

## REPORT OF OPENING SESSION



The Opening Session started at 09:00 hours on October 29, 2007. Dr. Tokio Wada, Chairman of PICES, welcomed delegates, observers and researchers to Victoria and formally declared that the PICES Sixteenth Annual Meeting was open. The session agenda is appended as *OP Endnote 1*.

### **Welcome address on behalf of the host country**

Mr. Paul Sprout (Regional Director-General, Fisheries and Oceans Canada) welcomed participants on behalf of the host country (*OP Endnote 2*).

### **Remarks by representatives of Contracting Parties and the Chairman of PICES**

Dr. Wada invited Dr. Yuji Uozumi (Counselor, Resources Enhancement Promotion Department, Fisheries Agency, Japan) to make a statement on behalf of the Japanese Government. Dr. Uozumi addressed the session and his remarks are appended to the report as *OP Endnote 3*.

Dr. Wada called upon Mr. Handi Guo (Division Director, Department of International Cooperation, Ministry of Agriculture, People's Republic of China) to speak on behalf of the Chinese Government. Mr. Guo addressed the session and his remarks are appended to the report as *OP Endnote 4*.

Dr. Wada then asked Mr. Kwang-Youl Park (Division Director, Marine Policy Bureau, Ministry of Maritime Affairs and Fisheries, Republic of Korea) to make a statement on behalf of the Korean Government. Dr. Park addressed the session and his remarks are appended to the report as *OP Endnote 5*.

Dr. Wada invited Dr. Lev Bocharov (Director-General, Pacific Scientific Research Fisheries

Center, State Committee for Fisheries, Russian Federation) to speak on behalf of the Russian Government. Dr. Bocharov addressed the session and his remarks are appended to the report as *OP Endnote 6*.

Dr. Wada requested Dr. Samuel Pooley (Director, Pacific Islands Fisheries Science Center, National Marine Fisheries Service, United States of America) to make a statement on behalf of the U.S. Government. Dr. Pooley addressed the session and his remarks are appended to the report as *OP Endnote 7*.

Dr. Wada called upon Dr. Laura Richards (Regional Director of Science, Pacific Region, Fisheries and Oceans Canada) to speak on behalf of the Canadian Government. Dr. Richards addressed the session and her remarks are appended to the report as *OP Endnote 8*.

Dr. Wada thanked Mr. Sprout and all the delegates for their remarks, and addressed the participants on behalf of PICES. His remarks are appended to the report as *OP Endnote 9*.

### **Wooster Award presentation ceremony**

Dr. Wada and Dr. Kuh Kim, PICES Science Board Chairman, conducted the 2007 Wooster Award presentation ceremony. First, Dr. Wada introduced the Wooster Award:

*In 2000, PICES established an award for scientists who have made significant contributions to North Pacific marine science, who have achieved sustained excellence in research, teaching, or administration, who have worked to integrate the various disciplines of the marine sciences, and preferably, all of these in association with PICES. The award was named in honour of Prof. Warren S. Wooster, the principal founder and the first Chairman of PICES, a world-renowned researcher of climate*

*variability and fisheries production, and an ambassador of international scientific co-operation.*

*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), Dr. Daniel Ware (2005) and Dr. Makoto Kashiwai (2006), and I would like to ask Dr. Kuh Kim, PICES Science Board Chairman, to announce the recipient of the Wooster Award for 2007.*

Dr. Kim quoted the following Science Board citation for the 2007 Wooster Award (reading of the citation was accompanied by a special slide show dedicated to Dr. Kenneth Denman):

*It gives me great pleasure to announce that the Wooster Award for 2007 is being given to Dr. Kenneth L. Denman, a world-renowned interdisciplinary ocean scientist.*

*Ken has authored more than 75 primary journal articles, book chapters or review papers on air-sea interaction, lower trophic-level biological production, and the role of the ocean in the global climate system. He was born and raised in the city of Calgary, Alberta. For those of you unfamiliar with Canadian geography, Calgary is located in the transition zone between the foothills of the Rocky Mountains and the vast Canadian prairie. Calgary is a long, long way from any ocean. As you will see in the accompanying photos, Ken never lost his affinity for mountains.*

*After completing a Bachelor of Science degree at the University of Calgary, Ken began graduate studies in physical oceanography at the Institute of Oceanography at the University of British Columbia, under the direction of Prof. Mike Miyake. The Institute was best known at that time for its advanced work on air-sea interaction, but the influence of Prof. Tim Parsons and others at the Institute stimulated what were, at the time, novel interdisciplinary collaborations. This was to have a significant effect on Ken's career.*

*With his shiny new Ph.D. in hand, Ken took a position as junior scientist at the Bedford Institute of Oceanography where he worked closely with Trevor Platt. They applied approaches used in meteorology and physical oceanography to the study of plankton. This was an important contribution to biological oceanography as the field was then dominated by descriptive science. The application of advanced analytical techniques to field data, satellite observations and numerical models is a hallmark of Ken's career.*

*In 1977, he returned to the Pacific coast as a research scientist in the Ocean Ecology Laboratory at the newly constructed Institute of Ocean Sciences (IOS). He continued to apply advanced techniques to practical problems in biological oceanography. In recognition of his skill, energy and leadership, Ken was promoted to senior positions in science and management in the Department, where Ken eventually discovered his deep dislike for matters of bureaucracy and administration, and returned to being a senior research scientist at IOS.*

