REPORT OF OPENING SESSION

The Opening Session was called to order at 09:00 hours on October 16, 2006, by the Chairman, Dr. Vera Alexander, who welcomed delegates, observers and researchers to the PICES Fifteenth Annual Meeting (PICES XV).

Welcome addresses on behalf of the host country, the host city and the host agency

Mr. Akira Nakamae (Deputy Director-General of the Fisheries Agency of Japan) welcomed participants on behalf of the host country (*OP Endnote 1*), Mr. Hiroshi Nakada (Mayor of Yokohama) addressed the session on behalf of the host city (*OP Endnote 2*), and Mr. Kyouichi Kawaguchi (President of the Fisheries Research Agency of Japan) greeted participants on behalf of the host agency (*OP Endnote 3*).

Remarks by representatives of Contracting Parties and the Chairman of PICES

Dr. Alexander invited Dr. Laura Richards (Regional Director of Science, Pacific Region, Fisheries and 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 as *OP Endnote 4*.

Dr. Alexander called upon Mr. Fengkui Liang (Division Director, Department of International Cooperation, State Oceanic Administration, People's Republic of China) to make a statement on behalf of the Chinese Government. Mr. Liang addressed the session and his remarks are appended to the report as *OP Endnote 5*.

Dr. Alexander then asked Dr. Ig-Chan Pang (Director, Headquarters for Marine Environment, National Fisheries Research and 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 as *OP Endnote 6*.

Dr. Alexander invited Dr. Lev N. Bocharov (Director-General, 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 as *OP Endnote 7*.

Dr. Alexander requested Dr. Samuel Pooley (Director, Pacific Islands Fisheries Science Center, National Oceanic and Atmospheric, Administration, United States of America) to speak on behalf of the U.S. Government. Dr. Pooley addressed the session and his remarks are appended to the report as *OP Endnote 8*.

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 as *OP Endnote 9*.

Dr. Alexander thanked Mr. Nakamae, Mr. Nakada and Mr. Kawaguchi, and all the delegates for their remarks and spoke on behalf of PICES. The text of her address is appended to the report as *OP Endnote 10*.

Wooster Award presentation ceremony

Dr. Alexander and the Science Board Chairman, Dr. Kuh Kim, conducted the Wooster Award presentation ceremony. Dr. Kim quoted the following Science Board citation for the 2006 Wooster Award (reading of the citation was accompanied by a special slide show dedicated to Dr. Makoto Kashiwai):

In 2000, PICES established an award in honor of 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 to be 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; and preferably someone who is or had been actively involved in PICES activities.

Prior recipients of the Wooster Award are Prof. Michael M. Mullin (2001), Prof. Yutaka Nagata (2002), Prof. William Pearcy (2003), Prof. Paul H. LeBlond (2004), and Dr. Daniel Ware (2005). Today, it is with great pleasure that I announce the Warren S. Wooster Award recipient for 2006. The Wooster Award for 2006 is being given to Dr. Makoto Kashiwai, a nationally and internationally distinguished interdisciplinary ocean scientist.

Dr. Kashiwai has authored or co-authored more than 20 primary journal articles, book chapters or review papers covering several disciplines that include fine-scale coastal hydrodynamics, biological production and fish population dynamics, and climate-scale ocean variability. His early career was with the Faculty of Fisheries at Kyoto University, where his research used hydraulic model experiments and theory to study tidal exchange, residual circulation and tidal vortices in Kumihama Bay. While in Kyoto, he also investigated the formation of the anoxic layers of water in Kumihama Bay using field observations, and he contributed to the development of a continuous fish egg sampler, which was used in interdisciplinary studies of the microdistribution of fish eggs, larvae and plankton and its relation to ocean microstructure.

*In 1986, Dr. Kashiwai moved to the Hokkaido National Fisheries Research Institute where he worked as the Head of the Physical Oceanography Section, and later as the Director of the Fisheries Oceanography Division until his retirement in 2001. During this period, he conducted a series of studies on the oceanographic structure and variability of the Oyashio region and its ecological influences. Among other observations obtained at this time, Dr. Kashiwai began routine physical and ecological observations of the Oyashio region along the "A-Line". This line is now an important time series, which continues today, and which has contributed greatly to the understanding of seasonal to decadal variability of the Oyashio region. Dr. Kashiwai, with other colleagues, also initiated studies of the relationships between oceanographic variability and fish population dynamics of Japanese sardine and walleye pollock in the Oyashio. In 1989, he organized a special session at an international symposium on "*The Okhotsk Sea and sea ice*", where the results of the Oyashio project were presented. This symposium marked Makoto's first appearance on the international stage. At the symposium, he met Prof. Yutaka Nagata and Dr. Daniel Ware (both previous Wooster Award winners), and those meetings led him into ecosystem modeling in the Oyashio region and to PICES. Later, Makoto and his Japanese colleagues conducted comparative studies of the La Perouse, Oyashio and Labrador ecosystems under a Japan/Canada Science and Technology Exchange program with Canadian scientists from the Department of Fisheries and Oceans. As part of this work, ecosystem models were developed to compare the impact of interannual and decadal ocean climate variations on lower trophic levels and fish population dynamics between western and eastern boundary current regions.*

