute to the scientific part of the Annual Meetings. The summary of the workshop is included elsewhere in this Annual Report.

Pilot project to "*Federate metadata on North Pacific ecosystems*"

One paper presented by Dr. Bernard A. Megrey at the TCODE Topic Session (above) described progress on this project. He provided a short review and demonstration including a query to a clearinghouse at http://clearinghouse3.fgdc.gov/. He noted that for metadata publishing using this technology: (1) minimal hardware is required, (2) open source (free) software is available and (3) the server is easily configured. All the work is in preparing the metadata records (including translation into English).

Using partial support from PICES, KODC (Korea Oceanographic Data Center) and NPEM (NOAA-PICES North Pacific Ecosystem Metadatabase) have exploited a communications technique that allows public internet search of their combined metadata collections in a single session. Major progress came from the first joint meeting held in August 2005, in Seattle. The second planning meeting will be held in Busan following the PICES Annual Meeting, to work out the details (mapping DIF which is used by Korea to the FGDC standard; translation of Korean metadata). Dr. Megrey will provide a report on "*Federate metadata on North Pacific ecosystems*" pilot project including a manual for those who are willing to federate (to be posted on the TCODE website at http://tcode.tinro.ru). Dr. Anthony Isenor will supply a link to a British parameter dictionary in order to try to standardize the vocabulary.

Personnel from the Japan Oceanographic Data Center, the Japan Marine Information Research Center and the Pacific Institute of Geography of the Far Eastern Branch of the Russian Academy of Sciences expressed strong interest in joining the federation process. To aid the ongoing effort, funding proposals were submitted to the Sasakawa Peace Foundation and to PICES (*TCODE Endnote 3*) for the continuation of the project. An article about the project was published in PICES Press (Vol. 14, No. 1).

TCODE Action Plan

The draft TCODE Action Plan was designed to reflect activities of the Committee for the next 5 years. Those activities are supposed to meet the goals and objectives of the PICES Strategic Plan and the PICES Strategy for Capacity Building.

Update TCODE web pages

Dr. Shevchenko described the current content of http://tcode.tinro.ru and asked members and observers for their contributions.

Assistance with HAE-DAT database activities

The Committee reviewed the progress made with the development of the HAE-DAT (Harmful Algal Event Database) partnership. IOC and PICES agreed (a formal agreement was signed in June 2005) to establish a partnership in systematically compiling, storing and presenting on-line records on harmful algal events. Event records will be compiled and stored annually in the format specified in the HAE-DAT database. A similar agreement was signed between IOC and ICES. It was recommended that continued assistance with database activities be provided to the Section on *Ecology of harmful algal blooms in the North Pacific*.

Coordinating TCODE and MONITOR activities

Dr. Thomas C. Royer reported on the activities of the new MONITOR Technical Committee and its Action Plan.

OBIS and other related projects

In order to better understand the Ocean Biological Information Systems (OBIS) and other related projects, Dr. Shevchenko posted links to relevant internet resources at http://tcode.tinro.ru.

National annual reports (Agenda Item 4)

TCODE members from all member countries, Robin Brown (Canada), Ruguang Yin (China), Tomowo Watanabe (Japan), Kyu-Kui Jung (Korea), Georgiy Moiseenko (Russia) and Bernard Megrey (U.S.A.), presented national annual reports that were mostly in accordance with the recommended template. This template includes key institutes and agencies, key persons/contacts, data and metadata sets, ocean observing systems, data and metadata formats and standards, information technologies for collecting, measuring and enumerating marine organisms, DM programs that underpin marine science programs, existing intra- and international data policies, software applicable in marine ecosystems studies and modeling, publications on marine DM issues, education materials, *etc*. All reports will be posted on the TCODE web page.

Updates on data management activities in PICES member countries and international organizations (Agenda Item 5)

Dr. Norio Baba (Japan) described ongoing data management programs of NOWPAP.

Dr. Shevchenko was invited to attend the 2nd International Workshop for GODAR-WESTPAC. He presented a report on PICES TCODE activities. At the workshop, representatives of WESTPAC member countries and several international organizations described various data management projects, such as IODE (International Oceanographic Data Information Exchange) activity, the GOSUD (Global Ocean Surface Underway Data) project, Australian Initiative for Oceanographic Data Management, SeaDataNet (Pan European Infrastructure for Ocean and Marine Data Management), and Japan Fisheries Oceanography Database, *etc*.

On behalf of PICES/TCODE, Dr. Shevchenko participated in the 3rd International Symposium on "*GIS/Spatial Analyses in Fishery and Aquatic Sciences*". There were 86 participants from 21 countries and 5 international organizations. Three themes were chosen for this Symposium: (a) effective and affordable GIS for fishery and aquatic information especially for the people in the developing countries; (b) spatial fish stock assessment modeling; and (c) spatial fisheries resource management. Most papers described applications of GIS technology, statistical methods and mathematical modeling to processing and understanding marine and fisheries data. Dr. Shevchenko invited members of the Fishery-Aquatic GIS Research Group to participate in PICES/TCODE activities.

Discussion of TCODE activities in relation to the PICES Strategic Plan and development of TCODE Action Plan (Agenda Item 6)

The Committee reviewed and discussed the draft TCODE Action Plan. The results of this discussion will be used to update the Action Plan.

Future integrative scientific program(s) of PICES (Agenda Item 7)

Dr. Shevchenko reviewed the procedure and status of the implementation of future PICES integrative scientific program(s). The proposed themes will be posted on the PICES website, and the PICES community is encouraged to provide comments.

Planning for PICES XV (Agenda Item 8)

TCODE discussed and supported the proposal by MONITOR to convene a 1-day joint workshop on "*Data management, delivery and visualization of products from Ocean Observing Systems in major boundary currents*" (*MONITOR Endnote 5*). TCODE will nominate an additional convenor, if necessary.

PICES XVI theme (Agenda Item 9)

TCODE supported the Canadian proposal on the theme for PICES XVI: *The changing North Pacific: Previous patterns, future projections, and ecosystem impacts.*

Relations with other international programs and organizations (Agenda Item 10)

No proposals on updates for the PICES Standing List were made.

Election of TCODE Chairman and Vice-Chairman (Agenda Item 11)

This was the third year of Dr. Shevchenko's chairmanship of TCODE. It was the intent of the Committee to elect a new Chairman. However, after serious discussion of the situation (including the issue of representation of different nations on Science Board), Dr. Shevchenko was asked to continue for one more year, and he agreed to do so.

The Committee decided to have a Vice-Chairman position, and Dr. Bernard Megrey was nominated. He accepted the proposal in principle, but needs to consult with his head of laboratory. The Committee will proceed with this matter by correspondence.

Items with financial implications (Agenda Item 12)

TCODE requests support for :

- 1 invited speaker for the MONITOR/ TCODE Workshop at PICES XV;
- a TCODE representative to attend a meeting of the ICES Working Group on *Marine Data Management*;
- Phase II of the PICES Federated Searching project (adding a node for JODC/MIRC) (*TCODE Endnote 3*).

TCODE Workplan for 2005/2006 (Agenda Item 14)

The Committee adopted the following workplan:

- Continue to support HAB-S work with HAE-DAT database and required metadata (Brown);
- Convene a 1-day joint MONITOR/TCODE Workshop at PICES XV on "*Data management, delivery and visualization of products from Ocean Observing Systems in major boundary currents*" (Royer);
- Update NPEM and TCODE inventory (all members);
- Initiate a dialogue with ICES Working Groups involved in data management issues (Shevchenko);
- Prepare and post a report on the PICES Federated Searching project: Phase I (Megrey);
- Carry out the PICES Federated Searching project: Phase II (if approved by Science Board) (Megrey);
- Update TCODE Action Plan (Brown and Shevchenko);
- Coordinate activities with MONITOR (Royer).

TCODE Endnote 1

Participation list

Members

Robin Brown (Canada)
Kyu Kui Jung (Korea)
Bernard A. Megrey (U.S.A.)
Georgiy Moiseenko (Russia)
Thomas C. Royer (U.S.A.)
Igor I. Shevchenko (Russia, Chairman)
Tomowo Watanabe (Japan)
Ruguang Yin (China)

Observers

Norio Baba (Japan)
Anthony Isenor (Canada)
Dengwen Xia (China)

TCODE Endnote 2

TCODE meeting agenda

1. Welcome and introduction of members
2. Adoption of agenda
3. Review progress on items in the 2004/2005 Workplan
   a. TCODE Topic Session on "*Marine data management and delivery systems to support ecosystem monitoring*"
   b. Pilot project to "*Federate metadata on North Pacific ecosystems*"
   c. TCODE Action Plan
   d. Updating TCODE web pages
   e. TCODE assistance with HAE-DAT database activities
   f. Coordinating TCODE and MONITOR activities
   g. OBIS and other related projects
4. National annual reports
5. Updates on data management activities in PICES member countries and international organizations
6. Discussion of the TCODE activities in relation to the PICES Strategic Plan and development of TCODE Action Plan
7. Future integrative scientific program(s) of PICES
8. Planning for PICES XV
9. PICES XVI theme
10. Relations with other international programs and organizations
11. Election of TCODE Chairman and Vice-Chairman
12. Items with financial implications
13. New business
14. TCODE Workplan for 2005/2006

TCODE Endnote 3

Data-sharing project "*Federate metadata on North Pacific ecosystems: Phase II*"

Significant progress has been made over the past year to connect PICES member nations' metadatabase systems into one integrated resource. With this new scientific resource, a user of any one metadata inventory will have the ability to search for data catalogued by any and all other participating systems with a single search request. Using modern data management techniques to cross-search separate metadatabases provides the advantages of shared metadata without compromising national ownership, data integrity, or security of national metadata products.

TCODE adopted a pilot KODC-NPEM federation as part of its 2004/2005 Workplan. The first PICES node (PICES-NPEM, PICES North Pacific Ecosystem Metadatabase) has been registered with the National Spatial Data Infrastructure clearinghouse, and a node for

KODC (PICES-KODC) will soon be on line. The status of the PICES nodes can be found at http://registry.fgdc.gov/serverstatus/, and the nodes can be searched by going to http://clearinghouse3.fgdc.gov/. Over the past year, two successful planning meetings took place that discussed required technical details and technical hurdles and the means to address and solve problems associated with federating with KODC. Success with this project means that efforts with other PICES countries will easily scale up with a nominal investment of time and planning.

We propose, as Phase II of the project, to federate with JODC and MIRC, and ask PICES to continue to support this project at the same level as last year, conditional on confirmation by JODC and MIRC that they are willing to federate at this time.

Projected budget:

Total cost: US$ 8,000

Two 2-day meetings; 2 people to travel to Japan or the United States at US$ 2,000/person/trip. Meeting dates and locations will be determined at a later date.

Contribution from PICES: US$ 4,000

Proponents of the proposal:

Toru Suzuki (JODC/MIRC, Japan)
S. Allen Macklin (NOAA/PMEL, U.S.A.)
Bernard A. Megrey (NOAA/AFSC, U.S.A.)

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* (HAB-S) met from 8:30 to 17:30 hours on October 1, 2005, under the chairmanship of Drs. Hak-Gyoon Kim and Vera Trainer. The meeting was attended by 20 scientists representing all PICES member countries (*HAB-S Endnote 1*). The agenda for the meeting was approved as presented (*HAB-S Endnote 2*).

HAE-DAT presentation and discussions (Agenda Items 3-5)

Dr. Henrik Enevoldsen reviewed the progress made with the development of the HAE-DAT (Harmful Algal Event Database) partnership. He informed that IOC and PICES agreed (a formal agreement was signed in June 2005) to establish a partnership in systematically compiling, storing and presenting on-line records on harmful algal events. Event records will be compiled and stored annually in the format specified in the HAE-DAT database. A similar agreement was also signed between IOC and ICES.

Presentations were made by representatives of all PICES member countries (Dr. Charles Trick for Canada, Dr. Jinhui Wang for China, Dr. Yasunori Watanabe for Japan, Dr. Hak-Gyoon Kim for Korea, Dr. Tatiana Orlova for Russia, and Dr. Vera Trainer for the United States) on the first year of their involvement in the IOC/ICES/PICES HAE-DAT. Discussion focused on HAE-DAT effectiveness, possible modifications and future data efforts. This followed by a practical exercise on entering national HAB data for the year 2001 in the database. The exercise was organized in the morning of October 2, and led by Dr. Monica Lion (IOC-IEO Science and Communication Centre on Harmful Algae). HAB-S members agreed on the following guidelines for HAE-DAT submissions:

- At a minimum, ASP, PSP, and DSP data will be entered in area codes where they have occurred;
- Entry of red tide (high biomass) data is optional, and only entered if phytoplankton species are known;
- Entry of data corresponding to high toxigenic cell numbers, without any information regarding toxicity, is also optional (for example, offshore cruise data where there is no known impact on coastal shellfish);
- At least one harmful algal event should be reported in each area code when such an event has occurred, but multiple events in a given area code can be listed in the comments section of a single report;
- If an event has spread from one area code to another, this can be described in a single report, but should list both area codes.

Planning for PICES XV (Agenda Item 6)

The Section recommends a 1-day MEQ Workshop on "*Review of selected harmful algae in the PICES region: II*. Dinophysis *and* Cochlodinium spp.", co-chaired by Drs. Charles Trick and Yasunori Watanabe. A product from the workshop will be a list of recommendations to help guide collaborative HAB research priorities in PICES countries over the next five years. The workshop will be preceded by a ½-day laboratory demonstration on Diarrhetic Shellfish Poisoning (DSP) detection (*HAB-S Endnote 3*). Drs. Ichiro Imai and Yasunori Watanabe have agreed to co-lead the demonstration. Travel funds are requested for 1 invited speaker to attend the workshop.

The Section also proposes a 1-day MEQ Topic Session on "*Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences*", co-convened by Drs. William Cochlan and Ichiro Imai (*HAB-S*

Endnote 4). Travel funds are requested for 1 invited speaker to attend the session.

A 1½-day HAB-S meeting is recommended which includes discussion of HAE-DAT use by each country led by Drs. Henrik Enevoldsen and Monica Lion of IOC. To strengthen and ensure the success of HAE-DAT, the Section requests participation by a delegate from China and funding for this delegate, if needed.

HAB-S Endnote 1

Participation list

Members

William Cochlan (U.S.A.)
Ichiro Imai (Japan)
Shigeru Itakura (Japan)
Hak-Gyoon Kim (Korea, Co-Chairman)
Changku Lee (Korea)
Olga Lukyanova (Russia)
Tatiana Yu. Orlova (Russia)
Mikhail Simonon (Russia)
Vera L. Trainer (U.S.A., Co-Chairman)
Charles Trick (Canada)
Yasunori Watanabe (Japan)
Mark L. Wells (U.S.A.)

Observers

Stephen Bates (Canada)
Robin Brown (Canada)
Henrik Enevoldsen (Denmark/IOC)
Sam Geon Lee (Korea)
Monica Lion (Spain/IOC)
John E. Stein (U.S.A.)
Jinhui Wang (China)
Satoshi Nagai (Japan)

HAB Section members not in attendance:
Jennifer Martin (Canada), Gennady Kantakov and Nina Klochkova (Russia), Qiu-Fen Li and Mingyuan Zhu (China)

HAB-S Endnote 2

HAB-S meeting agenda

1. Welcome, introductions, goals of HAB-S meeting, and review of HAB-S terms of reference
2. Scientific presentations:
   - "*Domoic acid: The synergy of iron, copper, and the toxicity of diatoms*" by M.L. Wells, C.G. Trick, W.P. Cochlan, M.P. Hughes, and V.L. Trainer;
   - "*Oceanological conditions and HAB monitoring in Aniva Bay, Sea of Okhotsk during 2003*" by G.A. Kantakov, M.S. Selina, I.V. Stonik, and T.Y. Orlova;
   - "Why the timing of a large-scale HAB of *Prorocentrum* in the area south of the Yangtze River Estuary was delayed in the spring of 2005" by M.Y. Zhu and R. Li (presented by Jinhui Wang).
3. HAE-DAT presentation:
   - "*Progress in the development of an international collaborative harmful algal event database: The joint IOC-ICES-PICES HAE-DAT*" by H.O. Enevoldsen, M. Lion and B. Sims
4. Participation in the IOC/ICES/PICES Harmful Algae Event Database (HAE-DAT): The first year of PICES involvement
5. Discussion of HAE-DAT effectiveness including possible modifications and future data efforts
6. Planning for PICES XV
7. HAE-DAT entry of HAB data for the year 2001 (practical exercise)

HAB-S Endnote 3

Proposal for a 1-day MEQ Workshop and ½ day laboratory demonstration at PICES XV on "*Review of selected harmful algae in the PICES region: II.* Dinophysis *and* Cochlodinium spp."

This workshop is the second of an annual series in which Harmful Algal Bloom (HAB) species that impact all or most countries in the North Pacific are discussed in detail. In 2006, we will focus on two genera, *Dinophysis* and *Cochlodinium*. *Dinophysis*, including DSP (Diarrhetic Shellfish Poisoning) producing species such as *D. acuminata*, *D. acuta*, *D. caudata* and *D. fortii*, is distributed in the PICES region. The integration of the information from each country will advance our understanding of this genus. *Cochlodinium polykrikoides* causes serious damage to finfish aquaculture in Korea and Japan. It also has potential to spread to other countries. Topics will include detection methods, ecosystem comparisons, and new advancements in physiology and ecology from each of the member countries. In particular, we would like to stress those factors which need additional study in order to develop a predictive capacity for these HABs. This workshop will be preceded by a half-day DSP (Diarrhetic Shellfish Poisoning) detection demonstration led by Dr. Toshiyuki Suzuki (Tohoku National Fisheries Research Institute, Japan).

Recommended convenors: Charles Trick (Canada) and Yasunori Watanabe (Japan).

Recommended invited speakers: Patrick Gentien (IFREMER, France) and Kazumi Matsuoka (Nagasaki University, Japan).

HAB-S Endnote 4

Proposal for a 1-day MEQ Topic Session at PICES XV on "*Harmful algal blooms in the PICES region: New trends and potential links with anthropogenic influences*"

This session will highlight recent advances in the understanding of the ecology and physiology of harmful algal bloom (HAB) species in the coastal waters of the PICES region. Of particular interest will be laboratory and field research where anthropogenic factors have been studied in order to elucidate if links exist between the apparent increase in the duration, distribution and impact of HABs, and environmental factors associated with human activities, including urban and agricultural runoff, climatic change and mariculture. This session will complement the continuing series of annual MEQ workshops where two new HAB genera found in the PICES region are examined in detail, but encourages studies of other HAB genera of interest in the coastal waters of the North Pacific Ocean.

Recommended convenors: William Cochlan (U.S.A.) and Ichiro Imai (Japan).

REPORT OF THE SECTION ON CARBON AND CLIMATE

The first meeting of the Section on *Carbon and climate* (CC-S) was held from 09:00-16:00 hours on November 17, 2005, at Shonan International Village, Kanagawa, Japan, in conjunction with the International Repeat Hydrography Workshop (co-sponsored with JAMSTEC, CLIVAR and IOCCP). It was attended by most of the Section members (*CC-S Endnote 1*). Drs. James Christian (Canada) and Toshiro Saino (Japan) acted as Section Co-Chairmen, and were subsequently unanimously elected to the positions during the meeting. Dr. Vedula Sarma served as rapporteur. The proposed meeting agenda was reviewed and adopted (*CC-S Endnote 2*).

PICES perspective: What is the purpose and function of CC-S? (Agenda Item 3)

Dr. Alexander Bychkov, PICES Executive Secretary, gave a brief presentation on the history of the establishment of CC-S and its evolution from the former PICES Working Groups 13 (*CO_2 in the North Pacific*) and 17 (*Biogeochemical data integration and synthesis*), the role of each in the overall structure of PICES, the reporting structure (co-supervision by POC and BIO), and the Science Board's expectations for the Section.

Final report of WG 17 on *Biogeochemical data integration and synthesis* (Agenda Item 4)

Dr. Andrew G. Dickson, WG 17 Co-Chairman, reported on the history and accomplishments of WG 17 (now disbanded). The terms of reference (ToR) of WG 17 were reviewed and the status of each outlined. Dr. Dickson also highlighted the similarities and differences between ToR of CC-S and those of WG 17. The major item of unfinished business from WG 17 is the publication of a "Guide to best practices for oceanic CO_2 measurements and data reporting". The recommendation is to publish this guide on-line as soon as possible in draft form to speed-up the process of review by members of WG 17, CC-S, and other interested experts. This website is expected to be operational in early 2006, and the various chapters finalized within a year. More detailed information should appear in the final report of WG 17 to be completed by December 1, 2005.

Science topic presentation (Agenda Item 5)

Dr. Richard A. Feely (NOAA/PMEL, U.S.A.) gave a presentation on "*Changes in anthropogenic CO_2 in the North Pacific*". The talk generated lively and interesting discussion, and it was generally agreed that future CC-S meetings should include as many such talks as possible.

Publications arising from the June 2004 NOAA/GCP/PICES Workshop (Agenda Item 6)

A joint NOAA/GCP/PICES Workshop on "*Understanding North Pacific carbon cycle changes*" was held June 2-4, 2004, in Seattle, U.S.A. It led to the distribution of numerous data sets for general access (available through the US data center at the Oak Ridge National Laboratory, CDIAC,) and the submission of scientific publications. Dr. Christopher L. Sabine provided an update on the progress of a special *Journal of Geophysical Research* section that arose from this workshop. Most papers have been reviewed and some have been revised and re-submitted. The publication is expected in 2006.

New POC Working Group on *Evaluation of climate change projections* (Agenda Item 7)

Dr. Christian gave a brief presentation on the new PICES Working Group (WG 20) on *Evaluations of climate change projections*

established under POC. Dr. Christian is a member of this group and will serve as its liaison to CC-S. More information on WG 20 and its terms of reference can be found in the report of the POC Committee (Agenda Item 5d and *POC Endnote 5*). A 1-day Inaugural Workshop for the new Working Group will be convened at PICES XV.

Data management: What did we achieve in WG 17 and what are our expected future needs? (Agenda Item 8)

Each of the three data centre representatives, Drs. Hernan Garcia (NODC, U.S.A.), Toru Suzuki (MIRC, Japan) and Alex Kozyr, (CDIAC, U.S.A.), gave a brief presentation on what their respective centers have accomplished and what their future plans are. There was a lively discussion of the exact pathways for data sharing among the various centers, the permanence of the data archives, and how users can avoid obtaining the same data from more than one center. All of the centers have made impressive progress in making data easily available to users, and improved integration among these systems is planned.

CC-S terms of reference: Review and discussion of possible revisions (Agenda Item 9)

There was an extensive discussion of the terms of reference (ToR) for CC-S (*GC Appendix B*). Prior to the meeting there were several suggestions for revisions to the original ToR from members of the Section and the BIO Committee (BIO Agenda Item 4). The terms of reference were revised and adopted by the consensus of the group (*CC-S Endnote 3*).

CC-S membership: Are there gaps in expertise that need to be filled? (Agenda Item 10)

There were several issues regarding CC-S membership. At PICES XIV, the BIO Committee recommended adding/replacing members to the Section so that more biologists and maybe a BIO member liaison can be added. The CC-S members did not achieve consensus on how to deal with this proposal. It was suggested that BIO itself should select one of its members and recommend that person to his or her government for appointment to the Section. It was agreed that when inter-sessional meetings are held, a BIO member from the host country should be invited.

It was also proposed that CC-S should try to recruit a biologist who works directly on CO_2 impacts on biota, since this is discussed in the revised terms of reference. Some suggestions were tabled but the question of who it should be was not resolved. Members will attempt to find possible appointees with relevant expertise, and this person need not necessarily be a BIO member.

CC-S Workplan: Discussion of various national initiatives and CC-S priorities (Agenda Item 11)

It was suggested to establish two sub-groups within the Section. One to carry on the work on the methodology of CO_2 measurements (ToR 4), while the other would address data integration (ToR 5). It was agreed that these should not be formal bodies, but that these two streams should represent the expected activities of CC-S reasonably well. Individual CC-S members designated as informal leaders for these two streams of activity are Drs. Dickson and Christian, respectively.

Under the first stream, it was noted that reference materials for nutrients and CO_2 are being developed at the Japan Meteorological Agency in collaboration with JAMSTEC (4-year project, just started). CC-S can, and should, play an advisory role in this project. It was suggested that a presentation from these investigators be invited at PICES XV.

Inter-comparisons of several methods were conducted by WGs 13 and 17 but never published (for pCO_2(sw) led by Dr. Yukihiro Nojiri, and $DI^{13}C$ led by Dr. Paul Quay). Dr. Kozyr volunteered to take responsibility for completing and publishing the results of

the pCO_2 inter-comparison, if Dr. Nojiri can provide necessary information.

With respect to data synthesis, the previous efforts and future directions were discussed. It was noted that, of the papers that were submitted to the *Journal of Geophysical Research* (Oceans) special section on "*North Pacific carbon cycle variability and climate change*", arising from the June 2004 workshop, the majority were primarily about air-sea CO_2 fluxes, while others considered only oxygen or were focused on a particular location. There is still a great deal of synthesis to be done (*e.g.*, on the subsurface distribution of dissolved inorganic carbon (DIC) and nutrients). The Section decided to press ahead with trying to consolidate as many data sets as possible in a single location in accessible formats to accelerate the process, and to attempt to have this done well in advance of PICES XV so that preliminary syntheses of these data can be presented at the meeting. It was agreed to request a 2-day CC-S meeting at PICES XV if possible. It was also suggested that a POC/BIO Topic Session be organized at PICES XVI in October 2007, in Victoria, Canada. Dr. Bychkov commented that it would be desirable to get the proposal for the Topic Session (describing the title, outline of the session, names of conveners and invitees) by mid-March 2006. The tentative title of the session is "*Decadal changes in carbon and biogeochemical systems in the North Pacific*". The necessity to have the integrated dataset well in advance to the Victoria meeting was pointed out.

Data collation will begin with bottle data such as DIC, nutrients and O_2. Fields with unusual space/time structure, such as primary production, will be addressed as time permits. It was emphasized that many data are already available via JODC, NODC, *etc.*, and that time should not be wasted on recovering data sets from their native formats unless those data are truly "new". It was also suggested that the community be informed on the existence of these data sets so that biogeochemists, especially those who are not primarily interested in carbon, are aware that they are available. We should aim to attract such people to PICES Annual Meetings and diversify the biogeochemistry component of PICES. The MIRC data set catalogue is not completely up to date (in many cases data sets are listed, but the data are not necessarily available), but will serve as a starting point. Dr. Toru Suzuki will serve as the primary contact person for this.

As for ToR 2, the current membership includes Dr. Christopher Sabine, the Chairman of IOCCP and an SSC member of GCP; Drs. Kitack Lee, and Toshiro Saino, both members of SOLAS/IMBER Implementation Group for carbon research, and Dr. Richard Feely, a member of CLIVAR Pacific Basin Panel, and hence the two-way communication with those activities could be maintained.

Dr. Saino introduced a plan for a Pacific regional study of GCP. The idea behind the plan was to cover ToR 1 and 3 in the planning phase, and to fulfil ToR 5, 6 and 7 in the implementation phase. The members felt that the plan does not fit well with PICES because it aims at the actual implementation of field studies. It was pointed out that the proposed Topic Session at PICES XVI will cover ToR 1, 3, 6 and 7.

With regard to PICES Annual Meetings, CC-S has the following action items:

- Request an extension from a 1-day to 2-day meeting/workshop at PICES XV (October 2006, Yokohama, Japan);
- Formulate a proposal for a 1-day Topic Session at PICES XVI (October 2007, Victoria, Canada) by mid-March for presentation to the April 2006 inter-sessional Science Board meeting. A suggested working title is "*Decadal changes in carbon and biogeochemical systems in the North Pacific*".

CC-S Endnote 1

Participation list

Members

Andrey Andreev (Russia)
James Christian (Canada, Co-Chairman)
Andrew G. Dickson (U.S.A.)
Richard A. Feely (U.S.A.)
Hernan E. Garcia (U.S.A.)
Alex Kozyr (U.S.A.)
Tongsup Lee (Korea)
Lisa Miller (Canada)
Tsuneo Ono (Japan)
Christopher L. Sabine (U.S.A.)
Toshiro Saino (Japan, Co-Chairman)
Toru Suzuki (Japan)
Shuichi Watanabe (Japan)
Yutaka Watanabe (Japan)

Observers

Alexander Bychkov (PICES Exec. Secretary)
Stephen Diggs (U.S.A.)
Masao Fukasawa (Japan)
Maria Hood (IOCCP)
Akihiko Murata (Japan)
Kazuyoshi Oichi (Japan)
Keith Rogers (U.S.A.)
Vedula Sarma (Japan)

CC-S Endnote 2

CC-S meeting agenda

1. Welcome and introductions
2. Approval of agenda
3. PICES perspective: What is the purpose and function of Section on *Carbon and climate*?
4. Final report of WG 17 on *Biogeochemical data integration and synthesis*
5. Science topic presentation: "*Changes in anthropogenic CO_2 in the North Pacific*" by Richard Feely
6. Publications arising from the June 2004 NOAA/GCP/PICES Workshop
7. New PICES Working Group (WG 20) on *Evaluation of climate change projections*
8. Data management: What did we achieve in WG 17 and what are our expected future needs?
9. CC-S terms of reference: Review and discussion of possible revisions
10. CC-S membership: Are there gaps in expertise that need to be filled?
11. CC-S Workplan: Discussion of various national initiatives and CC-S priorities

CC-S Endnote 3

Revised terms of reference for the Section on *Carbon and climate*

1. Coordinate and encourage ongoing and planned national and international syntheses of carbon cycle research studies in the North Pacific and, where necessary and appropriate, for the larger Pacific basin;
2. Ensure effective two-way communication with other international scientific groups that have a responsibility for the coordination of ocean carbon studies, such as the International Ocean Carbon Coordination Project (IOCCP), CLIVAR/CO_2 Repeat Hydrography and the SOLAS/IMBER implementation group for carbon research.
3. Review the existing information on carbon cycling in the North Pacific, including anthropogenic carbon, the biological pump, impacts of increasing levels of carbon dioxide on marine biota, and

possible feedbacks to atmospheric greenhouse gases; identify gaps in our knowledge, and make prioritized recommendations for future research;

4. Periodically review the status of the methodology of CO_2 measurements including the preparation of standards and reference materials, and advise on inter-calibration and quality control procedures;
5. Identify suitable data sets on the oceanic CO_2 system in the Pacific region as they become available, and recommend the mechanisms of data and information exchange;
6. Carry out and publish (in the refereed literature) basin-scale syntheses of carbon cycling in the North Pacific, including new data whenever appropriate, and encourage scientific interpretation of these evolving data sets;
7. Organize symposia, workshops, or Annual Meeting sessions on carbon cycle and climate studies in the North Pacific.

REPORT OF WORKING GROUP 18 ON MARICULTURE

The Working Group on *Mariculture in the 21st century – The intersection between ecology, socio-economics and production* (WG 18) met on October 1, 2005, under the chairmanship of Dr. Ik-Kyo Chung (*WG 18 Endnote 1)*. Only 6 scientists from 4 PICES member countries were in attendance (representatives from Canada and the United States were absent), and only 4 of the 14 Working Group members were present. The agenda was reviewed and adopted as presented (*WG 18 Endnote 2)*.