*Having bridged the fields of physical and biological oceanography, Ken turned his attention to chemistry, to the ocean carbon cycle, and to its importance in the global climate system. He played a leading role in many aspects of both the international and Canadian JGOFS, GLOBEC and SOLAS programs. These interests ultimately led him to work on the Intergovernmental Panel on Climate Change (IPCC) as a convenor and Lead Author in the 1995 Assessment, and as Coordinating Lead Author for the Fourth Assessment Report that was completed last spring. He shares with his IPCC colleagues the reward of a Nobel Peace Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change."*

*Ken was very active in the earlier history of PICES. He was a Canadian member of the BIO Committee from its very first meetings until*

2000, a member of Working Group 6 on the Subarctic Gyre, and Working Group 7 on Modeling Ocean Circulation. He worked to integrate the JGOFS North Pacific Task Team into PICES activities. In addition to his personal contributions to science, he also mentored, encouraged and entrained younger scientists into PICES activities. Many of these individuals are in the room today – you know who you are!

*Ken has been an adjunct professor at both the University of Victoria and the University of British Columbia, and for the last several years, he has been spending most of his time working at the Canadian Centre for Climate Modelling and Analysis, a branch of Environment Canada located on the campus of the University of Victoria. There, he is engaged in an interdepartmental effort to develop a global atmosphere, land and ocean climate model, complete with an ocean carbon cycle.*

*Please join me in congratulating Dr. Kenneth Denman as the 2007 Wooster Award winner.*

Unfortunately, Prof. Wooster was unable to join this ceremony, but he kindly sent a message to Dr. Denman. Dr. Wada read the following tribute from Prof. Wooster:

*It is a privilege to endorse the selection of Ken Denman for the Wooster Award, not only for his many services to PICES but also for his cross-disciplinary scientific approach that epitomizes the aspirations of PICES from its inception. When I read his list of research interests and resulting publications, I see them all as significant contributions to the unifying question that has motivated the organization from the beginning – “What is the nature of the subarctic Pacific ecosystem and how is it affected over periods of months to centuries by changes in the physical environment, by interactions among components of the ecosystem, and by human activities?” In particular, he has brought his insight as a physicist to an assessment of the physical and biological mechanisms whereby these ecosystem changes are effected. It is through the efforts of Ken Denman and his colleagues, and the support of organizations*

*such as PICES, that we can hope one day to establish a more sustainable relationship with the North Pacific and its flora and fauna.*

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

*It is a great honour and privilege to be selected as the recipient of the 2007 Wooster Award. The citation is very flattering, and I would like to thank the people who nominated me for the award. I first went to Ocean Station Papa in May 1972, early in the 51 years of oceanographic sampling there, although at the time I thought that it was already a very long time series. Since then, except for five years when I worked at the Bedford Institute of Oceanography in Halifax on Canada’s Atlantic coast, I have worked towards understanding first the physics, then the planktonic ecology, and more recently the biogeochemistry of the subarctic Northeast Pacific Ocean. Two Canadian scientists from the Department of Fisheries and Oceans influenced my scientific path early on. First, Sus Tabata had published two fascinating papers on the time series measurements at Ocean Station Papa that guided my Ph.D. thesis research on the dynamics of the upper mixed layer of the ocean. Second, Tim Parsons, as I was finishing my thesis, encouraged me to look beyond physics and apply my expertise in physics to the planktonic ecosystem and related biogeochemical cycles. I followed his advice and as a result have had a wonderful and fascinating career studying the interactions between physical, biological and chemical processes in the North Pacific. So, I thank you all for this great honour, and I thank Warren Wooster for his vision and perseverance in getting PICES started.*

### **PICES “Year-in-Review” 2007**

Dr. Kuh Kim reviewed PICES’ scientific accomplishments since the Fifteenth Annual Meeting (OP Endnote 10).

**Keynote lecture**

The 2007 keynote lecture entitled “*The North Pacific, human activity, and climate change*” was given by Dr. Kenneth Denman (Department of Fisheries and Oceans, and Canadian Centre for Climate Modelling and Analysis) as a part of

the Science Board Symposium on “*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*”. The abstract of his presentation is appended to the report as *OP Endnote 11*.

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

**OP Endnote 1**

**Opening Session agenda**

1. Opening by Dr. Tokio Wada, Chairman of PICES
2. Welcome address on behalf of the host country by Mr. Paul Sprout, Regional Director-General, Fisheries and Oceans Canada
3. Remarks by representatives of Contracting Parties
  - Dr. Yuji Uozumi (Counselor, Resources Enhancement Promotion Department, Fisheries Agency, Japan)
  - Mr. Handi Guo (Division Director, Department of International Cooperation, Ministry of Agriculture, People’s Republic of China)
  - Mr. Kwang-Youl Park (Division Director, Marine Policy Bureau, Ministry of Maritime Affairs and Fisheries, Republic of Korea)
  - Dr. Lev N. Bocharov (Director-General, Pacific Scientific Research Fisheries Center, State Committee for Fisheries, Russian Federation)
  - Dr. Samuel Pooley (Director, Pacific Islands Fisheries Science Center, National Marine Fisheries Service, United States of America)
  - Dr. Laura Richards (Regional Director of Science, Pacific Region, Fisheries and Oceans Canada)
4. Remarks by Dr. Tokio Wada, Chairman of PICES
5. 2007 Wooster Award presentation ceremony
6. PICES “Year-in-Review” 2007 by the Chairman of Science Board, Dr. Kuh Kim
7. Closing Remarks/Announcements