Dr. Kashiwai has been generous in serving the ocean science community at both the national and international levels. He served as a member on several committees of the Japanese Society of Fisheries Oceanography, and later as the Vice-President of that society. OK, but what has he done for PICES, you wonder? Well, his service to PICES has been also extensive and in many roles. He was a member of PICES' Working Group 1 on the Okhotsk Sea and Oyashio region. *Japan offered to host the PICES Third Annual Meeting in Nemuro in 1994. Makoto*

was appointed the main local coordinator of the meeting. On October 5th, 10 days before the start of the Annual Meeting, an 8.1-magnitude earthquake occurred in the southern Kurils and northern Hokkaido. The arranged venue for the PICES meeting was severely damaged and unusable. Makoto took the lead in arranging alternate facilities and preparing everything from scratch for the meeting, which was finally held primarily in the Nemuro-City Library. At the same meeting, he convened a PICES/GLOBEC workshop and was appointed the Co-Chairman of the PICES/GLOBEC initiative on Climate Change and Carrying Capacity (CCCC). He devoted significant time toward getting the CCCC Program up and running, establishing task teams, and contributing scientifically to the MODEL Task Team. At PICES IV in 1995, he succeeded his friend and colleague, Dr. Daniel Ware, as the Chairman of the Science Board of PICES. His term as the Science Board Chairman concluded in 1998, and that same year, the Japanese Government appointed him as national delegate to PICES. Thus, in a few short years, he had served as Co-Chairman of the first PICES scientific program, as Science Board Chairman, and as a national delegate on Governing Council. But, that apparently was not enough, for in 2000 he became again the Co-Chairman of the CCCC Program for another three years!

In his recent "retirement" years, Makoto has continued his study of the Oyashio ecosystem, he has coordinated a cooperative study of Nemuro-city and SakhNIRO, Russia, on the larval transport of the Hanasaki crab, and he has been an adjunct professor at the Tokyo University of Agriculture, where he continues to teach fisheries oceanography of the subarctic Pacific to undergraduate and graduate students.

In conclusion, Dr. Makoto Kashiwai is an active leader in fisheries oceanography, on theoretical and observational studies of the structure and variability of the Oyashio, and has contributed greatly to the goal of international cooperation and collaboration on North Pacific Ocean research in general, and through PICES specifically. He is eminently qualified and a worthy recipient of the Wooster Award of PICES, and we are pleased to honor him today with this award.

Dr. Wooster was the Chairman of PICES during the first year when Dr. Kashiwai served as the Science Board Chairman, and they also co-chaired the PICES/GLOBEC CCCC Implementation Panel and developed a special working relationship. Dr. Alexander read the following tribute sent by Dr. Wooster:

It is an honor for me to participate in this award to Makoto Kashiwai, one of the early and most substantial contributors to the scientific programs of PICES. He first made his mark with development of the CCCC Program. While the question was inspired by the threat of saturating the North Pacific with expatriate salmon, its broad scope became clear in Makoto's classic paper on the history of the carrying capacity concept. This demonstrated that carrying capacity was not just an arbitrary and ill-defined constant in a theoretical productivity equation, but was an index of ecosystem productivity and a variable function of environmental change. It made evident, to me at least, that the carrying capacity for a specific population, for example that of Steller sea lions, could change with the climate as did the availability of suitable food. The development of this program, to which Makoto has made major contributions, has been fundamental towards achieving the scientific goals of PICES.

Of course, as the Science Board makes clear in its citation, Makoto has been involved in most scientific activities of PICES, so perhaps that which I have emphasized is not the most significant. But it has certainly clarified the way I look at the effects of climate variations on marine ecosystems, so perhaps the education of this oceanographer at least is worth recognizing. In my view, the case for presenting this award to Makoto Kashiwai is crystal clear.

Dr. Alexander presented a commemorative plaque to Dr. Kashiwai (a permanent plaque identifying Wooster Award winners resides at the PICES Secretariat), who accepted the award with the following remarks:

Thank you, Vera. Thank you, Dr. Kim. This is the greatest honour of my life.

When I heard from my old PICES friends that they were planning to nominate me as a candidate for the PICES Wooster Award of this year, I felt a strong hesitation because I do not feel that I am a great professor or excellent scientist as the previous recipients. But they told me that the major reason for my nomination is that I am one of the first generation PICES scientists that is brought up by PICES and helped to shape the Organization today. I could not deny that and so I accepted the nomination, which will be a strong encouragement for present and future PICES scientists, especially from non-English-speaking countries.

I can clearly remember the words of Dr. Warren Wooster, back in 1995, when I hesitated to accept the position of Science Board Chairman because of my insufficient English speaking ability. Warren said, "My expectation is not in your English speaking ability". I thought, at that time, that Warren might have found in me some possible capability to cope with the role of Science Board Chairman. Now I am sure that Warren meant nothing but my incapability in English itself. It was very important for PICES at that time, for any scientist from a non-English-speaking country to sit in a major driving seat of PICES, because, except for 2 member countries in North America, the rest of the 4 member countries on the western side of the Pacific are non-English-speaking countries.