National reports and publication (Agenda Items 3-5)

In 2004-2005, activities of WG 18 focused on the preparation of national reports on the status and projected trends in marine aquaculture. At PICES XIII, the Working Group received reports from all countries, except Russia. Summaries of these reports as well as comments and questions from the participants are appended as *WG 18 Endnote 4* in the 2004 PICES Annual Report.

Highlights of national reports prepared for PICES XIII were reviewed. These were followed by a report on the status of invertebrate mariculture in the Russian Far East (with a short summary of aquaculture development in Russia in general) presented by Dr. Galina Gavrilova (*WG 18 Endnote 3*). Prior to her talk, Dr. Gavrilova pointed out that due to economic reforms in Russia, reliable aquaculture statistics is not available, and information on genetics, diseases and feed supply is currently lacking and not included in the report.

WG 18 intends to prepare a publication in the PICES Scientific Report Series based on the national reports on the current status and trends in aquaculture in PICES member countries. In order to accomplish this, references have to be added to the submitted reports. The WG 18 Co-Chairmen have to take the lead on this issue, but contributors from each member country should be identified and involved in the project.

Topic Session at PICES XIV (Agenda Item 6)

Dr. Chung provided a brief overview of a ½-day MEQ/FIS Topic Session on "*Current and emerging issues of marine and estuarine aquaculture in the Pacific Region: Carrying capacity, ecosystem function and socioeconomics*" scheduled for October 5. The summary of the session is included elsewhere in this Annual Report.

Recommendations to Science Board (Agenda Item 7)

Topic Session at PICES XV

The Working Group recommends a 1-day MEQ/FIS Topic Session at PICES XV on "*Aquaculture for sustainable management of marine environment and ecosystem*", co-convened by Drs. Ik Kyo Chung (Korea), Toyomitsu Horii (Japan) and Michael B. Rust (U.S.A.) (*WG 18 Endnote 4*). Travel support was requested for 1 invited speaker for this session. [Later, the session title was changed to "*Aquaculture for sustainable management of the marine ecosystem*", and Dr. Chung was replaced by Dr. Jie Kong (China) as one of the convenors, as he cannot attend PICES XV because of other commitments.]

Inter-sessional WG 18 Workshop

WG 18 discussed the feasibility of sponsoring a 2-day workshop on "*Conducting environmental risk assessment applied to marine aquaculture*". The idea is to apply the approach used by the EU/US and ICES to develop a systematic and common approach to environmental risk assessment for aquaculture using the WHO method (following ICES and FAO) focused on aquaculture in the Pacific Rim. The Working

Group decided to continue exploring this issue and to consider whether to adopt this project by the end of this year or at PICES XV. The Working Group recommends that Dr. Michael Rust take the lead on this topic.

Symposium on "*Stock enhancement and sea ranching*"

The 3rd International Symposium on "*Stock enhancement and sea ranching*" will be held in September 2006, in Seattle, U.S.A. It would be desirable to send one person to attend this symposium and report back to the group at PICES XV. The Working Group recommends Dr. Carolyn Friedman, WG 18 Co-Chairman, as the representative at the Symposium, and requests PICES to support her registration costs.

Others

- Difference of aquaculture business in PICES *vs*. ICES regions: Benchmarking of future works in PICES countries including environmental risk assessment;
- A survey of US national aquaculture sector: Reconsider Dr. Colin Nash's survey and respond promptly.

WG 18 Endnote 1

Participation list

Members

Ik Kyo Chung (Korea, Co-Chairman)
Toyomitsu Horii (Japan)
Hisashi Yokoyama (Japan)
Galina S. Gavrilova (Russia)

Observers

Igor Soukhin (Russia)
Xuelei Zhang (China)

WG 18 Endnote 2

WG 18 meeting agenda

1. Welcome and introductions
2. Adoption of agenda
3. Summary of national reports on "*Current status and trends in aquaculture*" presented at PICES XIII
4. Russian national report on "*Current status of research and problems of invertebrate mariculture in the Russian Far East*"
5. Finalizing and editing report for publication
6. Topic Session at PICES XIV
7. Adoption of report and recommendations to Science Board

WG 18 Endnote 3

Russian national report on "Current status of research and problems of invertebrate mariculture in the Russian Far East"

Production

In the 1970-80, the total (marine and freshwater) aquaculture production in the USSR accounted for 1% of the world production. Marine aquaculture was only 5-6,000 t, mainly from kelp culture in the Russian Far East (Dushkina, 1998). At the end of the 1990, practically all mariculture enterprises were closed due to economic reforms in the country, and reliable aquaculture statistics is not available now. Some estimations indicate that Russia occupies the 14th place in algae cultivation (3 thousand tons) and the 28th place in fish and invertebrate cultivation (68 thousand tons). There are 45 salmon hatcheries in Russia, which produced about 700 millions newly-hatched fishes in 2003 (Mamontov, 2003).

The main centres of mariculture research are: in the southern regions - the Azov and Black Seas; in the northern region - the Barents and White seas; and in the Far-East - the Sea of Okhotsk and the Japan/East Sea.

There are about 30 sea farms in Primorye that vary in size from 10 to 3,500 hectares. The total area under cultivation is about 8,000 hectares. The major cultivated species are Japanese scallop, Pacific mussel and kelp *Laminaria japonica*. The most important of these is the Japanese scallop, which accounts for 500-600 t annually. Biotechnologies for cultivating of sea urchins, sea cucumber and king crab are under development. In recent years, special attention was on a sea cucumber commercial cultivation scheme (because of low natural reproduction of these species). Technology of sea cucumber breeding was introduced and the first Russian breeding factory was built in Primorye in 2003.

Environmental and ecosystem function

Carrying capacity

One of the major objectives of research in bivalve cultivation is the estimation of carrying capacity. In Russia, methods of estimating carrying capacity were developed by different researchers in the White Sea, Black Sea and Prymorye near-shore regions. They are based on different theoretical approaches. Burkinsky and co-authors (1985) offered an economical-ecological method. It is based on the idea that the main anthropogenic load on an ecosystem during aquaculture development is the value of organic matter extracted from near-shore waters. A second method to determine the capacity and size of mussel farms was based on region-specific trophic capacity, estimated by Holodov and co-authors in 1991. This method is currently used in the Black Sea. In this case, the potential production of mussels was calculated by assuming complete utilization of all organic matter entering water per unit of time.

A preliminary calculation of mussel farm capacity in the near-shore areas of the White Sea was made with regard to food availability data, parameters of water activity and others (Kulakovsky *et al*., 2003). The amount of biosediments produced by mollusks during cultivation was also estimated. Oyster cultivation increases the sedimentation rate by 3.7 times on average. One hectare of oyster plantation produces up to 8 t of wet biosediment per month. A plantation with 1 million scallops or mussels produces more than 1.5 t of wet biosediments per month.

Habitat

The Primorye near-shore (including its southern part) is less favorable for aquaculture than the best mariculture regions of Japan, China, Norway and others. Shallow bays of southern Primorye can be ice-bound for more than four months a year. The hydrological peculiarities of Peter the Great Bay, including summer water stratification, provide characteristic biological features of this region. To calculate the maximal load onto some parts of Posiet Bay during oyster, mussel and Japanese scallop cultivation, an original model was developed (Bregman and Kucheryavenko, 1987). In the opinion of the model's authors, the most complete idea about potential loading relies on the consideration of a variety of characteristics which are: size of plantation, water activity in the bay, concentration of suspended matter (seston) at different sites, quantity of mollusks, and rate of filtration.

Native and exotic species

As a rule, major mariculture objects are native species of fishes, invertebrates, and algae. Mussel, kelp, herring and salmon are cultivated in the White Sea region (a joint Russian-Norwegian enterprise is planning to cultivate up to 5,000 t of salmon in the near-shore regions of the White Sea within 2-3 years). Great progress is achieved in cultivation of mussel and oyster, and fish-pond cultivation of salmon, sturgeon and mullet in the Black Sea. Sturgeon cultivation was of great importance in the Black, Azov and Caspian Seas. Biotechnologies of fish-pond and ranching cultivation of sturgeon were developed in the Caspian Sea.

There are well-known examples of some species' acclimatization in new regions: pink salmon (*Oncorhynchus gorbuscha*) in the White and Barents seas; harder (*Mugil soiuy*) in the Azov and Black Seas; Pacific oyster (C*rassostrea gigas*) in the Black Sea, and king crab (*Paralithodes camtshaticus*) in the Barents Sea.

Sustainability of production: Due to economic reforms in Russia, reliable aquaculture statistics is not available.

Genetics, diseases and feed supply: Information on these issues is currently lacking and not included in the report.

Socioeconomics: Experiments prove that the changing of hydrobionts enzymatic activity may be a diagnostic sign of changes in ecological conditions. For instance, when scallops are cultivated in ponds with high concentrations of these species, a revealed increase of enzymatic activity is an animal response to environmental conditions worsening (Kucheryavenko, 2002). In sea urchin cultivation researches (including hatchery of larvae and juveniles), juveniles bred in natural conditions and meliorative actions for sea urchins' marketable quality improve local economics.

Restoration of stocks: No information available.

Public aware awareness: Aquaculture in Russia is at an initial stage of development. The absence of legal framework for the aquaculture activity is also a constraining factor.

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WG18 Endnote 4

Proposal for a 1-day MEQ/FIS Topic Session at PICES XV on
"Aquaculture for sustainable management of marine environment and ecosystem"
[later renamed "*Aquaculture for sustainable management of the marine ecosystem*"]

Activities associated with aquaculture can result in both positive and negative impacts on the marine ecosystem. The environmental, ecological and genetic capacities of the marine environment need to be considered to maintain sustainable aquaculture development and a healthy wild ecosystem. At various levels of aquaculture production, environmental hazards can be assessed and management measures developed to minimize those hazards to the marine ecosystem and/or their probability (risk) of occurrence. PICES WG 18 has begun to consider environmental and ecological impacts associated with aquaculture. These include ecological hazards associated with nutrient release, escaped or released cultured organisms (predation, competition), and the potential for disease transfer. In addition, the escape of genetically-selected species used for aquaculture may have harmful effects on the genetics of the wild populations of native species. Genetic risks should be evaluated based on potential impacts to biodiversity and ecosystem conservation using proper evaluation techniques. These techniques should be consistent among researchers where possible. Moreover, it is necessary to consider the influence on the ecosystem and genetic diversity when

artificially-produced seedlings are released for stock enhancement or rebuilding. To promote responsible aquaculture in a healthy marine ecosystem, it is critical to continuously evaluate and manage the aquaculture activity. Clearly defining the potential hazards to the ecosystem, assessing the probability that hazards will occur and implementing mitigation strategies to reduce or eliminate hazards can facilitate this oversight. The goal of this session is to identify and establish evaluation techniques and models for potential hazards which aquaculture exerts on genetic diversity, ecosystem function and/or the marine environment. The potential for standardization of methods and models that deal with interactions between aquaculture and wild organisms will also be explored.

Recommended conveners: Ik Kyo Chung (Korea), Toyomitsu Horii (Japan) and Michael B. Rust (U.S.A.).

REPORT OF WORKING GROUP 19 ON ECOSYSTEM-BASED MANAGEMENT SCIENCE

Working Group (WG 18) on *Ecosystem-based management science and its application to the North Pacific* held its first meeting from September 28-30, 2005. The WG 19 Co-Chairmen, Drs. Glen Jamieson and Chang-Ik Zhang, welcomed the participants (*WG 19 Endnote 1*) and reviewed the agenda for the meeting (*WG 19 Endnote 2*). Ms. Patricia Livingston, the third WG 19 Co-Chairman, was unable to attend due to travel interruptions enroute to Vladivostok.

Making terms of reference useful to PICES (Agenda Item 2)

There seems to be a significant difference between regions: Japan, China, and Korea have relatively perturbed ecosystems, and much of the national emphasis is on fisheries and aquaculture; on the other hand, Russia, Canada, and the United States seem to emphasize maintaining less-impacted, historical ecosystem characteristics. Valuable perspectives were offered from other parts of the world (*e.g.*, ICES, Australia).

WG 19 proposes to produce a brochure on ecosystem-based management (EBM), following the template of the well-received approach used by the PICES Study Group on *Fisheries and Ecosystem Responses to Recent Regime Shifts.* The brochure would be an executive summary of the final report of the Working Group and would focus on (1) the need for EBM, (2) objectives for EBM, (3) consequences of not moving to EBM, and (4) research that is needed to move towards EBM.

Revision of ocean management reporting format (Agenda Item 3)

The draft management plan was reviewed and streamlined to increase the focus on the general characteristics at the eco-region level. For each section, a list of questions was prepared for members from each country to answer about the status of management in their respective jurisdictions (*WG 19 Endnote 3*).

National marine ecosystem monitoring approaches, plans and issues (Agenda Item 4)

All member countries represented at Vladivostok gave overviews of their existing ecosystem monitoring approaches (neither China nor Japan sent Working Group members to the meeting). Monitoring approaches exist in each country, although each identified many data gaps, difficulty with data accessibility, and a lack of integration among monitoring programs. Dr. Elizabeth Fulton summarized the Australian approach to EBM-based monitoring. Some member nations have monitoring programs, though not necessarily organized in an EBM conceptual framework.

WG 19 proposes to establish a standardized format for reporting monitoring in each country, focusing on biological monitoring, physical monitoring, human influences, modeling, and ecosystem status reporting (*WG 19 Endnote 4*).

Overview of the 2004 IOC/SCOR symposium on "*Quantitative ecosystem indicators for fisheries management*" (Agenda Item 6)

Dr. Ian Perry provided a summary of a symposium that was held from March 31 – April 3, 2004, in Paris, France. Selected papers from the symposium were published in the *ICES Journal of Marine Science* (2005, Vol. 62, No. 3). The symposium had two major themes: (1) to provide an overview of the range of indicators of exploitation and state of ecosystems developed for fisheries management; and (2) to examine scientific basis for incorporating indicators into ecosystem-based fisheries management (EBFM). Over 100

indicators were proposed, and some included reference points or reference directions. All papers advocated multiple indicators, and most indicators were derived from fisheries-independent surveys. The symposium did not achieve consensus on which indicators to use, but the general consensus was that the identification of indicators is an important task but it is work in progress.

Dr. Perry described the properties of good indicators, an eight-step procedure for identifying them, how to determine screening criteria, and the general approaches used in applying them (empirical *vs*. theoretical, which seem to converge on which indicators are strongest, according to ICES symposium papers by Drs. Jason Link and Elizabeth Fulton).

Dr. Fulton noted that indicators based on data from fishery-independent surveys are not available in all parts of the world because countries cannot afford them. Models and empirical studies suggest that restricting the choice of indicators to fishery-dependent data can result in incorrect conclusions being drawn from the indicator data. Therefore, priority should be placed on the use of fishery-independent data. There is optimism that this can be done, even in developing countries and new fisheries, because of increased capabilities of remote sensing and the power of coarse scale indicators (*e.g.*, body size, abundance of all individuals in a particular functional group) that may be relatively easy to monitor.

Discussion on eco-regions (Agenda Item 7)

WG 19 discussed how to define eco-regions, based largely on the Canadian experience. The "eco-region" definition includes a mixture of geological, biological and physical parameters. Eco-region boundaries tend to be fuzzy, not sharp, and indicate areas of commonality.

All countries reported on progress with eco-regional delineation. Canada has progressed farthest. Delineation of eco-regions is in progress in the United States and Russia. Korea has begun consideration of formal eco-regional delineation. All participants agreed that it would be beneficial to have regional plans that span national boundaries because many of the eco-regions in the North Pacific are trans-boundary or in international waters.

Dr. Fulton discussed the Australian approach to bio-regionalization, a hierarchical approach that is defined at large scale by information on circulation and temperature, and adds in finer scale, ecological processes as you move down the 5-level hierarchy.

To consider the scientific requirements for eco-region identification and review the existing Large Marine Ecosystem boundaries in the PICES area, WG 19 proposes to convene a 1-day MEQ/FIS Topic Session on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" at PICES XV. Travel funds are requested for 1 invited speaker to attend the session.

NPRB/PICES Workshop on ecosystem indicators for the Bering Sea (Agenda Item 8)

Dr. Perry informed about a project that was funded by the North Pacific Research Board to integrate ecological indicators in the North Pacific, with an emphasis on the Bering Sea. Four activities were identified for a workshop to be held May 31 – June 2, 2006, in Seattle:

1. Involve Bering Sea and international communities in developing a set of operational objectives for southeastern Bering Sea ecosystem;
2. Evaluate the NOAA/Fisheries "*Ecosystem Considerations*" chapter that is prepared annually for the North Pacific Fishery Management Council and the PICES North Pacific Ecosystem Status Report, with the goal of integrating the results;
3. Investigate methodologies to monitor system-wide structural ecosystem changes within the marine ecosystem;
4. Identify steps in valuating indicator performance that improve the monitoring network, and integration into predictive models.

Findings from this workshop are important for identifying criteria for ecosystem indicators.

Action items to be completed prior to the next WG 19 meeting (Agenda Item 9)

1. Compile national and international (*e.g.*, PICES, LMEs, "Sea Around Us" project (D. Pauly), Longhurst) approaches (maps, processes used to identify area) to establishing science-based eco-regions, and compare these to existing or planned "management" regions. Gather together all delineated areas (*e.g.*, fishery statistical areas, LOMAS, management areas, *etc*.) and digitize for GIS display. Identify areas of cooperation/collaboration between adjacent countries to jointly evaluate cross-jurisdictional areas with the goal of trying to establish common eco-regions. These deliberations may be useful in updates of the North pacific Ecosystem Status Report.
   - Lead – all countries
   - Submission deadline – January 1, 2006
   - Product – summary GIS chart and report; G. Jamieson and I. Perry for Canada; D. Fluharty and J. Stein for US; by July 1, 2006.

2. Consider a theoretical evaluation of the consequences of an artificial boundary that splits an ecological process and how that could affect management.
   - Lead – C. Harvey and E. Fulton (ghost collaborator)
   - Deadline – July 1, 2006
   - Product – report and presentation at next meeting, as well as a paper to be published in peer-reviewed literature.

3. Each country will complete at least one Ocean management activity report. The intent is to show the process and framework that each country is using to implement an ecosystem approach to management. In selecting a region, consider regions where there is more than one significant management issue (*e.g.*, fishing and oil and gas exploration).
   a. Leads – All WG members
   b. Deadline – June 1, 2006
   c. Product – reports

4. Describe national ecosystem monitoring approaches relevant to the eco-regions considered in #3 (above). Monitoring activities should be grouped by category.
   - Lead – all countries
   - Deadline – June 1 2006
   - Product – reports

5. Summarize the findings from the 2004 symposium on "*Quantitative ecosystem indicators for fisheries management*"
   - Lead – I. Perry and P. Livingston (with assistance from E. Fulton)
   - Deadline – January 1, 2006
   - Product – reports

6. Summarize findings from the upcoming PICES/NPRB workshop on the framework and criteria for identifying ecosystem indicators. Invite members of MONITOR to WG 19 meetings.
   - Lead – WG members that participate in the workshop
   - Deadline – October 2006, next WG 19 meeting
   - Product – preliminary report

7. Hold a mini-symposium at PICES XVI on "*Comparative analysis of frameworks to develop EBM and research needed to move towards implementation of EBM*" to build on products arising from the PICES/NPRB Bering Sea Indicators workshop. Each country would present their perspective. Invited speakers will address issues such as case studies, lessons learned, indicators, *etc*. WG 19 should invite participation by other PICES Committees (*e.g.*, MONITOR) and WGs/Sections. Consider "over-arching" questions such as the following (also proposed bases for a brochure-type publication):
   - scientific need for EBM and consequences of not moving to EBM,
   - objectives for EBM,
   - ways to move towards EBM,
   - research needs to move towards EBM.

   Co-Chairmen to present brochure concept to parent PICES Committees in 2006.

8. Next meetings:
   - A 3-day PICES/NPRB Workshop on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*" to be held May 31-June 2, 2006, in Seattle, U.S.A.;
   - A 3-day WG 19 meeting prior to PICES XV (October 2006, Yokohama, Japan);
   - A 1-day MEQ/FIS Topic Session on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*" at PICES XV.

WG 19 Endnote 1

Participation list

Members

Elena Dulepova (Russia)
David Fluharty (U.S.A.)
Christopher Harvey (U.S.A.)
Glen Jamieson (Canada, Co-Chairman)
Jae-Bong Lee (Korea)
R. Ian Perry (Canada)
Vladimir Radchenko (Russia)
Inja Yeon (Korea)
Chang-Ik Zhang (Korea, Co-Chairman)

Observers

Vladimir Belyaev (Russia)
Robin Brown (Canada)
Elizabeth Fulton (Australia)
Melissa Haltuch (U.S.A.)
Yukimasa Ishida (Japan)
Tokimasa Kobayashi (Japan)
Phillip Mundy (U.S.A.)
Hak-Gyoon Kim (Korea)
Darlene L. Smith (Canada)
John E. Stein (U.S.A.)

WG 19 Endnote 2

WG 19 meeting agenda

Wednesday, September 28

1. Welcome and introductions
2. Review terms of reference
3. Revision of ocean management reporting format
4. National marine ecosystem monitoring approaches, plans, and issues

Thursday, September 29

5. Continue descriptions of relevant national marine ecosystem monitoring approaches, plans and issues
6. Overview of the 2004 IOC/SCOR symposium on "*Quantitative ecosystem indicators for fisheries management*"
7. Review existing definitions of "eco-regions" and identify criteria that could be used for defining ecological boundaries in the PICES area

Friday, September 30

8. Discuss ideas for a PICES/NPRB workshop on ecosystem indicators for the Bering Sea planned (May-June 2006) and an inter-sessional workshop to be held in Year 2 or 3 of the WG's mandate
9. Discuss objectives, site and date for the next WG 19 meeting

WG 19 Endnote 3

Revised ocean management reporting format

Ocean management activities

- Eco-region where defined or geographic location (*e.g.*, Korean portion of Yellow Sea);
- General description of oceanographic and biological setting; if appropriate, start with PICES North Pacific Ecosystem Status Report for the description of regions;
- Relevant management plan, policy, legislation (please provide copies of these or a source, such as a website or a contact point, so that we can obtain copies);
- General form of management or any other general comments on the management regime;
- What are overall ecosystem-based management objectives?
- How will these objectives be achieved?
- What is the timeframe to implement these objectives and meet goals?

Fishery management

- Management objectives for targeted and non-targeted species in fisheries;
- How is the ecosystem taken into consideration when managing fisheries?
- How selective is the gear (*e.g.*, bottom trawl; mid water trawl; purse seine; other gear, such as long line and trap; gillnet) for the target species?
- Fishery gear targets certain sizes or life-history stage(s);
- Is fishery spatially concentrated, or not?
- Is fishery year round, or not?
- Are certain geographic areas excluded from the fishery? Explain reason for the exclusion.
- Are there catch limits on non-target species?
- Is the catch of non-target species recorded and accounted for?
- What is the environmental variability (*e.g.*, physical disturbance regime; El Niño, typhoon, changes in strength of currents) and how do species respond, if known?
- What is the spatial distribution of the fishery compared to the distribution of the target species?

Management of threatened or protected species and communities

- General approach to designation (legal/regulatory framework), management and recovery of threatened or protected species/communities (describe ecological properties of the species or groups that makes them vulnerable and needing protection);
- Is there legislation for designating species at risk?
- How are threatened species identified, and are there timeframes for developing recovery plans?
- Are recovery thresholds identified above which a species no longer needs legal protection?

Habitat management (conservation/restoration)

- General approach to management of habitats; this includes biological habitat, such as corals, sea-grass beds, *etc*., as well as physical habitat (describe ecological properties of the habitat that makes it significant.);
- Are specific habitats designated for protection, and what legislation allows for the designation?
- Are there monitoring and inventory activities in place?
- Are there restoration plans or activities underway?
- Are there ecologically or biologically significant habitat types/areas that can be identified and are they given special protection, and are there standards (*e.g.*, no activities allowed or just limitation of human activities in the habitat) for the level of protection?

Community/trophic structure management

- Are the characteristics of the community altered by human activities (*e.g.*, eutrophication, pollution, species introductions, sedimentation, altered coastal circulation, dredging and filling, altered hydrography of rivers, fishing, etc.)?

- Are management activities affecting food-webs or do existing food web perturbations constrain moving to a desired state.
- Does specific legislation address issues relevant to food webs?
- Are there monitoring and inventory activities in place?
- Are there restoration plans or activities underway?
- Are there ecologically or biologically significant species interactions that can be identified and are they given special consideration, and are there standards (*e.g.*, ballast water, coastal development, water quality etc.) for the level of protection?

Management of contaminants and pollutants

- General approach to management of ecosystem-wide effects of contaminants and pollutants;
- Does specific legislation address issues relevant to contaminants?
- Are there monitoring and inventory activities and standards in place?
- Are there restoration plans or activities underway?
- Which aspects of the ecosystem are being most affected by the effects of contaminants?

Management of aquaculture

- General properties of the aquaculture activities (*e.g.*, stocking or releasing of seed/fry/juvenile, production of individuals in contained environments);
- Do specific regulations address issues relevant to species selection, scale of the operation, spatial distribution, and environmental impacts of activities?
- Are there monitoring and inventory activities in place?
- Are there mitigation plans or activities underway?
- Are there significant ecological and biological interactions that can be identified and are they given special consideration?

Management of enhancement activities (species and habitat)

- General properties of the enhancement activities (*e.g.*, stocking or releasing of fry/juvenile, putting in artificial reefs, making seaweed beds, *etc*.);
- Do specific regulations address issues relevant to species selection, scale of the operation, spatial distribution, and environmental impacts of activities?
- Are there monitoring and inventory activities in place?
- Are there mitigation plans or activities underway?
- Are there significant ecological and biological interactions that can be identified and are they given special consideration?

WG 19 Endnote 4

Standardized format for reporting national monitoring

- Habitat classification (biogeographic zone)
- Biodiversity
- Species population abundance (fish, HABs, *etc*.)
- Species spatial distribution and movements (migration routes) – ecologically and biologically significant areas
- Temporal changes (cycles and trends) in physical environment
- Human influences
  - Pollution level, sedimentation, exotics, habitat alterations
  - Spatial locations (*e.g*., vessel location monitoring (VMS))
- Modeling, predictions and forecasting (identification of key indicators or gaps in knowledge)
- Ecosystem status reporting (state of ocean report); planning for reporting
- Level of integration, monitoring systems and data management and access

WG 19 Endnote 5

Proposal for a 1-day MEQ/FIS Topic Session at PICES XV on "*Criteria relevant to the determination of unit eco-regions for ecosystem-based management in the PICES area*"

The management of human activities that impact ocean ecosystems requires planning and engagement of stakeholders to meet the objectives of ecosystem-based management, which in turn requires identification of areas to determine which stakeholders need to be involved in each specific process. Area boundaries are typically based upon science (*i.e.* eco-regions), human community (*i.e.* coastal community composition), administrative (*i.e.* historical resource management areas) and international considerations (*i.e.* transboundary issues). This session will consider the science requirements for eco-region identification in the PICES area, and we solicit presentations that: 1) highlight national or regional experiences or frameworks in place for delineating marine sub-regions or eco-regions; 2) demonstrate the use of a variety of physical and/or biological criteria for region identification; or 3) explain the specific management purposes behind various sub-regional identification schemes. Session discussion will involve participants in reviewing the existing Large Marine Ecosystem boundaries of the PICES area and developing recommendations for criteria to be used in sub-regional identification in the North Pacific.

Recommended convenors: Glen Jamieson (Canada), Patricia Livingston (U.S.A.) and Chang-Ik Zhang (Korea).

REPORT OF THE IMPLEMENTATION PANEL ON THE CCCC PROGRAM

The Executive Committee of the Climate Change and Carrying Capacity Program Implementation Panel (CCCC-IP/EC) met from 18:00-20:00 hours on October 2, 2005. The meeting was chaired by Drs. Harold P. Batchelder and Suam Kim. The Co-Chairmen welcomed the attendees, and after brief introductions of those present (*CCCC-IP Endnote 1*), the agenda was reviewed and adopted with slight modifications (*CCCC-IP Endnote 2*).

Business from PICES XIII (Agenda Item 3)

The minutes from PICES XIII (Honolulu, U.S.A.) were accepted as is, with one minor correction. Under Agenda Items 6 and 7, the report from PICES XIII incorrectly stated that "…Dr. Thomas C. Wainwright (U.S.A.) to serve as Co-Chairman-elect after PICES XIV"; this should actually state that "…Dr. Thomas C. Wainwright (U.S.A.) to serve as Co-Chairman-elect after PICES XIII, and to assume the Co-Chairmanship after PICES XIV". No other items on-going from last year's meeting required discussion.

Review of procedures for Best Presentation Awards and Closing Ceremony

Awards for best CCCC presentation and best meeting poster will be announced at the Closing Session. The procedure of nomination and selection for the CCCC Best Presentation Award by a young scientist will be identical to that used at PICES XIII. The Secretariat provided a list of presentations that are eligible for this award. Drs. Suam Kim and Shin-ichi Ito agreed to serve as judges to determine the best CCCC presentation from the eligible papers in the various CCCC Topic Sessions and Workshops: S4, S5 and W3. Dr. Francisco E. Werner was nominated and agreed to represent the CCCC Program on the Best Poster Award Committee for PICES XIV.

Dr. Chiyuki Sassa, (Seikai National Fisheries Research Institute, Japan) won the CCCC Best Presentation Award for his paper on "*Recruitment processes of jack mackerel (*Trachurus japonicus*) in the East China Sea (ECS) in relation to environmental conditions*" (co-authored by Y. Tsukamota, Y. Konishi, S. Xie, Y. Watanabe and H. Nakata), presented in the CCCC/MODEL Topic Session (S5).

Documentation of scientific sessions (Agenda Item 4)

CCCC-IP/EC discussed responsibilities for documenting CCCC-sponsored Topic Sessions and Workshops at PICES XIV. Dr. Batchelder reminded the Committee that documentation of scientific sessions and workshops is required by session/workshop convenors. For CCCC at PICES XIV this responsibility rests with: Mr. Gordon A. McFarlane for the Topic Session (S4) on "*The comparative response of differing life history strategists to climate shifts*"; Mr. Jacob Schweigert and Dr. Yury I. Zuenko for the Topic Session (S5) on "*Modeling climate and fishing impacts on fish recruitment*"; Dr. Michael Schirripa for the Topic Session (S6) on "*Evidence of distributional shifts in demersal fish in relation to short- and long-term changes in oceanographic conditions*"; Dr. Harold Batchelder for the CCCC Poster Session on "*GLOBEC and GLOBEC-like studies in the North Pacific: Observing pattern and inferring process*"; and Dr. Jun Nishioka for the IFEP/MODEL Workshop (W3) on "*Modeling and iron biogeochemistry: How far apart are we?*". These session summaries were provided to Dr. Batchelder by the end of Thursday, October 6, are included in elsewhere in this Annual Report.