**OP Endnote 2**

**Welcome address on behalf of the host country by Mr. Paul Sprout**

Mr. Chairman, delegates, ladies and gentlemen: Good morning. On behalf of the Government of Canada, and my department, Fisheries and Oceans Canada, it is my great pleasure to welcome you to Victoria and to the PICES Sixteenth Annual Meeting. This is a very special event for us because it marks the beginning of a year-long celebration of a century of marine science in Canada. The Pacific Biological Station in Nanaimo, a two-hour drive north of here, and the St. Andrews Biological Station on the east coast of Canada, were both established in 1908. We have planned a number of events over the next 12 months to celebrate what has been a remarkable 100 years of innovation and excellence in marine science.

The theme of this year’s PICES meeting – “*The changing North Pacific: Previous patterns, future projections, and ecosystem impacts*” – speaks to the value of the work that has been done in the past century, and the need to continue this work in the future. This theme has real meaning for my department. As the Regional Director-General of Fisheries and Oceans Canada in the Pacific Region, I know that the changes occurring in the North Pacific impact on our work on a day-to-day basis. Changes in marine conditions and in the marine survival of fish stocks directly influence the decisions I and others make on managing fisheries and fish habitat.

In British Columbia, salmon is a cultural icon of immense importance, particularly to our First Nations and coastal communities. We have major commercial and recreational fisheries for salmon, in addition to food, social and ceremonial First Nation fisheries, and salmon aquaculture. However, since the mid-1990s, we have witnessed lower ocean productivity, lower ocean survival rates for salmon, and consequently, reduced salmon returns. This has led to economic upheaval in the commercial fisheries and a major restructuring of our commercial salmon fleet. The 2007 salmon season offers a good illustration. One of our most important salmon rivers is the Fraser River near Vancouver. Each year, based on the size of the spawning population four years earlier and on-average ocean survival, Fisheries and Oceans Canada develops pre-season estimates of the likely returns of the four main run timings of sockeye. These estimates help to develop fishing plans for the upcoming season. In 2007, however, the in-season test fisheries made it clear that the actual number of sockeye returning to the Fraser River would be less than 25% of our pre-season estimate. As a consequence, First Nations' food, social and ceremonial fisheries were curtailed, and the commercial fishery was closed for only the second time in its history. The previous closure of the commercial fishery occurred just two years ago, in 2005.

Although we do not understand the mechanism, we do know that the poor return of sockeye in 2007 was associated with three unusually warm years in the eastern North Pacific between 2002 and 2005. Sockeye salmon in the Fraser River are near the southern end of their range. Given the projections for warming over this century, we can likely anticipate more fishery restrictions in the years ahead, as well as conservation

concerns. This will probably occur either because of poor survival in the Pacific Ocean or because of higher in-river mortalities related to high water temperatures and low water flows as the adult fish return to spawn. We need to learn more about climate change and the potential impacts on fish and fisheries to help us prepare for an uncertain future.

I understand that you will have more discussions on the new science program for PICES during this meeting. That program – “FUTURE” – “Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems,” has obvious links to the problem of salmon survival that I just described. The vision of FUTURE: “to *understand* and *forecast* responses of North Pacific marine ecosystems to climate change and human activities” and “to broadly *communicate* this scientific information” resonates strongly with the strategic interests of my department. I look forward to hearing about the results of your discussions.

Understanding the changes occurring in our oceans will help us to better respond to them. It is my hope that this understanding and the knowledge being generated through the work of organizations such as yours, as well as by the science program of Fisheries and Oceans Canada, will help us to find actions for the challenges facing Fraser River sockeye, and answers for the people who treasure this wonderful resource.

To conclude, I would like to wish you a pleasant stay in the beautiful city of Victoria. I trust that your discussions are productive and I hope that you return home excited and eager to take on the many scientific challenges ahead.

### OP Endnote 3

#### Remarks at the Opening Session by Dr. Yuji Uozumi (Japan)

Mr. Chairman, distinguished delegates, ladies and gentlemen: First of all, on behalf of Japan and the Japanese delegation, I would like to express sincere thanks to the Government of Canada, and the local organizing committee for

kindly hosting the Sixteenth Annual Meeting of PICES here in Victoria. I also thank the PICES Secretariat for preparing for the meeting. We are sure that all your excellent efforts will make this meeting fruitful.

This year's Nobel Peace Prize has been awarded to the Intergovernmental Panel on Climate Change. This is a very symbolic topic for environmental issues, which are also very symbolic to the North Pacific Ocean. We know that many changes in the marine environment and marine ecosystems of the North Pacific are induced by changes in climate. We also know already that PICES plays a very important role in studying these environmental changes and their effects on marine ecosystems, and in making future projections. Therefore, PICES is now planning a new science program, FUTURE, which is being built as a successor to the CCCC Program, and is expected to be beneficial for understanding the effects of climate change on the ocean environment and for forecasting the responses of the North Pacific marine ecosystem to these changes. The scientific findings of the various PICES scientific programs will present valuable answers to the questions about what managers should do in light of these changes.