My first project was to compose the Chairman's Handbook. The most important task for me was to incorporate the guideline "Use slow and clear English, not machine-gun talk", which was much help through my PICES days. This might be one of the expectations of Warren. This Handbook was not an instruction booklet made by the Secretariat, but a driving manual for new Chairmen of any subsidiary body of PICES, hoping that PICES can be an organization driven by scientists.

During my Science Board Chairmanship, both PICES and I benefited from the powerful participation of elder and younger colleagues, and it was a truly rich and enjoyable time. Thus, this award is a proof of the achievement by all the PICES scientists who shared my PICES days with me. So, I would like to ask all of the PICES colleagues here to share this honour and happiness with me. Thank you.

PICES "Year-in-Review" 2006

Dr. Kuh Kim reviewed PICES' scientific accomplishments since the Fourteenth Annual Meeting (*OP Endnote 11*).

Keynote lecture

The keynote lecture entitled "*Biological production, animal migration and ecosystem regime shifts in the Kuroshio and Oyashio Currents: Perspectives for sustainable use*" was given by Dr. Akihiko Yatsu (Hokkaido National Fisheries Research Institute) as a part of the Science Board Symposium on "*Boundary current ecosystems*". The abstract of his presentation is appended to the report as *OP Endnote 12*.

The Opening Session closed at 10:40 a.m.

OP Endnote 1

Welcome address on behalf of the host country by Mr. Akira Nakamae

Madame Chairperson, distinguished guests, ladies and gentlemen: It is my great pleasure to be able to hold the Fifteenth Annual Meeting of the North Pacific Marine Science Organization (PICES) in the city of Yokohama. On behalf of the Government of Japan, let me extend my sincere welcome to you.

Since its foundation, PICES has made valuable scientific contributions toward the issues of climate change and to the responses observed in the marine ecosystem. It has recently dealt with the problems in coastal areas being shared by the member nations, such as the occurrence of harmful algal blooms, the outbreak of jellyfish on a large scale, or the spreading of invasive alien organisms, and attained profound results. I would like to pay my full respect to those who extended their best effort during this period, in particular to the Chairperson, Dr. Vera Alexander, and the Executive Secretary, Dr. Alexander Bychkov.

I have been involved with various international fisheries negotiations, including those on tuna and whales. Through these negotiations, which sometimes have led to a severe conflicting position due to one's own interests, I strongly feel that what is most important is an objective discussion based on the scientific knowledge and the spirit of reciprocity. The benefits of living marine resources and marine ecology are the common assets nature has given to mankind, and it is our duty to conserve them appropriately and to utilize them in a sustainable and wise manner. In undertaking such obligations, the advancement of marine science carried out by PICES, and by coordination and cooperation of the member countries for that target will, I am sure, render a great support. I expect that in the future PICES will continue to play a central role in the research of marine science in the North Pacific Ocean, and will return the outcomes to various areas of the North Pacific Ocean as well as to the member countries.

Finally, I wish this Annual Meeting will bear scientifically fruitful results and give an opportunity to deepen the mutual friendship and trust among all the participants.

Thank you very much.

OP Endnote 2

Welcome address on behalf of the host city by Mr. Hiroshi Nakada

Distinguished ladies and gentlemen: On behalf of the 3.6 million citizens of Yokohama, I would like to celebrate the opening of the Fifteenth Annual Meeting of the North Pacific Marine Science Organization (PICES). I am very pleased to hear that PICES was established to serve the collaboration of fisheries and marine science in the North Pacific Ocean area.

The Red Brick Warehouse where you are presently was a popular building from Meiji through the Taisho period, that is, from around 130 years ago to the 1920s, and until 1955, freighters were installed here, carrying goods and fisheries products from the port. So this red brick building on the water-front is a historical structure and symbolizes Yokohama.

I am sure you have already seen some parts of Yokohama. As the city is on the seaside, whales and young tuna were seen in the olden days. The high-grade materials for Japanese Edo style sushi, such as mantis shrimp or sea eel used to be harvested here. There are beautiful water-front scenery, the biggest China-town in the world and shopping areas for you to enjoy.

The world, in particular Yokohama city, is watching the activities of PICES this time. Please attain a fruitful meeting and provide us with the scientific information. I wish that your work will further be developed and your research will contribute to the society.

Thank you very much.

OP Endnote 3

Welcome address on behalf of the host agency by Mr. Kyouichi Kawaguchi

Madame Chairperson, distinguished guests, ladies and gentlemen: On behalf of the hosting organization for the Fifteenth Annual Meeting of the North Pacific Marine Science Organization (PICES), as the President of the Incorporated Administrative Agencies, Fisheries Research Agency, I would like to extend my cordial welcome to you all.