Progress reports of Task Team activities (Agenda Item 5)

CCCC-IP/EC received reports of CCCC Task Team activities from Co-Chairmen or representatives of MODEL and CFAME. On October 6, all Task Teams provided final reports that included a summary on their progress since PICES XIII and recommendations and planned activities for 2006, and even some for 2007 (*see MODEL and CFAME reports for details)*.

Items of significance for CFAME were:

- a status report from the May 2005 CFAME Workshop held in Victoria, Canada;
- discussion on preparation for a proposed January 2006 CFAME Workshop on "*A comparison of regional mechanisms for fish production: Ecosystem perspectives*" to be held at the University of Tokyo, Japan, and potential invited workshop participants; and
- potential CFAME synthesis papers to be presented and submitted as manuscripts for the 2006 CCCC Synthesis Symposium.

Other business items were:

- a proposal for a workshop at PICES XV brought forward from Dr. Richard J. Beamish (Canada);
- an update on the development of the new POC WG on *Evaluation of climate change projections* by the POC Chairman, Dr. Michael G. Foreman (*POC Endnote 5*); and
- a proposal brought forward by George Hunt for CFAME collaboration with a new GLOBEC regional program on *Ecosystem Study of Sub-Arctic Seas* (ESSAS). A 3-day workshop is planned in June 2006 to develop approaches for inter-comparing sub-Arctic ecosystems (*CCCC Endnote 3*). CFAME believes that the goals of ESSAS align well with some of the synthesis goals of CFAME and supports future collaboration of PICES and ESSAS.

The workshop proposed by Dr. Beamish would be sponsored primarily by FIS (*FIS Endnote 3*), and would identify key commercial species that might best be used as indicators of climate variability. Due to concerns regarding potential overlap with other CFAME activities, especially the January 2006 workshop, and to the WG 16 report which is not yet widely disseminated, CFAME recommended against co-sponsoring this workshop at the present time. Instead, CFAME suggested revisiting this issue after the January 2006 workshop results are known.

During the MODEL Task Team business meeting, participants:

- reviewed the accomplishments of MODEL over the past year;
- discussed proposals for the next major PICES scientific program;
- developed future plans for 2006-2007;
- discussed requests for travel to future meetings;
- discussed the maintenance of the MODEL web page; and,
- discussed the MODEL membership and the selection of a new MODEL Co-Chairman.

Details of these discussions are provided in the MODEL Task Team report included elsewhere in this Annual Report.

Progress report of the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean* (Agenda Item 6)

A report was received from Dr. Jun Nishioka of IFEP-AP. A complete description of their activities and plans can be found in the IFEP-AP report elsewhere in this Annual Report. Items of significance for IFEP-AP were:

- a report of the successful IFEP/MODEL Workshop on "*Modeling and iron biogeochemistry: How far apart are we?*" held at PICES XIV (IFEP Agenda Item 3);
- an update on the SEEDS-II Workshop to be held October 17-18, 2005, at the University of Tokyo, Japan (*IFEP-AP Endnote 4*);
- development of proposals for an IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*" (*IFEP-AP Endnote 5*) and a BIO Topic Session on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*" at PICES XV (*IFEP-AP Endnote 6*); and
- an update on several recent publications resulting from the previous iron fertilization

experiments in the subarctic Pacific (*IFEP Agenda Item 6*).

When the BASS Task Team of CCCC was disbanded at PICES XIII, IFEP-AP became orphaned within PICES. A proposal was made at PICES XIV for the BIO Committee to adopt the Panel. This proposal was accepted by BIO at their meeting on October 7, 2005. Governing Council agreed to move the responsibility for IFEP-AP from the CCCC Program to the BIO Committee. Activities of IFEP-AP up to and including PICES XIV will be supervised by CCCC and included as part of the CCCC report. Any activities of IFEP-AP following PICES XIV will be supervised by BIO.

Changes in CCCC-IP/EC and Task Team membership (Agenda Items 5 and 7)

The CCCC-IP/EC decided to:

- **Endorse** MODEL's request to extend Dr. Shin-ichi Ito's term as Co-Chairman for one additional year (to end at PICES XV);
- **Consider** MODEL's request for two new members from Korea (replacing Drs. Sinjae Yoo and Jae-Hak Lee), and addition of one new member (TBD) from Canada;
- **Recognize** and **welcome** Dr. George L. Hunt (U.S.A.) as a new member of CFAME and Dr. Jun Nishioka (Japan) as a new member of IFEP-AP.

CCCC-IP/EC proposed that Mr. Gordon (Sandy) A. McFarlane (Canada) succeed Dr. Harold Batchelder as North American Co-Chairman of the CCCC Program effective May 1, 2006, and to serve in this capacity through the conclusion of the CCCC synthesis phase and development of the next PICES integrative scientific program, or through PICES XVIII (2009), whichever comes earlier. Mr. McFarlane is exceptionally qualified to lead CCCC-IP/EC through the synthesis phase because of his prior service in CCCC, including a term as Co-Chairman of BASS and member of CFAME.

Suggested changes in membership will be forwarded to Science Board and Governing Council for further actions.

The CCCC Co-Chairmen thanked Dr. Francisco E. Werner (U.S.A.) for his service as MODEL Co-Chairman. Dr. Thomas C. Wainwright (U.S.A.) will replace him as North American Co-Chairman of MODEL, per the decision made at PICES XIII.

Proposals for new subsidiary bodies (Agenda Item 8)

The Executive Committee did not receive any proposals for new subsidiary bodies.

Planning for PICES XV (Agenda Item 9)

The following sessions and workshops were proposed:

- a ½-day CCCC/MODEL Topic Session on "*Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy*" (*MODEL Endnote 4*);
- a 1-day POC/MONITOR/CCCC Topic Session on "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*" (*POC Endnote 7*);
- a 1-day CCCC/FIS Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" (*CFAME Endnote 5*);
- a 1-day BIO (IFEP-AP) Topic Session on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*" (*IFEP-AP Endnote 6*);
- a 1-day IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*" (*IFEP-AP Endnote 5*); and
- a ½-day CCCC Paper Session on "*Patterns and processes of North Pacific ecosystem responses to physical forcing and climate change*". Convenors will be Harold Batchelder (U.S.A.) and Suam Kim (Korea).

Theme proposal for PICES XVI (Agenda Item 10)

CCCC-IP/EC has no specific theme suggestions for the Science Board Symposium at PICES XVI (October 2007, Canada).

Update on the April 2006 CCCC Symposium (Agenda Item 11)

Dr. Batchelder reviewed the current status on the planning of the PICES/GLOBEC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*". He noted that the CCCC Topic Session on "*The impacts of large-scale climate change on North Pacific marine ecosystems*" at PICES XIII was a preliminary step toward the April 2006 symposium. Co-convenors for the symposium are Drs. Harold Batchelder (U.S.A.) and Suam Kim (Korea). A seven member Steering Committee for the symposium has been formed. They met informally at PICES XIII to develop a timeline and agenda for the meeting. The Steering Committee consists of Drs. Makoto Kashiwai (Japan), Gordon A. McFarlane (Canada), Vladimir I. Radchenko (Russia), Yasunori Sakuarai (Japan), Franklin B. Schwing (U.S.A.), Sinjae Yoo (Korea), and Francisco E. Werner (GLOBEC International). All, except Dr. Kashiwai were able to attend the *ad hoc* meeting. Subsequent discussions and planning occurred via e-mail correspondence. The symposium will occur April 19-21, 2006, in Honolulu, U.S.A. Originally, the venue was planned as the East-West Center on the University of Hawaii campus. However, the space there was not sufficient, and the venue was changed to the Ala Moana Hotel, near the Convention Center in Waikiki. The change in venue will enable all posters to be displayed throughout the meeting, increase the time devoted to dedicated poster viewing, and permit 36 contributed oral presentations (up from the original 30 speaking time slots).

The meeting has three sub-themes: (1) Regime shifts, (2) Ecosystem productivity and structural responses to physical forcing, and (3) Pan-Pacific comparisons. A preliminary announcement of the symposium was published in July 2004 in PICES Press (Vol. 12, No. 2). A six-panel flyer of the meeting was distributed to the PICES mailing list in mid-2005.

Invited speakers for each theme and for the two "perspective" talks were identified and contacted to determine their willingness to present an invited talk and prepare a manuscript for inclusion in the symposium proceedings. Drs. James E. Overland (U.S.A.) and Shoshiro Minobe (Japan) will develop an overview paper on *regime shifts*, and one of them will present the talk. Dr. Sinjae Yoo (Korea), plus others of his selection, will develop an overview paper on *ecosystem productivity and structural responses to physical forcing*, and Dr. Yoo will give the talk. Dr. David Mackas (Canada), plus others of his selection, will develop an overview paper on *Pan-Pacific comparisons*, and Dr. Mackas will make the presentation at the symposium. Drs. John Davis (Canada) and Makoto Kashiwai (Japan) have agreed to give the perspectives talks.

A 35-minute Closing Discussion Panel is on the agenda. Panelists (probably 4 in number) have not yet been confirmed. Dr. Batchelder suggested that the panelists be Drs. William T. Peterson (U.S.A.; indicated willingness), Francisco E. Werner (GLOBEC International, indicated willingness), Laura Richards (Canada), and Dr. Kuh Kim (PICES Science Board Chairman). We discussed other possible panel members, considering disciplinary expertise and national representation. Except for Drs. Werner and Peterson, none have been contacted regarding this discussion panel.

Primary sponsors of the symposium are PICES and GLOBEC International. Potential co-sponsors were identified and several have been contacted by the PICES Secretariat regarding co-sponsoring the symposium. The following organizations have agreed to support the symposium (at various financial commitments): Pacific Islands Fisheries Center of NOAA, North Pacific Research Board, North Pacific Fisheries Management Council, Western Pacific Fishery Management Council, Pelagic Fisheries Research Program of the University of Hawaii, and SCOR. We are still awaiting responses from the U.S. GLOBEC National Program, Alaska Fisheries Science Center and Northwest Fisheries Science Center of NOAA, and *Exxon Valdez* Oil Spill Trustee Council regarding co-sponsorship. As most of these organizations are U.S.-related, CCCC-IP/EC suggests that the PICES Secretariat contact potential co-sponsors

from other PICES member nations (APN, Frontier Institute, Canada DFO, *etc*.). Korean delegates to CCCC IP/EC suggested that a letter be sent to the President of KORDI requesting their co-sponsorship of the CCCC Symposium.

CCCC inter-sessional activities and travel support requests (Agenda Item 12)

The following inter-sessional meetings were proposed for the period between October 2005 and October 2006:

- a CCCC/MODEL Workshop on "*Global comparison of sardine, anchovy and other small pelagics—building towards a multi-species model*" to be held on November 14-17, 2005, in Tokyo, Japan (*MODEL Endnote 3*); travel funds from PICES for this workshop were already requested (and awarded) last year;.
- a CCCC/CFAME Workshop on "*A comparison of regional mechanisms for fish production: Ecosystem perspectives*" to be held in January 2006, in Tokyo, Japan (*CFAME Endnote 4*);

CCCC-IP/EC requests travel support for:

- 2-3 CCCC scientists to attend the 4th International Zooplankton Production Symposium in spring 2007, in Hiroshima, Japan; it was noted that this symposium is already co-sponsored by PICES;
- Dr. Kenneth A. Rose (U.S.A.) to present MODEL contribution to the April 2006 CCCC Symposium (the highest priority request of MODEL);
- 2 experts on the Sea of Okhotsk and Yellow Sea/East China Sea to attend the CCCC/CFAME Workshop in January 2006, in Tokyo, Japan (the highest priority request of CFAME);
- 1 invited speaker for the CCCC/FIS Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" at PICES XV (second priority request of both CFAME and MODEL);
- 1 invited speaker for the CCCC/MODEL Topic Session "*Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy*" at PICES XV (second priority travel request of MODEL);
- 1 MODEL scientist to attend the joint IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*" at PICES XV;
- 1 CCCC/CFAME scientist to attend the June 2006 ESSAS/PICES Workshop on sub-Arctic ecosystems comparison (proposed for St. Petersburg, Russia), if PICES agrees to co-sponsor this workshop (third priority request of CFAME).

Future PICES integrative scientific program (Agenda Item 13)

CFAME did not have time to discuss themes proposed as a future integrative scientific program of PICES. MODEL provided comments on proposals in their report.

CCCC Action Plan (Agenda Item 14)

No time was spent on this issue in the CCCC-IP/EC meeting, except for Dr. Batchelder suggesting that he would develop a CCCC Action Plan using the planned activities of CFAME and MODEL from last year and this year, using a template provided by Science Board. This will be done following the January 2006 CFAME Workshop and prior to the 4th inter-sessional Science Board meeting in April 2006.

Relations to other international organizations and programs (Agenda Item 15)

CCCC-IP/EC identified linkages with ICES, GLOBEC International, and the North Pacific Research Board (NPRB) as high priorities for the coming year. Also, there are several regional coastal observing programs in the Northeast Pacific (PaCOOS, PNW-IOOS, AOOS), as well as numerous programs in the Northwest Pacific (CREAMS, NEAR-GOOS, others), that CCCC-IP should maintain connections with. Closer links with GOOS and the Census of Marine Life (CoML) initiative are promising areas to support, as was evidenced by the presentations made by Dr. Robin Rigby at PICES XIV on the CoML NaGISA project. The

Census of Marine Zooplankton (CMarZ) would be a good CoML project to establish more formal connections with. Finally, CCCC-IP must interact closely with NPAFC to address salmon issues of interest to the CCCC Program in the North Pacific.

Dr. Kenneth Drinkwater, Chairman of the ICES Cod and Climate Change Program, attended the CCCC-IP/EC meeting in 2004 (PICES XIII). He invited the CCCC Program to participate in a broadly based theme organized around climate and marine ecosystems at the ICES Annual Science Conference in 2006, in Maastricht, the Netherlands. Moreover, he suggested that the ICES and PICES meetings in 2006 have identical themes that would apply to both the CCCC and CCC Programs. The goal is to have several invited CCCC scientists attend the ICES Annual Science Conference in September 2006, and several CCC scientists attend the PICES Annual Meeting in October 2006. CCCC-IP/EC was in favor of this suggestion at PICES XIII. No one was present at the CCCC-IP/EC meeting that could comment on potential sessions proposed by ICES at their recent Annual Science Conference, but there may be sessions that will be of cross-interest (and parallel) between ICES and PICES in 2006. [*ADDENDUM: At the Science Board meeting, Dr. Skip McKinnell provided a list of themes occurring at the 2006 ICES Annual Science Conference. Science Board recommended that a theme titled,* "Large-scale changes in the migration of small pelagic fish and the factors modulating such changes*" be co-sponsored by PICES.*]

Other business (Agenda Item 17)

2006 ESSAS/PICES Workshop

CCCC-IP/EC recognizes that ESSAS and goals CCCC are complementary and recommends that PICES should support ESSAS effort in general, and the June 2006 ESSAS/PICES Workshop on comparing sub-Arctic ecosystems, specifically (*CCCC Endnote 3*).

PICES website content

- MODEL requests that the PICES website serve and maintain the MODEL Portal that was formerly hosted by Dr. Bernard A. Megrey on a NOAA server that is no longer available. MODEL offers to supply all documents, codes, presentation files to the PICES Secretariat for posting on the PICES website. If the PICES website cannot serve this, MODEL requests that PICES outsource web hosting to a commercial web server for MODEL products. [*ADDENDUM: At the Science Board meeting, TCODE Chairman, Dr. Igor Shevchenko, offered to host the MODEL Portal on a web server that supports TCODE metadata. He also noted that this server could also accommodate a password-protected member section if that is desired as well. The TCODE Chairman will work with Dr. Irina Ishmukova (Russia), who is a member of MODEL Task Team, to accomplish this.*];
- Dr. Harold Batchelder, Chairman of the *ad hoc* web publishing/oversight committee, recommends that a "Current Ocean Events" section be created on the PICES website. The recently revised PICES website is a great improvement over the prior design, but it is now primarily a repository for PICES documents (annual meeting reports, scientific reports, newsletters, calendar, address book) and does not have an emphasis on current ocean status and current events. During the past year, many PICES affiliated scientists have been consulted by and quoted by media regarding anomalous ocean conditions along the US west coast—just to cite one example. It is suggested that PICES establish a section of the website devoted to such "high profile stories", and actively engage scientists within the PICES community to contribute material to this section. Basically, it is desirable to get more timely ocean science news easily accessible from the PICES website.

Projected CCCC publications

- Selected papers on NEMURO and NEMURO.FISH models are expected to be published as a special issue of *Ecological Modelling* in 2006 (Guest editors: M. Kishi, B. Megrey, S.-I. Ito, and F. Werner);
- Selected papers from the IFEP SERIES experiment are currently under review and are projected to be published as a special

issue of *Deep-Sea Research II* in 2006 (Guest Editors: P. Boyd and P. Harrison);
- Selected papers from the CCCC/GLOBEC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" are expected to be published as a special issue of *Progress in Oceanography* in late 2007 or early 2008 (Guest editors: H. Batchelder and S. Kim);
- Five-year synthesis of iron fertilization experiments in the subarctic North Pacific is intended to be published in the PICES Scientific Report Series in 2007.

2007 PICES/ICES Young Scientist Conference
This issue was not discussed at the meeting.

Recommendations to Science Board (Agenda Item 18)

- CCCC-IP/EC **recommends the approval** of changes in CCCC-IP/EC membership requested under Agenda Items 5 & 7 above;
- CCCC-IP/EC **recommends the approval** of the workshops and travel requests detailed above.

CCCC Endnote 1

Participation list

Members

Kerim Y. Aydin (CFAME Co-Chairman)
Harold P. Batchelder (CCCC-IP Co-Chairman)
Shin-Ichi Ito (MODEL Co-Chairman)
Oleg Katugin (Russia)
Suam Kim (CCCC-IP Co-Chairman)
William T. Peterson (U.S.A.)
Yasunori Sakurai (Japan)
Francisco E. Werner (MODEL Co-Chairman)
Akihiko Yatsu (Japan; CFAME Co-Chairman)
Sinjae Yoo (Korea)

Observers

Gordon A. McFarlane (Canada)
Stewart (Skip) M. McKinnell (PICES Deputy Executive Secretary)
Jun Nishioka (Japan)
Hiroaki Saito (Japan)

CCCC Endnote 2

CCCC-IP/EC meeting agenda

1. Welcome and opening remarks
2. Adoption of agenda
3. Business from last year's meeting
4. Review of responsibilities for documenting CCCC Topic Sessions and workshops
5. Progress reports of Task Team (CFAME and MODEL) activities
6. Progress report of the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean*
7. CCCC-IP/EC chairmanship rotation
8. Proposals for new CCCC subsidiary bodies
9. Planning for PICES XV
10. Theme proposal for PICES XVI
11. Update on the April 2006 CCCC Synthesis Symposium
12. Review of planned CCCC activities and travel support requests/priorities for October 2005-October 2007 period
13. Future PICES integrative scientific program
14. CCCC Action Plan
15. Relations with other international programs and organizations
16. Preparation of CCCC report to Science Board
17. Other business
18. Recommendations to Science Board

CCCC Endnote 3

Proposal for a ESSAS/PICES Workshop comparing sub-Arctic seas

Support from PICES is sought for a proposed workshop to compare four sub-Arctic marine ecosystems, those of the Okhotsk Sea/Oyashio region, the Bering Sea, the Newfoundland/ Labrador Shelf and the Barents Sea. This would thus include areas with currents both to and from the Arctic, and those with marginal ice zones at quite low and rather high latitudes. PICES and a new GLOBEC regional program on *Ecosystem Study of Sub-Arctic Seas* (ESSAS) share the goal of developing comparative studies of the sub-Arctic seas and understanding how climate variability will affect their productivity and ability to support sustainable commercial and subsistence harvests. The goals of the workshop will be: 1) to lay the groundwork for developing the data sets needed to achieve the appropriate comparisons; and, 2) to commence establishing the teams necessary to synthesize available data and develop models for predicting the effects of climate variability on these ecosystems.

It is expected that the workshop will build upon extant syntheses and on-going and planned synthesis efforts. For example, the syntheses in the PICES North Pacific Ecosystem Status Report, and the ESSAS Science Plan and the Appendix to the ESSAS Science Plan that assembled data from each of the sub-Arctic seas should provide much basic information. Additionally, papers such as those by Aydin *et al*. (2002) examining the similarities and differences between the eastern and western Bering Sea, Hunt and Megrey's comparison of the Bering and Barents Sea ecosystems (in press), and the recent work by Ciannelli *et al*. comparing the Barents Sea and the Gulf of Alaska systems (in press) will provide a solid basis for moving forward with the analyses of these ecosystems. The workshop will also take advantage of advances made in a planned January 2006 CFAME Workshop on developing indices for North Pacific comparisons, and the results of workshops in the Norwegian funded program, Norway-Canada Comparisons of Marine Ecosystems (NORCAN), to be held in the autumn of 2005 and the late spring of 2006. The NORCAN workshops will develop specific plans for comparisons between the Barents Sea and the Labrador Shelf, including the use of biophysical models, and will initiate research on physical forcing, zooplankton dynamics and climate impacts on fish populations in these sub-Arctic seas.

Many of the synthesis products available to date have provided an excellent compendia of information about a particular sub-Arctic ocean basin, but few have explicitly compared mechanisms and responses to climate forcing across basins or between the Atlantic and Pacific systems. If the comparative method is to be used successfully, it will be necessary to identify important underlying structuring features of the ecosystems and how climate forcing, acting on those mechanisms, will result in ecosystem change. It will also be necessary to develop data sets that can be used in predictive modeling efforts. These data sets will have to be sufficiently closely aligned that inter-regional comparisons will be fruitful. Although all systems are unique, there must be a search for basic elements common to many, if not all, that can be usefully employed in a comparative approach.

The proposed ESSAS/PICES Workshop will be a significant step in achieving the goals of the PICES CFAME Task Team of putting "Particular emphasis… on testing ecosystem-level hypotheses, through review and examination in a collaborative environment, of (i) comparisons between regional and/or basin ecosystems; (ii) linkages in time, space, or seasonality between climate and ecosystems; and (iii) responses of regional ecosystems to basin-scale forcing." The workshop will, through its review of the existing syntheses of North Pacific data sets and comparisons with data from North Atlantic systems, provide a solid basis for the development of revisions and updating of the pilot PICES North Pacific Ecosystem Status Report published in December 2004.

REPORT OF CFAME TASK TEAM

The Climate Forcing and Marine Ecosystems Task Team (hereafter CFAME) met from 8:30-17:00 hours on October 2, 2005. Attending were 8 Task Team members and 8 observers (*CFAME Endnote 1*). Dr. George L. Hunt, Jr. was appointed as a new US member since the first CFAME workshop (May 14-15, 2005, Victoria, Canada). The agenda was reviewed and adopted with minor modifications (*CFAME Endnote 2*).

Follow-up of the May 2005 CFAME Workshop (Agenda Items 2a-2c)

Dr. Kerim Y. Aydin reviewed the summary of the first CFAME Workshop published by the Co-Chairmen in PICES Press (Vol. 13, No. 2). At this workshop, several speakers provided background material on some conceptual models, climate linkages and trophic level interactions. The workshop outlined the terms of reference for CFAME, and a general 2-year workplan, with initial work to begin with a workshop in January 2006. Terms of reference were developed under three key themes related to specific action items within the workplan:

- Mechanisms:
  Hold a workshop in January 2006, on conceptual/regional models, with a specific goal of providing developed mechanisms for 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.);
- Ecosystems:
  Hold a workshop prior to PICES XV (October 2006, Yokohama, Japan), on changes in ecosystem structure in response to climate forcing, in preparation for a 2007 joint POC/CFAME scenario exploration workshop (next bullet);
- Scenarios:
  Hold an inter-sessional joint POC/CFAME Workshop in 2007 for climate modelers to provide regional indicators identified at the January 2006 workshop, and for CFAME to apply climate output to developed conceptual models.

Dr. Akihiko Yatsu provided an update on efforts to obtain information on the target species (pollock, sardine, herring, pink and chum salmon) that includes data on biomass, catch and surplus production, recruitment indices, and reproductive success. Since many of these indices are difficult to measure, a simpler index of surplus production [biomass (year) – biomass (year-1) + catch (year-1)] was proposed.

There is general concern that for many species or stocks there are no biomass, recruitment or spawner data. Other possibilities need to be explored, for example, a standardized year-class index or relative abundance indices (*e.g.*, catch per unit effort - CPUE), or alternatively to expand the species list so that species are included for which biomass, recruitment or spawner data might be available. Periodic strategists (*e.g.*, long-lived demersal species) and equilibrium strategists (*e.g.*, elasmobranches or long-lived very low fecundity species) are currently missing from the list of target species. There was general agreement that three data types should be collated for target species (or target-like species):

- Catch
- Biomass or relative abundance (*e.g.*, survey CPUE)
- Recruitment or relative year-class strength (*e.g.*, juvenile CPUE).

The Task Team expanded the list of species to encompass sablefish and halibut (periodic strategists) and dogfish (equilibrium strategists), and identified CFAME members to provide the three types of data for their regions (*CFAME Endnote 3*). Members are at liberty to collate or report data by region, and are also requested to provide any published literature that might identify specific mechanisms of production variability. Members are also asked to provide a

basis for developing a conceptual model for each species (and region) for which they are reporting data. This will require an identification and provision of regional climate/ocean drivers. Applications of these data will be the eventual development of conceptual mechanisms of climate forcing on species population dynamics (abundance and recruitment success).

A follow-up to the January 2006 CFAME Workshop will be the identification of basin-wide and regional-scale climate variables that are driving forces for biological responses.

Definition of carrying capacity (Agenda Item 2d)

The 1996 definition of carrying capacity is a general term for production limits (*K*), where *K* represents an equilibrium state. In 2005, production levels can vary with climate regimes, moderated by life histories, where *K* has multiple equilibrium states. In reality, ecosystems are never in an equilibrium state but they achieve *relatively* stable states. Changes in equilibrium state might include not only a change in traditional *K* (production limits) but also in production rates (marine survival, larval survival, functional relationship between *S* and *R*), and therefore response time in population (abundance). Are structural/life history descriptions of regime response more robust, more comparative?

In anticipation of the January 2006 CFAME Workshop and the April 2006 PICES/GLOBEC Symposium, Dr. Kerim Aydin proposed to produce a paper that describes the rates of change between *K*s and implications for long-term production, citing some specific mechanistic examples (life-history specifics) and some ecosystem-level implications, and focuses on answering questions posed during the breakout session on ecosystem response at the 1998 CCCC Workshop on "*Development of cooperative research in coastal regions of the North Pacific*" (PICES Scientific Report No. 9, 1998), and to circulate a draft in January 2006. Dr. Aydin will take the lead on the development of a paper, with indication from Drs. George L. Hunt, Jacquelynne R. King and Akihiko Yatsu, and Gordon A. McFarlane that they will provide assistance.

Preparation for the January 2006 CFAME Workshop (Agenda Item 3)

A CFAME Workshop is proposed for January 2006 (*CFAME Endnote 4*). At the May 2005 CFAME Workshop, a representative from China suggested his country as a suitable location for the January workshop, since the previous meeting was in Canada, and China is close to the Yellow Sea, which is one of the focus areas of the Task Team. However, no Chinese members of CFAME attended PICES XIV to discuss this possibility, so Japan was selected as an alternate host in the western Pacific. The workshop will take place during the week of January 10-14, 2006 (exact days to be set to accommodate various members' schedules), at the University of Tokyo. Instead of 3 days, an intensive 2-day workshop was suggested. The three ecosystems to focus on at that workshop will be:

- Sea of Okhotsk (lead by Drs. Igor Volvenko and/or Victor Lapko)
- California Current System (lead by Drs. Vera Agostini and Gordon A. McFarlane)
- East China/Yellow Sea (lead by Dr. Hyung-Ku Kang; contact Dr. Qisheng Tang for input).

The Task Team discussed the option of focusing on the Oyashio/Kuroshio region rather than the East China/Yellow Sea. The latter was selected to be of greater interest to China, but so far it has been difficult to receive any input from Chinese members (Dr. Qisheng Tang might be a suitable invited speaker to address this issue). It was suggested that the Kuroshio/Oyashio region will have more evidence of climate impacts and might serve as a focus of the Task Team.

Various CFAME members were assigned to be lead-presenters for each ecosystem, for providing overviews of dominant species and how they have changed over time, some basis on relevant physical variables and other trophic levels. The workshop must also begin to include other trophic levels (aside from fish) in the consideration of ecosystem changes and development of these mechanistic models. As

with target fish species, time series on the abundance of other trophic levels will need to be compared (*e.g.*, include jellyfish; euphausiids). Lead-presenters are asked to draw on relevant discussion of other trophic levels and dynamics.

CFAME contributions to the 2006 CCCC Symposium (Agenda Item 4)

It was agreed that the following products from the January 2006 CFAME Workshop will be presented at 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.):

- Mechanistic model comparison (Dr. Akihiko Yatsu to prepare an abstract);
- Ecosystem (food-web structure) comparison (Dr. Jacquelynne R. King to prepare an abstract);
- Carrying Capacity definition (Dr. Kerim Y. Aydin to prepare an abstract).

Topic Session for PICES XV (Agenda Item 5)

CFAME proposes, jointly with MODEL and FIS, a 1-day Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" (*CFAME Endnote 5*).

Travel requests/priorities for 2006 (Agenda Item 6)

CFAME requests support for (in the order of priority):

- 2 scientists (Dr. Qisheng Tang of China and Dr. Victor Lapko of Russia are suggested) to attend the January 2006 CFAME Workshop to ensure participation by China and Russia, particularly since the Yellow Sea and the Sea of Okhotsk are two (of only 3) ecosystems selected for the discussion at the workshop;
- 1 invited speaker for the CCCC/FIS Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" at PICES XV;
- 1 PICES representative to attend a possible ESSAS/PICES Workshop in St. Petersburg, Russia discussed under Agenda Item 8, below.

Future PICES integrative scientific program (Agenda Item 7)

Dr. Harold P. Batchelder reviewed the outcome of the discussion at the inter-sessional Science Board meeting (April 2005, Seattle, U.S.A.) on the development of the next integrative scientific program for PICES. The Study Group on *Future integrative scientific program(s)* (SGFISP) has considered several themes proposed to them as future integrative science programs:

- Ecosystem-based Fisheries Management and Sustainable Use
- North Pacific Marine Ecosystem Response to the Global Change (including climate change, expanded fishing, population growth)
- A New Integrative Scientific Program built upon the Foundations of CCCC
- North Pacific Ocean Sustainability
- Coastal Ocean Ecosystems – The Human Dimension and Climate
- Marine Biodiversity: Status and Trends

SGFISP would like feedback on these initial themes (and accompanying outlines). Which themes meet the needs, are cross-disciplinary, and are of interest to the greatest number of nations? Feedback is solicited from CFAME, but the Task Team did not receive the outlines prior to this business meeting. CFAME Co-Chairmen agreed to provide themes to Task Team members who had not yet seen them. Individual scientists are encouraged to provide their comments on themes/outlines through the Co-Chairmen or to SGFISP members directly.