Related to these climate changes, harmful aquatic organisms such as red tide algae, giant jellyfish, and invasive species have caused various damages to fishing activities and have disturbed the marine ecosystems. These issues are particularly serious for developing countries. PICES created a Section to focus on *Ecology of Harmful Algal Blooms in the North Pacific* and recently established a Working Group on *Non-indigenous Aquatic Species*. Japan decided to provide a voluntary financial contribution to PICES to support the activities of these expert groups. Japan is interested in seeing that these activities contribute to the establishment of a network around the Pacific Rim, and capacity building in the developing countries.

Finally, I really wish that activities of the PICES scientific community can foster closer international cooperation to carry out our important tasks more productively. I also wish that every participant can have productive days here in Victoria. Thank you very much.

#### OP Endnote 4

##### Remarks at the Opening Session by Mr. Handi Guo (People's Republic of China)

Honourable Chairman of PICES, Dr. Tokio Wada, distinguished delegates, ladies and gentlemen: First, on behalf of the Chinese delegation, I would like to extend our congratulations to the opening of the PICES Sixteenth Annual Meeting, and to express our gratitude to the Canadian Government and the PICES Secretariat for making excellent preparations for the meeting.

It has been 16 years since PICES was established, and it has made a significant contribution to marine scientific research in the North Pacific. During these 16 years, the marine environment has gone through changes. We are now faced with the challenge of climate change, which is causing harm to marine ecosystems and to marine biological resources. Therefore, I am delighted to see that PICES, an organization dedicated to marine science, has already drafted

a Science Plan for its next future integrative scientific program, which will focus on research of climate change and marine ecosystems. This program will be reviewed by the Governing Council at this Annual Meeting. We hold that it is consistent with the Chinese Government's principles and position concerning the issue of climate change to carry out research on the impact of climate change on marine ecosystems and related international cooperation under the framework of PICES. I do hope that, apart from protecting the marine ecosystem, the research on the North Pacific marine ecosystem can also promote the sustainable development of fisheries.

Finally, I wish for complete success of the PICES Sixteenth Annual Meeting, and hope to meet all of you again in Dalian, China, next year. Thank you.

**OP Endnote 5****Remarks at the Opening Session by Mr. Kwang-Youl Park (Republic of Korea)**

Dear Dr. Tokio Wada, Chairman of PICES, distinguished delegates, ladies and gentlemen: On behalf of the Republic of Korea and the Korean delegation, I would like to express my sincere gratitude for the invitation to the Sixteenth Annual Meeting of PICES. Also, my special thanks go to the Government of Canada and to the PICES Secretariat for their efforts to prepare for this meeting.

As the UN IPCC reports seriously warned, the challenges facing the ocean and coast, such as the changing of sea water temperature and rising of sea levels, are brought up as critical issues. Considering that the North Pacific region is densely populated and has significant economic activities, we should pay more attention to this region. In this regard, the theme for this Annual Meeting, *“The challenging North Pacific: Previous patterns, future projections and ecosystem impacts”* is, I think, very timely and appropriate.

The Korean Government is willing to fully support PICES and to cooperate with member countries to deal with the relevant issues of this theme. Within this context, I am very happy to inform you that the Korean Government will

host the Eighteenth Annual Meeting of PICES in 2009, in Busan, the biggest port city and hub of ocean science and technology of Korea.

Also, I would like to take this opportunity to introduce the Korean Government’s effort to be the host of the World EXPO in the year of 2012, in the beautiful coastal city of Yeosu. *“The Living Ocean and Coast”* was chosen by the Korean Government as the main theme of the EXPO. This theme is exactly in line with the spirit of PICES and the topics we are going to discuss in this Annual Meeting. If Yeosu is confirmed as the host city in Paris next month, the Korean Government will propose to hold a global ocean conference next year in partnership with PICES and IOC. I hope all of you will take part in this event and share your experiences and expertise. I think that we will be able to find solutions for imminent ocean issues and present new visions for the common prosperity of humankind. I would like to ask for your interest and support in such events.

And finally, I wish all of you great success and rewarding results from the Sixteenth Annual Meeting in this beautiful island city of Victoria. Thank you.

**OP Endnote 6****Remarks at the Opening Session by Dr. Lev N. Bocharov (Russian Federation)**

Dear Mr. Chairman, distinguished delegates of PICES member countries, dear participants, ladies and gentlemen: First of all, I would like to thank our Canadian colleagues for the invitation to the capital of beautiful British Columbia which has been chosen as a place for this year’s PICES Annual Meeting. On behalf of the Russian delegation I would like to thank sincerely Fisheries and Oceans Canada, and the PICES Secretariat for the excellent work done during the preparation of this meeting.

In the past 16 years since the origin of our Organization, the scale of PICES activities has strongly expanded, with significant work being

carried out between Annual Meetings. Relationships within the PICES community became stronger and cooperation with other international organizations and programs is developing successfully. First among these is the North Pacific Anadromous Fish Commission (NPAFC) which recently held its Fifteenth Annual Meeting in Vladivostok as a guest of the Russian Government and TINRO-Centre, which I head. I served as a PICES representative at the NPAFC meeting and noted that activities of our Organization were highly appreciated.

Participation at PICES XVI by observers from many organizations with an interest in the study

and use of the World Ocean is a confirmation of constantly growing interest in PICES around the world. Moreover, Russia is glad to see that the number of countries participating in PICES activities is going to increase.

Once again I would like to stress that the Russian Federation is constantly paying much attention to the study of the World Ocean, and PICES' growing activities receive our regular support and are highly appreciated in Russia.