PICES, since its establishment in 1992, has carried out, until now, various scientific activities to advance marine science in the North Pacific Ocean and to promote international cooperation toward that objective. During this period, a rapid expansion was noticed in the exchange between scientists and research institutes of the member countries, advancing research in diverse fields of marine science and strengthening the ties among scientists and research institutions.

The Fisheries Research Agency, having its head office here in Yokohama, is a core organization of marine research in Japan. It has actively performed activities of PICES together with other universities and research institutes of fisheries or marine studies. We are very pleased to have contributed, during these years, to the measures such as changes in the marine ecosystem of the North Pacific Ocean, elucidation on the dynamic movement of marine ecosystem, and counter-measures against toxic red tide or outbreak of jellyfish. And it is a great honor for us to help organize the Annual Meeting at this occasion.

Today, when the influence of global warming is getting visible, and since the main focus of PICES is placed on climate changes and elucidation on the response by marine ecosystems, the activities of the Organization will be much more important in the future, not only for the member nations, but also for the Pan Pacific area. Under such circumstances, the research institutes and universities in the member countries have to keep closer ties and work in collaboration to elucidate the problems we are facing, and widely return the fruitful outcomes to society. At present, the Fisheries Research Agency is aiming to build a comprehensive and cooperative relationship with the Chinese National Marine Science Research Institute and with the Korean National Fisheries Research and Development Institute. A Memorandum of Understanding is scheduled to be signed in the near future.

I strongly believe that the closer ties among the three countries, Japan, China and Korea, will further advance research on fisheries and the ocean, and at the same time make activities of PICES further developed.

Lastly, I wish that this Annual Meeting would be completed with great success, and I hope you will enjoy a comfortable stay in Yokohama.

Thank you very much.

OP Endnote 4

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

Madame Chairman, distinguished guests and colleagues: On behalf of Canada and the Canadian delegation, I would like to thank the Fisheries Research Agency and the Government of Japan for inviting us here to the beautiful port city of Yokohama.

PICES has just completed another exciting year with the CCCC synthesis symposium in Hawaii. This symposium not only examined how ecosystems respond to climate variability but also identified priorities for the next stages climate–ecosystem variability research. Then, the Line-P symposium in Victoria in July examined 50 years of oceanography along Line-P, and outlined plans to ensure the continuation of this important data series. Another highlight is the planning for the next

major integrative scientific program. These events continue the long history of research in oceanography and fisheries science in the North Pacific – a history of which PICES now plays a proud part.

The new program, FUTURE, will build on the success of the CCCC Program and continue to advance PICES' work by developing a forecasting capability, thereby further developing PICES' ability to advise member nations on important changes that are occurring in the Pacific Ocean. This will require, more than ever, a truly multinational, interdisciplinary approach – an approach that PICES will continue to foster. These developments will ensure that PICES stays relevant by providing information to help governments and society in making the tough choices that lie ahead. FUTURE should also bring new people and fresh ideas into PICES to keep it a vibrant and dynamic organization. I expect FUTURE to be a hot topic of conversation during this meeting.

For next year, I look forward to welcoming you all to Victoria when it is Canada's turn to host the PICES Sixteenth Annual Meeting. This will be a particularly special event for us, since it will mark the beginning of a year-long celebration recognizing 100 years of science at the St. Andrews Biological Station on Canada's east coast and the Pacific Biological Station at Nanaimo, north of Victoria, on Canada's west coast. I hope to see you there.

Thank you.

OP Endnote 5

Remarks at the Opening Session by Mr. Fengkui Liang (People's Republic of China)

Respected Chairperson, distinguished delegates, representatives and guests, ladies and gentlemen: First of all, I would like, on behalf of the Chinese Delegation, to extend our thanks to the Government of Japan and the PICES Secretariat for inviting us to attend this Fifteenth Annual Meeting of PICES. Our thanks also go to their hard effort devoted to the preparation of the meeting. It is our great pleasure and honor to be able to participate in this important gathering in the field of marine science in the region.

For the past decade, PICES has grown into a full fledged and an important intergovernmental regional organization for marine science. The successful implementation of its various programs and activities by the participating governments and their distinguished scientists contributed a lot to the sustainable use of the ocean resources of the member countries. And now, more and more countries have paid greater attention to the role of marine science in promoting the sustainable development of ocean resources. In order to achieve the sustainable development of the ocean, an ecosystem approach has been widely advocated by several UN agencies, governmental and non-governmental organizations, including the World Summit on Sustainable Development. There is general understanding that there is still great uncertainty how the ecosystem-based approach works in science. There will be a great role for PICES to exert in solving these uncertainties through science. And therefore, we in principle endorse the proposed themes for the future PICES Integrative Scientific Program entitled *Forecasting and Understanding Trends, Uncertainty and Responses of Ecosystems*, which is to be the focus of the future activities of the Organization for the next phase. We would also continue encouraging Chinese scientists to be more deeply involved in the implementation of the PICES program and contribute to its success.

Finally, we wish all of us a wonderful stay in Japan and great success for the Annual Meeting. We welcome you all to Dalian in 2008 for the PICES Seventeenth Annual Meeting.