Other business (Agenda Item 8)

Gordon McFarlane presented an update to the Task Team on the upcoming CCCC/CFAME Topic Session (S4) "*The comparative response of differing life history strategists to climate shifts*" that will take place on Tuesday, October 4, 2005. There have been a number of cancellations, but a full-day of presentations has been achieved. Most papers look to be on topic,

so the session should be of interest to Task Team members.

Dr. Richard J. Beamish (WG 16 Co-Chairman) discussed a proposal that he will present to the FIS Committee for a workshop to follow-up the completion of the WG 16 report (*FIS Endnote 3*). The workshop will focus on key commercial fish species to further identify the specific linkages between climate and trends in their production. An objective of this workshop could be to achieve consensus on a list of 12-15 of the most important commercial species and further clarify the effects of climate variability. The key species could then be used as indices of climate impacts. CFAME was asked for interest in co-sponsoring the workshop. CFAME noted that this proposal overlaps with CFAME terms of reference and workplan, and requests further clarification on how the proposed workshop varies from CFAME activities, particularly the upcoming January 2006 workshop. CFAME participation could occur after the January 2006 workshop, so that Task Team members could focus on the objectives of the CFAME Workshop, and perhaps these could form an initial basis or starting point for the proposed FIS Workshop.

Dr. Michael G. Foreman provided an update on the development of a POC Working Group on *Evaluation of climate change projections*; the proposal will be brought to Science Board on Saturday, October 8, 2005 (*POC Endnote 5*). If approved, the Working Group will have its inaugural meeting at PICES XV. CFAME expressed strong interest in the products of the proposed Working Group and stressed its importance to making future biological forecasts.

Dr. George L. Hunt presented a proposal for continued collaboration between PICES and a new GLOBEC regional program on *Ecosystem Study of Sub-Arctic Seas* (ESSAS). The first collaboration occurred at a symposium in May 2005, in Victoria, which was both well-attended and successful. A 3-day workshop is planned for June 2006, in St. Petersburg, Russia. The goals of this workshop are to: (1) outline approaches to assessing which processes in the sub-Arctic seas will likely be most impacted by climate variability and might warrant future focus; (2) identify key datasets; (3) develop standard methodologies for comparing responses to climate variability in different systems; and (4) assess whether similar changes in climate cause similar responses in four different sub-Arctic ecosystems (*CCCC Endnote 3*). Dr. Hunt proposed that CFAME support this workshop and request funds to send a CFAME member to this workshop to ensure that all selected sub-Arctic systems will be covered. Other PICES Committees will be approached for similar support. Dr. Hunt encouraged members of the Task Team to attend the workshop to ensure collaboration between ESSAS and CFAME, particularly because the issues to be considered are similar between the two groups. CFAME supports PICES collaboration with ESSAS and recommends that PICES provides travel funds for Pacific Rim scientists to attend the June 2006 ESSAS/PICES Workshop.

CFAME Endnote 1

Participation list

Members

Kerim Y. Aydin (Co-Chairman, U.S.A.)
George L. Hunt, Jr. (U.S.A.)
Masahide Kaeriyama (Japan)
Hyung-Ku Kang (Korea)
Jacquelynne R. King (Canada)
Gordon A. McFarlane (Canada)
Yoshiro Watanabe (Japan)
Akihiko Yatsu (Co-Chairman, Japan)

Observers

Harold P. Batchelder (U.S.A.)
Richard J. Beamish (Canada)
Suam Kim (Korea)
Vadim Navrotsky (Russia)
Jake Schweigert (Canada)
Muyin Wang (U.S.A.)
Yury I. Zuenko (Russia)
and unidentified Russian scientists

CFAME Endnote 2

CFAME Task Team meeting agenda

1. Introductions and nomination of reporter(s)
2. Follow-up of the May 2005 CFAME Workshop:
   a. expand the Excel template (used at the May 2005 workshop) to include a simple production-rate indicator
   b. collect data for our target species
   c. compare collected data
   d. definition of carrying capacity
3. Preparation for the January 2006 CFAME Workshop
4. CFAME contribution to the 2006 CCCC Symposium
5. Topic Session and Workshop proposals for PICES XV
6. Travel requests/priorities for 2006
7. Future PICES integrative scientific program
8. Other business

CFAME Endnote 3

Assignments to coordinate data for the January 2006 CFAME Workshop

	Sardines	Pollock	Sablefish	Halibut	Herring	Pink/Chum	Dogfish
Japan	Yatsu	Yatsu	NA	NA	Yatsu	Kaeriyama	Yatsu
China	No member identified but Yatsu will attempt to contact						
Korea	Kang	Kang	NA	NA	NA	NA	NA
Russia-Bering	Zuenko (TINRO)	TINRO	TINRO	TINRO	TINRO	TINRO	TINRO
Russia-Okhotsk	TINRO	TINRO	NA	TINRO	TINRO	TINRO	TINRO
Canada	McFarlane	McFarlane	McFarlane	McFarlane	Schweigert	Beamish	McFarlane
USA-Alaska	NA	Aydin	Aydin	Aydin	Aydin	Aydin	Aydin
USA-West Coast	Agostini	Agostini	Agostini	Agostini	Agostini	NA	Agostini

CFAME Endnote 4

Proposal for a workshop on
"A comparison of regional mechanisms for fish production: Ecosystem perspectives"

Justification

We propose to hold a workshop on conceptual/regional models, with a specific goal of providing developed mechanisms for 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.). This workshop will seek to develop regional and Pacific-wide conceptual models describing mechanisms linking climate to fish production by focusing on two methods:

1. Attendees will develop mechanistic models for the following species in eastern and

western ecosystems: pollock, sardine, herring, pink and chum salmon, sablefish, halibut and dogfish. This approach will include the refining of regional climate indices to specifically and directly represent processes of interest, while allowing for linkages to large scale climate patterns or models.

2. Attendees will identify the set of key fish or squid species in the following ecosystems: California Current, East China/Yellow Seas, and Sea of Okhotsk. The set of key species may differ over time within each ecosystem. The aim is to describe the mechanisms between climate, ecosystem history, food web structure, and life history strategies which have led to the selected species playing a pivotal role in their respective ecosystems. It is expected that these descriptions will contribute to understanding patterns of variation and potential for changes in overall ecosystem structure, stability, or other ecosystem properties.

Time and place: 2-day workshop to be held between January 10-14, 2006 (exact dates TBD), in Tokyo, Japan.

Co-conveners: Kerim Y. Aydin (U.S.A.) and Akihiho Yatsu (Japan)

Travel request: funds for 1 Russian and 1 Chinese expert in regional ecosystems: Sea of Okhotsk and East China/Yellow Seas.

CFAME Endnote 5

Proposal for a 1-day CCCC/FIS Topic Session at PICES XV on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*"

Stock-recruitment relationships for exploited fishery stocks quite often show large deviations from theoretical curves. This results from the tremendous variability in survival rates in the early life stages of marine species. In the synthesis phase of the PICES CCCC Program, comparison of life-history strategies in relation to climate changes are recommended for pollock, pink salmon, capelin, sardines, anchovies, saury, euphausiids, squids, and others. Among the potential causes of succession of different life-history strategists, recruitment variability is one of the most important factors. To perform scientific management for target species, appropriate modeling of recruitment processes, including environmental effects, is needed. Under this theme, we will review the temporal and spatial variability of recruitment processes of key species, their linkages to climate changes, human impacts and regional ecosystem structure. Moreover, this session will explore new methodologies to plug the gaps between data and the current state of modeling.

Recommended convenors: Kerim Y. Aydin (U.S.A.), Shin-ichi Ito (Japan), Jacob Schweigert (Canada), Akihiko Yatsu (Japan) and Yury I. Zuenko (Russia).

REPORT OF MODEL TASK TEAM

The meeting of the MODEL Task Team (hereafter MODEL) was held from 14:30-18:00 hours on October 2, 2005. The Co-Chairmen, Drs. Francisco E. Werner and Dr. Shin-ichi Ito, called the meeting to order and welcomed the participants (*MODEL Endnote 1*). The Task Team reviewed the draft agenda, which was adopted (*MODEL Endnote 2*). During the meeting, participants:

- reviewed the accomplishments of MODEL over the past year;
- discussed proposals for the next major PICES scientific program;
- developed plans for 2006-2007;
- discussed the requests for travel to future meetings;
- discussed the maintenance of the MODEL web page; and,
- discussed the MODEL membership and the selection of a new MODEL Co-Chairman.

MODEL accomplishments in 2005 (Agenda Item 3)

The project "*Effects of climate on the structure and function of marine food-webs and implications for marine fish production in the North Pacific Ocean and marginal seas interaction and marine ecosystems*" (PIs: Drs. Francisco E. Werner and Bernard A. Megrey) was funded by APN (Asia Pacific Network for Global Change Research), and that allowed MODEL to hold a successful workshop on "*Climate interactions and marine ecosystems*" (co-sponsored by PICES and GLOBEC), from October 10-13, 2004, in Honolulu, U.S.A. Another meeting was held from March 5-10, 2005, in Baton Rouge, U.S.A. Among the main results of the workshop and meeting were:

- modeling differences in Pacific herring growth along the Northeast Pacific coast (from Vancouver Island to Alaska);
- implementation of an automatic parameter calibration system software PEST for the two target species, herring and Pacific saury;
- a comparison of differences in growth response between herring in the eastern and western North Pacific and saury under the same climate forcing derived from 3-D NEMURO model outputs.

The project "*Development of a model on the coupled response of lower and higher trophic level ecosystems to climate variability in the North Pacific*" (PI: Dr. Shin-ichi Ito) was funded by FRA (Fisheries Research Agency, Japan) for the April 2003 - March 2005 period. Under this project, MODEL held a workshop "*Summary and synthesis of contributions from NEMURO and NEMURO.FISH*" (co-sponsored by PICES) from December 15-18, 2003, at the National Research Institute for Fisheries Science, Yokohama, Japan. The project partially supported (together with PICES) a follow-up workshop of the same title as the project, "*Development of a model on coupled responses of lower and higher trophic levels to climate variability in the North Pacific*", held from August 20-23, 2004, at the Alaska Fisheries Science Center, Seattle, U.S.A.. Originally the project was planned to be 3 years in duration, however, to develop and apply the model to sardine and anchovy problems and to hold a related international workshop, the project was revised and shifted to another FRA program "*International symposium/workshop support by FRA*". The main results of the project were:

- improvement of model parameters for Pacific saury migration and spawning;
- showing the possible effect of sardine predatory pressure on prey zooplankton of Pacific saury; and
- the extension of NEMURO.FISH to sardine growth.

MODEL had agreed previously to publish the scientific contributions of NEMURO and NEMURO.FISH as a special issue of *Ecological Modelling*. Drs. Michio J. Kishi, Bernard A.

Megrey, Shin-ichi Ito, and Francisco E. Werner are the guest editors of the special issue. The review process is ongoing and the current status is as follows:

- 10 papers have been reviewed by two anonymous reviewers and are now in revision by the authors;
- 3 papers are still in review;
- 4 papers are still in preparation;
- the final editorial meeting is planned for January 2006, in Seattle;
- the completed package is expected to be sent to *Ecological Modelling* in March 2006.

The project "*Software framework for integrating marine ecosystem models*" (PIs: Drs. Thomas C. Wainwright and Bernard A. Megrey) was funded by NOAA. The objectives of the project are:

- integrate NEMURO and NEMURO.FISH in the Earth System Modeling Framework (ESMF);
- provide a web-based interface for the NEMURO and NEMURO.FISH models;
- post user's guides and documentation on the web.

ESMF will make the NEMURO code available for integration into the other U.S. Climate Change Research efforts and will also provide web-based tools to facilitate long-distance collaboration.

At PICES XIV, an IFEP/MODEL Workshop on "*Modeling and iron biogeochemistry: How far apart are we?*" was held on October 2, 2005, with Drs. Jun Nishioka and Yasuhiro Yamanaka as co-conveners. The workshop was a success, and IFEP and MODEL agreed to collaborate in building ecosystem models that include iron cycle effects. A CCCC/MODEL Topic Session on "*Modeling climate and fishing impacts on fish recruitment*" (Co-conveners: Drs. Yury I. Zuenko and Jacob Schweigert) was held on October 5, 2005. Summaries of the workshop and session are included elsewhere in this Annual Report.

Discussion of proposals for next major PICES scientific program (Agenda Item 4)

MODEL discussed the following 6 proposed themes as potential candidates for the next major PICES scientific program:

i) Ecosystem-based Fisheries Management and Sustainable Use
ii) North Pacific Marine Ecosystem Response to the Global Change
iii) A New Integrative Scientific Program Built upon the Foundations of CCCC
iv) North Pacific Ocean Sustainability
v) Coastal Ocean Ecosystems – The Human Dimension and Climate
vi) Marine Biodiversity: Status and Trends

The main results of the discussion were:

- to involve all PICES member countries, the main scientific program should have broad scientific value,
- i), v) and vi) appear to be too narrow in scope and may not be appropriate programs for PICES,
- ii), iii) and iv) widely cover the scientific interests,
- climate change issues including global change is very important for PICES countries and the predictability of the ecosystem response will be needed,
- therefore, iii) seems the most desirable program, and model suggested the title of iii) as "*New Synthesis of Ecosystem Change and Forecast* (NESCAFE)".

Planning for 2005-2007 (Agenda Item 5)

<u>November 2005 inter-sessional workshop</u>

Plans and arrangements were discussed for a FRA/APN/IAI/PICES/GLOBEC Workshop on "*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*" to be held from November 14-17, 2005, in Tokyo, Japan (*MODEL Endnote 3*).

The workshop was successfully convened, and details can be found in PICES Press (Vol. 14, No. 1). The focus of this workshop was on sardine and anchovy, and the participants:

- revisited the results of the 1989 symposium describing the inter-annual and inter-decadal variability of marine ecosystems in key regions in the world;

- discussed new factors and recent explanations regarding the cause of their variability;
- reviewed modeling capabilities; and
- proposed a common modeling approach to study the synchrony and asynchrony of sardine and anchovy populations, and discuss and compare their response to environmental or climate/global change factors in selected areas.

Workshops at PICES XV

A 1-day IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*" is proposed by IFEP (*IFEP-AP Endnote 5*).

Topic Sessions at PICES XV

The Task Team proposes a ½-day CCCC Topic Session on "*Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy*" (*MODEL Endnote 4*).

MODEL supports a proposal to convene a 1-day CCCC/FIS Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" (*CFAME Endnote 5*).

MODEL also supports a 1-day Topic Session on "*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*", to be convened jointly by POC, MONITOR and CCCC (*POC Endnote 7*).

Requests for travel to future meetings (Agenda Item 6)

MODEL requests travel support for:

- 2 scientists to attend a workshop on "*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*" (November 14-17, 2005, Tokyo, Japan); these travel funds from PICES were already requested (and awarded) last year;
- Dr. Kenneth A. Rose (U.S.A.) to present MODEL contribution to the CCCC Symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" (April 19-21, 2006, Honolulu, U.S.A.);
- 1 invited speaker for the CCCC/MODEL Topic Session on "*Modeling and historical data analysis on pelagic fish, with special focus on sardine and anchovy*" at PICES XV;
- 1 invited speaker for the CCCC/FIS Topic Session on "*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*" at PICES XV.

MODEL web page (Agenda Item 7)

Dr. Bernard A. Megrey has maintained the MODEL Portal at a NOAA website. Using the portal site, MODEL members have exchanged Fortran model codes, drafts of manuscripts, presentation files at inter-sessional workshops, *etc*. This site archives all material related to the MODEL activities. MODEL members agreed to request that PICES maintain such a portal in the future. If the site cannot be hosted on the PICES website, MODEL requests PICES to consider funding for commercial hosting of the Task Team archive and the distribution of Task Team products.

Rotation of MODEL membership (Agenda Item 8)

Chairmanship: Dr. Francisco E. Werner rotated off as Co-Chairman of MODEL, and Task Team members enthusiastically agreed to have Dr. Thomas C. Wainwright as the new MODEL Co-Chairman. MODEL members offered great thanks to Dr. Werner for his strong leadership and efforts over the past years. Dr. Shin-ichi Ito agreed to remain as the other Co-Chairman for one more year.

Membership: MODEL needs two new members from Korea. One is to replace Dr. Sinjae Yoo and the other is to replace Dr. Jae-Hak Lee. Additionally, MODEL also needs another member from Canada, as presently the only Canadian member is Mr. Jacob Schweigert.

MODEL Endnote 1

Participation list

Members

Irina Ishmukova (Russia)
Shin-ichi Ito (Japan, Co-Chairman)
Michio J. Kishi (Japan)
Bernard A. Megrey (U.S.A.)
Jake Schweigert (Canada)
Francisco E. Werner (U.S.A., Co-Chairman)
Sinjae Yoo (Korea)
Yury I. Zuenko (Russia)

Observers

Michael Schirripa (U.S.A.)
Yasuhiro Yamanaka (Japan)
Inja Yeon (Korea)
Naoki Yoshie (Japan)

MODEL Endnote 2

MODEL Task Team meeting agenda

1. Welcome and introduction of new members (*F. Werner and S. Ito*)
2. Review of agenda and inclusion of new items as needed
3. Review of MODEL accomplishments after PICES XIII:
   a. APN project "*Climate interaction and marine ecosystems*", including meeting in Baton Rouge in March 2005 (*F. Werner*)
   b. FRA project "*Development of a model on the coupled response of lower and higher trophic level ecosystems to climate variability in the North Pacific*" (*S. Ito*)
   c. Special issue of *Ecological Modelling* (*M. Kishi*)
   d. NOAA project "*Software framework for integrating marine ecosystem models*" (*T. Wainwright*)
   e. Discussion/review/preview of upcoming events at PICES XIV: CCCC/MODEL Topic Session (*J. Schweigert and Y. Zuenko*) and IFEP/MODEL workshop (*Y. Yamanaka*)
4. Discussion of proposals for next major PICES scientific program (after CCCC) (*S. Ito and T. Wainright*)
5. Planning for 2005-2007 (*S. Ito, F. Werner* and *T. Wainright*)
   a. Joint FRA/APN/IAI/PICES/GLOBEC Workshop in November 2005 *(S. Ito)*
   b. CCCC Symposium in April 2006 (*F. Werner*)
   c. PICES XV (October 2006) - proposals for Topic Sessions and workshops
   d. Theme for PICES XVI (October 2007)
6. Requests for travel to future meetings
7. MODEL web page (*B. Megrey*)
8. Rotation of MODEL membership

MODEL Endnote 3

Plan for a workshop on "*Global comparison of sardine, anchovy and other small pelagics: Building towards a multi-species model*"

Rationale: Large-scale, global fluctuations in populations of sardines and anchovies have been observed in the past century. The amplitude of their fluctuations is high and contributes a significant share of the total variability of the world's harvest of fish. There are several intensive fishery grounds for sardine and anchovy that show asynchrony in their abundance. At the same time, sardine shows synchrony in the Pacific (*e.g.*, the Humboldt Current, California Current and Kuroshio Current areas) suggesting a bottom-up, climate driven component. Finally, sardine populations do not show any clear systematic synchrony between Pacific and Atlantic. The out-of-phase asynchrony between sardine and anchovy may

reflect not only the differences of their life histories, but also a bottom-up process driven by climate shifts.

This climate-induced variability has attracted the attention of fisheries scientists worldwide and an international symposium on *Long-term variability of pelagic fish populations and their environment* was held in Japan more than 15 years ago, in 1989. In that symposium, the worldwide sardine variability was synthesized, and factors possibly causing the variability were discussed. At that time, global ocean circulation and marine ecosystem models were not available. However, in the past decade, the modeling of ecosystem responses to climate change, including enhanced computational capabilities, has evolved rapidly. For example, the PICES MODEL Task Team built a community ecosystem model "North Pacific Ecosystem MODEL for Understanding Regional Oceanography (NEMURO)", with an embedded fish bioenergetics model, and applied it to Pacific herring and saury, and compared their responses to climate scenarios.

Recommended convenors: Shin-ichi Ito, Michio J. Kishi (Japan), Bernard A. Megrey, Kenneth A. Rose and Francisco E. Werner (U.S.A.)

Venue: November 14-17, 2005, Tokyo, Japan

Organizer: Fisheries Research Agency, Japan

Sponsors: Fisheries Research Agency of Japan, Asia-Pacific Network for Global Change Research, Inter-American Institute for Global Change Research, GLOBEC and PICES.

MODEL Endnote 4

Proposal for a ½-day CCCC/MODEL Topic Session at PICES XV on
"Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy"

In the synthesis phase of the CCCC Program, comparisons of life-history strategies in relation to climate change are recommended for pelagic species such as pollock, pink salmon, capelin, sardines, anchovies, saury, euphausiids, squids, and others. The MODEL Task Team will hold a workshop in November 2005 on "*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*, co-sponsored by FRA, APN, IAI, GLOBEC, and PICES. Modeling and historical data analysis of recruitment processes, and their relevance to scientific management of sardine and anchovy will be discussed during this workshop. For the PICES Topic Session, we will call for papers on models and historical data analysis on the temporal and spatial variability of recruitment processes of sardine and anchovy, their linkages to changes in climate, human impacts and regional ecosystem structure. Advances in modeling fish population dynamics coupled with lower trophic ecosystems applied to pelagic fish are especially encouraged.

Recommended convenors: Shin-ichi Ito, Michio J. Kishi (Japan), Bernerd A. Megrey, Kenneth A. Rose and Francisco E. Werner (U.S.A.).

REPORT OF ADVISORY PANEL ON IRON FERTILIZATION EXPERIMENT IN THE SUBARCTIC PACIFIC OCEAN

The meeting of the Advisory Panel on *Iron fertilization experiment in the subarctic Pacific Ocean* (IFEP-AP) was held from 14:30-15:30 hours on October 2, 2005. Dr. Mark L. Wells called the meeting to order and welcomed the participants *(IFEP-AP Endnote 1*). A new member, Dr. Jun Nishioka (Japan), was introduced to the Advisory Panel. The proposed agenda was reviewed and adopted *(IFEP-AP Endnote 2).*

Report of the IFEP/MODEL Workshop at PICES XIV (Agenda Item 3)

To enhance communication between experimentalists and modelers concerning the structure of iron biochemical models, IFEP and MODEL convened a ½-day workshop on "*Modeling and iron biogeochemistry: How far apart are we?*" from 08:30-14:30 hours on October 2, 2005, at TINRO-Center, Vladivostok, Russia. Participation included 17 scientists from Russia, Canada, Japan, and the United States of America (*IFEP-AP Endnote 3*). The Panel started discussion on incorporating the iron cycle into the ecosystem models as a joint IFEP/MODEL activity, and intends to convene a workshop along these lines at PICES XV (*IFEP-AP Endnote 5*). The summary of the workshop is included elsewhere in this Annual Report.

SEEDS-II Workshop (Agenda Item 4)

A workshop on SEEDS-II (**S**ubarctic Pacific Iron **E**xperiment for **E**cosystem **D**ynamics **S**tudy II) was held from October 17-18, 2005, in Tokyo, Japan (*IFEP-AP Endnote 4*). The workshop was co-sponsored by the Ocean Research Institute (University of Tokyo), PICES and SOLAS-Japan. In attendance were almost 40 scientists from Canada, Japan, New Zealand and the United States of America. There were 7 keynote talks and 13 posters presented, followed by working group discussions aimed at synthesizing these findings. The goals of the workshop were:

- to synthesize results from the second *in situ* iron enrichment experiments in the western subarctic North Pacific (SEEDS-II); and
- to discuss similarities and differences in responses of biological processes and export fluxes between SEEDS-I and SEEDS-II.

A summary of the workshop was published in PICES Press (Vol. 14, No. 1).

Future IFEP-AP activities (Agenda Item 5)

Governing Council agreed with Science Board's recommendation to move the responsibility for the IFEP Advisory Panel from the CCCC Program to the BIO Committee.

IFEP/MODEL Workshop at PICES XV

To compare ecological models that describe how plankton ecosystems respond to mesoscale iron enrichment in the high-nutrient, low-chlorophyll waters of the subarctic Pacific, the Panel proposes to convene a 1-day IFEP/MODEL Workshop on "*Modeling iron biogeochemistry and ocean ecosystems*" at PICES XV (*IFEP-AP Endnote 5*).

IFEP Topic Session at PICES XV

IFEP-AP recognized the importance and need to compare and contrast all three successful meso-scale iron enrichment experiments in the subarctic North Pacific (SEEDS-I & II and SERIES). Therefore, the Panel proposes to convene a 1-day BIO Topic Session on "*Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific*" at PICES XV (*IFEP-AP Endnote 6*).

Synthesis report of IFEP-AP activities

The final scientific report of IFEP-AP activities will be developed based on the extended abstracts of the Topic Session at PICES XV.

Future of IFEP-AP

It was suggested that IFEP-AP will conclude its activities in 2006 because three iron enrichment experiments have been successfully completed and will be synthesized at PICES XV. Nevertheless, the Panel recognized that iron plays an important role in biogeochemical cycles in the North Pacific, and considerable uncertainty still remains about iron chemistry and ecosystem responses to iron input. One option to continue such studies in PICES is to establish a new group under the BIO Committee or the CCCC Program (or its replacement).

Recent publications (Agenda Item 6)

SEEDS: Synthesis paper and special volume

Tsuda *et al*. published a synthesis paper entitled "*A mesoscale iron enrichment in the western subarctic Pacific induced a large centric diatom bloom*" in *Science* (Vol. 300: 958-961, 2003).

Thirteen papers were published in a special issue of *Progress in Oceanography* (Vol. 64, 2005) on "*Results from the Subarctic Pacific Iron Experiment for Ecosystem Dynamics Study (SEEDS)*"

SERIES: Synthesis paper and special volume

Boyd *et al*. published a synthesis paper entitled "*The decline and fate of an iron-induced subarctic phytoplankton bloom*" in *Nature* (Vol. 428: 549-553, 2004).

More than 15 papers have been submitted to a special issue of *Deep Sea Research, Part. II* and are currently under review.

PICES Scientific Report Series

A report of the 2004 IFEP Workshop on "In situ *iron enrichment experiments in the eastern and western subarctic Pacific*" will be published in the PICES Scientific Report Series in 2005. It includes a summary of SEEDS and SERIES experiments, together with a report and abstracts of the 2000 IFEP Planning Workshop on "*Designing the iron fertilization experiment in the subarctic Pacific*" as appendices.

Request for travel support (Agenda Item 7)

The Panel requests support for 1 invited speaker each for the proposed IFEP/MODEL Workshop and BIO (IFEP) Topic Session at PICES XV (*IFEP-AP Endnote 5-6*).

IFEP-AP Endnote 1

Participation list

Members

William P. Cochlan (U.S.A.)
Jun Nishioka (Japan)
Mark L. Wells (U.S.A.)

Observers

Harold P. Batchelder (U.S.A.)
Angelica Peña (Canada)
Hiroaki Saito (Japan)

IFEP-AP Endnote 2

IFEP-AP meeting agenda

1. Welcome and introduction of new member
2. Adoption of agenda
3. Report of the IFEP/MODEL Workshop at PICES XIV

4. Program of the 2005 SEEDS-II Workshop
5. Future IFEP-AP activities
   - Topic Session on SEEDS/SERIES at PICES XV
   - IFEP/MODEL Workshop at PICES XV
   - Synthesis report of IFEP-AP activities
   - Future of IFEP-AP
6. Recent publications
7. Requests for travel support for 2006
8. Other business

IFEP-AP Endnote 3

Participants of the IFEP/MODEL Workshop at PICES XIV

Harold P. Batchelder (U.S.A.)
Robin Brown (Canada)
James Christian (Canada)
William R. Crawford (Canada)
Irina Ishmukova (Russia)
Shin-ichi Ito (Japan)
Michio Kishi (Japan)
Yuri Nikonov (Russia)
Jun Nishioka (Japan, Co-Convenor)
Angelica Peña (Canada)
Hiroaki Saito (Japan)
Kazuaki Tadokoro (Japan)
Shuichi Watanabe (Japan)
Mark L. Wells (U.S.A.)
Francisco E. Werner (U.S.A.)
Yasuhiro Yamanaka (Japan, Co-Convenor)
Naoki Yoshie (Japan)

IFEP-AP Endnote 4

SEEDS II Workshop on "*Second iron enrichment experiment in the western subarctic Pacific*"

Date: October 17-18, 2005

Venue: Ocean Research Institute (University of Tokyo), Tokyo, Japan

Convenors: Atsushi Tsuda, Shigenobu Takeda, Mitsuo Uematsu (University of Tokyo) and Mark L. Wells (University of Maine)

Sponsors: Ocean Research Institute (University of Tokyo), North Pacific Marine Science Organization (PICES), and SOLAS-Japan

Main themes:
1. To synthesize the key biological findings of the SEEDS II
2. To elucidate the changes in iron biogeochemistry
3. To determine the effect of iron addition on the production of trace gases
4. To compare the biogeochemical changes associated with SEEDS I and SEEDS II

Oral presentations:
- Background and introduction of SEEDS II (A. Tsuda)
- Physical behavior of the iron-fertilized patch by SF_6 tracer release (D. Tsumune, Y. Watanabe, A. Shimamoto)
- Iron and trace metal chemistry (J. Nishioka, H. Obata, S. Takeda, K. Johnson, M. Wells, S. Nakatsuka, Y. Kondo, S. Takada, Y. Sorin)
- Biological responses (H. Saito, K. Suzuki, H. Kiyosawa, A. Tsuda)
- Primary production, bacterial production and nitrogen assimilation dynamics during SEEDS II (I. Kudo, T. Aramaki, W. Cochlan, Y. Noiri, T. Ono, Y. Nojiri)
- Complexity of grow-out experiments: further iron stimulation of communities from an iron fertilized patch (W. Cochlan, M. Wells, C. Trick)
- DMS in the seawater and atmosphere measured during the iron fertilization experiment (SEEDS-II) in the sub-arctic North Pacific (I. Nagao, S. Hashimoto, M. Uematsu)
- The role of bacteria in modulating the impact of Fe on DMS production in HNLC waters (M. Levasseur, M. Lizotte, G. Caron)
- Distribution of marine biogases and their fates between surface seawater and marine atmospheric boundary layer during the

SEEDS II cruise in the northern North Pacific (M. Uematsu, Y. Narita, Y. Iwamoto, M. Kondo, K. Yoshida, I. Nagao, S. Hashimoto, S. Toda, S. Kato, K. Kajii)
- The SAGE Experiment: Why was there no bloom? (J. Hall)
- Suggestions from modelers (M. Fujii, M. Wells, F. Chai, N. Yoshie)

Poster presentations:
- Meso- and microzooplankton dynamics in SEEDS II (A. Tsuda, H. Saito, R. Machida)
- Dynamics of mass flux and particulate matter flux during SEEDS II (T. Aramaki, Y. Nojiri, K. Imai)
- Release of organic iron-binding ligands during grazing on phytoplankton and its effect on phytoplankton community structure (M. Sato, S. Takeda, K. Furuya)
- Complexation of iron (III) by natural organic ligands during SEEDS II (Y. Kondo, S. Takeda, J. Nishioka, K. Furuya)
- Iron oxidation status during the SEEDS II mesoscale experiment and its potential biological implications (E. Roy, M. Wells, C. Trick, W. Cochlan)
- Trace gasses in the water (U. Tsunogai)
- Geochemistry of bioactive trace metals during an *in-situ* iron enrichment in the subarctic western North Pacific Gyre (SEEDS II) (S. Nakatsuka, J. Nishioka, M. Kinugasa, Y. Sorin)
- Ammonium inhibition of nitrate uptake during mesoscale iron-enrichment experiments: A comparison of the planktonic response during SOFEX and SEEDS II (W. Cochlan1, J. Herndon, J. Betts, D. Costello, C. Trick, M. Wells)
- Behavior of rare earth elements and 210Po-210Pb during the iron fertilization experiment (Y. Hara, H. Obata, T. Doi, Y. Hongo, T. Gamo)
- Behavior of thorium and particles obtained by the multiple-unit large-volume *in situ* filtration system in SEEDS II (T. Zono, T. Nakanishi, J. Zheng, M. Yamada, M. Kusakabe)
- Temporal variability of cosmogenic radionuclides ^{32}P, ^{33}P and ^{7}Be in SEEDS II (T. Nakanishi, T. Aono, M. Yamada, M. Kusakabe)
- Phosphorus dynamics during SEEDS II (T. Yoshimura)
- Effects of iron fertilization on the distribution of volatile organic compounds in seawater (S. Toda, Y. Narita, H. Oda, Y. Akatsuka, T. Nagai, M. Kurihara, M. Uematsu, S. Hashimoto)
- Six posters from the SAGE experiment.