Undoubtedly, in the first half of the current century, great changes will occur in ocean science in general, and in fishery science in particular. An ecosystem approach to the study of the ocean will be widely used in the

utilization of numerous marine resources and in the development of mariculture in all countries. PICES, as a progressive scientific system, is ready to take a lead in this process. The scientific community of PICES member countries has done, without excessive modesty, an excellent job during preparations for FUTURE, the new integrative science program of PICES. The draft Science Plan for FUTURE will be refined and filled with new ideas at this Annual Meeting, and I am quite positive about that!

In conclusion, I would like to wish all of the participants of the PICES Sixteenth Annual Meeting a successful and productive time for work. Thank you for your attention.

#### OP Endnote 7

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

Good morning, distinguished delegates and fellow scientists. The United States is very pleased to be participating in this Sixteenth Annual Meeting of PICES hosted by our neighbor to the north in this beautiful island location, Victoria.

PICES continues to be a vibrant and important forum for collaboration on matters of scientific, as well as conservation and management, importance to the countries of the North Pacific. The United States is particularly pleased with the success of this year's Conference for Early Career Scientists focusing on "*New frontiers in marine science*" held in Baltimore, Maryland, jointly with ICES. This conference was important for two reasons: first, because it provided an excellent opportunity for early career scientists to meet and exchange ideas, and second, because it marked on-going collaboration between ICES and PICES. Both are important for the growth and development of PICES and marine science in the North Pacific.

The United States is also very pleased with the on-going success of the PICES Intern Program that has brought young scientists here to Victoria to work with the PICES Secretariat. We look

forward to continued success for this program, and the United States pledges to continue supporting the PICES Intern Program to the extent possible.

Finally, this is a very important meeting for PICES as we consider the future of the Organization in terms of its integrative science program. The Study Group on *Future Integrative Scientific Program(s)* has worked very hard to develop this important program, and we look forward to substantive discussion on the program at this meeting. Without pre-judging any of these conversations, we look forward to increased attention to the impact of climate and understanding it in more systematic ways in terms of the impacts of multiple stressors on North Pacific Ocean ecosystems, such as increased heat content and ocean acidification. This is also consistent with NOAA's increasing emphasis on integrated ecosystem assessments for large marine ecosystems.

With that, we thank the Government of Canada and the Secretariat of PICES for your preparations for what we are sure will be a very productive meeting. Thank you.



**OP Endnote 8****Remarks at the Opening Session by Dr. Laura Richards (Canada)**

Mr. Chairman, distinguished guests and colleagues: On behalf of Canada and the Canadian delegation, I would like to echo the warm welcome to you that was expressed by Mr. Sprout a few minutes ago. It is our pleasure to welcome you to Victoria and to the home city of the PICES Secretariat.

As Mr. Sprout already mentioned, this event is particularly special for Fisheries and Oceans Canada, since it marks the beginning of a year-long celebration to recognize 100 years of science at St. Andrews Biological Station on Canada's east coast and the Pacific Biological Station at Nanaimo, on Canada's west coast, a two-hour drive north of Victoria. In 2008, as part of this celebration, Canada is also hosting the Annual Meeting of the American Fisheries Society in Ottawa and the ICES Annual Science Conference in Halifax.

But to return to PICES, I would like to acknowledge another busy and successful year. I am particularly pleased to see the progress we have made in moving forward with FUTURE, our next major science program, and I look forward to concluding our discussions this week.

FUTURE gives us the opportunity to shape a new direction for PICES and to ensure that the work we do together aligns with priority needs within our own countries. The issues around forecasting and uncertainty are ones that we all face. By working together, with our different views and experiences, we can solve our problems more effectively. The diversity of ecosystems around the North Pacific gives us a wonderful laboratory in which we can learn by comparing our successes and failures.

In closing, I would like to express my sincere thanks to those staff members from Fisheries and Oceans Canada who worked hard along side the staff of the PICES Secretariat to put this meeting together. Canada is proud to host the Secretariat in our facilities at the Institute of Ocean Sciences, and we recognize many benefits of a close working relationship. When the Annual Meeting is near the Secretariat's home in Canada, the Secretariat staff organize and coordinate more of the activities than when the meeting is hosted in another PICES country. We acknowledge and appreciate their support.

Again, welcome to Victoria. Thank you.

**OP Endnote 9****Welcome address by Dr. Tokio Wada, Chairman of PICES**

Mr. Paul Sprout, distinguished delegates, guests, ladies and gentlemen of the PICES family, welcome again to the Sixteenth Annual Meeting of our Organization. It gives me great pleasure to greet you. First of all, on behalf of all the PICES members, I would like to express our hearty thanks to our hosts for their hospitality and hard work to organize this Annual Meeting.

As Mr. Paul Sprout and Dr. Richards mentioned in their remarks, the year of 2008 is a memorable year for marine science in Canada. One hundred years ago, in 1908, the Pacific Biological Station (PBS) was established in Nanaimo. Since its establishment, PBS has contributed greatly to the knowledge of fisheries oceanography of the

North Pacific, and has been a good and strong partner of PICES. On behalf of PICES, I would like to say "*Please accept our congratulations on your upcoming centennial anniversary.*" I wish you continuous scientific success and good luck for the next centennial.

PICES has conducted various scientific activities from its inception, and now PICES has become a renowned marine science organization in the world. The PICES-GLOBEC CCCC (Climate Change and Carrying Capacity) Program was the first integrated and very successful science program of the Organization. The Program has contributed greatly to clarify the ecosystem response to climate variability in the North

Pacific, and has also showed us that scientists from different countries and disciplines can work together toward a common objective.