Thank you very much.

OP Endnote 6

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

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

Through PICES activities, we in the North Pacific are expanding our international and interdisciplinary scientific cooperation. I would like to appreciate the enthusiastic efforts of PICES scientists. The Republic of Korea realizes the importance of international cooperation in ocean science, and our government is getting more interested in PICES activities and has encouraged young scientists to join PICES activities with various supporting programs. One of such programs is to bring 24 young scientists to PICES XV by the research vessel *Gaya* of Pukyong National University from Busan port in Korea to Yokohama port in Japan. As a part of PICES activities, the CREAMS/PICES international workshop and the first PICES international summer school, held in Korea this summer, were partly supported by our government, and both were well attended and concluded with very good results. The Government of the Republic of Korea is willing to support PICES activities.

PICES is a unique organization that includes the involvement of both scientists and governments. Through the coordinated efforts of PICES scientists, we can maintain the North Pacific ecosystem. PICES is getting important and therefore, can play an important role in the future in helping the member countries in policy decision making for the ecosystem.

I wish all of you successful achievement at this Fifteenth Annual Meeting with the PICES spirit.

Thank you very much.

OP Endnote 7

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

Dear Dr. Vera Alexander, distinguished guests, dear participants, ladies and gentlemen: First, on behalf of the entire Russian delegation I would like to thank PICES for the invitation to take part in the Fifteenth Annual Meeting. I would also like to thank the local organizing committee for their prompt and effective activity during the preparation of the meeting.

The scale of PICES activities has enormously increased during the 14 years since the origin of the Organization. Today, PICES is a widely known and authoritative international organization, whose role in the study of oceans and seas has been constantly growing. PICES relationships and joint activities with other international organizations have notably strengthened during the last years. Interest in PICES projects as demonstrated by a wide international audience has increased as well.

At the moment, PICES is considering the possibility of new coming members and observers from other Pacific Rim countries to join the organization. Involvement of new countries will certainly improve our knowledge and understanding of marine ecosystems, particularly, their state-of-the-art dynamics and interaction.

Much work is done in between PICES Annual Meetings. Scientists from various fields (biology, oceanography, chemistry, *etc*.) are involved in research under the auspices of PICES. They develop complex ecosystem approaches, organize inter-disciplinary symposia and promote research projects.

The Russian Federation has always paid much attention to the development of scientific knowledge about marine living resources of the

World Ocean. That is why an international scientific community, called "PICES", and its activities, are highly appreciated in Russia. The fact that Russia is involved in PICES provides an additional credit to our country and favors our increasing influence on the development of international cooperation in the Pacific Ocean region of Asia.

The participation of Russian scientists in various PICES programs and conferences provides an access to the extensive set of data on fundamental and applied ecosystem studies for other PICES countries. These data are incorporated into the international database thus improving our understanding of global processes underlying environmental changes and their impact on marine inhabitants.

All of us are now completing the integrative CCCC Program, and working on development of the next PICES integrative scientific program, "FUTURE". Russia is interested in pooling efforts of all the PICES members to fulfill these programs. We have worked out several concrete suggestions on how to implement these programs.

"Boundary Current Ecosystems" of the North Pacific Ocean is the key theme of the PICES Fifteenth Annual Meeting. I am quite sure that the progressive ecosystem approach towards the study of the ocean will be widely used by all nations in their endeavors towards the utilization of marine living resources and the development of aquaculture.

In conclusion I would like to wish all the participants of this meeting an interesting and fruitful meeting.

Thank you for your attention.

OP Endnote 8

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

Good morning, distinguished delegates and fellow scientists. It is with great pleasure that the United States thanks the Government of Japan for hosting this year's PICES Annual Meeting at this wonderful venue in Yokohama. Yokohama has a rich history and we look forward to getting to know it better.

The United States understands that this is a pivotal meeting for PICES as we develop a program for our future work. Collaborative science is the hallmark of PICES, and our future integrative science program must weave these strands in a truely interdisciplinary fashion. But this integration is not easy, just as the work of an essentially voluntary organization of academic, governmental, and independent scientists is not easy. Both depend on a strong spirit of collegiality and creativity. The challenge is even greater as we bring the forces of climate and human impacts into the equation concerning ecosystem processes, biological productivity, and resource use.

The development of young scientists in all member nations goes hand-in-hand with developing the new PICES science program. The United States is pleased to host the 2007 ICES/PICES Early Career Scientists Conference, as well as to continue its support of the PICES Intern Program to help build capacity in young scientists internationally. We encourage strong participation in the Early Career Scientists Conference and look forward to continued success for the Intern Program.

It is a special pleasure for me to represent the United States at this meeting in Yokohama since the staff of my own fisheries research laboratory has a 50–year history of work with Japan's Far Seas Laboratory located nearby in Shimizu. When we look at the patterns of productivity in the North Pacific albacore fishery, we see strong decadal signals that can only be caused by complex interactions of biology with an underlying oceanographic process. Similarly, new technologies allow us to identify so-called "hot spots" of the occurrence of bigeye tuna and

other fishery species at 30ºN related to oceanographic conditions. We hope that PICES will broaden its focus to include new species such as tunas and their more extensive habitats.