List of participants

Tatsuo Aono (Japan)
Takafumi Aramaki (Japan)
William P. Cochlan (U.S.A.)*
Julie Hall (New Zealand)
Yasuko Hara (Japan)
Hidenori Iguchi (Japan)
Teruaki Ishii (Japan)
Y. Iwai (Japan)
Yoko Iwamoto (Japan)
W. Keith Johnson (Canada)
Syungo Kato (Japan)
Masaki Kondo (Japan)
Yoshiko Kondo (Japan)
Isao Kudo (Japan)*
Maurice Levasseur (Canada)
Ryuji Machida (Japan)
Ippei Nagao (Japan)
Takahiro Nakanishi (Japan)
Seiji Nakatsuka (Japan)
Noriko Nakayama (Japan)
Jun Nishioka (Japan)*
Hajime Obata (Japan)
Hiroshi Ogawa (Japan)
Tsuneo Ono (Japan)
Hiroaki Saito (Japan)*
Mitsuhide Sato (Japan)
Koji Suzuki (Japan)
Shigenobu Takeda (Japan, Co-Chairman)*
Syuji Toda (Japan)
Charles G. Trick (Canada)
Atsushi Tsuda (Japan)*
Daisuke Tsumune (Japan)
Makoto Tsutsumi (Japan)
Mitsuo Uematsu (Japan)
Hidetoshi Urakawa (Japan)
Mark L. Wells (U.S.A.)*
Kentaro Yoshida (Japan)
Naoki Yoshie (Japan)
Takeshi Yoshimura (Japan)

*IFEP-AP member

IFEP-AP Endnote 5

Proposal for a 1-day IFEP/MODEL Workshop on
"Modeling iron biogeochemistry and ocean ecosystems"

Synthesis of data from three successful meso-scale iron enrichment experiments in the subarctic North Pacific (SEEDS-I & II and SERIES) has been underway, which helps development of ocean ecosystem models. This workshop will enhance communication between experimentalists and modelers working on iron biogeochemistry and modeling. The workshop will focus on a couple of key questions: 1) What have we learned regarding iron biogeochemistry in the ocean from natural observation and iron-enrichment experiment? and 2) How can ocean models be improved with detailed iron dynamics to better represent ocean ecosystems? The workshop will provide an opportunity for experimentalists and modelers to share their latest results and understanding on iron biogeochemistry and ocean ecosystems, and make recommendations for future iron cycle observations and ocean ecosystem modeling in the subarctic Pacific.

Recommended Convenors: Fei Chai (U.S.A.) and Jun Nishioka (Japan).

Recommended invited speaker: Marie Boye (Institut Universitaire European de la Mer, France).

IFEP-AP Endnote 6

Proposal for a 1-day BIO (IFEP-AP) Topic Session at PICES XV on
"Synthesis of* in situ *iron enrichment experiments in the eastern and western subarctic Pacific"

Three successful meso-scale iron enrichment experiments have been conducted in the subarctic North Pacific (SEEDS-I & II and SERIES) over the last four years. The proposed session will synthesize the key findings of these experiments and initiate the development of a common database. We invite contributions specifically comparing and contrasting these three experiments. In addition, the unpredicted response of recent mesoscale iron enrichment experiment (SEEDS-II) highlights our limited understanding of how iron affects biogeochemical cycles, and the complexity of ecosystems responses to iron in High Nutrient Low Chlorophyll waters. We also encourage papers investigating how iron influences, and is influenced by, ocean-atmospheric exchanges, plankton activities and community structure, micronutrient chemistry, and other processes in the subarctic North Pacific.

Recommended Convenors: Maurice Levasseur (Canada), Shigenobu Takeda and Atushi Tsuda (Japan).

Recommended invited speaker: Philip Boyd (NIWA, New Zealand).

REPORT OF ADVISORY PANEL ON MARINE BIRDS AND MAMMALS

The fifth meeting of the Advisory Panel on *Marine birds and mammals* (MBM-AP) was held from 16:00 – 18:00 hours on October 5, 2005. The Panel Co-Chairman, Dr. William J. Sydeman, called the meeting to order and welcomed the members and observers (*MBM-AP Endnote 1*). The Panel reviewed the terms of reference to orient the new observers. It was re-iterated that MBM-AP serves to generate interest in PICES from the marine bird and mammal research communities, and to coordinate multi-disciplinary investigations and symposia within the PICES community. The proposed agenda was approved without additions (*MBM-AP Endnote 2*).

MBM-AP membership (Agenda Item 3)

MBM-AP urges PICES member countries to increase participation in general for scientists to attend PICES Annual Meetings. The PICES community would benefit greatly from this effort.

Dr. Sydeman pointed out that work of MBM-AP has been hindered by the lack of national participation. In fact, only Japanese and U.S. members attended all meetings of the Panel.

MBM-AP encourages Canada to designate a seabird expert to serve on the Panel. Canada has many active marine bird research programs, yet the Canadian seabird position on the Advisory Panel has been vacant for 3 years.

MBM-AP requests China to assign experts on marine birds (*e.g.*, from the Forest Service Administration) and marine mammals (*e.g.*, from the State Oceanic Administration) to the Panel.

MBM-AP would benefit from more Korean (specifically KORDI and NFRDI) involvement. Korea has an expanding interest in marine birds and mammals. The Yellow Sea Large Marine Ecosystem project offers new opportunities. MBM-AP requests that Korea nominate an expert on seabirds to the Panel. In particular, Dr. "Sunny" Pae may be a suitable candidate for this position.

MBM-AP is concerned with lack of participation by Russian marine bird and mammal scientists. The Panel and PICES would benefit greatly by their active participation.

MBM-AP Topic Session at PICES XIV (Agenda Items 4)

The BIO (MBM-AP) Topic Session (S3) at PICES XIV on "*Factors affecting distribution, foraging ecology, and life histories of top predators in the northwestern Pacific Ocean and its marginal seas*" was convened on October 4, 2005. The summary of the session is included elsewhere in this Annual Report.

Topic Session proposal for PICES XV (Agenda Item 5)

A 1-day BIO (MBM-AP) Topic Session entitled "*Synchrony in responses of marine top predators to large-scale climate variability: Mechanisms of environmental forcing*" is proposed for PICES XV (*MBM-AP Endnote 3*).

PICES website (Agenda Item 6)

It is recognized by MBM-AP that attention should be paid to updating the PICES website with new material. Dr. Rolf Ream is the point of contact between the Panel and the PICES web master.

Cooperation with the International Whaling Commission (Agenda Item 7)

Dr. Hidehiro Kato is the IWC representative to PICES, and *vice versa*. He submitted a report to MBM-AP on IWC-PICES interactions (*MBM-AP Endnote 4*). MBM-AP thanks Dr. Kato for his significant efforts to date.

MBM-AP Endnote 1

Participation list

Members	Observers
William J. Sydeman (U.S.A., Co-Chairman)	John Bengsten (U.S.A.)*
Yutaka Watanuki (Japan)	Edward Gregr (Canada)*
	George L. Hunt, Jr. (U.S.A.)
	Jaime Jahncke (U.S.A.)*
* first AP-MBM meeting attended	"Sunny" Pae (Korea)*

MBM Endnote 2

MBM-AP meeting agenda

1. Welcome and introductions
2. Adoption of agenda
3. MBM-AP membership
4. Review of BIO (MBM-AP) Topic Session (S3) at PICES XIV on "*Factors affecting distribution, foraging ecology, and life histories of top predators in the northwestern Pacific Ocean and its marginal seas*"
5. Topic Session proposal for PICES XV
6. PICES website: MBM-AP contribution
7. Cooperation with IWC

MBM-AP Endnote 3

Proposal for a 1-day BIO/MBM-AP Topic Session at PICES XV on *"Synchrony in responses of marine top predators to large-scale climate variability: Mechanisms of environmental forcing"*

Distribution and abundance, diets, and breeding performance of marine mammals and seabirds reflect local marine environments. A number of studies from the western and eastern North Pacific indicate interannual to interdecadal changes of environmental parameters. In particular, low-frequency climate changes sometimes result in profound effects on marine ecosystems, yet the influence on top predators has not been adequately quantified. In the North Atlantic breeding performance and population dynamics of top predators has been related to changes in the NAO. Papers that examine synchrony in responses of top predators to interannual to interdecadal climate variability in the North Pacific are solicited. Studies describing and testing mechanisms of environmental forcing on top predators, from physics to prey, are of particular interest. It is intended that selected papers (oral and poster) from this session will be published in a special issue of *Deep Sea Research II*.

Potential collaborating PICES Committees: BIO and POC.

Potential sponsor: Hokkaido University, Center of Excellence (COE).

Recommended convenors: Shoshiro Minobe (Japan), R. Ian Perry (Canada), Rolf Ream (U.S.A.) and Yutaka Watanuki (Japan).

Recommended invited speakers: R. Furness (UK), S. Wanless (UK), R. Crawford (RSA), S. Emslie (U.S.A.), W. Trivelpiece (U.S.A.), I. Boyd (UK).

Travel support is requested for 2 invited speakers from PICES and 2 invited speakers from COE.

MBM-AP Endnote 4

PICES Observer Report on the 57th IWC Scientific Committee meeting

The 57th Scientific Committee (SC) meeting of the International Whaling Commission (IWC) was held from May 30 to June 10, 2005, at Ulsan, Republic of Korea. A total of 201 participants from 31 countries including 44 invited experts participated in this year's annual meeting, and a total of 5 international organizations (CCAMLR, ACCOBAMS, ECCO, IUCN and PICES) sent their observers. PICES was especially welcomed by the IWC/SC.

There are 7 sub-committees (*Revised management procedure*; *Bowhead, right and gray whales*; *In-depth assessment*; *Southern Hemisphere whales*; *Small cetaceans*; *Whale-watching*) and 5 working groups (*Aboriginal whaling management procedure*; *Stock definition*; *By catch and other human induced mortality*; *Environmental concerns*; *Special permit*) under the Scientific Committee. Every substantial issue has to be discussed by the sub-committee or the working group, and then forwarded to plenary of the Scientific Committee. The Scientific Committee has worked mainly on comprehensive assessments of whale stocks (CA), implementation trials of Revised Management Procedure (RMP) after cessation of commercial whaling, and agreed the scientific base of RMP in 1996.

This year, the Scientific Committee focused especially on review of stock status of Southern Hemisphere humpback whales under the CA, as well as North Atlantic right whales and Western North Pacific gray whales with some concerns of their recent entanglement. There were relatively long discussions on stock structure of Bowhead whales which were harvested by Alaskan Inuits. Also a new Japanese scientific permit program in the Antarctic (JARPA II) was highlighted. The Scientific Committee also continued work on general RMP issues including work towards finalizing the guidelines and requirements for implementing RMP.

Cetacean habitat and environment issues (including conflict fisheries and cetaceans) have been mainly dealt with by the working group on *Environmental concerns*. This year the group focused on the relationship between sea ice and cetaceans, habitat degradation progress on two established programs (POLLUTION 2000+, and Southern Ocean collaborative studies) and SOCER (Status of Cetacean Environment Report).

The next annual meeting will be held at St. Kitts and Nevis in May 2006.

REPORT OF ADVISORY PANEL ON MICRONEKTON SAMPLING INTER-CALIBRATION EXPERIMENT

The Advisory Panel on *Micronekton sampling inter-calibration experiment* (MIE-AP) has been focusing on fieldwork and did not convene meetings or workshops in 2005.

Membership changes

Since PICES XIII, several changes in membership have occurred to the Advisory Panel. New members include Drs. Alexei Baitalyuk and Oleg Ivanov of the Pacific Fisheries Research Center (TINRO-Center) representing Russia, and Dr. Orio Yamamura of the Hokkaido National Fisheries Research Institute representing Japan. Dr. Yamamura has also been appointed to co-chair MIE-AP replacing Dr. Michael Seki, who stepped down as Co-Chairman but remains as a member of the Panel.

Inter-sessional report, March 2005

Dr. Michael Seki summarized the activities and plans of MIE-AP in March 2005, prior to the inter-sessional Science Board/Governing Council meeting After the successful completion of the initial MIE-1 in Hawaiian waters just prior to PICES XIII, the Panel began plans to conduct the experiment (MIE-2) in waters of the Bering Sea (possibly in conjunction with a BASIS cruise), Gulf of Alaska, or the temperate waters of the western Pacific. A second attempt to obtain funding from the North Pacific Research Board through the 2004-05 request for proposals was not successful. Nevertheless, Dr. Yamamura offered two cruises in 2005 (July 5-11 and September 27-October 3) aboard the Hokkaido University research ship, *Hokko Maru,* to conduct MIE-2 in waters of the western Pacific off Kushiro, Japan. The R/V *Hokko Maru* is a state-of-the art 200' stern trawler (905t) equipped with a MOCNESS-10 (enabling discrete depth sampling) and capabilities to deploy other mid-water sampling gear including stern trawls equipped with a MULTI-SAMPLER (an opening-closing multiple codend system). Transit time to sampling sites would be minimal at just 30 minutes after departure from Kushiro. At that time (March 2005), no firm decisions have been made with regard to proceeding with MIE-2. As for MIE-1, processing of samples collected on the cruise continues.

Status Report at PICES XIV

Drs. Evgeny Pakhomov and Orio Yamamura (MIE-AP Co-Chairmen) provided an update of activities and plans for the period from the inter-sessional report until PICES XIV.

MIE-1 cruise

In 2005, samples collected during the MIE-1 cruise in Hawaiian waters have been transported to the University of British Columbia, where detailed analysis of the sample size-structure has been carried out. Presently, the catch size-structure analysis is in its final stage, and Dr. Pakhomov is going to present the findings at the BIO Committee meeting in Vladivostok.

MIE-2 cruise

Just prior to PICES XIV, the second MIE cruise (MIE-2) took place. The cruise, provisionally scheduled for September 27 to October 3, on board R/V *Hokko Maru* was extended by 2 days and was conducted between September 25 and October 3, 2005. Dr. Yamamura served as the Chief Scientist. The cruise started and ended at Kushiro. The experiment was conducted in the Doto area where the cold Oyashio current prevails. This area represents a relatively simple and stable species composition of micronekton, which makes it fairly easy to compare sampling efficiency of different gears. Since the areas where nets have to be deployed are just 1-2 h

sail from the port of Kushiro, it was possible to split the cruise into two legs to accommodate those who can participate in either the first or second half of the cruise only.

The nets deployed in the experiment include MOCNESS-10, 10 ft IKMT, HUFT (Hokkaido University Frame Trawl), MOHT, and mid-water otter trawling net with a mouth opening of ca. 30 × 30 m and opening/closing multiple codends. The RV *Hokko Maru* is equipped with a Simrad EK-60 echosounder that can monitor and record backscattering from micronekton.

MIE-3 cruise

Plans for the 2006 (MIE-3) cruise in the Bering Sea are proposed to coincide with the 2006 NPAFC BASIS program activities in this area. A formal letter has been sent to NPAFC representatives to determine if there is any interest in doing a joint cruise to the Bering Sea in 2006 using one of the BASIS project vessels. The initial response is promising. Dr. Richard Brodeur is planning to meet with NPAFC representatives at the joint NPAFC/PICES Symposium in November 2005 to discuss the MIE-3 cruise proposal. Attempts will be made to obtain financial support for MIE-3 from the North Pacific Research Board during 2006. So far, no financial support has been obtained for these experiments.

MIE Workshop and Topic Session at PICES XV

As the dates of the MIE-2 cruise overlap, in part, with PICES XIV, there will be no MIE workshop and business meeting this year. At the next PICES Annual Meeting in Yokohama, MIE-AP would like to convene a 1-day BIO Workshop on "*Synthesis of MIE-AP sampling inter-calibration experiments*" (*MIE-AP Endnote 1*) and a 1-day BIO Topic Session on "*Micronekton biology: Advances in epi- and meso-pelagic ecosystem research*" (*MIE-AP Endnote 2*).

MIE-AP Endnote 1

Proposal for a 1-day BIO (MIE-AP) Workshop at PICES XV on
"Synthesis of MIE-AP sampling inter-calibration experiments"

The Advisory Panel on *Micronekton sampling inter-calibration experiment* (MIE-AP) was established to evaluate efficiency of a variety of sampling gears and procedures employed by different investigators to sample micronekton in the North Pacific and other parts of the world ocean. Two MIE-AP gear inter-calibration experiments were conducted in 2004 (MIE-1 cruise on board of R/V *Oscar Elton Sette*, in Hawaiian waters) and in 2005 (MIE-2 on board of R/V *Hokko Maru*, in the Oyashio region). The proposed workshop will review and synthesize findings from these two successful sampling experiments.

Recommended convenors: Evgeny Pakhomov (Canada) and Orio Yamamura (Japan).

MIE-AP Endnote 2

Proposal for a 1-day BIO (MIE-AP) Topic Session at PICES XV on
"Micronekton biology: Advances in epi- and meso-pelagic ecosystem research"

Micronekton is an important component of epi- and meso-pelagic ecosystems linking mesozooplankton and higher trophic levels. Due to their intermediacy and mobility, quantitative sampling of micronekton has long been regarded as virtually impossible. Recent advances in acoustic devices and efforts in standardizing sampling gear have made the sampling of micronekton more precise. In the PICES area, various ongoing projects such as BASIS (NPAFC), US-GLOBEC and DEEP (Japan FRA) are studying micronekton. The session will synthesize new knowledge on micronekton biology including distribution, life history and

vertical migrations, relationships with commercial species and its functional role in the North Pacific boundary current and open ocean ecosystems. Presentations on quantitative sampling are also welcome.

Recommended convenors: Evgeny Pakhomov (Canada) and Orio Yamamura (Japan).

SUMMARY OF SCIENTIFIC SESSIONS AND WORKSHOPS

Science Board Symposium (S1)

Mechanism of climate and human impacts on ecosystems in marginal seas and shelf regions

Co-Convenors: Kuh Kim (SB), Michael J. Dagg (BIO), Yukimasa Ishida (FIS), John E. Stein (MEQ), Michael G. Foreman (POC), Igor I. Shevchenko (TCODE), Jeffrey M. Napp (MONITOR), and Harold P. Batchelder and Suam Kim (CCCC)

Background

There are many examples of statistical correlations that demonstrate relations between climate or human impacts and ecosystems. While retrospection may be informative in revealing patterns, it rarely leads to mechanistic understanding required for eventual prediction. This session, instead, will focus on physical and biological mechanisms in the marginal seas and shelf regions. Many coastal species have life histories/cycles that rely on specific geographic features, and they may be particularly vulnerable to the effects of human activities and climate variability. In order to predict the impacts of climate and human activities, we need to understand the mechanisms responsible for shifts in ecosystem structure and function. We will consider "wind to whales" in this session. This theme was designed to provide opportunities to address questions such as: How widespread is bottom-up control of fluxes? At what spatial and temporal scales are: 1) trophodynamic demands and food supply in balance? 2) signals amplified in food webs? and 3) physical processes most important in impacting marine populations? The human impacts that could be considered include fishing and fisheries enhancement, changes in biodiversity, petroleum development, eutrophication, mariculture, non-point source pollution, and others.

Summary of presentations

The session consisted of 3 invited talks, presented by Sok Kuh Kang, Franz Mueter, Tetsuo Yanagi, 8 contributed oral presentations plus 12 posters. As diverse topics were addressed across the North Pacific by these papers, these presentations are summarized geographically, from western to eastern regions. Along the Primorye coast, rapid changes occurred in physical and biological fields during the transitional period of monsoon winds in September and October, associated with coastal upwelling and the beginning of sea surface cooling and convection. In this region, stratification developed in spring due to meltwater advected from Tatarsky Strait, resulting in spring blooms that occurred earlier in the year than most areas of the Japan/East Sea. The bloom might be delayed by strong winds in some years. Seasonal variation of mixed layer depth and surface chlorophyll distribution and the long-term change of sea level in the Japan/East Sea were also discussed. Harmful algal blooms in Osaka Bay, Japan were dominated by non-diatoms in the early 1990s, but diatoms dominated in late 1990s. An ecosystem model that included nitrogen, phosphorus and silicate cycling explains this remarkable change. Comparison of growth patterns of Japanese chum salmon in the Okhotsk Sea and Bering Sea indicates that the life history strategy of Pacific salmon offers a useful framework for evaluating not only inter- and intra-specific interactions, but also climate-related risk factors around the North Pacific. The partial pressure of CO_2 in the surface water measured during the 1st and 2nd Chinese National Arctic Research Expeditions during the summers of 1999 and 2003, show sharp fluctuations on the Chukchi Sea continental shelf, which can be traced to inflows from the Bering Abyssal Plain and the Alaska Coastal Current as well as local effects such as absorption of atmospheric CO_2 in summer, rapid ice melting, high primary

production in the continental shelf and marginal ice zone, and the transformed water from the Bering Sea. The Fishery Interaction Team at the Alaska Fisheries Science Center investigated whether fishing affects prey fields. They focused on Pacific cod, Atka mackerel and walleye pollock and found that fish movement plays an important role in determining the potential for commercial fishing to cause localized depletions of fish. It is also key to assess the efficacy of trawl exclusion zones for maintaining local concentrations of fish for foraging sea lions. Comprehensive data from mesoscale mapping cruises in the northern California Current System show profound influence of flow-topography interactions and its year-to-year modulation by large-scale climate variability on the local ecosystem, from creation of nearshore hypoxic zones to increased frontal habitat. The northern California Current ecosystem in 2004 and 2005 closely resembled what might be expected during a major El Niño: warm water copepod species were abundant. Yet conditions in the tropical Pacific were El Niño-neutral so there is a clear need to find new terminology for a warm California Current under "El Niño-like conditions".

List of papers

Oral presentations

Franz J. Mueter, Jennifer Boldt, Bernard A. Megrey and Randall Peterman (Invited)
Spatial and temporal scales of variability in the productivity of Northeast Pacific fish stocks

Tetsuo Yanagi and Mitsuru Hayashi (Invited)
Numerical model on the changing dominant species of red tide in Osaka Bay from 1990 to 2000

Sok Kuh Kang, Joseph Y. Cherniawsky, Michael G.G. Foreman, Sinjae Yoo, Hong Sik Min, Cheol-Ho Kim and Hyoun-Woo Kang (Invited)
Patterns of recent sea level rise in the East/Japan Sea and their ecological implication in the Ulleung Basin

Vyacheslav Lobanov, Vladimir Zvalinsky, Pavel Tishchenko, Anatoly Salyuk, Sergei Zakharkov, S. Ladychenko and E. Shtraikhert
Mechanisms of fast changes in physical and biological fields along the Primorye coast in the Japan Sea

Chun-Ok Jo and Kyung-Ryul Kim
Effects of melting sea ice in the Tatarskiy Strait on spring bloom along the Primorye coast in the East Sea

Hyun-cheol Kim, Sinjae Yoo and Im Sang Oh
The relationship between the mixed layer depth and surface chlorophyll in the Japan/East Sea

Masahide Kaeriyama, Sei-ichi Saito and Akihiko Yatsu
Comparison of the growth pattern for Japanese chum salmon in the Okhotsk Sea and the Bering Sea

Liqi Chen, Zhongyong Gao, Liyang Zhan and Suqing Xu
Carbon cycling in the Bering Sea and its impacts on marine ecosystems in the subarctic waters and the western Arctic Ocean

Elizabeth A. Logerwell, A.B. Hollowed, C.D. Wilson, P. Walline, P. Munro, M.E. Conners, S. McDermott, S. Neidetcher, D. Cooper and K. Rand
Fish movement plays a key role in understanding the potential for commercial fishing to impact prey fields of endangered Steller sea lions

John A. Barth, Stephen D. Pierce, Timothy J. Cowles and William T. Peterson
Flow-topography interaction and its influence on ecosystem dynamics in the northern California Current System

William Peterson, Rian Hooff and Robert Emmett
Extreme climate variability in the northern California Current: Can we explain the current anomalous warm state and its effects on the coastal upwelling ecosystem off Washington and Oregon?

Posters

Zhongyong Gao, Liqi Chen and Suqing Xu
Comparisons of carbon cycling between the Bering Sea and bipolar regions: Distributions of pCO_2 in the surface seawater and their control

In Seong Han, Hee Dong Jeong, Ki Tack Seong and Ju Lee
Mass mortality of the scallop *Haliotis gigantean* affected by high frequency fluctuations around the eastern coast of Korea

Kiyotaka Hidaka and Kaoru Nakata
Interannual variation in the winter-spring plankton community in the late 1990's: Relationship between communities in the "slope water" and Kuroshio axis

Hee Dong Jeong, Ki Tack Seong and In Seong Han
Recent variations of the thermocline in Korean waters

Young Shil Kang, SeungH. Heo and Jae-Kyoung Shon
Mesozooplankton responses to regime shifts associated with the changes in oceanographic conditions in the eastern area of the Yellow Sea

Dmitry D. Kaplunenko, Vladimir I. Ponomarev and Antonina Polyakova
Study of climate oscillations at different time scales in the North Pacific

Vjacheslav S. Labay and Georgy V. Shevchenko
Hydrodynamic influences on macrobenthos structural characteristics of the northeastern Sakhalin shelf

Jae-Young Lee, Chung Il Lee and Kyung-Ryul Kim
Effects of climate change on physical and biogeochemical elements in the East/Japan Sea

Chuanlan Lin, Xiuren Ning and Jilan Su
Changes in biogenic elements of the Yellow Sea and their influences on its ecosystem

Jisoo Park, Sinjae Yoo and Im Sang Oh
Estimation of primary production in the Yellow Sea

Mikhail V. Simokon and Lidia T. Kovekovdova
Spatial distribution of heavy metals in bottom sediments of Peter the Great Bay (Sea of Japan) and related environmental complications

Elena I. Ustinova, Natalia I. Rudykh, Yuri D. Sorokin and Vladimir I. Ponomarev
Variability of thermal regime and various climatic indices in Far East Seas

BIO Topic Session (S2)
Life history and ecology of euphausiids in coastal and oceanic waters around the Pacific Rim

Co-Convenors: William Peterson (U.S.A.), Michael Dagg (U.S.A.) and Anatoly Volkov (Russia)

Background

Euphausiids are among the most important links in coastal and oceanic food webs, transferring energy from primary and secondary producers to higher trophic level animals such as salmon, herring, sardines, mackerels, Pacific whiting, sablefish, many rockfish species, auklets, shearwaters, and whales. Given their importance in the food chain, euphausiids may be regarded as a keystone sentinel taxa. Moreover, many in PICES are interested in formulating ecosystem models with better parameterizations of the euphausiid component. Therefore a half-day topic session was convened at PICES XIV to invite scientific papers that review and discuss results of research on the ecology and life history of euphausiids in the North Pacific Ocean, with a focus on comparative studies in continental shelf and slope waters around the Pacific Rim.

Summary of presentations

The session anticipated 8 oral presentations and 7 posters but the numbers were reduced to 7 and 3 on the day. Between 30-40 people attended the session. All papers dealt with some aspect of the ecology of euphausiids and most were concerned with one species, *Euphausia pacifica*. Four talks were based on work carried out on euphausiids in the California Current (three from Oregon and one from California), one talk on the Gulf of Alaska/Bering Sea, one Japan and one Korea. One common theme of most talks was the extreme variability in euphausiid distribution, abundance, growth and egg production rates. High variability was attributed to the very plastic life history characteristics of these animals, and the tendency for adults to form swarms. Concerning reproduction, it was also agreed that long-term studies seem necessary since these animals have such variable

brood sizes, interbrood periods, growth rates, spawning seasons. One generalization that can be made is that egg production seems to be highest during phytoplankton blooms. However some spawning was observed nearly year round both off Oregon and in Oyashio waters off Japan. Another generalization is that *E. pacifica* seems to be mostly herbivorous, shown by stomach content analysis of animals from Japan, and through the use of lipid biomarkers in animals from Oregon. Work done off Oregon and California showed that euphausiid numbers were greatly reduced in 2005, and this was correlated with complete nesting failure of Cassin's auklets at the Farallone Islands off San Francisco. Finally, we learned that *E. pacifica* can at times present a problem for a nuclear power plant in Korea because they clog the screens which filter water for the cooling towers.

List of papers

Oral presentations

Kenji Taki (Invited)
Distribution and life history of *Euphausia pacifica* off northeastern Japan

Jinho Chae, Doo-Jin Hwang, Young-Ok Kim, Dongsung Kim and Jae-Hac Lee
Euphausiid distribution near Uljin with special reference to its importance as a food source of demersal fish and impingement on the cooling water intakes of a power plant

Sonia Batten, David Welch and Doug Moore
Seasonal distribution of euphausiids on a transect from the Gulf of Alaska to the Bering Sea

Leah R. Feinberg, William T. Peterson, C. Tracy Shaw and Jaime Gomez-Gutierrez
Euphausiid reproduction off the Oregon Coast, U.S.A.