There are growing expectations from PICES Contracting Parties to bring back our scientific achievements to support their policy making. The impact of global warming on marine environments and living resources is not only a scientific issue, but also a serious problem for the safety and comfort of human life. In addition, conservation of bio-diversity and genetic diversity of ecosystems and populations are quite urgent issues for the sustainable use of marine living resources under largely fluctuating environments. In order to cope with these issues and to return the scientific results to human society, it is expected that PICES should enhance a close and strategic relationship among the Contracting Parties, and broadly cooperate with other countries and organizations that have common interests with us beyond oceans and borders.

During this Annual Meeting, we will discuss a successor to the CCCC Program called FUTURE, Forecasting and Understanding of Trends, Uncertainty and Responses of North Pacific Marine Ecosystems. Based on the results from the CCCC Program, FUTURE aims to achieve an in-depth understanding of ecosystem dynamics of the North Pacific under the present and future ocean climate variability. FUTURE will also focus on various human

dimensions of ecosystem dynamics and will consider how to communicate the scientific results to policy makers of the Contracting Parties.

To stimulate our present activities, and to take a more important role in marine science in the world, we will also discuss frameworks needed to establish closer and more comprehensive relationships with various bodies outside of PICES. I hope that through the intensive discussions at this Annual Meeting, a new direction of PICES will be oriented toward building a bridge between marine science and human society in the North Pacific.

I was elected as the Chairman of PICES at the last Annual Meeting in Yokohama. This is my first opportunity to serve in this highly responsible position. I fully understand that my knowledge and experience are not enough to fulfill these responsibilities. However, I would like to do my best to inherit the dreams and passions of PICES' ancestors for international scientific cooperation in the North Pacific, and to pass these on to the next generation. I would like to ask all of you for your cooperation.

PICES is now not only expected to analyze scientific questions, but also expected to know how to cope with various problems in the North Pacific. And we can do it. I believe that this Annual Meeting will be the dawn of a new era of PICES. Thank you very much for your attention.

## OP Endnote 10

### PICES "Year-in-Review" 2007 by Dr. Kuh Kim, Chairman of Science Board

This year has been most remarkable and, indeed, a milestone was reached in the publication of a special issue of *Ecological Modelling* on NEMURO, which stands for "North Pacific Ecosystem Model for Understanding Regional Oceanography", and NEMURO.FISH which is "NEMURO For Including Saury and Herring". This was the culmination of international teamwork and energy over a period of 7 years and 10 international workshops. Drs. Michio Kishi, Bernard Megrey, Shin-ichi Ito and Francisco Werner edited this special issue which

contains 17 papers. This publication might be the best example to demonstrate why PICES exists and what PICES can do.

The editors and contributors dedicated this special issue to Dr. Daniel Ware, who was their colleague, mentor and friend. Dan was the first Chairman of the PICES Science Board who helped guide the establishment of PICES' first science program on Climate Change and Carrying Capacity and later became a key member of its MODEL Task Team within this

program. The Wooster Award was awarded to Dan in 2005.

I must add that Dr. Kishi recently received two prestigious awards, in part, for his contribution to the development of NEMURO and NEMURO.FISH: the Uda Prize from the Japan Society of Fisheries Oceanography in April 2006, and the Prize of the Oceanographic Society of Japan, the highest prize in oceanography in Japan, in March of this year.

Currently in press are two more major publications: selected papers from the 2006 Symposium to mark the 50<sup>th</sup> anniversary of Line-P will be published in November 2007 in *Progress in Oceanography* (Vol. 75, No. 2) as a special issue titled “*Time series of the Northeast Pacific Ocean*” (Guest editors: Angelica Peña, Steven Bograd and Alexander Bychkov), and a set of papers presented at the 2005 GLOBEC/ESSAS Symposium on “*Climate variability on sub-Arctic marine ecosystems*” will appear in December 2007 as a special issue of *Deep-Sea Research II* (Guest editors: George Hunt, Kenneth Drinkwater, Skip McKinnell and David Mackas). I would like to express our thanks to the guest editors of all these special issues for their outstanding efforts to make these publications possible in time.

PICES continues to produce scientific reports. *PICES Scientific Report No. 33* is the proceedings of the 2006 PICES/NPRB workshop on “*Integration of ecological indicators of the North Pacific with emphasis on the Bering Sea*”.

PICES also introduced its new electronic Technical Report Series this year. Technical Report No. 1 (*Metadata Federation of PICES Member Countries*) describes the history of the PICES Metadata Federation Project that PICES initiated with the objectives of creating standardized metadata descriptions of national, institutional and agency databases, and serving those descriptions in a World-Wide-Web-based, one-stop environment with search and delivery capabilities. This is a living document and the goal is to keep it current.

The much anticipated “*Guide to Best Practices for Ocean CO<sub>2</sub> Measurements*” is being published as *PICES Special Publication No. 3*, and is edited by Andrew Dickson, Christopher Sabine and James Christian. This Guide will allow scientists from different countries to use the same standardized methods for their surveys and will allow a Pacific-wide synthesis of ocean CO<sub>2</sub> based on national surveys.

An American Fisheries Society book on “*The ecology of juvenile salmon in the Northeast Pacific Ocean: Regional Comparisons*”, edited by Churchill Grimes, Richard Brodeur, Lewis Haldorson and Skip McKinnell, will also be out soon.