Finally, let us hope that the close working interactions of the PICES scientific community foster the kind of international cooperation that enhances the role of science in society.
With that, let me close by wishing everyone a productive fortnight.

Thank you for your attention.

OP Endnote 9

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

Madam Chairperson, distinguished delegates, guests, ladies and gentlemen: Welcome to Yokohama! On behalf of the Japanese participants, and as a citizen of Yokohama, I would like to extend my sincere welcome to all of you. One hundred and fifty years ago, Yokohama opened its port to the world. Thereafter, Yokohama has been developed as a Japanese window where the East meets the West beyond the Pacific Ocean. Therefore, I could say that here is the best place to hold this PICES Fifteenth Annual Meeting.

Boundary current ecosystems, the theme of this Annual Meeting, have been a basic topic for PICES. We have frequently discussed various aspects of their role, such as a transport system of eggs and larvae, a migration passage of marine organisms, and a transport system of heat and other materials. Those discussions have not only promoted the North Pacific marine science, but also affected fisheries management and ecosystem conservation in the Contracting Parties.

On the other hand, the boundary current is an interface of coastal and offshore waters. If its heat transport changes with global warming, coastal ecosystems must be strongly affected. Therefore, studies on the interaction between boundary currents and coastal waters are important for understanding the influence of global warming to various ecosystem services of coastal waters.

As an old proverb says, by exploring the old, one becomes able to understand the new. I would like to expect that this Annual Meeting will provide an opportunity to synthesize the previous discussions, and will be a starting point for more advanced studies.

Thank you very much.

OP Endnote 10

Welcome Address by Dr. Vera Alexander, Chairman of PICES

Mr. Nakamae, Mr. Nakada, Mr. Kawaguchi, distinguished delegates and members of the PICES community: It is a great pleasure to be warmly welcomed here in Yokohama. Yokohama is a strong and vital maritime center, famous as a focus for Japanese research on the deep sea and for advanced technology. We thank our hosts for their vision and hospitality in making this unusual and charming venue available for this PICES Annual Meeting.

This is the last time that I will have the pleasure of addressing you as Chairman of PICES, and I have to tell you that I have enjoyed working with this marvelous PICES family over the past 4 years as Chairman and, in fact, during the entire gestation and life of the Organization in other capacities as well. I say “family” rather than our more usually applied term “member” because that is what we are. We are a multinational multitude of scientists all united in a common cause – developing an in-depth and predictive understanding of the North Pacific Ocean. The contributions by scientists from all the signatory nations have been amazing. As a result, our goal of advancing knowledge of the

North Pacific Ocean is being achieved. Not only have official participants in the various bodies of the Organization worked hard and effectively, but a much broader community has been engaged in the scientific meetings, symposia and workshops.

The theme of my message to you today, as I prepare to step down as Chairman, is the compelling need to continue to address our changing world, and the important role PICES has to play in this. Why? In the process of developing PICES, well before the memorable occasion in Ottawa in November 1992, when finally signatures were put on paper, the group that I call the "PICES plotters" held meetings and symposia that, for the first time, examined the relationship between oceanographic processes, climate and biological processes, including fisheries. This blending of disciplines was prescient, and led towards the contemporary approach, now universally accepted — almost! It is hard for our young scientists to understand that there once were formidable difficulties in bringing long-established disciplines together. No one recognized this more than our founder, Dr. Warren Wooster, a physical oceanographer himself. Now, we accept the juncture among fields, and the holistic approach to our oceans.

The PICES/GLOBEC CCCC Program built on this enlightened approach. The practical application of its results becomes even more important, as climate warming persists and we recognize that now, more than ever, biological resources need a new management paradigm. This will be to the benefit of all PICES nations and beyond. A comprehensive understanding of ecosystem science is needed to enable a new enlightened approach.

PICES has produced the report on the status of the North Pacific Ecosystem and is winding down the CCCC Program. The nature of the next large integrative PICES program is as yet unknown. As we proceed with the conception and planning, PICES almost certainly will bring a new dimension into the picture — the human dimension.

History shows that PICES can rise to the occasion, and address timely and important scientific issues. Arguably, nothing is more critical than the potential effects of climate change, and nothing confounds our ability more to predict future conditions. Managing fisheries in the context of such change and taking into account the complexities of a marine ecosystem, is a daunting task, and acquiring an in-depth scientific knowledge is but the first step.

We will need to take our collective knowledge, apply newly emerging scientific understanding, and develop a new paradigm for dealing with our Pacific Ocean. This will be to the benefit of all PICES nations and beyond. The next decade promises to be fruitful, if we can continue to apply the PICES tradition of relentless international cooperation in addressing the problem. We are a small organization, with six nations and a small secretariat. The Pacific Ocean is vast, and relatively understudied, at least in comparison with the Atlantic. We must count on you, the PICES scientists, to lead the charge and get the job done.