C. Tracy Shaw, Leah R. Feinberg and William T. Peterson (Invited)
Seasonal variations in intermolt period and growth of *Euphausia pacifica* and *Thysanoessa spinifera* in the coastal Pacific Northwest

Se-Jong Ju, H. Rodger Harvey, William T. Peterson, Leah Feinberg and Tracy Shaw (Invited)
Understanding the nutritional status, diet, and demographic structure of *Euphausia pacifica* through multiple organic markers

Jaime Jahncke, Benjamin L. Saenz, Chris Rintoul and William J. Sydeman
Krill and krill-predators: Habitat associations in the dynamic Gulf of the Farallones, California

Posters

Jaime Gómez-Gutiérrez, Carlos J. Robinson and Karmina Arroyo Ramírez
Egg production and molting rates of the subtropical sac-spawning euphausiid *Nyctiphanes simplex* in the southern part of the California Current System

Se-Jong Ju, H. Rodger Harvey, Jaime Gómez-Gutiérrez and William T. Peterson
The role of lipids during egg development in *Euphausia pacifica* and *Thysanoessa spinifera*

Jinhui Wang, Yawei Sun, Caicai Liu, Xiangshen Chen and Ren Xu
Quantitative distribution of euphausiids in the East China Sea and the Yangtze Estuary in relation to the environmental conditions

BIO/MBM-AP Topic session (S3)
Factors affecting distribution, foraging ecology and life histories of top predators in the western North Pacific and its marginal seas

Co-convenors: Hidehiro Kato (Japan), William Sydeman (U.S.A.), Alexander Kitaysky (U.S.A.) and Andrew Trites (Canada)

Background

Top predators may integrate fluctuations in lower trophic levels and ocean climate, and may therefore serve as reliable indicators of change. But, how ubiquitous are these patterns, spatially and temporally? What are the time lags between the occurrence of an environmental change and

the responses of top predators? What taxa, guilds and parameters would be best suited to serve as ecosystem samplers and monitors? This multi-disciplinary, multi-trophic level topic session examined the oceanographic and ecological factors determining the distribution, foraging ecology, and life history dynamics of top marine predators in the northwestern North Pacific and its marginal seas, focusing on the Sea of Okhotsk/Oyashio and western Bering Sea. Focal organisms include predatory marine fish, marine birds and mammals, and their prey resources (copepods, euphausiids, squids, forage fishes). Presentations were invited describing spatio-temporal variation in distribution, abundance, life history, demography, and food habits of predators and/or prey species or communities in relation to atmospheric and physical oceanographic variability, including ice cover. In particular, the hope was to deepen our understanding of the response of top predators to ocean climate variability and change in the northwestern Pacific Ocean regions. These questions are critical to future efforts to monitor the North Pacific, as well as important to fisheries oceanography in the Sea of Okhotsk and western Bering Sea.

Summary of presentations

This half-day session was convened on October 4, 2005, with 10 oral and 3 poster presentations. It was viewed as completely successful, taking both a wide geographic approach, and regional focus (Sea of Okhotsk). All presentations were excellent and represent continuing integration of MBM research in PICES community. The session provided overview of oceanography of the western North Pacific and Sea of Okhotsk, as well as specific MBM research in the region. Highlights included information on the occurrence of extremely rare northern right whales in Sea of Okhotsk and interactions between Sakhalin Island oil exploration and endangered gray whales. Differences in the scale of responses to climate variability between marine mammals and marine birds were discussed. A trans-Pacific overview of Steller's sea lion and northern fur seal population dynamics was presented.

List of papers

Oral presentations

Konstantin Rogachev (Invited)
Physical forcing of marine ecosystems and long-term oceanographic changes in the Sea of Okhotsk

Andrew W. Trites and David A.S. Rosen (presented by **Edward J. Gregr**)
Marine mammals in the North Pacific as indicators of ecosystem change

W.J. Sydeman, J. Jahncke, B.L. Saenz, C.Rintoul and R. Bradley
2005: An unprecedented breeding failure for planktivorous auklets in the Central CCS.

Yutaka Watanuki, Motohiro Itoh and Hiroshi Minami
Do parents of seabirds feed chicks with prey that is different from their own?

Aleksey Yu. Merzlyakov, Elena P. Dulepova and Valerii I. Chuchukalo
Modern state of pelagic communities in the Okhotsk Sea

Tomio Miyashita, Valery L. Vladimirov and Hidehiro Kato
Current status of cetaceans in the Sea of Okhotsk

Rolf R. Ream and Vladimir Burkalov
Trends in abundance of Steller sea lions and northern fur seals across the North Pacific Ocean..

Yuri M. Yakovlev and Olga Yu. Tyurneva
Photo-identification of the western gray whale (*Eschrichtius robustus*) on the northeastern Sakhalin shelf, Russia, 2002-2004

Alexander S. Kitaysky and Elena Yu. Golubova
Reproductive responses of planktivorous and piscivorous birds to climate variability in the northern Sea of Okhotsk

Edward J. Gregr, Stephen Ban, Ryan Coatta and Andrew W. Trites
Ecological characterization of Steller sea lion rookeries and haulouts in the North Pacific

Posters

Svetlana V. Naydenko and Natalia T. Dolganova
Estimation of hydrobiont consumption food by the basic nekton species in the upper epipelagic Russian economic zone of the Japan/East Sea

Seong-Hwan Pae
Ecologically important areas for waterbirds in Yellow Sea

Larisa A. Zelenskaya
Inter-annual and inter-colonial variability in the diet of Slaty-backed Gulls (*Larus schistisagus*)

CCCC/CFAME Topic Session (S4)
The comparative response of differing life history strategists to climate shifts

Co-Convenors: Hyung-Ku Kang (Korea) and Gordon A. McFarlane (Canada)

Background

In recent years we have come to accept that regime shifts are real and produce species and ecosystem-level responses, however not all species and ecosystems are equal. In particular, there is the need to move beyond correlative indices between climate variables and species indicators, and consider the temporal and spatial scale of the mechanisms, especially as they may differ between different life history strategists within an ecosystem. In this session, contributions were invited which examine the scale of response of species to climate, especially from an east/west comparative perspective. Papers investigating the underlying mechanisms of responses, with an emphasis on targeting critical life history stages and differences in sensitivity to climate for different life history strategists (for example, between equilibrium and opportunistic strategists) were especially encouraged. It is intended that selected papers (oral and poster) will be published in an international scientific journal.

Summary of presentations

The CCCC/CFAME Topic Session was held on October 4, 2005. Fourteen oral and 3 poster presentations were made during this 1-day session. Two other speakers were unable to attend due to travel difficulties. The session was extremely well attended. Our goal of examining not only correlative indices between species and climate change, but to consider temporal and spatial scales of the actual mechanisms involved was successfully addressed, especially as they differed between different life history strategists and trophic levels. During the session, speakers addressed these responses at trophic levels from zooplankton to fish to birds. The responses of these life history strategists to climate change in ecosystems from around the North Pacific, and suggestion on how to incorporate this information into ecosystem assessment, both traditional and non-traditional, were a highlight of the session.

Jacquelynne King was the first speaker, and presented how life history strategies can apply to fisheries management, based on five categories of fish strategists: Opportunistic, Periodic, Equilibrium, Salmonic and Intermediate strategists. Kerim Aydin presented a system of management evaluation, which combines survey trends, fishing history, and life history characteristics in order to pinpoint vulnerable non-target species within a fishery. Kazuaki Tadokoro showed that interdecadal variability in body size of *Neocalanus* copepods from the historical sample in the Oyashio water, and body size of copepods was negatively correlated with the SST, and some species were positively correlated with PO_4 concentrations. However, future work will include examining chlorophyll concentrations and other potential factors. David Mackas presented the recent trend of the exotic copepod *Acartia tonsa* on the British

Columbia continental margin and posed several research questions (*e.g.* origin, ocean process involved, potential competition with native zooplankton) and proposed his hypothetical answers. Hiroya Sugisaki presented long-term variation of species and life stage composition of zooplankton in the western North Pacific in relation to the Odate project, and showed there were 20 years' oscillation in zooplankton biomass, copepod abundance and copepod life stage abundance, with suggestion of potential reasons. Alexander Goryainov presented the relationship between atmospheric processes above the Asian continent and the North Pacific Ocean, and the abundance of Asian chum salmon and pink salmon. He presented a new approach to examine the linkages between atmospheric processes and the fluctuation in abundance of these salmon. Francisco Werner and Shin-ichi Itoh presented the interannual response of growth of Pacific herring and saury to the 3-D global NEMURO output with realistic atmospheric forcing. In the case of Pacific saury, an automatic calibration program PEST was applied to overcome smaller zooplankton density estimated from NEMURO.

After lunch, Yoshiro Watanabe presented the manuscript of the invited speaker Shang Chen and showed that the East China Sea has experienced three ecological regime shifts in the last 50 years, different with the NW Pacific and similar with the NE Pacific. Guram Tsitsiashvili proposed the method of interval recognition for diagnosis and prognosis of extreme natural phenomena in the Russian Far East. Yongjun Tian noted that an oceanic regime shift from cold to warm is identified in the Tsushima Warm Current in the late-1980s, and showed that the response pattern of the pelagic and demersal fish were different between cold and warm water species. Vladimir Sviridov examined the adaptive significance of spatial distribution patterns as a reflection of life history strategy and density dependence in populations of some pelagic fish, squid and jellyfish species in the Russian EEZ of North Pacific. Akihiko Yatsu examined mechanistic responses of Japanese sardine, anchovy and chub mackerel in the Kuroshio/Oyashio system to regime shifts, and suggested that the different life-histories of sardine and anchovy took advantage of different regime characteristics. William Sydeman compared the response of a piscivorous marine bird between California and the Tsushima Current system to oceanographic variability in the North Pacific Ocean. This session clearly pointed out the importance of incorporating life history strategies in future studies of ecosystem dynamics to climate change.

List of papers

Oral presentations

Jacquelynne R. King and Gordon A. McFarlane
Life history strategies: Applications to fisheries management

Todd TenBrink, Anne Hollowed and Kerim Aydin
Evaluating the climate-moderated fishing vulnerability of different life history strategists in Alaskan waters

Kazuaki Tadokoro, Toru Kobari, Hiroaki Saito and Hiroya Sugisaki
Interdecadal variability in body size of *Neocalanus* copepods in the Oyashio waters from 1960 to 2002 - A study of the Odate Project

David L. Mackas and Moira D. Galbraith
Appearance and rapid increase of the exotic copepod *Acartia tonsa* on the British Columbia continental margin

Hiroya Sugisaki and Hiroshi Ito
Long term variation of species and life stage composition of zooplankton in the western North Pacific: Introduction of the Odate project

Alexander A. Goryainov, Tatiyana A. Shatilina, Guram Sh. Tsitsiashvili and Vera A. Kochetova
The relationship between atmospheric processes above the Asian continent and the North Pacific Ocean and the abundance of Asian chum salmon and pink salmon in 20th century

Yongjun Tian, Hideaki Kidokoro and Tatsuro Watanabe
Differing response patterns of pelagic and demersal fish assemblages to the late-1980s regime shift in the Japan Sea

Kenneth A. Rose, Bernard A. Megrey, Francisco E. Werner, Yasuhiro Yamanaka, Maki Noguchi-Aita, Shin-ichi Ito and Michio J. Kishi
Interannual response of fish growth to the 3-D global NEMURO output with realistic atmospheric forcing. Part I: Latitudinal differences in Pacific herring growth

Shin-ichi Ito, Kenneth A. Rose, Maki Noguchi-Aita, Bernard A. Megrey, Yasuhiro Yamanaka, Francisco E. Werner and Michio J. Kishi
Interannual response of fish growth to the 3-D global NEMURO output with realistic atmospheric forcing. Part II: Pacific saury growth

Shang Chen, Yoshiro Watanabe and Yan Ma (Invited)
Ecological regime shift events in the East China Sea

Guram Sh. Tsitsiashvili, Tatiyana A. Shatilina, Alexander A. Goryainov, T.A. Radchenkova and L.Yu. Matyushenko
Diagnosis and prognosis of extreme natural phenomena in the Russian Far East

Vladimir V. Sviridov
Adaptive significance of spatial distribution patterns as reflection of life history strategy and density dependence in populations of some pelagic fish, squid and jellyfish species in Russian EEZ of North Pacific

Akihiko Yatsu, Hiroshi Kubota, Akinori Takasuka, Motomitsu Takahashi, Norio Yamashita, Hiroshi Nishida, Chikako Watanabe and Yoshioki Oozeki
Distribution and population dynamics of Japanese sardine, anchovy and chub mackerel in the Kuroshio/Oyashio system: Seeking for mechanistic responses to regime shifts

Julie A. Thayer, Yutaka Watanuki, Tomohiro Deguchi, Akinori Takahashi and William J. Sydeman
East/West comparative responses of a Piscivorous marine bird to oceanographic variability in the North Pacific Ocean: California versus Tsushima current systems

Posters

Miriam J. Doyle, Ann C. Matarese, Morgan S. Busby and Deborah M. Blood
Life history strategies of selected Gulf of Alaska fish species with reference to recruitment vulnerability under fluctuating environmental conditions

Gordon A. McFarlane, S. Kim, J.R. King, R.J. Beamish, C. Zhang and J.H. Oh
Contrast in life histories of commercially exploited marine fishes off the coasts of Canada and Korea and changes in ecosystem structure

Lubov N. Vasilevskaia, Pavel I. Khazantsev and Denis N. Vasilevskii
Annual changes of areas of trade of pollock in the Sea of Okhotsk and Bering Sea for the last thirty years

CCCC/MODEL Topic Session (S5)
Modeling climate and fishing impacts on fish recruitment

Co-Convenors: Jacob Schweigert (Canada) and Yury I. Zuenko (Russia)

Background

To model the state of fish populations, both individual growth and the population number are necessary. Recently the PICES MODEL Task Team has generalized ecosystem models for the North Pacific, and applied the prototype model of lower trophic models (NEMURO) for the growth of individual fish, at present Pacific saury and herring. However, the same developments were not implemented at the fish population level. Clearly, the abundance depends strongly on reproductive success and fish survival during early life stages, and these are, in turn, affected by the environment. The goal of this session was to review existing models and related scientific knowledge on fish recruitment under varying environmental conditions, and create a foundation for their incorporation in the ecosystem model for the North Pacific and its regions.

Summary of presentations

This topic session consisted of 8 oral presentations and 1 poster. The speakers represented 5 PICES countries: Canada, Japan, Korea, Russia, and the United States.

The session was well-structured and covered several aspects of the difficulties related to modeling the recruitment of fish populations. The invited paper by F. Mueter provided a broad overview of the concepts as well as the pitfalls that may be encountered in modeling fish recruitment with examples from a range of species and areas. The second invited paper by C. Sassa discussed a comprehensive empirical approach to investigating the factors that affect the recruitment of jack mackerel, ranging from the effect of food supply to larval and juvenile transport to predation. The other papers were broadly focused on either examining the empirical effects of environment on fish survival and recruitment (Y. Zuenko, H. Nishikawa, M. Shirripa, J.-B. Lee, and T. Watanabe for anchovy, sardine, and sablefish), or presenting alternative modeling approaches for understanding aspects of ecosystem production or recruitment (I. Ishmukova, R.I. Perry, and M. Haltuch). Ishmukova presented details of parameter estimation in a theoretical NPZ model compared to empirical parameter estimates of mortality. Perry discussed an approach to estimating "carrying capacity" based on the concepts of annual production by the population. The method shows some promise from its application to Pacific herring stocks in Canada. Haltuch presented results from a simulation study that examined the ability to detect climatic forcing of recruitment in analytical models assuming various levels of error in the input data as well as alternate climate scenarios on three life history scenarios typified by a short-lived sardine, a flatfish, and a long-lived rockfish. The conclusion was that it might be difficult to detect climatic forcing variables for some typical fisheries data series. Zuenko presented the results of modeling the survival of anchovy eggs and compared results with those from laboratory studies. Nishikawa presented the results of using a NEMURO physical forcing model to examine the relationship of mixed layer depth with the timing of the phytoplankton bloom and its subsequent effects on larval survival. Finally, Schirripa discussed the effects of variation in sea level on the recruitment of sablefish in the eastern Pacific, and its possible application for hind-casting abundance to derive a predictor of future recruitment and provision of advice to fishery managers. The climatic factors of sea surface temperature transport of eggs and larvae, mixed layer depth, sea level, and food ability were all identified as being important environmental factors influencing fish recruitment success for these species.

Overall, the session was very successful. There was extensive discussion of the usefulness and applicability of the suggested models and procedures for future studies. The methods and concepts presented could be easily applied for fish populations modeling in local areas. Additional discussion and focus of this type of research and analysis of climate and fishery effects on recruitment for a broader array of species in the entire PICES region is recommended for future meetings.

List of papers

Oral presentations

Franz J. Mueter (Invited)
Detecting and modeling environmental effects on recruitment: Strategies and pitfalls

Chiyuki Sassa, Youichi Tsukamoto, Yoshinobu Konishi, Songguang Xie, Yoshiro Watanabe and Hideaki Nakata (Invited)
Recruitment processes of jack mackerel (*Trachurus japonicus*) in the East China Sea (ECS) in relation to environmental conditions

Alexander I. Abakumov and Irina V. Ishmukova
Using the model approach to understand functioning of the Okhotsk Sea ecosystem

R. Ian Perry and Jake Schweigert
Concepts of marine ecosystem carrying capacity, and their application to NE Pacific herring populations

Melissa A. Haltuch and Andre E. Punt
Life history, climate forcing, and fish stock assessment – Evaluating statistical power

Yury I. Zuenko and Svetlana V. Davidova
In situ experiments to investigate the Japanese anchovy eggs development

Haruka Nishiakwa and Ichiro Yasuda
Population decline of Japanese sardine and variation of mixed layer depth in the Kuroshio Extension

Michael J. Schirripa and J.J. Colbert
Incorporating environmental effects in the assessment of sablefish (*Anoplopoma fimbria*) off the continental U.S. Pacific coast

Posters

Kosei Komatsu, Akihide Kasai and Tomowo Watanabe
Modeling transport of eggs and larvae of jack mackerel in the East China Sea

FIS/CCCC Topic Session (S6)
Evidence of distributional shifts in demersal fish and invertebrates in relation to short and long term changes in oceanographic conditions

Co-Conveners: Gordon A. McFarlane (Canada), Michael J. Schirripa (U.S.A.), Mikhail A. Stepanenko (Russia)

Background

Demersal fish and invertebrates, either on the continental shelves, slopes, or sea mounts, support major fisheries in both the eastern and western Pacific. These include such fish as the rockfishes (genus *Sebastes*), thornyheads (genus *Sebastolobus*), many flounders (family Pleuronectidae), as well as invertebrate species. These species are known to exhibit periodic shifts in their distribution either latitudinally or longitudinally. While these shifts can at times be attributed to such factors as life history characteristics, often they are due to changes in the environment. Changes in the environment can be the result of short-term phenomena, such as seasonal depletions in oxygen levels, medium-term phenomena such as fishing, or long-term phenomena, such as decadal climate shifts. Shifts in the spatial distribution of these species due to changes in the environment can cause populations to move into and out of the areas traditionally covered by the fishing fleets they support, as well as the scientific surveys that seek to assess their abundance. As a consequence, scientific surveys designed to develop annual indices of abundance for these species can produce erroneous trends, causing the stock assessments that depend on these surveys to be inaccurate. If the causes of these distributional changes were known, indices of abundance could be modeled to account for these changes in ways other than changes in overall stock abundance. The goal of the session was to provide sound evidence for ecosystem-based distributional shifts that can be used to account for some of the year-to-year variability in survey trends of demersal fish that may currently be attributed to changes in overall abundance. This session invited papers that describe changes in demersal fish distributions with specific emphasis on those changes due to changes in climate, either short or long term. Preference was given to work that results in functional relationships that can be directly incorporated either into indices of abundance or established stock assessment models.

Summary of presentations

The session consisted of 6 oral and 6 poster presentations. It was apparent after listening to the talks that fish distributions have, are, and will no doubt continue to change on an ongoing

basis. Shifts include both migrations (regular change) and excursions (boundary testing). It was shown that fish distributions shift over scales from geological (1000s km) to daily (m). Barriers to distributions include physical (landmasses, deep ocean, currents), physiological (temperature, salinity), behavioral (spawning fidelity, range), nutritional (food), and mortality (predators). Contemporary distribution changes can be caused by fishing, changes in the environment, or both simultaneously. Climate change will change barriers to fish distribution, so we should expect continued change in fish distributions in the future.

At contemporary scales of management, distribution shifts affect surveys and stock assessment. Methods were shown that could be used to quantify changes in spatial distribution of demersal fish and invertebrates. Statistically significant trends in distribution were found for several species in the Bering Sea. These include northward shifts in Pacific halibut (*Hippoglossus stenolepis*), Bering flounder (*Hippoglossoides robustus*), yellowfin sole (*Limanda aspera*), ronquils (Bathymasteridae), and tunicates. Southward shifts were found in arrowtooth flounder (*Atheresthes stomias*), Pacific cod (*Gadus macrocephalus*) and rex sole (*Glyptocephalus zachirus*). Potential causes of shifting, such as bottom temperature, density dependence, and residual long-term trends were discussed.

The spatial distributions of rock sole and flathead sole appear to be related to temperature, although for rock sole this effect may reflect movement associated with density-dependent habitat selection. Several flatfish species on the Eastern Bering Sea shelf showed dramatic movements in 1999, which was an unusually cold year in the midst of an overall warming trend. Because broad regions of the Eastern Bering Sea shelf have similar depth characteristics, flatfish are able to maintain preferred depth while adjusting distributions. Survey catchability estimates may need to be adjusted to account for temperature anomalies. Habitat models for flatfish have generally not considered the effect of environmental variability, but these factors may be important (particularly in years corresponding to unusual events).

One of the more far reaching points made via the talks was the demonstration of a "domino effect" that can occur due to recently observed changes in the environment of the Pacific Ocean. Environmental changes can cause shifts in zooplankton distribution, which can lead to a shift in the distributions forage that feed on them. This is turn can lead to distributional shifts in larger predatory fish that often support substantial fisheries. As the fishing fleets shift their geographical distributions to follow the fish, it can result in significant changes in the human communities that these fisheries support.

List of papers

Oral presentations

George A. Rose (Invited)
Demersal fish distribution dynamics in Boreal and Sub-Arctic marine ecosystems

Jin-Yeong Kim, Yang-Jae Im, Seok-Gwan Choi, Soon-Song Kim, Joo-Il Kim and Young-Yull Chun
Spatial limitation of demersal fish and ecosystem characteristics during wintering season in the southern waters of Korea

Oleg G. Zolotov
Long-term changes in Atka mackerel, *Pleurogrammus monopterygius*, distribution and abundance in waters off the northern Kurile Islands and southeastern Kamchatka

Alexei M. Orlov
Long-term and seasonal shifts of distribution of commercially important flat- and rockfishes in the Pacific off the northern Kuril Islands and southeastern Kamchatka: Probable affecting of changes in climatic and temperature conditions?

Paul D. Spencer and Tom W. Wilderbuer
Geographic distributions of eastern Bering Sea flatfish: Effects of environmental variability and population abundance

Franz J. Mueter and Bernard A. Megrey
Geographical shifts in the spatial distribution of Northeast Pacific groundfish populations in relation to water temperatures

Posters

Leonid S. Kodolov and Maxim A. Ocheretyanniy
Distributional pattern and population structure of Greenland turbot *Rheinchardtius hippoglossoides* in the Bering Sea

Leonid S. Kodolov and Vladimir N. Tuponogov
Impact of some biological features and environmental factors on distributional patterns of North Pacific deep-water fishes

Larisa P. Nikolenko
Influence of environmental factors on year-class abundance of the Greenland turbot (*Reinhardtius hippoglossoides*) in the Sea of Okhotsk

Larisa P. Nikolenko
Seasonal migrations of the black turbot (*Reinhardtius hippoglossoides*) in the Okhotsk Sea

Andrei A. Smirnov, Alexei M. Orlov and Yuri K. Semenov
Distribution of Greenland halibut, broadbanded thornyhead, skates, and eelpout in the eastern Sea of Okhotsk in relation to changes of water temperatures within the layers of their inhabitation

Vladimir N. Tuponogov
Vertical and spatial distribution of longfin grenadier off Japanese and Kuril Islands and in the Okhotsk Sea

MEQ/FIS Topic Session (S7)

Current and emerging issues of marine and estuarine aquaculture; carrying capacity, ecosystem function and socioeconomics

Co-Convenors: Ik Kyo Chung (Korea) and Galina S. Gavrilova (Russia)

Background

It is well recognized that for successful and long-term utilization of waters for aquaculture and other uses, we must consider the allocation of resources and trophic structure of the system. Ecosystem-based management of resources requires ways to monitor current conditions and predict future sites, particularly in response to known human activities that impact the marine environment. Mariculture is an important expanding industry in all PICES countries, and this session will consider mariculture as a case study on how the impacts of a particular human activity on marine ecosystems can be managed. Indicators and predictive models are being used to evaluate and hypothesize the responses of an ecosystem to environmental impact and resulting management actions. This session brought experts together to identify criteria for suitable indicators and the utilities of predictive models relevant to the impacts of mariculture, to access the sensitivities of indicators, and to highlight gaps in current knowledge.

Summary of presentations

The session consisted of 8 oral presentations and 6 posters. The following scientific issues were noted in the presentations (not in priority order):

Determination of potential carrying capacity of bays and economic aspects were highlighted and an ecosystem model was developed to describe the estuarine coastal systems. Indices for environmental management of fish farms and the range of assimilative capacity and the stocking density of cultured fish have been developed. The preferential control by cultured bivalve molluscs on dinoflagellate biomass in the field was presented with laboratory experiments. The concept of simultaneous coupling of nutrient removal between fed and extraction culture, and the long-term delayed seasonal removal of nutrients between a summer fed culture and a winter extraction culture, implies that any kind of seaweed cultivation could be a part of the biofilter in the holistic sense and could be a good measure of ecosystem-based management in coastal waters. Some of these potential effects are related to decadal scale regime shifts that affect freshwater

discharge and surface salinities in spring, which in turn affect the outbreak of sea-lice in salmon culture. Technology and production trends of salmon, crustacean and sea urchin cultivation in Russia were presented in several posters.

List of papers

Oral presentations

Galina S. Gavrilova
The current status of research and problems of invertebrate mariculture in the Russian Far East

Yongsik Sin
Use of ecosystem models for study and management of coastal estuarine ecosystems in Korea

Hisashi Yokoyama
Proposal of site selection guidelines for fish farming in Japanese coastal waters

Xuelei Zhang, M.Y. Zhu, L.H. Zhang and D. Zhang
A first exploration on differential impacts of bivalve mollusc on the two phytoplankton groups, diatom and dinoflagellate

Ik Kyo Chung, Yun He Kang and Yu-Feng Yang
Seasonal assembly of seaweed species in the sustainable seaweed integrated aquaculture system in Korea

Richard J. Beamish, Chrys-Ellen M. Neville and Ruston M. Sweeting
Regimes and the relationship between farmed and wild salmon in British Columbia

Igor Khovansky and Anastassia Mednikova
Perspectives of salmon sea ranching in the coast of the Okhotsk Sea and in estuaries of rivers

Larissa A. Gayko
Influence of environmental factors to forecast the yield of mollusks on marine farms (Sea of Japan)

Posters

Marianna V. Kalinina and Elena G. Semenkova
Use of a visual method of estimation of Japanese mitten crab ovaries by maturity stages

Nikolina P. Kovatcheva
Crustacean cultivation in artificial conditions: Promising trends in aqua- and mariculture in Russia

Nikolai I. Krupjanko and Aleksei V. Lysenko
Reproduction of chum (*Oncorhynchus keta*) and masu (*O. masu*) salmon at salmon hatcheries in Primorye (Peter the Great Bay)

Dmitry S. Pavlov, George G. Novikov and Andrei N. Stroganov
On some ways of preservation of local fish populations

Nadezhda E. Struppul and Olga N. Lukyanova
Selenium content in marine organisms from the Russian coast of the Sea of Japan

Galina I. Victorovskaya, Anatoly S. Socolov and Igor J. Suhin
Increasing sea urchin settlement productivity using various forms of melioration

MEQ/FIS Topic Session (S8)
Ecosystem indicators and models

Co-convenors: Glen Jamieson (Canada), Xian-Shi Jin (China), Pat Livingston (U.S.A.), Tokio Wada (Japan), Vladimir Radchenko (Russia) and Chang-Ik Zhang (Korea)

Background

Ecosystem-based management (EBM) of resources will require ways to monitor current conditions and predict future states. Ecosystem indicators are single variables that reflect the status of broad suites of management activities or environmental conditions, and their assessment is key to monitoring the achievement of EBM. Predictive ecosystem models can be used to hypothesize the responses of an ecosystem to management actions, to assess the

sensitivities of indicators, and to highlight gaps in current knowledge. This session brought experts together to identify criteria for suitable indicators and the utilities of predictive models, and to present candidates of indicators and models that are actively in use in PICES areas.

Summary of presentations

Thirteen of 15 scheduled oral papers were presented plus several posters. Presentations included reviews of indicators in simulation models that attempted to describe key elements of entire ecosystems, and the ecosystem behavior that might result from perturbation, indicators relative to describing the consequences of fishing and/or environmental features in particular, modeling of specific ecosystem energy pathways, approaches to the identification of indicators that track ecosystem characteristic shifts, identification of important spatial areas where monitoring activities might most cost-effectively be focused, and the utility of different bioindicators for monitoring specific impacts. Given this diversity of papers, discussion was wide-ranging and reflected the challenges in trying to identify relevant, cost-effective and conceptually easily explainable potential indicators for evaluation of success in achieving EBM.

List of papers

Oral presentations

Elizabeth A. Fulton, Michael Fuller and Anthony D.M. Smith
Management strategy evaluation and indicators for ecosystem-based fisheries management

Gordon H. Kruse, Patricia A. Livingston and Glen S. Jamieson
Evolution of ecosystem-based fishery management

Sang Cheol Yoon and Chang Ik Zhang
A comprehensive ecosystem-based approach to management of fisheries resources in Korea

James E. Overland, J. Boldt, J. Grebmeier, J. Helle, P.J. Stabeno and M. Wang
Multiple indicators track major ecosystem shifts in the Bering Sea

Michio J. Kishi, Ippo Nakajima and Yasuko Kamezawa
Fish growth comparisons around Japan using NEMURO.FISH

Vladimir I. Zvalinsky
Ecosystem parameters and stability: Theoretical considerations

Glen Jamieson and Cathryn Clarke
Identification of ecologically and biologically significant areas in Pacific Canada

Chuan-Lin Huo, Geng-Chen Han, Ju-Ying Wang and Dao-Ming Guan
EROD as bioindicator for monitoring of marine contaminants along the Dalian coast

Sun-Kil Lee, Jae Bong Lee, Chang-Ik Zhang and Dong Woo Lee
Comparisons in ecosystem effects of fishing in Korean waters

Zhenyong Wang, Hao Wei and Zuowei Zhang
Application of modified NEMURO Model to Jiaozhou Bay

Thomas C. Wainwright, James J. Ruzicka and William T. Peterson
A biological production index for the northern California Current

Jie Li, Zengmao Wu and Xiaofang Wan
Modelling study of the new production and the microbial food loop impact in the Yellow Sea Cold Water Mass

Chris J. Harvey, Isaac C. Kaplan, Emily J. Brand, Elizabeth A. Fulton, Anthony D.M. Smith, Albert J. Hermann, M. Elizabeth Clarke and Phillip S. Levin
A spatially explicit ecosystem model to examine the effects of fisheries management alternatives in the California Current

Posters

Young-Min Choi, Kwang-Ho Choi, Yeong-Seop Kim, Jung Hwa Choi and Jong-Bin Kim
Ecosystem structure and fisheries resources status in the southern part of Korean waters

Jae Bong Lee, Chang-Ik Zhang and Dong Woo Lee
Ecosystem indicators for the recruitment of pelagic fish around Korean waters

MEQ Topic Session (S9)
Ecological effects of offshore oil and gas development and oil spills

Co-convenors: Tatyana Belan (Russia), Alexander Tkalin (UNEP/NOWPAP) and Takuya Kawanishi (Japan)

Background

In recent years, offshore oil and gas production expanded to new areas of the world ocean. Unfortunately, oil and gas exploration and extraction can be associated with negative ecological consequences. For example, seismic surveys may interfere with commercial fishing, installation of platforms may disturb habitats of marine fish and invertebrates, and the discharge of drilling muds introduces a number of contaminants into the surrounding waters. Oil spills associated with offshore operations or with tanker accidents also threaten the marine environment. Recent spills have demonstrated vulnerability of coastal communities. Oil slicks at sea can kill or otherwise adversely affect marine birds and mammals, zooplankton, as well as the eggs and larvae of fish and invertebrates. The goal of this session was to bring together marine scientists working on these issues and to discuss what steps can be taken to minimize adverse ecological effects of offshore oil and gas production.