Next year, we expect to see several special issues of primary journals. For example, selected papers from the PICES XV Topic Session on “*The human dimensions of jellyfish blooms*” will be published in *Plankton and Benthos Research*; papers from the SEEDS-II experiment will appear in *Deep-Sea Research II*; a set of papers from the 2006 PICES/GLOBEC Symposium on “*Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis*” will be published in *Progress in Oceanography*; and selected papers from the CREAMS/PICES Workshop on “*Model-data inter-comparison for the Japan/East Sea*” in the *Journal of Marine Systems*.

As well, selected papers from three major conferences co-sponsored by PICES in 2007 (the 4<sup>th</sup> International Zooplankton Production Symposium on “*Human and climate forcing of zooplankton populations*”, the 5<sup>th</sup> International Conference on “*Marine bioinvasions*” and the ICES/PICES Early Career Scientists Conference on “*New frontiers in marine science*”) will be published either as a special issue or as part of a regular series of *ICES Journal of Marine Science*.

Finally, selected papers from the recently completed NAFO/PICES/ICES Symposium on “*Reproductive and recruitment processes of exploited marine fish stocks*” are scheduled for publication in the *Journal of Northwest Atlantic Fishery Science* in 2009.

Since the last Annual Meeting in Yokohama, PICES has had a very busy year. A total of 14 meetings were co-sponsored by PICES and convened around the world. Not only was it a busy year, but also an unusual one because PICES was involved in co-sponsoring 3 major inter-sessional meetings.

In May 2007, PICES and ICES worked with the U.S. National Sea Grant College Program and MIT Sea Grant College Program to organize the 5<sup>th</sup> International Conference on “*Marine bioinvasions*” in Cambridge, U.S.A. Immediately following this conference, the first ever meeting between PICES WG on *Non-indigenous Aquatic Species* and ICES Working Group on *Introductions and Transfers of Marine Organisms* and ICES/IOC/IMO WG on *Ballast and Other Ship Vectors* was held.

Later in the same month, the 4<sup>th</sup> International Zooplankton Production Symposium on “*Human and climate forcing of zooplankton populations*”, co-sponsored by PICES, ICES and GLOBEC, was convened in Hiroshima, Japan, after long and meticulous planning. This was the first time this symposium had been held outside of Europe, and its location allowed for greater participation by Pacific Rim countries. Three hundred and thirty-four participants from 46 countries attended this symposium, and presented 141 papers and 250 posters. The scale of this meeting was as big as PICES Annual Meetings, and the four conveners of this symposium deserve congratulations for its resounding success.

In June 2007, an ICES/PICES Conference for Early Career Scientists on “*New frontiers in marine science*” was held near Baltimore, U.S.A. This conference was different from any of our past conferences. The idea for this meeting was conceived four years ago in preparation for the next generation of PICES scientists. It was unique in the sense that it was designed to encourage early career scientists to share knowledge and to help build networks across disciplines and international borders that will undoubtedly last for decades. Nearly 100 early career scientists from 20 nations attended this conference which featured six theme

sessions, each with a keynote speaker, for a total of 65 oral and 33 poster presentations. The conference was a resounding success, accomplishing its goals and more. Let us congratulate the success of this conference and express our thanks for organizing this event to the Scientific Steering Committee members, Franz Mueter, Sukyung Kang, Julie Keister, Elizabeth North, Angel Lopez-Urrutia, Jens Floeter, and to the Coordinators of this conference, Skip McKinnell from PICES and Adi Kellermann from ICES.

PICES was also active in co-sponsoring a number of workshops. In June 2007, the Second Annual Meeting of the GLOBEC regional program on Ecosystem Studies of Sub-Arctic Seas (ESSAS) was held in Hakodate, Japan. At this meeting PICES co-sponsored two workshops, on the “*Evaluation of climate scenarios for sub-arctic regions*” and on “*The role of seasonal sea ice cover in marine ecosystems*”.

As a capacity building activity, PICES co-sponsored a 3-day training workshop, held in April 2007, in La Paz, Mexico, on “*Techniques for building multi-trophic level marine ecosystem models with special emphasis on NEMURO and NEMURO.FISH*”, for Ph.D.-level Mexican scientists.

A workshop on “*Linking climate-forcing mechanisms to indicators of species ecosystem-level changes*” was convened by the PICES Climate Forcing and Marine Ecosystem Response Task Team (CFAME), in May 2007, in Seattle on the U.S. west coast. The goal of this workshop was to finalize the working hypotheses of mechanisms linking climate to key species and ecosystem processes in three major marine ecosystems in PICES regions. A PICES/NPRB workshop on “*Forecasting climate impacts on future production of commercially exploited fish and shellfish*” was held at the same location in July 2007.

PICES and ICES have very close ties in many activities. At the 2007 ICES Annual Science Conference held last month in Helsinki, three joint Theme Sessions were convened: on

*“Integrating observations and models to improve predictions of ecosystem response to physical variability”*, on *“Comparative marine ecosystem structure and function: Descriptors and characteristics”* and on *“The ecosystem approach: What’s the impact on marine science, science based advice and management of marine ecosystems?”*. During our Annual Meeting here in Victoria, two joint Topic Sessions will be held, on *“Fisheries interactions and local ecology”* and on *“Operational forecasts of oceans and ecosystems”*.