Science is truly the international language, and it recognizes no boundaries. Just as we break the scientific barriers through cooperation, so we also develop a mutual understanding among the nations on the North Pacific margins, again to the benefit of all. There is a lot of work to be done, and the PICES family is ready, willing and able to move ahead. Let this meeting be a milestone in effecting a regime shift in knowledge.

Thank you for your attention.

OP Endnote 11

PICES "Year-in-Review" 2006 by Dr. Kuh Kim, Chairman of Science Board

PICES aims to develop international collaborations by bridging scientists across disciplines, national boundaries and institutions through the organization of meetings and publications.

PICES has maintained excellence in its record of publications in 2006. Selected papers from two Topic Sessions convened at PICES XIII in 2004 on "*Mechanisms that regulate North Pacific ecosystems: Bottom up, top down, or something else?*" and "*Hot spots and their use by migratory species and top predators in the North Pacific*" are published this year in *Progress in Oceanography* (Vol. 68, Nos. 2-4) and *Deep-Sea Research II* (Vol. 53, Nos. 3-4), respectively. Two more major publications are now in press: results of the IFEP SERIES experiment will be published by the end of 2006 in *Deep-Sea Research II* (Vol. 53, Nos. 20-22), and a set of papers on NEMURO and NEMURO.FISH models will appear in *Ecological Modelling* in February 2007. I would like to take this opportunity to express our thanks to the guest editors of all four special issues for their outstanding efforts to make these publications possible in time.

Since its inception, PICES has established the Scientific Report Series as an essential vehicle to distribute its knowledge, and in 2006 two more reports are added. *PICES Scientific Report No. 31* is the proceedings of the 2004 workshop on "In situ *iron enrichment experiments in the eastern and western subarctic Pacific*", and *PICES Scientific Report No. 32* is the proceedings of the 2005 workshop on "*Oceanic ecodynamics comparison in the subarctic Pacific*". Results of the PICES/NPRB workshop on "*Integration of ecological indicators of the North Pacific with emphasis on the Bering Sea*" will be published in December as *PICES Scientific Report No. 33*.

This year is particularly notable in that the PICES community has met thirteen times at workshops and meetings around the world since the 2005 Annual Meeting in Vladivostok. Some of these include:

- In October 2005, an NPAFC/PICES symposium on "*The status of Pacific salmon and their role in North Pacific marine ecosystem*" was held in Jeju (Korea);
- In November 2005, a workshop on "*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*" (sponsored by FRA, APN, IAI, PICES and GLOBEC) was held in Tokyo (Japan);
- In April 2006, a PICES/GLOBEC symposium on "*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*" was convened in Honolulu (U.S.A.);
- In June 2006, a PICES/NPRB workshop on "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea*" was convened in Seattle (U.S.A.);
- In June 2006, an ESSAS workshop to develop comparative studies of the sub-Arctic seas (sponsored by GLOBEC, PICES and TINRO-Center) was organized in St. Petersburg (Russia);
- In July 2006, a symposium on "*Time series of the Northeast Pacific Ocean*" (sponsored by DFO and PICES) was convened in Victoria (Canada), to mark the 50th anniversary of Line-P, which has been a backbone of time series observation programs in the northeastern Pacific;
- In August 2006, a CREAMS/PICES workshop on "*Model/data inter-comparison for the Japan/East Sea*" (sponsored by SNU, KORDI, PKNU and PICES) was held in Busan (Korea);
- Close cooperation between PICES and ICES continued this year with two joint theme sessions on "*Large-scale changes in the migration of small pelagic fish and the factors modulating such changes*", and on "*Operational Oceanography*" convened at the ICES Annual Science Conference in Maastricht (Netherlands) in September.

As PICES has been recognized as a very successful organizer of international meetings, several big symposia are already in front of us. Preparation is well underway for the 4th International Zooplankton Production Symposium on "*Human and climate forcing of zooplankton populations*" (co-sponsored by PICES, GLOBEC and ICES) to be held in May 2007, in Hiroshima (Japan). Active participation of the PICES community is expected in the 5th International Conference on "*Marine bioinvasions*" (co-sponsored by ICES, PICES and the U.S. National Sea Grant Program) in May 2007 (Cambridge, U.S.A.), and in the International Symposium on "*Reproductive and recruitment processes in exploited marine fish stocks*" (co-sponsored by NAFO, PICES and ICES) in October 2007 (Lisbon, Portugal). PICES will organize, with ICES and IOC, an International Symposium on "*Effects of climate change on the world's ocean*" to be held in May 2008, in Gijón (Spain).

PICES' long-term interests in capacity building resulted in organizing the first PICES summer school on "*Ocean circulation and ecosystem modeling*" held August 23–25, 2006, in Busan (Korea). This school was co-sponsored by PICES and several Korean universities and institutions. Seven lecturers from Japan and U.S. taught a total of 37 participants from all 6 PICES member countries plus Chile and Indonesia (14 Ph.D. and 11 M.Sc. students, 7 early-career scientists, 4 undergraduate students, and 1 from a private company). Certificates were delivered to all participants on completion of the school. PICES has already received a proposal from Japan to host a second summer school on "*Ecosystem-based management*" in September 2008, at Hokkaido University, in Hakodate.