Summary of presentations

Fourteen oral papers scheduled were presented plus several posters. Presentations included reviews of environmental consequences of oil and gas extraction on sea shelf, monitoring results along the Sakhalin Island, possible influence of accidental oil spills on biota of the Far Eastern Seas, new monitoring and assessment techniques and other related issues. Discussions were useful for creating common understanding among participants from different scientific organizations and oil and gas companies. It was recommended that such sessions should continue to be organized in the future, and industry representatives are involved as much as possible.

List of papers

Oral presentations

Chang-Gu Kang, Seong-Gil Kang and Jeong-Hwan Oh (Invited)
Oil spills - Risk, preparedness and response in the Northwest Pacific

Kazuichi Hayakawa, Maki Nomura, Takuya Nakagawa, Seiji Oguri, Takuya Kawanishi, Akira Toriba and Ryoichi Kizu
Study on damage and recovery of coastlines for three years after the Nakhodka oil spill

Valentina V. Andreeva, Tatyana V. Konovalova, Paul G. Mowatt and Olga V. Samoilyuk
Review of monitoring results in the area of Moliqpak platform (north-eastern shelf of Sakhalin)

Review by Tatyana A. Belan based on the following abstracts:

Tatyana V. Konovalova, Alexander V. Moshchenko, Tatyana A. Belan and Nadezhda K. Khristoforova
Alterations of biotopical conditions and variations of benthos distribution near Molikpaq platform (North-East Sakhalin Island shelf)

Alexander V. Moshchenko, Tatyana V. Konovalova and Nadezhda K. Khristoforova
Changes of granulometric composition of bottom sediments near Molikpaq platform (North-East Sakhalin Island shelf)

Evgeniyi V. Karasev, Tatyana S. Lishavskaya, Tatyana. A. Belan, Alexander V. Tkalin, Alexander V. Moshchenko and Anastasia S. Chernova
Ecological investigations on the Sakhalin Island shelf, including Molikpaq platform monitoring: A review of FERHRI studies

Tatyana V. Konovalova, Alexander V. Moshchenko, Tatyana S. Lishavskaya and Nadezhda K. Khristoforova
Interrelation of the contents of petroleum hydrocarbons, metals and granulometric composition of sediments near Molikpaq platform (North-East Sakhalin Island shelf)

Takuya Kawanishi, Masayuki Kunugi and Kazuichi Hayakawa
Monitoring chemical substances in surface sea water in North Pacific Area

Review by Galina Moyseychenko based on the following abstracts:

Galina Borisenko and Galina Moyseychenko
The quantification of natural radioactive background levels of radioactivity in offshore bottom sediments of northeastern part of Sakhalin Island

Inna Nemirovskaya, Galina Moyseychenko and Yury Blinov
Concentrations and compositions of aliphatic and polycyclic hydrocarbons in bottom sediments off Sakhalin Island

Xuelei Zhang, R.J. Wu, Z.H. Zhang and Z.F. Dong
Benzene toxicity to the scallop, *Chlamys farreri*, and the shrimp, *Penaeus japonicus*

Galina Moyseychenko and Alla Ogorodnikova
Possible influence of accidental oil spills on the Far Eastern Sea shelf biota

Svetlana V. Davydova and Sergey A. Cherkashin
Ichthyoplankton as an indicator of the state of coastal ecosystems in the areas of oil and gas deposits on Sakhalin shelf

Alexander Bogdanovsky, John Wardrop, Igor Kochergin, Sergei Pokrashenko, Igor Arshinov and Sergey Rybalko
Progress in oil spill risk assessment for Sakhalin shelf conditions

Posters

Andrey P. Chernyaev
Petroleum hydrocarbon pollution of Ussuriyskiy Bay (Japan Sea) in 2003 – 2004

Sam Geun Lee and Eun Seob Cho
Effects of oils and chemical dispersants on the growth of the phytoplankton, *Cochlodinium polykrikoides*

Olga N. Lukyanova, Andrey P. Chernyaev, Sergey A. Cherkashin and Svetlana A. Aleshko
The distribution of petroleum hydrocarbons and biota assessment in Amursky Bay (Japan Sea)

Valeriy I. Petukhov, Irina G. Lisitskaya and Alexandra V. Romanchenko
Research of the composition of petroleum products to identify petroleum contamination

Sergey Rybalko, Igor Kochergin, Victor Putov and Tatyana Belan
Complex environmental impact assessment within marine seismic surveys

TCODE Topic Session (S10)
Data management and delivery systems to support ecosystem monitoring

Co-Convenors: S. Allen Macklin (U.S.A.), Bernard A. Megrey (U.S.A.) and Igor I. Shevchenko (Russia)

Background

A stated objective of PICES is to provide data in exchangeable formats to better enable the evaluation of North Pacific ecosystems status and trends, and to support other strategic pursuits. PICES scientists face challenges in managing and delivering data in a shareable way. Furthermore, a growing number of ocean observing systems require data management and communication methodologies that conform to rigid standards and protocols. For the most part, traditional science education of the past century offered little training in data management. Today's typical scientist, although supportive of data exchange, lacks the background to understand techniques to facilitate it.

Summary of presentations

This session was designed to acquaint PICES scientists with state-of-the-art information about metadata description, data delivery and data browsing techniques, with emphasis on existing standards and web services recommended for ocean observing systems. Basic to advanced methods were presented. Presenters described successful systems and learned ways of mapping existing data structures into conformant, exchangeable formats using no-cost, open-source and/or commercial applications. Session

topics covered database aggregation, real-time ship-shore data exchange protocols, cabled observatory data management, and GIS techniques.

The session's invited speaker, Dr. Anthony Isenor, established a foundation for the proceedings by discussing, with examples, three conceptual models for the exchange of data between systems. The first model, relying on a central data structure for passing data among nodes, is used commonly in meteorology and oceanography. A second, more formal model uses instances of a common data model. Nodes exchange data with an instance of a common database, with data replicated between the common-instance databases. The third conceptual model entails wrapper software that encapsulates the data asset. Applications query the data asset using an intermediate layer, sometimes called an integrator or mediator, to identify the required data asset. The mediator then deals with critical data issues such as consolidation of parameter codes, units, replicate data, metadata content and multiple structures. The resulting data is provided to the user as a coherent and internally consistent data set.

This session was the first scientific session organized by TCODE. Papers covered topics of real time data delivery between ships at sea and land-based laboratories, marine data exchange protocol options and standards, merging and aggregating data sets and data streams from diverse sources, and metadata search and federation systems. Eleven papers were delivered and 5 posters. The session was received very well by PICES scientists and attendance was high, sometimes reaching 50 people, even though two other concurrent sessions were taking place.

List of papers

Oral presentations

Anthony W. Isenor (Invited)
Data exchanges, XML, and why the exchange problem is still unsolved

Deng-Wen Xia
Marine data exchange prototype based on XML

Dmitry. D. Kaplunenko, Vyacheslav B. Lobanov, Young Jae Ro and Mikhail Danchenkov
Merging Argo data and ship CTD observations to study mesoscale patterns in the Japan/East Sea

Natalia I. Rudykh, Elena V. Dmitrieva and Vladimir I. Ponomarev
Use of diverse database aggregation for the study of variability in oceanographic parameters of the Japan/East Sea

Shin-ichi Ito, Shigeho Kakehi, Motohiko Kashima, Yoshioki Oozeki and Kazuyuki Uehara
A system development for near-realtime data exchange between ship and shore-based analysts in Japan's Fisheries Research Agency (FRA)

Benoît Pirenne and Robin Brown
NEPTUNE and VENUS: Data management and archival system for cabled ocean observatories

Kimberly Bahl, Hee Dong Jeong, Kyu Kui Jung, Hae Seok Kang, S. Allen Macklin and Bernard A. Megrey
Federated metadata of PICES member nations: Information sharing across international boundaries

Alex Kozyr and Misha Krassovski
The Mercury Metadata Search System and Web-Accessible Visualization and Extraction System (WAVES) for oceanographic data

Igor D. Rostov, Vladimir I. Rostov, Natalia I. Rudykh, Elena V. Dmitrieva and Alexander A. Pan
Oceanographic data base applications for the Far Eastern Region of Russia

Sei-Ichi Saitoh, Hidetada Kiyofuji, Daichi Tachikawa, Mihoko Abe, Kazuhiko Tateyama and Motoki Hiraki
Research and development of ubiquitous information services for integrated fisheries activities in the offshore around Japan

Anatoly I. Alexanin, Marina G. Alexanina, Pavel V. Babyak and Michail V. Kruglov
Problems of satellite data delivery and their solution by the FEB RAS Centre for Regional Satellite Environment Monitoring

Posters

Stepan A. Antushev, Vitaliy K. Fischenko and Andrey V. Golik
About the scope of Grid technologies for support of complex oceanographic research in the northern Pacific

Sergey A. Fedorov, Vitaliy K. Fischenko and Andrey V. Golik
Web-based technology of CTD data visualization in FEB RAS corporate oceanographic GIS

Sergey M. Krasnopeyev and Alexander O. Teregulov
Metadata catalogue service based on the preliminary national standard

Alexander A. Pan and Vladimir I. Rostov
Tools for the visualization of gridded oceanographic data

Tomowo Watanabe and Yukimasa Ishida
Oceanographic data in the Japan Fisheries Oceanography DataBase (JFODB)

FIS Paper Session

Session Convenors: Yukimasa Ishida (Japan) and Gordon Kruse (U.S.A)

Background

Fishery science is a broad field in the PICES region, not only due to species diversity but also the wide geographical range of the North Pacific Ocean. Therefore, a specific topic session sometimes does not fully cover the science communication needs of fisheries scientists of PICES member countries. At the FIS meeting in 2002, it was noted that there was no FIS Paper Session at PICES XI. Furthermore, it was pointed out that convening such a session at PICES XII would enhance FIS activities in PICES by allowing participation of more fisheries scientists with different interests. The FIS paper session is also a good way to provide presentation opportunities by young scientists including students. These ideas were also confirmed at the FIS meeting in 2004. The FIS Paper Session in 2005 received 49 submissions, including 19 oral presentations (3 of which were withdrawn) and 30 posters (2 of which were withdrawn) that covered a wide variety of fish species from all member countries.

Summary of presentations

The session consisted of 16 oral presentations plus 28 posters. The most common topics during the oral session included presentations on the effects of ocean conditions on species distributions, food and feeding. Species covered in these topics included shrimp, crab, squid, black snake mackerel and Pacific saury. One paper on Pacific cod recommended studies by PICES member countries to define population structure for management purposes, whereas a study of walleye pollock examined the role of climate regime shifts on recruitment and abundance. It appears that dynamics of walleye pollock biomass are related to changes in water temperature, primary productivity and zooplankton, and all of these were related to the 1977 regime shift. Another paper considered the effects of coastal pollution on the biomass distribution of macrobenthos. On a very different topic, a study was conducted on the effectiveness of a device, called an orca-sphere, to reduce depredation of longline catches by killer whales. The orca-sphere emits ultrasonic signals that appear to discourage killer whales from feeding on halibut, cod and Greenland turbot caught on longlines. Depredation of longline gear has also been a problem for these same fisheries, as well as sablefish fisheries in Alaska.

The most common taxa covered during the presentations were salmon and squid with 4 talks each. Papers presented on salmon covered the use of sea surface temperature to recommend fry release dates, a new estimation on return rate, use of otolith microchemistry, and tracking of

tagged salmon by the Pacific Ocean Shelf Tracking (POST) system. It appears that otolith microchemistry, particularly Sr/Ca and Ba/Ca, hold much promise to separate salmon stocks as well as to reconstruct life history patterns of migration from freshwater to estuary to marine and return to freshwater. The POST project continues to provide interesting results. Individual tagged salmon have been tracked as they migrate along the coast, and the project allows estimates of important parameters such as migration and survival rates. The number of presentations on squids at PICES has been increasing over the past several years. Despite this trend, it is clear that much additional work is needed. For instance, very little is known about the life history of gonatid squids, especially the location of spawning. Estimates of squid abundance are lacking, but distribution and feeding ecology are becoming better understood. Off Korea, it was shown that common squid largely consume fish (perhaps mostly anchovy) and molluscs (including cannibalism of other squid). Based on the number of presentations and posters, breadth of species and subjects covered, and quality of the presentations, the FIS paper session was very successful.

List of papers

Oral presentations

Gennady A. Kantakov and Sergey D. Bukin
Oceanographical conditions changing and *Pandalus borealis* redistribution in the northern part Sea of Japan

Yuri Yu. Nikonov, Andrey S. Krasnenko and Valeriy N. Chastikov
Numerical analysis of the *Paralithodes brevipes* larvae migration in the Southern-Kurile strait's region

John R. Bower
Paralarval distribution patterns of the gonatid squid *Berryteuthis anonychus* in the North Pacific

Hyoung-Chul Shin, Don Hyug Kang and Yoon-Seon Yang
Fate of the common squid population in Korean waters; a natural oceanographic experiment over various time scales

Eun Jung Kim, Suam Kim, Dae-Yeon Moon and Jeong-Rack Koh
The vertical and horizontal distribution of bigeye (*Thunnus obesus*) and yellowfin tuna (*Thunnus albacares*) related to ocean structure

Toshiyuki Konishi, Hidetada Kiyofuji and Sei-Ichi Saitoh
Predictability of Pacific saury fishing grounds in the Northwestern North Pacific using satellite remote sensing data

Oleg Bulatov
The Bering Sea pollock and regime shifts

Alexei M. Orlov and Andrei N. Stroganov
Prerequisite of the study of Pacific cod population structure

George Shevchenko and Olga Shershneva
Monitoring of SST in the areas adjacent to the river mouths of Sakhalin applied to the problem of fry salmon release

Hyunju Seo, Suam Kim, Sukyung Kang and Kibeik Seong
A new estimation of salmon return rate and its use in environmental studies

Vladimir A. Rakov, Valentina V. Goncharova and Yulia V. Zavertanova
Monitoring of macrobenthos and larvae of fish at the Vrangel Bay (Sea of Japan)

Hyejin Song, Gun Wook Baeck and Suam Kim
Food and feeding of the common squid *Todarodes pacificus* (Cephalopoda: Ommastrephidae) off Busan, Korea

Hiroshi Kubota, Yoshioki Oozeki and Ryo Kimura
Feeding ecology of larval and juvenile black snake mackerel (*Nealotus tripes*, Gempylidae) and their roles in the fish communities of the Kuroshio Extension Region

Dongwha Sohn, Sukyung Kang and Suam Kim
Comparison of otolith microchemistry between chum salmon (*Oncorhynchus keta*) and cherry salmon (*Oncorhynchus masou*) in Korean waters

David Welch, Peggy Tsang, Jayson Semmens, Sonia Batten and R. Scott McKinley
Performance of the POST (Pacific Ocean Shelf Tracking) array in 2004-05, and plans for the future

Konstantin A. Karyakin
The use of the "Orca Sphere" device in bottom longline fishery in the Okhotsk Sea

Posters

Nadezhda L. Aseeva
Change of Myxozoa life strategy in the Japan/East Sea in XX Century

Nadezhda L. Aseeva
Myxozoa parasites in the fishes of the Japan Sea

Alexander A. Bonk
The loss of herring developing eggs in spawning grounds in the western Bering Sea

Oleg Bulatov and Georgiy Moiseenko
The Bering Sea pollock stock assessment using GIS "Fishery"

Svetlana V. Davydova
Interadecadal variations of the masses subtropical fishes reproduction and their influence on ichthyoplankton community of northwestern Japan/East Sea

Elena E. Andreeva, Svetlana V. Davydova and Marina A. Shebanova
Species composition, distribution and food habits of ichthyoplankton in the Okhotsk Sea in summer-autumn, 2003-2004

Yeong Gong and Young-Sang Suh
Effect of the environmental conditions on the structure and distribution of Pacific saury in the Tsushima Warm Current region

Elena V. Gritsay
The northern Bering Sea pollock fishery in 2004

Soto-o Ito and Yukimasa Ishida
Species identification and age determination of Pacific salmon (*Oncorhynchus* spp.) by scale patterns

Victor A. Nazarov, Boris I. Ivanov and Nikolay A. Chernykh
Changes of fish communities in estuaries of the Peter the Great Bay during the 20-21st centuries

Yeong Hye Kim, Dong Woo Lee, Jae Bong Lee, Kwang Ho Choi, Young Seop Kim, In Ja Yeon, Byung Kyu Hong and Soon Song Kim
Age and growth of the yellow croaker, *Larimichthys polyactis* in the East China Sea

Nikolai V. Kolpakov
Interannual variability of species composition and structure of circumlittoral fish community of Russkaya Bay (northern Primorye, Sea of Japan)

Svetlana Davydova, A. Zhigalin and N. Kuznetsova
About species composition and distribution of ichthyoplankton in the northwestern part of Pacific Ocean

You Jung Kwon, Dae Yeon Moon and Chang Ik Zhang
Stock assessment of bigeye tuna (*Thunnus obesus*) in the Pacific using the AD model builder

G.V. Avdeev and E.E. Ovsyannikov
The northern Okhotsk Sea pollock year-classes abundance

S.L. Ovsyannikova
Walleye pollock distribution and migrations in the south Kuril region in 1999-2004

Andrew B. Savin
Seasonal migrations of Pacific cod (*Gadus macrocephalus*, Gadidae) nearshore of Kamchatka peninsula

Victor A. Nazarov, Eugene I. Barabanshchikov, Nikolay A. Chernykh, Alexander A. Goryainov, Boris I. Ivanov, Nikolay I. Krupyanko, Anatoly Yu. Semenchenko, Vladimir I. Tarazanov and Sergey F. Zolotukhin
Characteristics of salmon association in the Sea of Japan's EEZ of Russia on boundary of the 20-21st centuries

Alisa V. Semina, Neonila E. Polyakova and Vladimir A. Brykov
Genetic divergence in daces of the *Tribolodon* genus (Teleostei: Cyprinidae) from Far Eastern seas

Young Il Seo, Jin Yeong Kim, Joo Il Kim, Sung Tae Kim, Chang Ik Zhang and Jae Bong Lee
Assessing the impact of yellow goosefish predation on small yellow croaker in the East China Sea of Korea

E.I. Barabanshchikov, N.V. Kolpakov and M.E. Shapovalov
Appraisal of striped mullet (*Mugil cephalus*) stock near-shore of Primorye

Marina A. Shebanova
Feeding of juvenile *Cololabis saira* in waters of Peter the Great Bay (Sea of Japan)

Hirofumi Shimizu, Kiyoshi Fujita and Yoshioki Oozeki
Bone abnormality of Pacific saury larvae *Cololabis saira*

M.A. Stepanenko and E.V. Gritsay
Effects of 2000-year class for recruitment Pollock in the eastern Bering Sea

Katsuya Suzuki, Tsutomu Takagi, Shinsuke Torisawa, Hiromu Fukuda, Osamu Murata, Shinji Yamamoto and Kazushi Miyashita
Evaluating the roles of vision and the lateral line in the schooling behavior of chub mackerel (*Scomber japonicus*) using a mathematical model

Inja Yeon, Yangjae Im, Hakjin Hwang and Myoungho Sohn
Current status of the Yellow Sea fisheries resources and management in Korea

Hakjin Hwang, Inja Yeon, Yangjae Im and Myoungho Sohn
Current stock conditions of yellow croaker, *Pseudosciaena manchurica*, in the Yellow and East China seas

Inja Yeon, Yangjae Im, Myoungho Sohn, Hakjin Hwang and Manwoo Lee
Morphological identification of subpopulations of the blue crab, *Portunus trituberculatus*, in the western sea of Korea

POC Paper Session

Convenor: Michael G. Foreman (Canada)

Background

Papers were invited on all aspects of physical oceanography and climate in the North Pacific and its marginal seas, particularly those related to the impacts of future climate change.

Summary of presentations

The session consisted of 26 oral presentations and 23 posters covering a wide range of physical oceanographic and climate issues. After a brief introduction by Dr. Foreman outlining a new working group entitled "Evaluation of Climate Change Projections", that will hopefully be established under POC, two invited speakers gave presentations related to recent climate change models that have been submitted to the Inter-governmental Panel on Climate Change (IPCC) for their Fourth Assessment Report. Dr. Hasumi described the high and medium resolution coupled atmosphere-ocean models that are presently being run on the Earth Simulator in Japan, and Dr. Wang described her preliminary analyses of 15-20 IPCC climate model simulations for the Arctic and North Pacific Oceans. Subsequent talks in the first afternoon session presented results on ecosystem changes in the Northwest Pacific associated with global warming (Yamanaka), analyses of temperature regimes in the northwest Japan/East Sea (Gayko), the predictability of seasons in the Bering and Okhotsk Seas (Tananaeva), the importance of including a surface wave parameterization in numerical circulation models (Qiao), an improved tropical teleconnection index for the Northeast Pacific (McKinnell), and the role that the 18.6-year nodal modulation of diurnal tides in the Kuril Islands may play in intermediate water formation in the Northwest Pacific and Sea of Okhotsk (Osafune), and perhaps climate variability for the entire North Pacific (Yasuda).

On the second day, talks in the morning session prior to the coffee break focussed on numerical modelling. Presentations included predicting the location of the Kuroshio Extension and Oyashio First Branch with the JDOPE model (Ito), modelling and observational studies of the Juan de Fuca Eddy (Foreman), assimilating temperature and salinity data into a circulation model for the Japan/East Sea (Platov), comparing numerical current simulations with infrared satellite imagery in the Japan/East Sea (Trusenkova), and modelling and analysing North Pacific sea surface temperature variability using EOF and cluster approaches (Kuzin). After the coffee break the presentations were more varied. They included studies of seasonal hypoxia near the Changjiang Estuary (Wei), realtime monitoring and modelling in Kanjin Bay Korea (Ro), water and chlorophyll modelling in Aniva Gulf (Nikonov), interannual changes in dissolved oxygen in the Sea of Okhotsk (Mateev), and the development and interaction of eddies in the Kuroshio Current (Obukhova). The final part of the session after

lunch included presentations on variations in North Pacific intermediate water formation (Shimizu), seasonal variability along the line between Cape Aniva and Cape Dokuchaev (Shevchenko), the impact of tidal and atmospheric forcing variability on salinity and dissolved oxygen in the western subarctic Pacific (Andreev), meridional mass and heat transport across a line in the East/Japan Sea (Park), the effects of eddy dynamics on phytoplankton distributions in the Eastern Kamchatka and Oyashio Currents (Takemura), and interannual variations in temperature in the Sea of Okhotsk (Zhigalov).

Satoshi Osafune (Japan) and Yuri Nikonov (Russia) were named co-winners of the Best Presentation Award from the POC Committee for their respective presentations "*Bidecadal variability in the intermediate waters of the northwestern subarctic Pacific and the Okhotsk Sea in relation to the 18.6-year nodal tidal cycle*" and "*Water and chlorophyll circulation modeling of Aniva Gulf according to oceanographic data from the year 2002*". The Best Poster Award for the entire meeting was awarded to Hanna Na (Korea) for her submission "*Temporal variation of the estimated volume transport through the Korea and Tsugaru Straits*" to the POC Paper Session.

Overall, the session was a success. The number of submitted abstracts exceeded expectations (necessitating a session expansion from 1.0 to 1.5 days), the foundation was laid for a new working group on evaluating climate change projections, and all participants left with a lasting impression of the breadth and depth of physical oceanographic studies being carried out in the North Pacific.

List of papers

Oral presentations

Michael G. Foreman
Evaluation of climate change projections: A new Working Group under the PICES Physical Oceanography and Climate Committee

Hiroyasu Hasumi, Tatsuo Suzuki, Takashi T. Sakamoto, Seita Emori, Masahide Kimoto and Akimasa Sumi
Present and future of the North Pacific simulated by a high resolution coupled atmosphere-ocean general circulation model

Muyin Wang and James E. Overland
A first look at the new IPCC AR4 climate model simulations over the North Pacific

Yasuhiro Yamanaka, Taketo Hoshioka, Maki N. Aita and Michio J. Kishi
Changes in ecosystem in the western North Pacific associated with global warming

Larissa A. Gayko
The analysis of temperature regimes in coastal areas of the north-west Japan/East Sea by climatic periods

Ichiro Yasuda, Satoshi Osafune and Hiroaki Tatebe
Possible mechanism of bi-decadal North Pacific ocean/climate variability in relation to the 18.6-year period nodal cycle

Skip McKinnell
Detecting the 1972/73 El Niño in the Northeast Pacific with an improved tropical teleconnection index

Victor I. Kuzin, Aleksandr S. Lobanov and Valery M. Moiseev
Analysis and modeling of north and tropical Pacific SST variability

Yulia N. Tananaeva and Marat A. Bogdanov
Interannual variability of cold and warm seasons and their duration in the North West Pacific

Satoshi Osafune and Ichiro Yasuda
Bidecadal variability in the intermediate waters of the northwestern subarctic Pacific and the Okhotsk Sea in relation to the 18.6-year nodal tidal cycle

Fangli Qiao, Changshui Xia, Zhenya Song, Yongzeng Yang and Yeli Yuan
Ocean surface waves play an essential role in air-sea interaction from an atmosphere-wave-ocean coupled model

Shin-ichi Ito, Shigeho Kakehi, Motohiko Kashima, Kosei Komatsu, Takashi Setou and Yasumasa Miyazawa
Predictability of location of the Kuroshio Extension and the Oyashio First Branch by JCOPE

Michael Foreman, Wendy Wiggins, Angelica Peña, Emanuele Di Lorenzo, Barbara Hickey, Amy MacFadyen and Vera Trainer
Modelling and observational studies of the Juan de Fuca Eddy

Gennady A. Platov, Elena N. Golubeva, Young Jae Ro and John F. Middleton
Numerical study of the general circulation in the Japan/East Sea with simple assimilation of temperature and salinity data

Olga O. Trusenkova, Vyacheslav B. Lobanov and Aleksandr A. Nikitin
Seasonal and interannual variation of currents in the western Japan/East Sea: Numerical simulation in comparison with infrared satellite imagery

Hao Wei, Yunchang He, Qingji Li and Zhiyu Liu
Seasonal hypoxic zone adjacent to the Changjiang Estuary

Young Jae Ro and Kwang Young Jung
Realtime monitoring of oceanic state variables in Kangjin Bay, South Sea, Korea

Yuri Yu. Nikonov, Valeriy N. Chastikov and Ludmila Yu. Gavrina
Water and chlorophyll circulation modeling of Aniva Gulf according to oceanographic data from the year 2002

Vladimir I. Matveev
Interannual changes of dissolved oxygen in an active layer of the Okhotsk Sea

Nafanail V. Bulatov and Natalya G. Obukhova
One type of eddy development in the northeastern Kuroshio branch

Yugo Shimizu, Lynne D. Talley, Shin-ichi Ito and Miyuki Tatesawa
Distribution and transport variations of source waters for North Pacific Intermediate Water formation revealed by multiple tracer analysis

George Shevchenko and Valery Chastikov
Seasonal variability of oceanological conditions in the southern part of the Okhotsk Sea from CTD surveying on standard section Cape Aniva – Cape Dokuchaev

Andrey G. Andreev and Victoria I. Baturina
Impacts of the tides and atmospheric forcing variability on salinity and dissolved oxygen in the western subarctic Pacific

Young-Gyu Park, Kyung-Hee Oh and Moon-Sik Suk
Meridional mass and heat transport across the 38-40°N line in the East/Japan Sea

Hiroki Takemura and Sei-Ichi Saitoh
Spatial phytoplankton distributions affected by eddy dynamics in the Eastern Kamchatka Current and Oyashio regions during the spring between 1998-2004

Vladimir A. Luchin and Igor A. Zhigalov
Typical distribution of interannual variations of water temperature in the active layer of the Okhotsk Sea and their possible prediction

Posters

Valentina D. Budaeva, Georgi V. Shevchenko, Vajcheslav Makarov and Valery N. Chastikov
Intraannual thermohaline dynamics in Aniva Bay

Boris S. Dyakov
Spatial and temporal variability in circulation and hydrophysical fields in Tatar Strait

Lyudmila Yu. Gavrina, L.N. Propp and V.N. Chastikov
Factors of the environment and production characteristics in Aniva Bay, Sea of Okhotsk and bordering straits (Laperuz, Tatarsky) in 1996-2002

Shigeho Kakehi, Shin-ichi Ito, Motohiko Kashima, Kosei Komatsu, Takashi Setou and Yasumasa Miyazawa
The comparisons between JCOPE and observed data in Tohoku regions

Kosei Komatsu, Takashi Setou, Yasumasa Miyazawa, Akira Kusaka, Shin-ichi Ito, Shigeho Kakehi, Motohiko Kashima, Manabu Shimizu, Hideki Akiyama, Kazuyuki Uehara and Mitsuyuki Hirai
Verification of JCOPE Ocean forecast system using *in situ* data of Japanese fisheries research institutions

Takashi Setou, Kosei Komatsu, Yasumasa Miyazawa, Shin-ichi Ito, Kazuyuki Uehara, Manabu Shimizu, Akira Kusaka, Shigeho Kakehi, Motohiko Kashima, Hideki Akiyama and Mitsuyuki Hirai
Incorporating *in situ* data obtained by Japanese fisheries research institutions into the JCOPE Ocean forecast system

Young Jae Ro and Kwang Young Jung
Hydrographic and hydrodynamic variability in Kangjin Bay, South Sea, Korea

Yun-Bae Kim, Kyung-Il Chang, JongJin Park, Kuh Kim, Jae Hak Lee and Jae-Chul Lee
Flow through the Ulleung Interplain Gap in the southwestern East/Japan Sea

Zhiyu Liu, Haitang Wang and Hao Wei
Bottom drag coefficient estimates in the tidal bottom boundary layer from acoustic Doppler velocimeter data

Vasiliy F. Mishukov, Alexader N. Medvedev and Andrey S. Neroda
Natural and anthropogenic sources of chemical elements in aerosols over Vladivostok

Valentina V. Moroz and Konstantin T. Bogdanov
Water structure and circulation variability in the Kuril Straits area

Hanna Na and Kuh Kim
Temporal variation of the estimated volume transport through the Korea and Tsugaru Straits

Aleksander A. Nikitin
Thermal features of water structure of the Japan/East Sea on satellite and ship observations

Aleksander A. Nikitin, Yury Novikov and Vadim Petruk
Monitoring of Peter the Great Bay (Japan/East Sea) on IK-images and hydrological data in April-May of 2005

Alexander A. Nikitin, Larissa S. Shkoldina, Ekaterina N. Selivanova and Lyana D. Kulichkova
The phenomenon of warm water allochthonts in the north-western Japan/East Sea during winter-spring 2003-2004 and peculiarities of the thermal regime

Eugene V. Samko and Vadim M. Petruk
Research on Bering Sea geostrophic circulation from satellite altimetry data: Two approaches to solving the problem

Antonina M. Polyakova
Especially dangerous wave heights and safety of the fishing fleet in the Northern Pacific

Antonina M. Polyakova
Ice formation is especially dangerous for fishing boats in the Northern Pacific and for the safety of the fishing fleet

Eung Kim and Young Jae Ro
Structure of seawater properties profiled by the Argo floats in the Ulleung-do area (East/Japan Sea), 2003-2004

Tatyana A. Shatilina, L.Yu. Matyushenko and R.B. Kravchenko
Monitoring of baroclinic circulation conditions and ice cover by GIS methods in the Far Eastern Seas

Young-Sang Suh, Hiroshi Kawamura, Futoki Sakaida, Sang-Woo Kim, Lee-Hyun Jang and Na-Kyung Lee
Daily variation of abnormal ocean conditions in the northwestern Pacific Ocean using NGSST satellite data

Svetlana N. Taranova and Igor A. Zhabin
Water mass transformation in the Japan/East Sea

Galina A. Vlasova and Vladimir I. Rostov
Analysis of seasonal variability of hydrodynamic structures in the Sea of Okhotsk and their dependence on baric systems in the atmosphere

MEQ Workshop (W1)
Review of selected harmful algae in the PICES region: I. Pseudo-nitzschia & Alexandrium

Co-convenors: Tatiana Orlova (Russia) and Mark Wells (U.S.A.)