Several international symposia of interest to PICES are awaiting your participation. In December of this year the First CLITOP Symposium on *“Climate impacts on oceanic top predators”* co-sponsored by PICES and other organizations will be held in La Paz, Mexico. In May 2008, an International Symposium on *“Effects of climate change on the world’s oceans”* will be held in Spain, co-sponsored by ICES, PICES and IOC, with support from other organizations. This meeting will be followed by an International Symposium on *“Coping with global change in marine social-ecological systems”* held in Rome in July 2008. In August 2008, an International Symposium on *“Herring: Linking biology, ecology and status of populations in the context of changing environments”* will be held in Galway, Ireland, co-sponsored by ICES, PICES and GLOBEC.

Since the last Annual Meeting, there has been major progress in the development of the next PICES integrative Science Program “FUTURE” which stands for Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems”. At a workshop held in Yokohama last April, consensus was reached on a set of key questions to guide the overall outline for the Science Plan, and a draft of the Science Plan has been placed on the PICES website for your comments. Committee meetings on Wednesday, October 31, will be an opportunity to express your views on the Plan. Through an Open Forum on FUTURE on Thursday afternoon, November 1, followed by the workshop of the Study Group on *Future Integrative Science Program* on November 3, the Science Plan will

be refined for review by external experts this winter. We expect that the final Science Plan will be adopted in time for an Implementation Plan workshop to be held in the spring of 2008.

The overarching question which will guide FUTURE activities for the next decade is, *“Given current and expected pressures, what is the future of the North Pacific?”* There are three themes to be addressed:

1. How does ecosystem structure and function determine an ecosystem’s response to natural and anthropogenic forcing?
2. How do physical and chemical processes respond to natural and anthropogenic forcing and how are ecosystems likely to respond to these changes in abiotic processes?
3. How do human activities impact coastal marine ecosystems and their interactions with offshore and terrestrial systems?

FUTURE will be launched at PICES XVII which will be held next year in Dalian, China, under the theme of *“Beyond observations to achieving understanding and forecasting in a changing North Pacific: Forward to the FUTURE”*.

At this meeting there will a noteworthy event. Governing Council and Science Board agreed to establish a new award, called the PICES Ocean Monitoring Service Award. This award is to recognize organizations, groups and outstanding individuals that have contributed significantly to the advancement of marine science in the North Pacific through long-term monitoring and/or data management in the North Pacific. Nominations for this award may be made by individuals or groups from PICES member countries. A description of this award will soon be made available on the PICES website.

Now I would like to close the 2007 report with my personal note. What is PICES? When I first attended a PICES Annual Meeting about 10 years ago, I did not know what PICES stood for. I thought it should be NPMSO (North Pacific Marine Science Organization). After serving three years as the Science Board Chairman, I have learned that P means *Partnership*, I is for

*Interdisciplinary*, **C** means *Collaboration*, **E** is for *Exploration*, and **S** is, of course, for *Science*. At the same time **S** in PICES means, I believe, *Service*. PICES should serve the people around

the North Pacific Ocean and PICES should also serve the North Pacific itself for the generations to come. Thank you.

**OP Endnote 11**

***“The North Pacific, human activity, and climate change”***

**Abstract of the keynote lecture by Dr. Kenneth Denman**

**(Department of Fisheries and Oceans, Canadian Centre for Climate Modelling and Analysis)**

Humans are profoundly altering the oceans – by changing the climate through the burning of fossil fuels, by overfishing, and by physical and chemical alteration of the coastal zone. Human-induced warming of the oceans can be detected to depths of thousands of meters. The rate of sea level rise, due to the warming expansion of seawater and freshwater input from glacial and snow melt, has accelerated over the last two decades. Nearly half the CO<sub>2</sub> that has been emitted into the atmosphere through human activities, primarily fossil fuel and biomass burning, now resides in the oceans. This “anthropogenic” CO<sub>2</sub> can be detected to the bottom of the ocean, and has already made it more acidic, further reducing the ocean’s ability to accept more CO<sub>2</sub> from the atmosphere. In Canada, in 2006 we marked 50 years of sampling along Line P and at Ocean Station Papa, and this year marks 100 years of sampling fisheries ecosystems by the Pacific Biological Station. From these and sustained sampling programmes by other PICES member nations, we have determined that the subarctic North Pacific represents the state of future global oceans. It is more stratified. Subsurface dissolved oxygen is decreasing. And the depth below which calcareous organisms are subjected

to dissolution is already only a few hundred metres in some areas. By 2100, this increasing acidity in the North Pacific risks the dissolution and disappearance of calcareous organisms such as coccolithophorids, pteropods and the cold water corals found in some British Columbia fjords. More frequent harmful algal blooms seem to occur in some coastal regions, and ‘dead zones’ with anoxic conditions that kill large numbers of benthic invertebrates may be more frequent in others. To what extent are these findings caused by human activities and climate change? From coupled carbon–climate models we can forecast future CO<sub>2</sub>-related changes in the North Pacific seawater for different scenarios of human development, but we cannot yet predict how the community structure of marine planktonic foodwebs will change, and what the possible feedbacks will be, both to ocean biogeochemical cycles and to higher trophic levels including living marine resources. We need to develop such ‘end-to-end’ foodweb and biogeochemistry models and embed them in comprehensive climate models. This modelling requires sustained sampling and focused scientific studies in both the coastal and open ocean. PICES collaboration is essential to address this challenge.