It has taken 3 years for PICES and ICES to prepare the Early Career Scientists Conference on "*New frontiers in marine science*" to be hosted by the University of Maryland Center for Environmental Science from June 26–29, 2007, in Baltimore, U.S.A. The goal of the conference is to foster the development of contacts, collaborations, and associations among early career scientists that will persist for decades, and to establish personal and institutional networks that will help to advance our understanding of the marine environment. Approximately 100 young scientists from around the globe will be invited to share their interests in marine sciences. For detailed information about the conference please visit the PICES website.

Now I would like to turn to the most important agenda of this Annual Meeting. As all of you know very well, a Study Group was formed in May 2005 to develop recommendations for one or more new integrative scientific programs to be undertaken by scientists in PICES member countries, as the CCCC Program will come to its completion in the near future. Since then, ideas and themes have been widely solicited from PICES communities, reviewed and assessed at a special meeting convened on October 4, 2006, during PICES XIV in Vladivostok, and presented at the PICES XIV Closing Session.

As reported in the July 2006 issue of *PICES Press* by Dr. Vera Alexander, PICES Chairman, and Dr. John E. Stein, Science Board Vice-Chairman, the Study Group has developed a preferred theme, and a working document is produced out of intense discussions at the joint 2006 inter-sessional Science Board/Governing Council Meeting under a tentative title "FUTURE", which stands for "*Forecasting and Understanding Trends, Uncertainty and Responses of the North Pacific Ecosystem*". It was agreed that the ultimate goal for the Program is "*To understand and forecast responses of North Pacific marine ecosystems to climate change and human activities at basin-wide and regional scales, and to broadly communicate this scientific information to governments, resource managers and the general public*".

Central Scientific Issues to be addressed by FUTURE include:

- marine ecosystem responses on seasonal, annual and decadal time scales;
- climate forcing of physical, biological and biogeochemical processes at scales relevant to PICES member countries;
- ecological interactions and linkages across ecosystems;

- the direct and indirect effects of human activities such as fishing, aquaculture, species invasion, and pollution;
- the cumulative impacts of multiple ecosystem stresses on biological diversity;
- forecasting in a policy environment through risk-based ecological assessments.

It is expected that all of you will participate in Committee meetings on Wednesday (October 18) afternoon to further review the preferred theme and specify the key research activities of FUTURE. At the Open Forum on Thursday (October 19) afternoon we will hear outcomes from Committee meetings on the highest priority research activities, what type of forecasts should we develop and what our focus should be to broaden the communication of PICES science.

Finally, I would like to announce that to facilitate the continuity of Science Board affairs, the Governing Council (at the 2006 inter-sessional meeting) established a Science Board Chairman-elect position to allow the election of the Science Board Chairman 1 year before the official change of the chairmanship. It is my honor to report to you that Dr. John Stein (U.S.A.) was elected as the next Science Board Chairman for 2007–2010. Dr. Stein has been the Vice-Chairman of the Science Board and the Chairman of the MEQ Committee. Please welcome Dr. Stein.

PICES XVI will be held from October 26–November 5, 2007, in Victoria, Canada. The theme of this Annual Meeting is "*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*". In 2008, we will meet in Dalian, China, for PICES XVII.

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 12

"Biological production, animal migration and ecosystem regime shifts in the Kuroshio and Oyashio Currents: Perspectives for sustainable use"

Abstract of the keynote lecture

by Dr. Akihiko Yatsu (Hokkaido National Fisheries Research Institute, Japan)

The poleward-flowing Kuroshio and the equatorward-flowing Oyashio are western boundary currents that transport heat, nutrients, and planktonic animals, including fish larvae from the subtropical/subarctic gyres, to the coastal areas of the Japanese archipelago. They converge east of Honshu Island to form an oceanographically complex Transition Zone that is an important area for the recruitment of some pelagic fishes of commercial interest. These species have developed life history traits and horizontal migration patterns by adapting to the seasonality of biological production and oceanography. Climatic and ecosystem regime shifts are key factors affecting the population dynamics of species in this region and need to be considered for the sustainable use of the region's ecosystem services, including fish harvests. Proper understanding of how ecosystem dynamics are linked to both climate and human activities is essential for wise management, which recognizes ecosystem factors and various uncertainties. The most plausible mechanisms for sardine/anchovy cycles in the Kuroshio/Oyashio system are discussed to highlight the importance of these interconnections. Perspectives for sustainable use of ecosystem services, including fishing, will be discussed more generally in relation to case studies involving: 1) reclamation effects on a coastal ecosystem, 2) mitigation efforts, 3) successful adaptive co-management in a coastal fish stock, and 4) failure of fisheries management due to an overcapitalization that resulted from a mismatch between investment to fishing fleets and ecosystem regime shifts.