Background

This workshop is the beginning of an annual series in which harmful algal bloom (HAB) species that impact all or most countries in the North Pacific are discussed in detail. In 2005, the workshop focused on two genera, *Pseudo-nitzschia* and *Alexandrium*. Topics included detection methods, ecosystem comparison, and new advancements in physiology and ecology from each of the member countries. In particular, we would like to stress those factors, which need additional study in order to develop a predictive capacity for these HABs. Specific subjects included: a comprehensive listing of both macro- and micro-nutrient requirements, toxin production, light and temperature requirements, environmental conditions, species and strain variability, cyst formation, shellfish species impacted, modeling, and genetics. We documented our knowledge on the ecophysiology of these HAB species as a result of this workshop. During future workshops we anticipate discussing additional HAB species,

including: *Cochlodinium, Heterosigma akashiwo, Dinophysis, Heterocapsa, Chattonella, Gymnodinium catenatum*, and *Karenia mikimotoi*. This workshop was preceded by a ½-day laboratory demonstration on detection techniques for algal toxins at the TINRO-Center in Vladivostok.

Summary

The workshop was held on September 30, 2005, at the TINRO-center in Vladivostok, Russia, and was attended by 22 participants, including 11 members of the HAB Section from Canada, Japan, Korea, Russia and the United States of America. The convenors organized the presentations to include *Alexandrium* spp. in the morning session and *Pseudo-nitzschia* spp. in the afternoon session. Each session was started with a series of brief (10-15 min) overviews provided by each PICES country. These were followed up by invited presentations on what is known about the ecophysiology of the organism, including the factors governing growth rates and toxin production. Combined, this information on distribution and ecophysiology was served as a framework for discussions on the key research goals needed to strive towards gaining better understanding of HAB events and the future of HAB work within PICES. HAB species that impact all or most countries in the North Pacific are discussed in detail.

The workshop discussions addressed *Alexandrium* spp. in the morning session and *Pseudo-nitzschia* spp. in the afternoon session. Both discussions were structured around the three main stages presented in Dr. Trick's initial review seminar. These stages influence both the appearance and persistence of toxic phytoplankton in coastal waters of different regions. They are:

- Getting There
- Being There
- Staying There

Where "getting there" reflects the transport of a toxic species to the new region via natural (*e.g.*, water movement) or anthropogenic (*e.g.*, ballast water or aquaculture) means. "Being there" reflects the ability of the cells to reproduce and remain viable over the course of the growth season. "Staying there" reflects the persistence of the species over several annual cycles. During the subsequent discussions the group selected a series of key questions that were both central to understanding the ecophysiology of these toxic species and of sufficiently narrow focus that they could be addressed successfully over the next several years.

Alexandrium spp.

Does toxin play a role in any of the three stages necessary for a toxic bloom event? What are the factors responsible for the greater diversity of *Alexandrium* species in the western Pacific *vs*. the eastern Pacific Ocean, and also the Northern and Southern reaches of the western Pacific Ocean? Does greater genetic diversity make up for the lesser diversity of species and geographic diversity in the eastern Pacific - or is this related to a paucity of different potential habitats in the eastern Pacific Ocean (western North America) compared to the western Pacific (environmental-based).

Does toxin confer a competitive advantage for *Alexandrium* spp.? We need a physiological comparison between toxic and non-toxic strains. Could one strain under different conditions produce different toxins (*e.g.* nutrient limitation), and thus be a factor responsible for regional variations in toxin type and/or production?

Is the composition of the toxin physiological-(genetic) or environmental-based? In other words, do the environment factors select for the successful propagation of *Alexandrium* spp. and its production of specific toxins?

Does sediment composition affect the survivability of cysts and their viability, and hence bloom distributions?

Do the complexities of eutrophication affect toxin production? For example, does the change in nutrient ratios influence the total production and composition of the saxitoxin isomers?

How might (does) climatic change affect *Alexandrium* distribution and its toxicity? It is important to consider that the stability of the water column could be the 'key' to the success of *Alexandrium*, and how could this be impacted by a) changes in hydrological patterns (*i.e.* riverine discharge), b) storm severity/frequency resulting in surpassing natural physical barriers for cyst transport, and c) sea temperature effects on the distribution of *Alexandrium* spp?

Pseudo-nitzschia spp.

What chemical or biological factors contribute towards toxin production in *Pseudo-nitzschia*. This question is of particular significance because blooms of a given species can be either non-toxic or extremely toxic for reason not yet understood.

Is there a difference in the degree of toxin production in *Pseudo-nitzschia* species between the Eastern and Western margins of the North Pacific? If so, why? For example, is it related to the structure of the food web, the growth conditions for the organisms, or total nutrients inputs?

What is the capacity of different *Pseudo-nitzschia* species to produce domoic acid? In other words, are there truly non-toxic *Pseudo-nitzschia* species? Or, is the absence of toxin in cultures of isolates due to culture conditions being unfavorable to toxin production?

Does domoic acid production confer some competitive advantage to toxic cells? Some current hypotheses suggest that the toxin serves some metabolic role, but if so, what benefit do *Pseudo-nitzschia* species gain by producing domoic acid?

Is high cell toxicity in coastal waters associated primarily with cell senescence, or actively growing populations? In other words, can the stage of the *Pseudo-nitzschia* bloom serve as a rudimentary predictor of bloom toxicity?

Is there a common succession pattern of phytoplankton leading to toxic *Pseudo-nitzschia* blooms? Does the removal or addition of nutrients or compounds by preceding phytoplankton populations enhance the success or toxicity of subsequent *Pseudo-nitzschia* blooms?

List of papers

W1 (MEQ) Workshop

Charles G. Trick (Invited)
Occurrence and effects of *Alexandrium* species in the environs of the North Pacific

Satoshi Nagai
Microsatellite markers reveal population genetic structure of the toxic dinoflagellate *Alexandrium tamarense* (Dinophyceae) in Japanese coastal waters

Shigeru Itakura, Satoshi Nagai, Yukihiko Matsuyama and Mineo Yamaguchi
Notes on *Alexandrium* bloom occurrence in Japanese coastal waters

Ruixiang Li and Mingyuan Zhu
The distribution and HAB formation of *Alexandrium* spp. in Chinese coastal waters

Changkyu Lee, Ensub Cho, Jongkyu Park, Changhoon Kim, Wolae Lim and Giyoung Kwon
Occurrence of *Alexandrium* species in Korean coastal waters

Tatiana Orlova, Marina Selina and Inna Stonik
Species of the genera *Alexandrium* from the east coast of Russia

Vera L. Trainer, B-T.L. Eberhart, J.C. Wekell, N.G. Adams, L. Hanson, F. Cox and J. Dowell
Paralytic shellfish toxins from *Alexandrium* in Puget Sound, Washington, U.S.A.

Stephen S. Bates (Invited)
Biology of the diatom *Pseudo-nitzschia*, producer of the ASP toxin domoic acid

Shigeru Itakura, Satoshi Nagai, Yukihiko Matsuyama and Mineo Yamaguchi
Notes on *Pseudo-nitzschia* bloom occurrence in Japanese coastal waters

Ruixiang Li and Mingyuan Zhu
The distribution and HAB formation of *Pseudo-nitzschia pungens* in Chinese coastal waters

Jinhui Wang, Nina Lundholm, Øjvind Moestrup, Yutao Qin and Ren Xu
Preliminary study of *Pseudo-nitzschia* spp. in the Yangtze estuary (China)

Changkyu Lee, Ensub Cho, Jongkyu Park, Changhoon Kim, Wolae Lim and Giyoung Kwon
Occurrence of *Pseudo-nitzschia* species in Korean coastal waters

Tatiana Orlova, Marina Selina and Inna Stonik
Species of the genera *Pseudo-nitzschia* from the east coast of Russia

William P. Cochlan, Julian Herndon and Nicolas C. Ladizinsky
Inorganic and organic nitrogen uptake capabilities of the toxigenic diatom *Pseudo-nitzschia australis*

HAB Section Meeting

Gennady A. Kantakov, Marina S. Selina, Inna V. Stonik and Tatiana Y. Orlova
Oceanological conditions and HAB monitoring in Aniva Bay, Sea of Okhotsk during 2003

Mark L. Wells, Charles G. Trick, William P. Cochlan, Margaret P. Hughes and Vera L. Trainer
Domoic acid: The synergy of iron, copper and the toxicity of diatoms

Mingyuan Zhu and Ruixiang Li
Why the time of large scale HAB of *Prorocentrium* in the area south of Yangtze River Estuary changed in spring of 2005

Hak-Gyoon Kim, Tatiana Orlova, Vera L. Trainer, Charles G. Trick, Yasunori Watanabe and Ming-Yuan Zhu
Participation in the Intergovernmental Oceanographic Commission's Harmful Algae Event Database (HAE-DAT): The first year of PICES involvement

Henrik Oksfeldt Enevoldsen, Monica Lion and Benjamin Sims
Progress in the development of an international collaborative harmful algal event data base: The joint IOC-ICES-PICES HAE-DAT

MEQ Workshop (W2)
Introduced species in the North Pacific

Co-convenors: Yasuwo Fukuyo (Japan), Stephan Gollasch (ICES) and Glen Jamieson (Canada)

Background

The workshop concerned the status of introduced organisms in member countries and progress in developing inventories of introduced species; reports of activities related to research on vectors, including natural (currents and organisms such as turtles and birds), and anthropogenic (ballast water, hull fouling, fisheries, etc.) ones; reports of activities related to the Ballast Water Management Convention, especially measurement of compliance with ballast water exchange protocols, and measurement of effectiveness and development of systems of ballast water treatment. The workshop aimed to have a discussion on the establishment of a Working Group on introduced species under MEQ.

Summary of presentations

Fourteen of 15 scheduled speakers presented papers, with contributors from both PICES and ICES members. Papers presented ranged from descriptions and listings of NIS by geographic area, the characteristics of species that increase their survival if transported to new areas and habitats, the consequences of NIS on ecosystems, research requirements to address recently approved guidelines in the Ballast Water Management Convention that were established at MEPC 53 in July 2005, and the implications from using approved chemicals or products to treat water (possible within the Convention) for control of NIS, and finally, the characteristics of bacterial communities found in ballast water tanks and their reduction as a result of before and after mid-ocean exchanges.

Discussion following the presentations included the impact of global warming on NIS spread, the utility of risk assessment in identifying the most important introduction vectors, the challenges in developing mitigation measures, and how changing water characteristics (quality and heat discharge) seem to be favouring survival rates on new invaders.

The workshop discussion included a proposal to establish a new PICES Working Group on invasive species.

List of papers

Oral presentations

Alexander Yu. Zvyagintsev
Introduction of species into the northwestern Sea of Japan

Li-Jun Wang and Bin Wang
Marine introduced species in China seas and action plans

Hiroshi Kawai, Takeaki Hanyuda and Shinya Uwai
Macroalgal diversity of hull communities on trans-ocean coal carriers

Glen Jamieson, Colin Levings, Dorothee Kieser and Sarah Dudas
Marine and estuarine non-indigenous species in the Strait of Georgia, British Columbia, Canada

John E. Stein
Invasive species in the North Pacific – review of US research

Mitsunori Iwataki, Hisae Kawami, Kazumi Matsuoka, Takuo Omura and Yasuwo Fukuyo
Phylogeny and geographical distribution of *Cochlodinium polykrikoides* population (Gymnodiniales, Dinophyceae) collected from Japanese and Korean coasts

Sergej Olenin (Invited)
Xenodiversity versus biodiversity: Invasive alien species in European coastal marine ecosystems

Stephan Gollasch
Overview on introduced aquatic species in Europe – With focus on ICES Member Countries

Dan Minchin (Invited)
Vectors and processes involved in biological invasions

Akiko Tomaru, Yasuwo Fukuyo, Masanobu Kawachi and Hiroshi Kawai
Effect of mid-ocean exchange of ballast water on bacterial community in ballast tanks

Yasuwo Fukuyo, Katsumi Yoshida and Shin-ichi Hanayama
Importance of inputs from scientists to effective implementation of ballast water management convention

Shinichi Hanayama and Miyuki Ishibashi
Efforts of IMO to avoid secondary toxicity risk on the marine environment by chemical treatment of Ballast Water Management System

Helge Botnen and Stephan Gollasch
Tests of a ballast water treatment system onboard an ocean-going vessel and hints on a new sampling device for larger volumes of water

John E. Stein
Advantage of organizing a PICES Working Group on marine bioinvasions for future cooperation among PICES and ICES

Stephen Gollasch
Recommendation from the Chairman of ICES/IOC/IMO WGBOSV for the consideration by PICES in preparing the TOR for the new PICES Working Group

IFEP/MODEL Workshop (W3)
Modelling and iron biogeochemistry: How far apart are we?

Co-convenors: Fei Chai (U.S.A.), Jun Nishioka (Japan), Yasuhiro Yamanaka (Japan)

Background

Synthesis of data from three successful meso-scale iron enrichment experiments in the subarctic North Pacific (SEEDS-I & II and SERIES) is underway. This workshop was structured to enhance communication between experimentalists and modelers. For the most part, iron is not explicitly represented in current ecological models. The goal of this workshop was to examine the structure of iron biochemical models with respect to what is known about iron biogeochemistry, and to establish a framework for organizing a 2-3 day workshop to address this problem in detail, and to compare ecological models that describe how plankton ecosystem respond to meso-scale iron enrichment in the high-nutrient, low-chlorophyll waters of the subarctic Pacific.

Summary of presentations

An iron biogeochemist introduced recent knowledge of the marine iron cycle and explained the complexities of iron chemistry. Five modelers introduced various types of models that included iron response: a 1-D model representing the SEEDS experiment, a 3-D model with various sources of iron in the Sea of Okhotsk, a 1-D model for intercomparison of three iron fertilization experiments, a 1-D model representing the SERIES experiment, and an ocean iron cycle model.

The discussion led to the following understanding:

- That in order to determine suitable model complexity, it is necessary to consider the identification of important processes, the selection of appropriate spatial and temporal scales, the determination of functional groups, *etc.*)
- That understanding the iron cycle and its effect on ecosystems involves goals that are both specific (mechanisms differ among iron fertilization experiments) and general (variability of ecosystem dynamics associated with climate changes in the near future, iron cycle in the ocean).

It was agreed that:

- Jointly with MODEL, an ecosystem model be developed that includes an iron cycle,
- Be facilitated intercomparisons of models with experimental databases provided by IFEs,
- A 1-day IFEP/MODEL workshop be planned at PICES XV in Yokohama and travel support requested for 1 invited speaker (*IFEP Endnote 3*).

List of papers

Oral presentations

Peter L. Croot (Invited)
The importance of iron speciation and kinetics in understanding iron biogeochemical cycling in the open ocean: Effects on budget estimates from meso-scale tracer release experiments

Naoki Yoshie, Yasuhiro Yamanaka and Shigenobu Takeda
Development of a marine ecosystem model including intermediate complexity iron cycle

Michio J. Kishi, Takeshi Okunishi and Yukiko Ono
Lower trophic ecosystem model including effect of iron in the Okhotsk Sea and adjacent areas

M. Angelica Peña, K.L. Denman, C. Voelker and R.B. Rivkin
Modelling the ecosystem response to iron fertilization during SERIES

Masahiko Fujii, Naoki Yoshie, Yasuhiro Yamanaka and Fei Chai
Simulated biogeochemical responses to iron enrichments in three high nutrient, low chlorophyll regions

James Christian and Christoph Voelker
Modelling the ocean iron cycle – The major uncertainties

MONITOR Workshop (W4)
Filling the gaps in the PICES North Pacific Ecosystem Status Report

Co-convenors: Vyacheslav Lobanov (POC), Phillip R. Mundy (MONITOR), R. Ian Perry (SB), and Sei-Ichi Saitoh (MONITOR)

Background

PICES published its first North Pacific ecosystem status report (NPESR), as Marine Ecosystems of the North Pacific in 2004 (PICES Special Publication 1). The NPESR focused on the period from 1999-2003 in presenting information from throughout the PICES area on climate, oceanography and living marine resources. It also identified some of the critical factors responsible for change in the ecosystems of this area. Although the report covered a large diversity of information, much important information has yet to be incorporated. For example, benthic organisms, nearshore areas and contaminants were not well represented, nor were syntheses and summaries of ecosystem indicators that could be compared across regions widely represented. Determining the relative importance of these data gaps and other missing information are important considerations in producing the next NPESR. The PICES Scientific Report on *Fisheries and Ecosystem Responses to Recent Regime Shifts (FERRRS)* addressed some of these gaps and could become part of the NPESR in the future. The new MONITOR Technical Committee was assigned the responsibility to produce the next version of the NPESR. The purpose of the workshop was to guide the MONITOR Technical Committee by critically examining the current NPESR and the process that produced it. In addition the workshop considered and discussed other ecosystem status reports and other formats for providing similar information. Presentations on these topics were received and discussed during the workshop.

Summary of presentations

The workshop consisted of 7 oral presentations accompanied by extensive discussion of the issues surrounding the production of the North Pacific Ecosystem Status Report, NPESR. Papers addressed the purpose and content of scientific status reports relevant to the development of the NPESR. Five key issues in producing the report were presented and discussed:

1) Defining the overall process;
2) Filling data gaps;
3) Identifying themes to be more fully developed;
4) Identifying scientists to produce the report; and
5) Identifying clients and users of the report.

In the subsequent discussion of the five issues, two more important issues were identified:

6) Identifying the boundaries of the geographic regions used in the report,
7) Adding stock assessments of the approximately 15 species that are targets of the major North Pacific fisheries as indicators of ecosystem status.

A range of options for producing future reports, including labor intensive major re-writes with hard copy publication, and brief annual updates of selected topics on the web were presented and discussed. Significant gaps in data and analysis were noted in the areas of chemical oceanography, benthos, harmful algal blooms and indicators of the status of salmon populations. Hypotheses regarding the mechanisms of production of birds, fish and

mammals were presented as a means to identify gaps in the NPESR and monitoring programs in general. As one means to fill gaps, it was suggested that periodic workshops be conducted on themes including large basin scale physical oceanography including circulation analyses, contaminants, ecosystem level salmon status and trends, intertidal and subtidal ecosystems (see NaGISA presentation), human dimensions (*e.g.* fishing effort and other human activities), acidification and habitat. The NPESR could also benefit from balanced participation by scientists from all member nations. MONITOR was advised to take a proactive approach to understanding what organizations and professions may need in the NPESR, and how the format (brochures, web site, full printed version) of the NPESR could be best designed to reach them. The experience in the Yellow Sea advises that thorough data mining will be necessary to ensure that significant information has not been overlooked. Overall, the workshop participants expressed enthusiasm for the present NPESR, and they were very positive about the future utility of the NPESR in a variety of formats for scientists, policy makers and implementers, NGO's and the concerned public. The workshop results guided the discussion in the MONITOR Technical Committee the next day.

List of papers

Oral presentations

R. Ian Perry and Skip McKinnell
PICES report on the marine ecosystems of the North Pacific: Why, how, and what's needed next

David L. Fluharty
Putting ecosystem science to work

Jacqueline Alder (Invited)
Millennium Ecosystem Assessment: Lessons learned

P. Robin Rigby, Tetsuya Kato and Yoshihisa Shirayama (Invited)
Broadening our understanding of the North Pacific nearshore ecosystem: Integrating PICES and NaGISA

Sinjae Yoo
Filling the gaps: The case of the Yellow Sea

Peter S. Rand, Xanthippe Augerot and Cathy D. Pearson
Progress on a range-wide inventory for Pacific salmon monitoring data

Phillip R. Mundy
Hypothesis-driven ecosystem monitoring in the Gulf of Alaska

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LIST OF ACRONYMS

ACIA	Arctic Climate Impact Assessment Program (ACIAP of AMAP)
AFSC	Alaska Fisheries Science Center
AFS-CAR	American Fisheries Society Program on Climate and Aquatic Resources
AMAP	Arctic Monitoring and Assessment Program
AOML	Atlantic Oceanographic and Meteorological Laboratory
AOOS	Alaska Ocean Observing System
APEC-FWG	Fisheries Working Group, Asia Pacific Economic Cooperation
APEC-MRC	Marine Resources Conservation WG, Asia Pacific Economic Cooperation
APFIC	Asia-Pacific Fisheries Commission
APN	Asia Pacific Network
Argo	International Program for deployment of profiling floats
BASIS	Bering-Aleutian Salmon International Survey, NPAFC
BASS	Basin Studies Task Team, PICES
BEST	Bering Ecosystem Study
BIO	Biological Oceanography Committee, PICES
CalCOFI	California Cooperative Oceanic Fisheries Investigations
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CCCC	Climate Change and Carrying Capacity Program, PICES
CCCC-IP/EC	Executive Committee / Implementation Panel for CCCC
CC-S	Carbon and Climate Section, PICES
CDIAC	Carbon Dioxide Information and Analysis Center
CDN	Canadian Dollar
CeNCOOS	Central and Northern California Ocean Observing System
CFAME (TT)	Climate Forcing and Marine Ecosystem Task Team, PICES
CLIVAR	Climate Variability and Predictability Program
CmarZ	Census of Marine Zooplankton Program
CoML	Census of Marine Life Program
CPR-AP	Advisory Panel on the Continuous Plankton Recorder Survey in the North Pacific, PICES
CPUE	Catch Per Unit Effort
CREAMS	Circulation Research of the East Asian Marginal Seas Program
DBCP	Data Buoy Cooperation Panel
DFO	Department of Fisheries and Oceans, Canada
DMS	Dimethylsulphide
EBM	Ecosystem-Based Management
EC/IP	Executive Committee / Implementation Panel for CCCC
ECCO	Estimating the Circulation and Climate of the Ocean Program
ECOHAB	Ecology and Oceanography of Harmful Algal Blooms Program
ECOR	Engineering Committee on Oceanic Resources
EML	Ecological Metadatabase Language
ENSO	El Niño-Southern Oscillation
ESMF	Earth System Modeling Framework
ESSAS	Ecosystem Studies of Sub-Arctic Seas Program
EVOS	Exxon Valdez Oilspill Trustee Council
FAO	Food and Agriculture Organization
FIS	Fishery Science Committee, PICES
FRA	Fisheries Research Agency of Japan
FUTURE	Forecasting and Understanding Trends, Uncertainty and Responses of Ecosystems

GCM	General Circulation Model
GCOS	Global Climate Observing System
GCP	Global Carbon Project
GEM	Gulf of Alaska Ecosystem Monitoring and Research Program of EVOS
GEOHAB	Global Ecology and Oceanography of Harmful Algal Blooms
GEOS	Global Earth Observing System
GEOSS	Global Earth Observing System of Systems, NOAA
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GIPME	Global Investigation of Pollution in the Marine Environment
GLOBEC	Global Ocean Ecosystem Dynamics Programme
GODAR	Global Oceanographic Data Archaeology and Rescue (IOC-WESTPAC)
GOOS	Global Ocean Observing System
GRA	GOOS Regional Alliances
HAB	Harmful Algal Blooms
HAB-S	Section on Harmful Algal Blooms, PICES
HAE-DAT	ICES-IOC Harmful Algal Event Data Base
HTL	Higher Trophic Level
IAI	Intra-American Institute
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
ICSU	International Council of Scientific Unions
IFEP-AP	Advisory Panel on Iron Fertilization Experiment in the Subarctic Pacific, PICES
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IGBP	International Geosphere Biosphere Programme
IGOSS	Integrated Global Ocean Services System
IHDP	International Human Dimensions Programme on Global Environmental Change
IMARPE	Instituto del Mar del Perú
IMBER*	Integrated Marine Biogeochemistry and Ecosystems Research (former OCEANS)
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission, UNESCO
IOC-IEP	International Ecological Program of IOC
IOCCP	International Ocean Carbon Coordinated Project
IODE	International Oceanographic Data Information Exchange (IOC)
IOS	Institute of Ocean Sciences, Canada
IPCC	International Panel on Climate Change
IPHC	International Pacific Halibut Commission
IPRC	International Pacific Research Center
IUCN	International Union for the Conservation of Nature and Natural Resources
IWC	International Whaling Commission
JAMSTEC	Japan Marine Science & Technology Center
JCG	Japan Coast Guard
JMA	Japan Meteorological Agency
JODC	Japanese Oceanographic Data Center
KODC	Korean Ocean Data Center
KORDI	Korea Ocean Research and Development Institute
LTL	Lower Trophic Level
MBM-AP	Advisory Panel on Marine Birds and Mammals, PICES
MEDS	Marine Environmental Data Service
MEQ	Marine Environmental Committee, PICES

MIE-AP	Advisory Panel on Micronekton Inter-calibration Experiment, PICES
MIRC	Marine Information Research Center
MODEL (TT)	Conceptual / Theoretical and Modeling Studies Task Team, PICES
MOMAF	Ministry of Maritime Affairs and Fisheries, Korea
NAFO	Northwest Atlantic Fisheries Organization
NAO	North Atlantic Oscillation
NaGISA	National Geography in Shore Areas Project
NaNOOS	Northwest Association of Networked Ocean Observing Systems (Pilot project)
NaNOOS-IOOS	Northwest Association of Networked Ocean Observing Systems – Integrated Ocean Observing System
NASA	National Aeronautics and Space Administration, U.S.A.
NASCO	North Atlantic Salmon Conservation Organization
NDBC	National Data Buoy Center, NOAA
NEAR-GOOS	North East Asian Regional GOOS
NEMURO	North Pacific Ecosystem Model for Understanding Regional Oceanography
NESCAFE	New Synthesis of Ecosystem Change and Forecast
NEXT	NEMURO Experimental Planning Team
NIPR	National Institute of Polar Research, Japan
NIWA	National Institute of Water and Atmospheric Research, New Zealand
NMFS	National Marine Fisheries Service, U.S.A.
NOAA	National Oceanographic and Atmospheric Administration, U.S.A.
NODC	National Oceanographic Data Center
NORCAN	Norway–Canada Comparisons of Marine Ecosystems
NORI	National Ocean Research Institute, Korea
NOWPAP	Northwest Pacific Action Plan
NPAFC	North Pacific Anadromous Fish Commission
NPDB-AP	North Pacific Data Buoy Advisory Panel, PICES
NPEMD	North Pacific Ecosystem Data Base
NPESR	North Pacific Ecosystem Status Report
NPFM	North Pacific Fishery Management Council
NPRB	North Pacific Research Board
NSF	National Science Foundation, U.S.A.
NWFSC	Northwest Fisheries Science Center
OBIS	Ocean Biological Information System, CoML
OECOS	Oceanic Ecodynamics Comparison in the Subarctic Pacific
ONR	Office of Naval Research, U.S.A.
ORI	Ocean Research Institute, Japan
OSU	Oregon State University
PaCOS	Pacific Coast Observing System
PaCOOS	Pacific Coast Ocean Observing Systems
PIBOC	Pacific Institute of Bio-Organic Chemistry, Russia
PICES	North Pacific Marine Science Organization
PIFSC	Pacific Islands Fisheries Science Center
PMEL	Pacific Marine Environmental Laboratory, NOAA
PNW-IOOS	Pacific Northwest Integrated Ocean Observing System
POC	Physical Oceanography and Climate Committee, PICES
POGO	Partnership for Observation of the Global Ocean
PORSEC	Pacific Ocean Remote Sensing Conference
PSA	Pacific Science Association
PSC	Pacific Salmon Commission
PSG	Pacific Seabird Group

REX (TT)	Regional Experiments Task Team, PICES
RHLF	Relocation and Home Leave Fund, PICES
RMP	Regional Monitoring Program
RNODC-Section	Responsible National Oceanographic Data Centre Section
SAGE	SOLAS Air–Sea Gas Exchange
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SB	Science Board, PICES
SCCOOS	Southern California Coastal Ocean Observing System
SCOPE	Scientific Committee on Problems of the Environment
SCOR	Scientific Committee on Oceanic Research
SEAFO	South East Atlantic Fisheries Organization
SEEDS	Subarctic Pacific Iron Experiment for Ecosystem Dynamics Study
SERIES	Subarctic Ecosystem Response to Iron Enrichment Study
SGCP	Study Group on Capacity Building, PICES
SGEBM	Study Group on Ecosystem-based management and its applications to the North Pacific, PICES
SGFISP	Study Group on Future Integrative Scientific Program(s), PICES
SOCER	Status of the Cetacean Environment Report
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
SWFSC	Southwest Fisheries Science Center
TBD	To be determined
TCODE	Technical Committee on Data Exchange, PICES
TINRO-Centre	Pacific Research Fisheries Centre, Russia
TRF	Trust Fund, PICES
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WCF	Working Capital Fund, PICES
WESTPAC	IOC Sub-Commission for the Western Pacific
WG	Working Group
WG 18	Working Group on Mariculture in the 21st Century - The Intersection Between Ecology, Socio-Economics and Production
WG 19	Working Group on Ecosystem-Based Management Science and its Application to the North Pacific
WGNIAS	Working Group on Non-Indigenous Aquatic Species
WGBOSV	Working Group on Ballast Waters and Other Ship Vectors, ICES/IOC/IMO
WGITMO	Working Group on Introductions and Transfers of Marine Organisms, ICES
WMO	World Meteorological Organization
XML	Extensible Markup Language